

THE BATTLE FOR THE DESKTOP

THWARTING THE HACKERS
NCC PRODUCT PREVIEW



A

Model 6470 Cartridge Recorder — the latest distinguished member of a

PIONEER FAMILY

Kennedy didn't just pioneer the 1/4" cartridge field — it started it, with the first practical recorder using the new 1/4" 3M cartridge.

Model 6470 continues the tradition with the usual package of new features, such as:

- High Capacity — Model 6470 can store up to 54 MBYTES of formatted data on one cartridge.
- Start/Stop with data streamings at 37.5 ips.
- Full Command Repertoire, utilizing either the Pico Bus or Pertec interface.

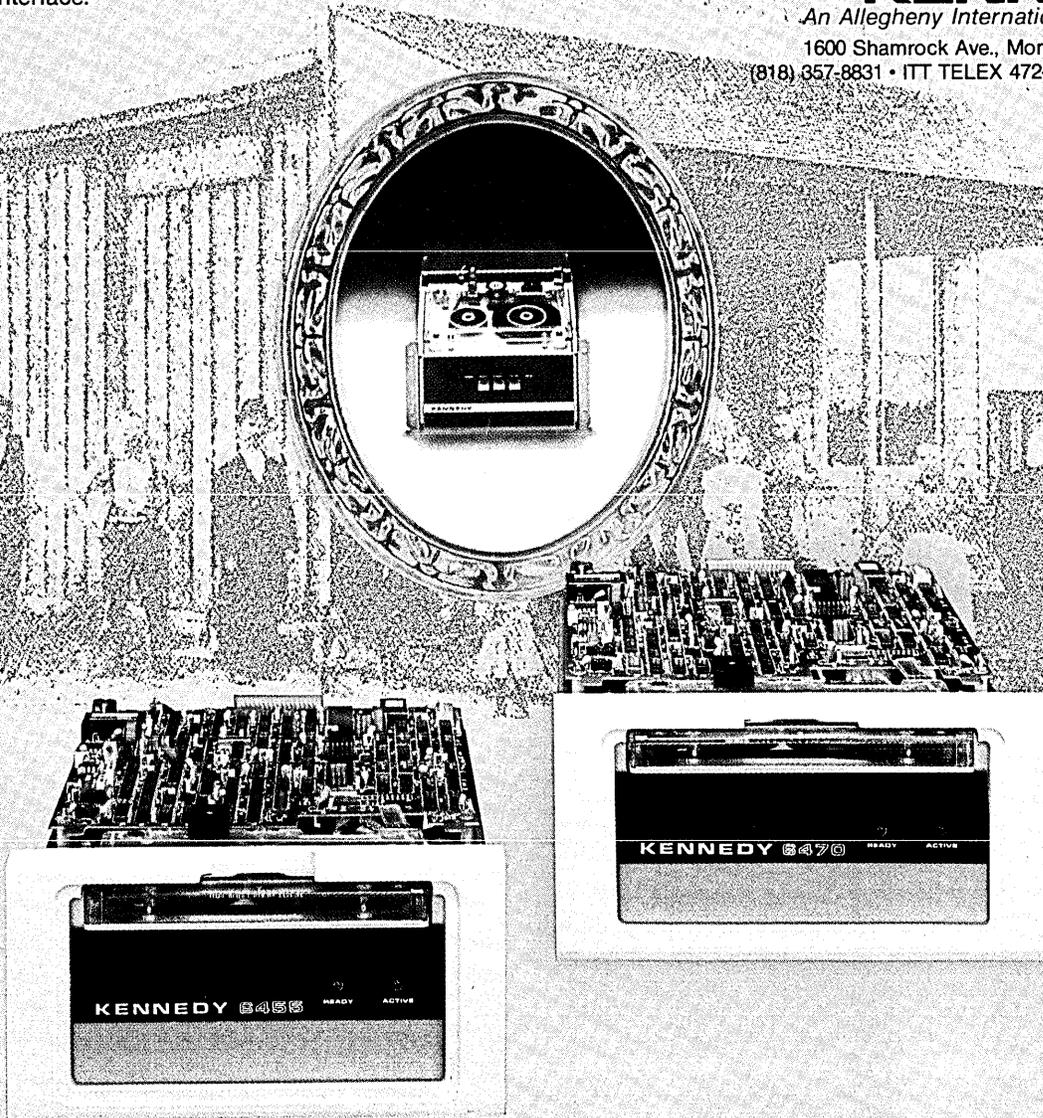
- Automatic Read Thresholds — during read retry three different thresholds are automatically selected, a feature usually found only on large 9 track tape transports.
- Backward Compatibility — Model 6470 will read tapes written by Model 6455.

These are, but a few of Model 6470's many features. Write or give us a call today for the complete story of the newest member of this oldest family.

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CIRCLE 1 ON READER CARD

Don't waste your money on modems for local networking.

Whether you're connecting your terminal or personal computer directly to a nearby mini-computer or to a data/FAX-based local network, you probably don't need a modem at all.

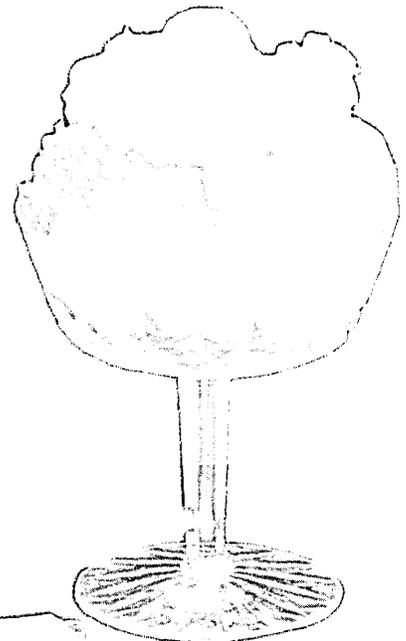
MICOM's inexpensive Micro400 line drivers and local datasets can substitute for regular modems over distances of several miles and at full-duplex data rates up to 19,200 bps. Then, because they're asynchronous devices, they can allow you to operate at any speed within their total range

(rather than limiting you to one or two data rates as a synchronous device would). And—even better—they're priced at a tiny fraction of the cost of a high-speed modem.

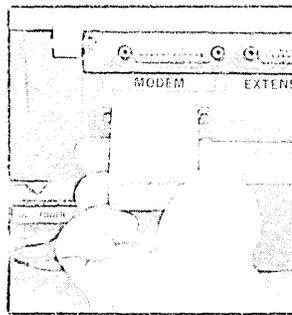
Also unlike conventional modems, MICOM's tiny Models 480 and 490 require no extra cabling—nor even a power cord. They simply plug into the back of your terminal or PC.

Looking for a better way to transmit data over your own lines or over metallic circuits supplied by the phone company? Call or send for information on MICOM's Micro400s.

Considering a bunch of modems for local networking?



You'll find our local datasets more appealing.



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CIRCLE 4 ON READER CARD

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- System Performance Navigator
- Change Evaluation

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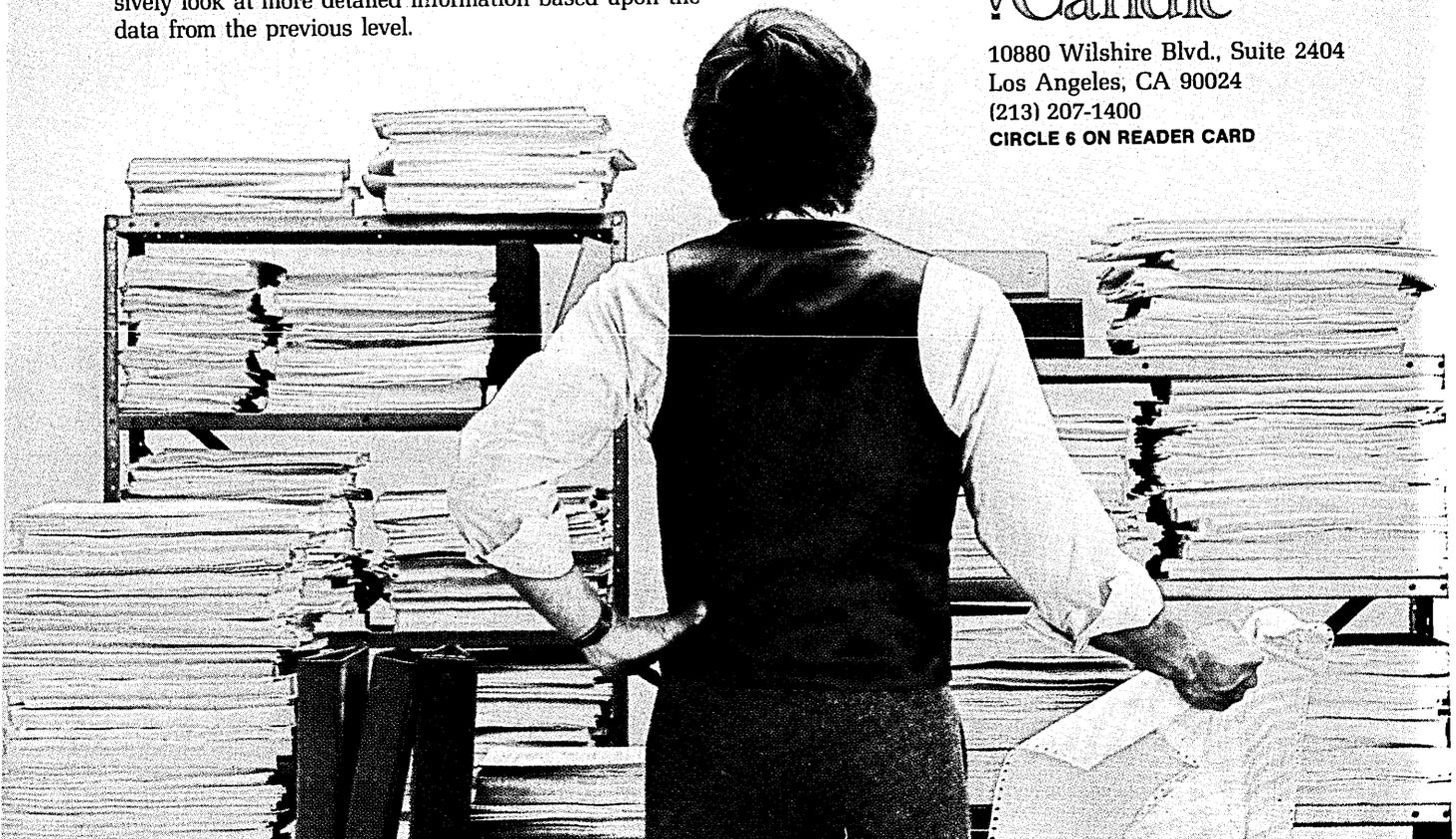
For more information, contact your Candle representative.



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CIRCLE 6 ON READER CARD



DATAAMATION®

JULY 1, 1984/\$4.00 U.S.A.
VOLUME 30 NUMBER 10
This issue, 184,786 copies

FEATURES

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First there was Cinerama. Then came 3-D, followed by Sensurround. Tinsel Town's next craze may be computer-generated images. Edith Myers tells how "Cray Conquers Hollywood" with its X-MP.

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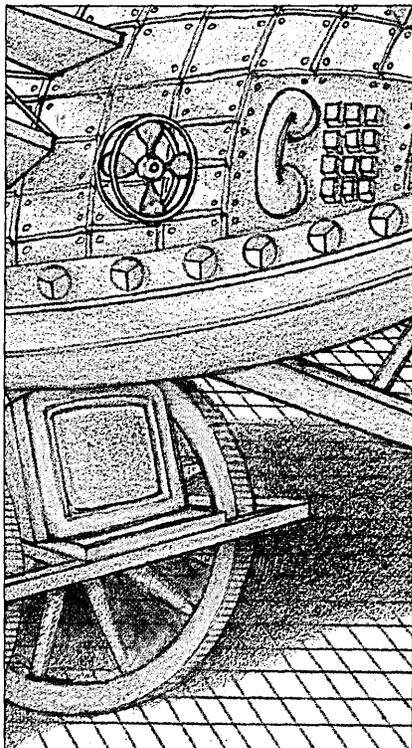
Michael Hammer

"I regret that I have but one workstation RFP to make for my company," lament marketing-war-weary dp managers, bewildered by the propaganda of brawling vendors.

78 THE LITTLE ENGINES THAT MIGHT

Ken Zita

In their infancy, the progeny of the marriage of the telephone and the data terminal look cute and promising, but will they grow up to be heroes or bums?



86 NCC PRODUCT PREVIEW

Robert Crutchfield

One-armed bandits and computer companies alike hope to profit from the horde about to descend on Las Vegas. But while the slots can offer only apples and oranges, vendors will exhibit everything from disk drives to ribbons, operating systems to aptitude tests. Herewith, a run-down of some representative products to whet any dper's appetite.

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Gene Troy

Hey, crimestoppers! Sure it's hard to prevent breaking and entering when the perpetrators can't be seen and they leave no fingerprints. But a vigilant staff and a port protection device can keep your system unmolested.

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David Evans compares the risks and rewards of "Taming Large Projects" to a lunch with King Kong. In *Digits*, Roy Mengot proves computers aren't the only ones capable of producing graphics.

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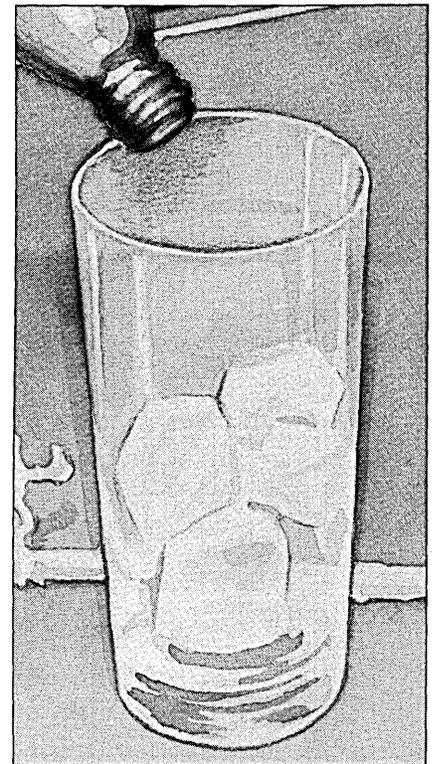
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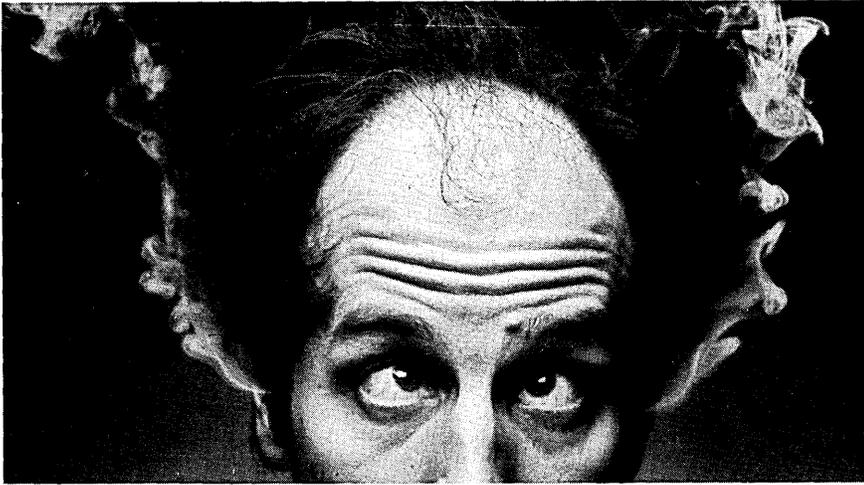
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COVER DIORAMA BY KATHY JEFFERS;
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Technical Publishing

DB a company of
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Member American Business Press, Inc.

DATAMATION (ISSN 0011-6963) Magazine is published twice monthly, on the 1st and 15th. Published by Technical Publishing, a company of The Dun and Bradstreet Corp., John K. Abely, President, Executive, advertising, editorial offices, and subscription departments, 875 Third Ave., New York, NY 10022. Published at Lincoln, Nebr. Annual subscription rates: U.S. and possessions: \$50; Canada: \$75; Japan, Australia, New Zealand: \$140 air freight; Europe: \$120 air freight, \$225 air mail. All other countries: \$120 surface, \$225 air mail. Reduced rate for qualified U.S. students, public and school libraries: \$30. Single copy: \$3 in U.S. Special Datamation/Dataguide issue: \$25. Sole agent for all subscriptions outside the U.S.A. and Canada is J. B. Tratsart, Ltd. 154 A Greenford Road, Harrow, Middlesex HA13QT, England, (01)422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Second-class postage paid at New York, NY 10001 and at additional mailing office. ©Copyright 1984 by Technical Publishing Co., a Division of Dun-Donnelley Publishing Corp., a company of The Dun and Bradstreet Corp. All rights reserved. "Datamation" registered trademark of Technical Publishing Company. Microfilm copies of Datamation may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Foote & Davies/Mid-America. POSTMASTER: Send address changes to Datamation, 875 Third Avenue, New York, NY 10022.

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TAXRATE	Tax Rate	22	22	22	22
INFLATE	Inflation Rate	0	7	8	6
D_UNITS	Delta Units	0			
D_PRICE	Delta Price	0			
UNITSOLD	Units Sold	50,000	57,500	66,125	76,044
PRICE	Selling Price	8.50	9.00	9.50	10.00
REVENUE	Revenue	425,000	517,500	628,187	760,437
RAW_MAT	Raw Material	150,000	184,575	229,242	279,446
DIR_LAB	Direct Labor	100,000	123,050	152,828	186,297
PACKAGE	Packaging	25,000	30,762	38,207	46,574
DISTRIB	Distribution	37,500	46,144	57,311	69,862
GROSS_P	Gross Profit	112,500	132,969	150,600	178,258
FIXED_C	Fixed Costs	40,000	40,000	40,000	40,000
NET_BTAX	Net Before Taxes	72,500	92,969	110,600	138,258
TAXES	Taxes Payable	15,950	20,453	24,332	30,417
NET_INC	Net Income	56,550	72,516	86,268	107,841

Financial Spreadsheets on the IBM 3279.

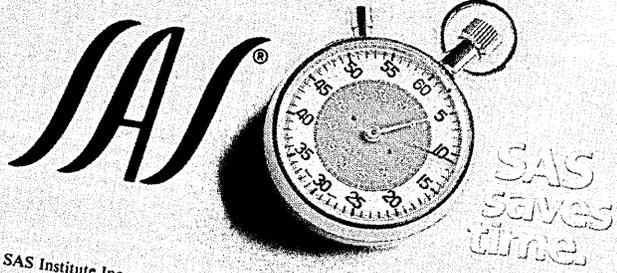
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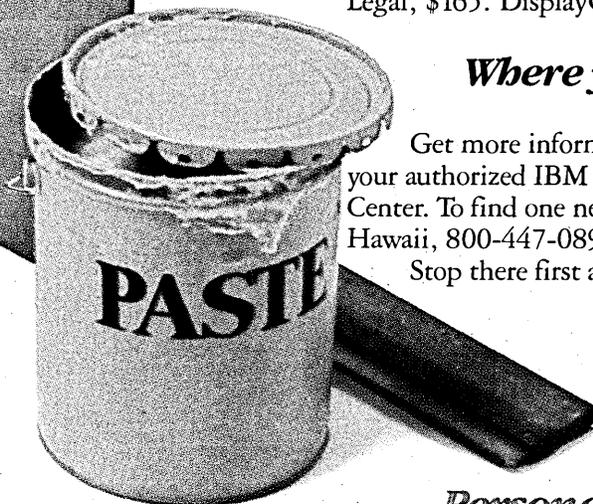
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CIRCLE 9 ON READER CARD

LOOK AHEAD

INFIGHTING AT AT&T

AT&T Technologies chief James E. Olson's recent demand for a 20% across-the-board cut in costs may presage big trouble for managers in the division formed out of the old Western Electric, Bell Labs, and some other bits of postdivestiture AT&T. There's talk of stripping out an entire level of management in the rank-obsessed company. But the real battle looks to be brewing between Olson and Ian Ross, president of Bell Labs. Ross, a proud, English-born engineer, is said have told Olson that there would be "no cuts in projects" at the labs. If anyone can keep the peace between these two, it will probably be Marilyn Laurie, vice president of public relations and public affairs at AT&T Technologies. She has Olson's ear and Ross's respect, having held a similar post at Bell Labs before taking the Technologies job.

MACINTOSH FOR OEMS?

Seems everybody wants to sell Macintosh, Apple Computer's mouse-equipped desktop. Wang Labs and NBI, two word processing equipment vendors, are understood to be talking to Apple about OEMing the machine. Moreover, AT&T has taken an interest in the machine, which could be enhanced with a built-in telephone of some sort. One Big Eight accounting firm, we hear, has ordered some 3,500 of the machines to be used among its 49 domestic offices.

DO YOU HEAR VOICES?

In your PC, that is. You may, come NCC this month, when Interstate Voice Products, a spin-off of Interstate Electronics, Anaheim, Calif., introduces a voice recognition board for the IBM machine. The first model of the VocaLink board will deal only with discrete speech, but the company says it is working on connected speech algorithms, which are much more difficult to perfect.

IBM GOES LAP-TOP

Watch out for a notebook-sized computer to come out of IBM, which has been exercising its personal computing muscle lately with price slashing and further commitment to the micro software market. The new lap machine is expected to use a flat-panel liquid crystal display. Software would be run under the PC/DOS operating system. Chances are the hardware will be built in Japan by an OEM to IBM specs, according to industry sources. Pricing is still up in the air.

INSIDERS' VIEWS

This summer will see published histories of two microcomputer companies, one famous, one infamous.

LOOK AHEAD

"A Small Kingdom," by Michael Moritz, follows the Apple Computer gang from garage to the Pepsi generation. Surely more inflammatory is "Hypergrowth, the Rise and Fall of Osborne Computer Corporation," written (with John Dvorak) and published by the often scheming, and occasionally lying (he admits it), Adam Osborne himself. Dropped by an established publisher supposedly afraid of litigation from Robert Jaunich, president and ceo of the portable pc company at the time of its spectacular crash last year, the book offers a detailed business analysis of Osborne's sordid rocket ride to failure.

INK JET TAKING OFF?

A recently acquired Kodak subsidiary, Diconix (the former Mead Digital Systems) of Dayton, Ohio, is quietly showing off a high-speed ink jet printer that is claimed to print 8 to 10 pages a minute. Using a multiple array binary ink jet technique, the printer shoots 300 jets of ink at once, providing typewriter-quality printing. Deliveries of the product, expected to sell to oems for \$8,000 to \$10,000, will begin in October.

RUMORS AND RAW RANDOM DATA

Gould Inc.'s Compion subsidiary, in Champaign, Ill., is soon to unveil a line of Unix-based networking products that will enhance applications development and protection of software and data files....Braegen Corp., Cupertino, Calif., will soon introduce a means of connecting IBM PCs into its 3270-type terminal system....IBM watchers expect a doubling of the capacity in IBM's 3380 disk drive shortly. This would hurt PCMs, which have had trouble copying the original 3380, and help users who continue to grow DASD capacity at some 45% a year....We hear IBM expects to have some 600 retail outlets in place by the end of next year handling the PC and related products....Input, a Mountain View, Calif., research house, says the U.S. software and services market grew 22% last year to reach \$33.5 billion....Tandem Computers will soon add multiple column formatting to its T-Text word processing package....3M is readying a new diskette manufacturing technique that enables up to 12 megabytes of data to be stored on a 5¼-inch floppy....GRiD Systems of Mountain View, Calif., is adding shared remote database files for users of its Compass portable computer. Several popular micro DBMS packages will be offered in the fall....It looks as if the Reagan Administration will go along with a move to deregulate IntelSat tariffs, a move that would drastically change international telecom rates.

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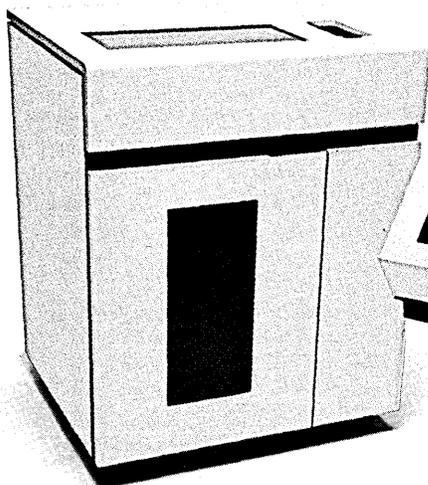
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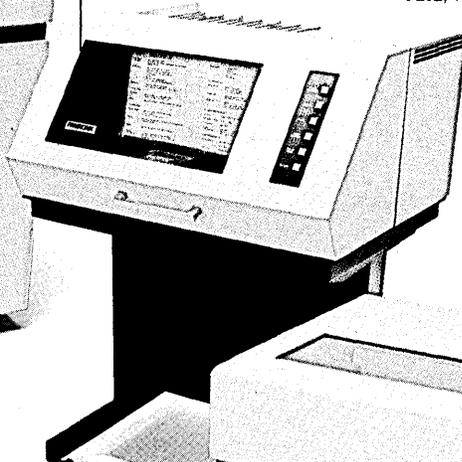


P-Series

The P-Series consists of our proven printer/plotters, the P300 and P600. At 300 LPM, the P300 can combine bar codes, OCR and alphanumerics all in one dependable package to bring you the best in medium-speed line printer capabilities.

And, with twice the throughput of our P300, the extra-rugged P600 is truly an industrial printer, designed for all your heavy-duty processing tasks.

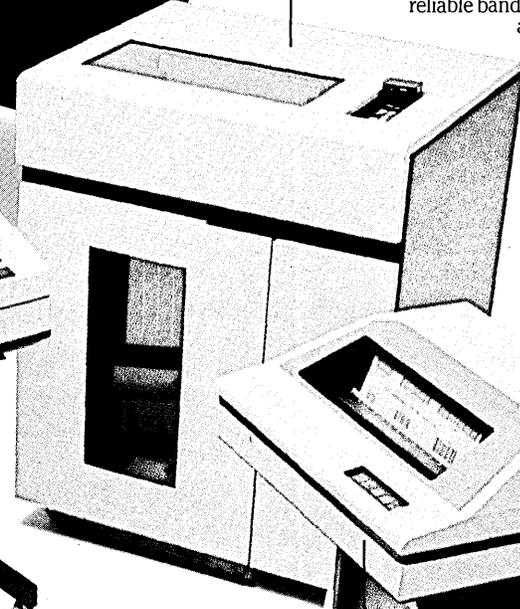
Plus, there's our new P-Series XQ. Enhanced versions of our P300 and P600, delivering high-speed draft print and compressed print in an office-quiet cabinet.



DataPrinter

Our DataPrinter series gives you the most reliable band printer performance available, using a precision hammer actuator system evolved from chain printer technology.

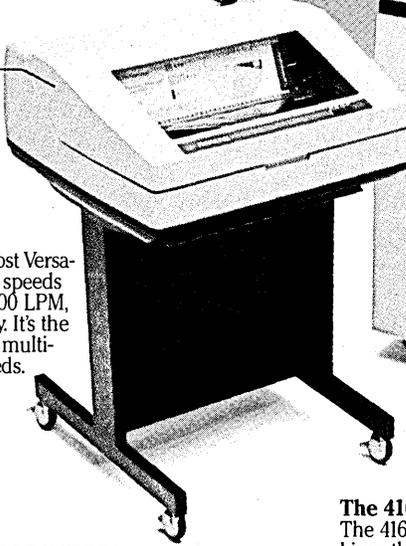
DataPrinter's fully-formed character bands offer superior print quality for your super-mini and mainframe data processing needs, at speeds from 600 LPM to a blistering 2000 LPM.



MVP

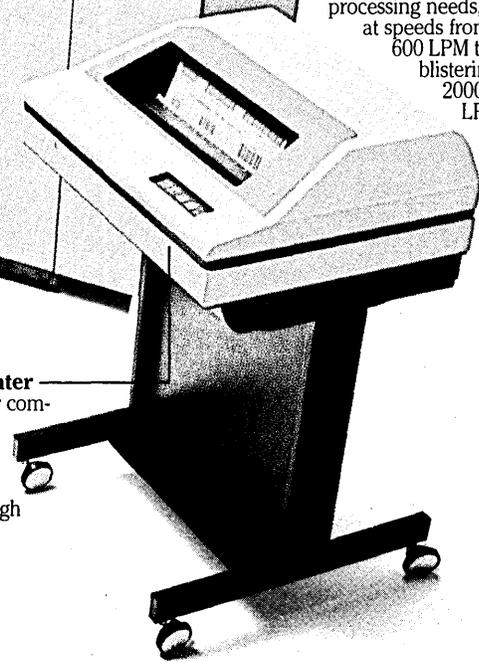
Our MVP is the business printer that really means business. It's the world's first and only microcomputer line printer which puts the dependability of our P-Series into a smaller package.

The MVP is truly the Most Versatile Printer, with selectable speeds ranging from 80 LPM to 200 LPM, and full graphics capability. It's the perfect printer for all your multi-user, multi-application needs.



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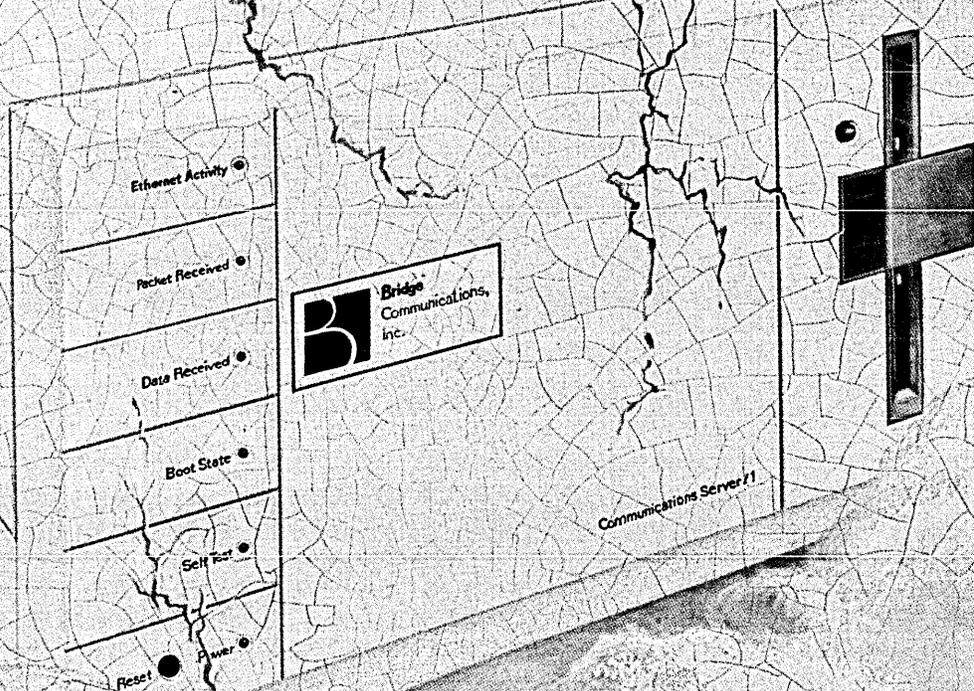


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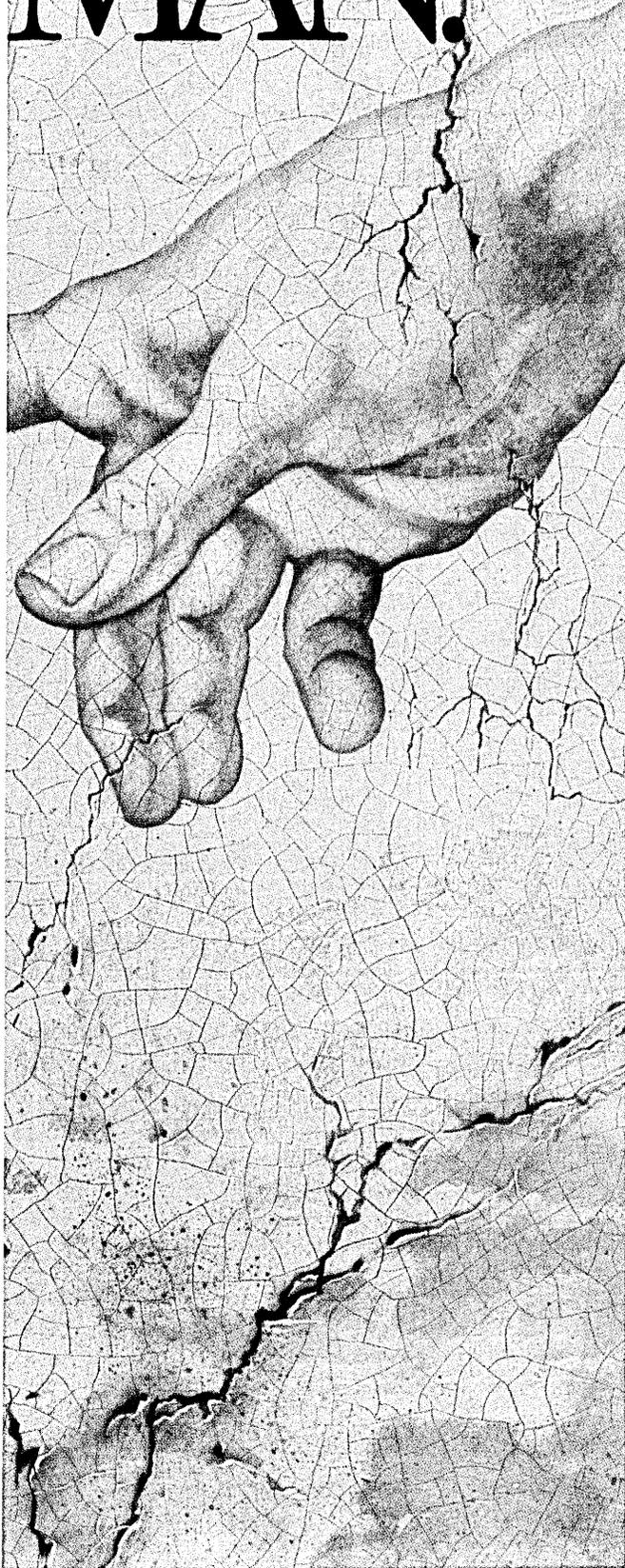
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MAN is more than just another LAN or Data PBX. Much more.

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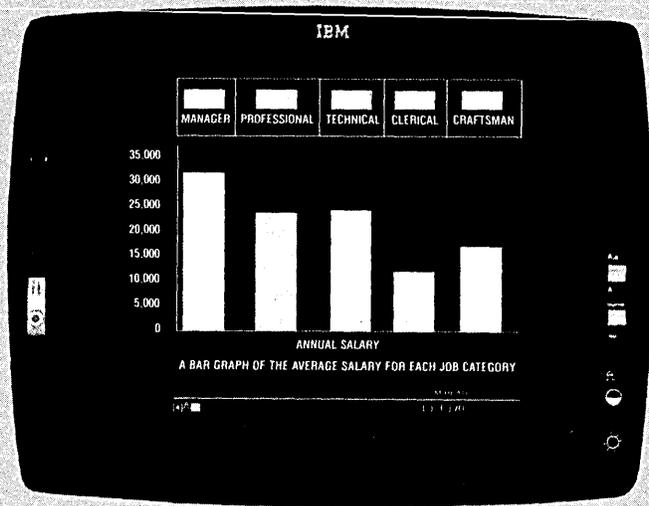
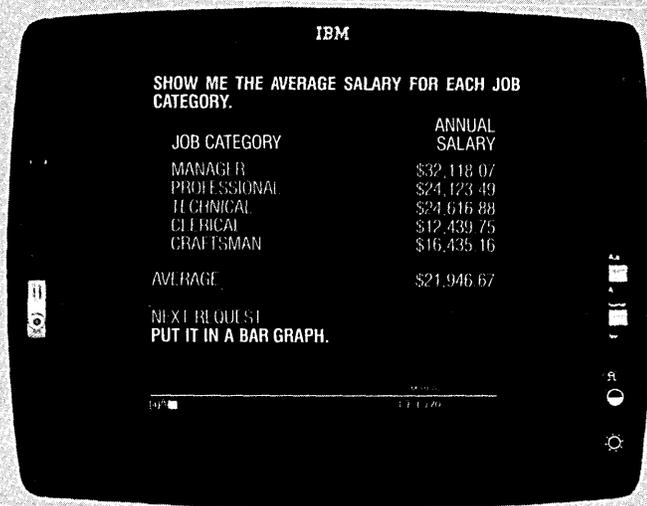
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CIRCLE 13 ON READER CARD

LETTERS

HURRAY FOR MERCER COUNTY!

I was wondering which Mercer County cartoonist Henry Martin was referring to in his cartoon on p. 182 of your February issue. I also wonder exactly what was meant by the cartoon.

Please be aware that I was not offended, but rather was surprised to see it in print. Very few people have ever heard of Mercer County, Ohio, which is where I am originally from. I am wondering if there is another Mercer County.

I look forward to a response because my curiosity is killing me!

LUCY FELTZ
University of Dayton
Dayton, Ohio

I live in Mercer County, Pa., and I don't understand Mr. Martin's cartoon. Please explain.

DARRELL L. STUYVESANT
Greenville, Pennsylvania

Cartoonist Henry Martin responds: I live in Mercer County, N.J. Like pride of country, pride of city, pride of home state, or pride of college, I have pride of Mercer County, and thought it would be nice to put up a sign with a cheer for my home county. I knew signs cost tax dollars and I doubted that I'd get my idea through legislation, so I chose the cheaper, quicker route and put it in a cartoon. Instead of my message costing me tax dollars, I was paid for it!

Now as to Mercer County, I checked my atlas very quickly and discovered counties of the same name in Kentucky, Missouri, New Jersey, North Dakota, Ohio, Pennsylvania, and West Virginia. If I missed a state, sorry. If you live in one of those states, let's hear it for Mercer County!

PUBLISHING IS PUBLISHING

I was prompted by the article on software piracy in your April 15 issue (p. 49) to make an observation.

Legal action and technical fixes of various sorts will be of some use, but pricing and packaging strategies will play the

primary role in reducing this problem of piracy to a minor irritation. The chance to save hundreds of thousands of dollars is a strong motivator for a demonstrably creative community to develop those means.

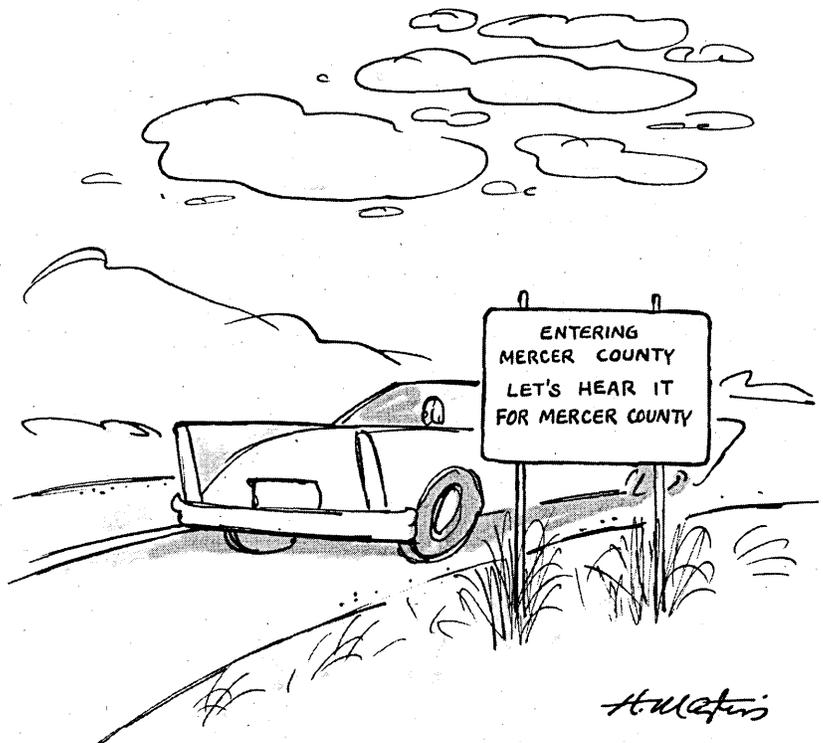
I believe the solution becomes apparent when examining similarities to the book publishing industry. There, intangible intellectual property is sold and the creators are rewarded reasonably well. The differences between that industry and the software industry are mainly price and packaging. Books sell for well under \$100 normally, and the "reward" for cheating the publisher is correspondingly less. The effort and cost of copying in that case is usually enough to keep people honest.

The reason this system works in book publishing is, of course, because there is a volume market for books, which has not

until recently been true for software. Trends in desktop computer sales, however, indicate that a true volume market for generally useful software is rapidly developing. Software which is useful in only a limited number of applications may continue to be developed through in-house programming, consultation, or development syndicates.

I suggest that general use software should and will come to be packaged as a hardbound, well-written instruction and reference manual together with a floppy disk (or whatever), and will be sold for under \$100. Making a genuinely useful manual the prime component, along with a lower price, reduces to negligible proportions the temptation to copy.

There has been a tendency lately to pretend that computer usage can be instinctive. While software should be as user



LETTERS

friendly as possible, the need for a complete, well-written manual is not likely to be eliminated.

ROBERT A. MILLER
Cranbury, New Jersey

WRONG INSTITUTION

A recent issue of DATAMATION describes the Information Age Institute as an organization "whose mission, among other things, is to propogate [CBEMA's] stand on the crt issue" (April 1, Benchmarks, p. 76). We believe you have confused the Information Age Institute with the Coalition for Technology in the Workplace, an organization supported by CBEMA whose purpose is to advocate the industry viewpoint on this issue.

While the institute will certainly be examining many issues arising from the introduction of new technologies in the workplace, our purposes are broader than your article implies. Furthermore, we will not be engaged in efforts to influence legislation.

The institute will perform three basic roles: public education regarding communication and information technologies, their applications and benefits, and related policy considerations; industry education focusing on the introduction and implementation of communication and information technologies and on public policy issues

relevant to such actions; and agenda-setting for dialog and research on policy issues and management.

Expert, independent panels will be established to review the state of the technologies, their applications, and related public policy issues. Research findings will be provided for the benefit of the public and of industry; as appropriate, research agenda will be proposed. At times, monies to support the research will be brokered. The institute does not foresee its role as that of a funding agency.

The Computer and Business Equipment Manufacturers Association has made a commitment to launching IAI as an independent institute. Other trade associations—as well as some corporations and foundations—have shown a keen interest in supporting the institute.

CAROL LEE HILEWICK, PhD, President
Information Age Institute
Washington, D.C.

NOT THE ONE AND ONLY!

The February issue of DATAMATION cites a new "Robotics News" service in the Source Data section on p. 226. The news note states that *Robotics Technology Abstracts* "is the only journal to provide worldwide coverage of important developments and key literature."

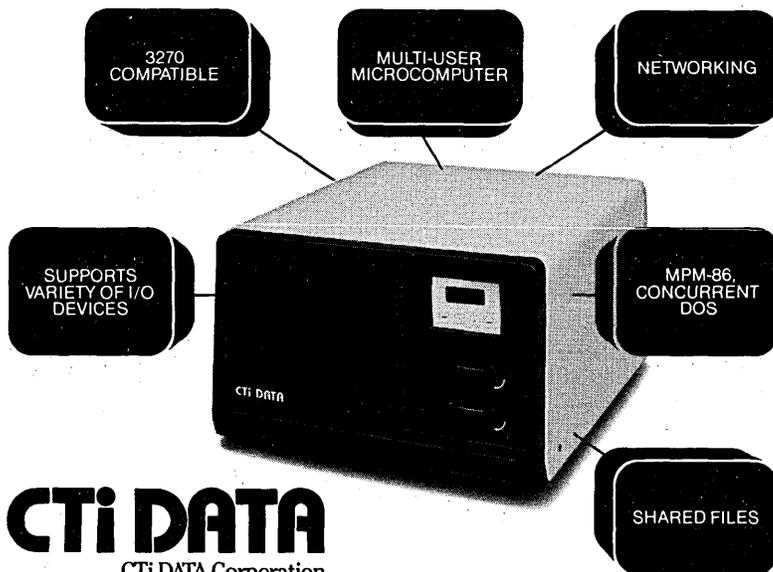
Alas, this is not the case. For 100 years, Engineering Information Inc. (Ei) has covered the world's literature in engineering and applied science, including data processing and robotics. (Before the turn of the century, we even abstracted and indexed papers on Hollerith's experiments at the Census Bureau.) Our international coverage currently involves scanning titles of about 5,000 periodicals (including DATAMATION, of course), and we plan to cite over 250,000 individual articles and papers this year in our print *Engineering Index* publications and in our electronic databases, *COMPENDEX* and *Ei Engineering Meetings*. The electronic files are offered on 10 host computer services worldwide.

HERBERT B. LANDAU, President
Engineering Information Inc.
New York, New York

CORRECTION

A usually reliable source wasn't when he told DATAMATION that a value-added remarketer must sell 300 to 400 PCs or XT's per year to qualify for the 33% to 40% discount from IBM, a statement we repeated in the oem edition of the April 15 issue ("What It's Like Working with IBM," p. 136-3). The correct time frame is per month. We still consider the source reliable, but we no longer consider him infallible.—Ed. *

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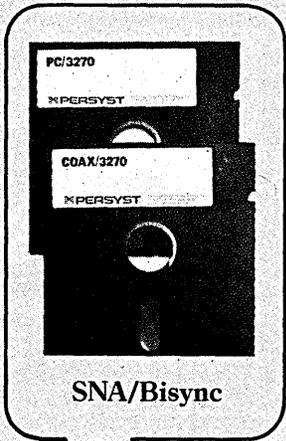
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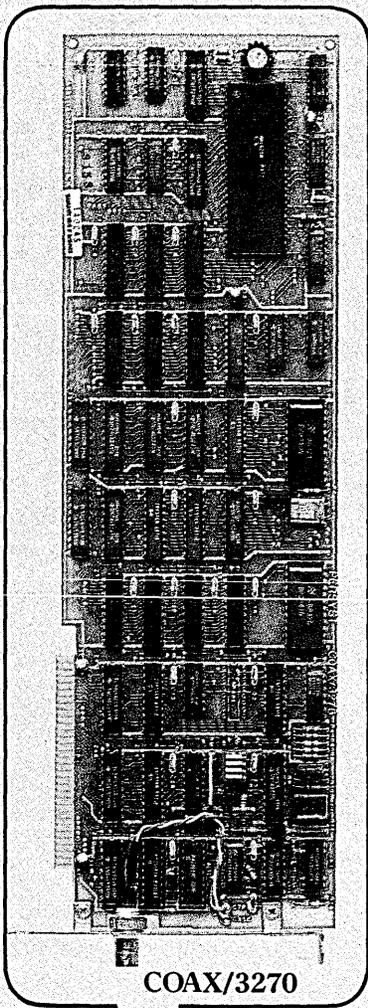
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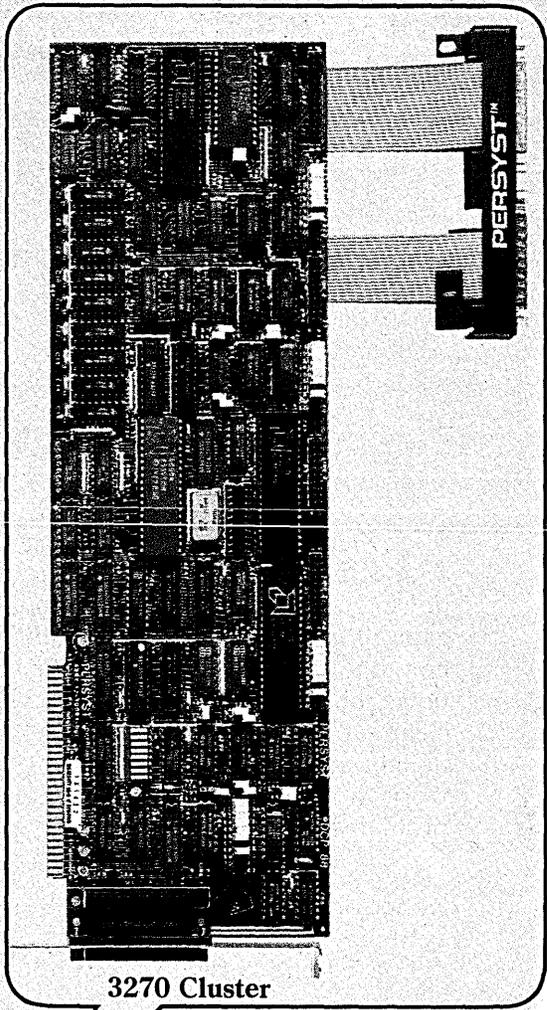




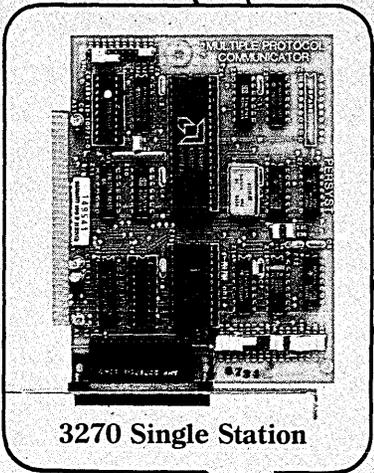
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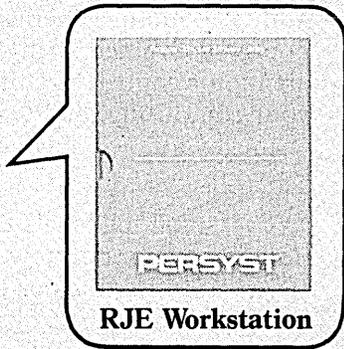
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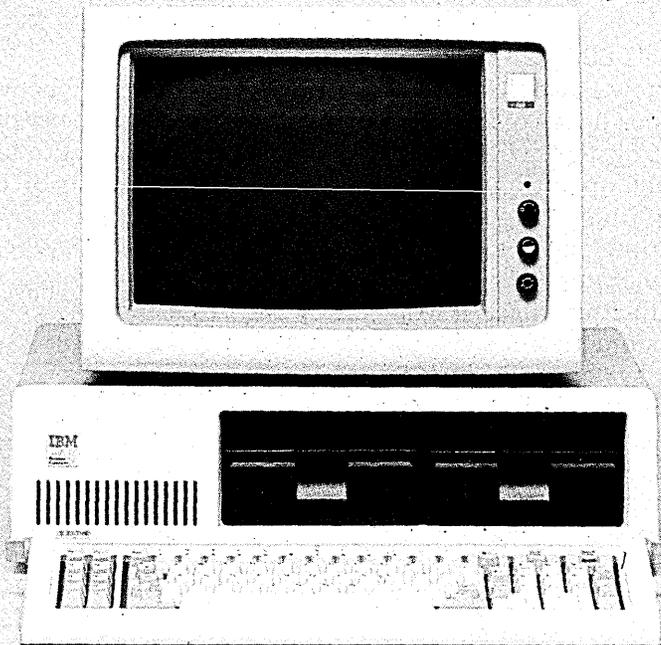
3270 Cluster



3270 Single Station

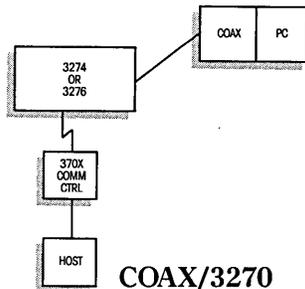


RJE Workstation



Let Persyst get your IBM PC talking to your mainframe, because we have more to talk about.

We have a full range of communication solutions to talk about. That's why Persyst is your single source for the most flexible, the most cost efficient ways to tie your IBM PC to your mainframe computer.



For instance, one solution is our Coax/3270. This single-slot expansion board lets you connect your IBM PC directly into virtually any IBM 3270 environment. And with our 3278/79 emulation software, it's easy to share information between your mainframe and IBM PC.

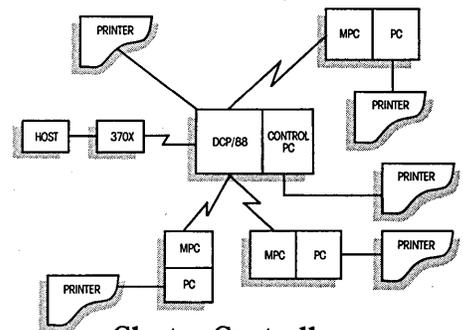
And that's just the start. Persyst has other solutions that will help you incorporate your IBM PC into almost any IBM communications environment, including SNA or Bisync.

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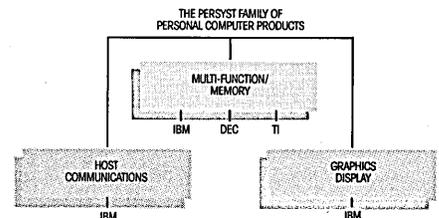
And when you're ready to talk about quality and reliability we have plenty to say about that, too. All Persyst products are submitted to one of the most stringent testing and quality assurance programs in the industry. We're so confident in our quality and reliability that we back our products by a 2-year warranty.

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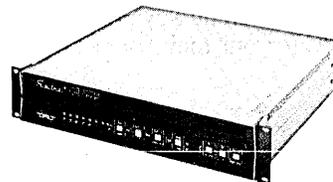
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The Sematrans 4848 modem developed by TRT operates at 4800 bps full duplex over the switched telephone network or on 2-wire leased lines.

When France's top manufacturer of high-speed modems announced its successful development of this avant-garde telecommunications instrument, the CCITT itself realized the importance of drafting a new recommendation on this significant aspect of data communication:

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CIRCLE 17 ON READER CARD



EDITORIAL

COOL THOUGHTS FOR HOT DAYS

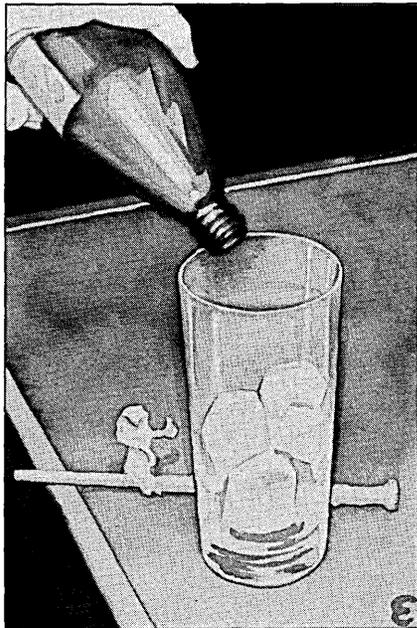


ILLUSTRATION BY DORIS ETTLINGER

To survive all the heat, hoopla, and hyperbole that will surround members of the information processing community in Las Vegas next week, consider a good stiff belt of Skepticism Soda. This refreshing drink contains neither caffeine, sugar, calories, nor cholesterol, yet has a coolheaded taste that would soothe even the most harried NCC showgoer.

Over the past several years we've all learned lessons the hard way about the wares unveiled at the National Computer Conference. Amazing new software and hardware products are introduced with great fanfare at each confab; alas, many of these great inventions are never heard from again. Every pundit, consultant, and analyst from Route 128 to Silicon Valley claims to have originated the word vaporware, the new dp industry buzzword that graphically describes a new product that didn't really exist when it was introduced, except as a gleam in the eye of the salesman and his venture capital backers.

Products editor Robert Crutchfield was able to identify more than 40 brand-new products scheduled to debut at the 1984 NCC—and that number represents only those wares that had been awarded model numbers or names, as well as price tags, prior to our deadline last month for the annual "NCC Product Preview" (see p. 86). Included in this passel of new products are not only hardware and software, but vaporware as well.

The real thing at this year's show is certain to be workstations. You'll hear vendors from all corners talk about them, though you can expect widely differing definitions of these new wonders. Not to mention widely varying costs per user—from \$1,000 to \$10,000, depending on whose pitch you're getting. It's the hype that counts, say the gurus.

For the pause that refreshes, read Mike Hammer's analysis of the real "workstation" needs of the dp manager in "The Battle for the Desktop," beginning on p. 68. Consultant Hammer, author of the controversial "The OA Mirage" piece in the February issue of DATAMATION, warns that cheap desktop computer power has seduced senior executives, middle managers, and white collar professionals to collectively spend millions of dollars unwisely. Magic boxes selling for \$1,000 leads to impulse spending, he contends. "Below some price threshold, people buy systems just for the hell of it. Not only don't they know what the benefits will be, they're not even sure what they'll do with them."

Nobody is knocking the validity of distributing computer power to the user, of course. Indeed, Hammer quotes a dp manager as saying that "the mainframe is a network peripheral." In Hammer's view, "while we're all grateful for the big MIPers, they are no longer the hub of the computing universe." The ultimate in distributed dp is upon us, the logical end result of years of trying to move the MIPS to the needy. It's just that too many machines are being bought after too little planning.

The hottest of the hot new workstation concepts now being foisted on dp managers is the sometimes gangling combination of telephone and computer. These integrated voice/data workstations are now offered by 18 vendors, reports Ken Zita in "The Little Engines that Might" beginning on p. 78. Zita's analysis of the gaps between market needs and vendor dreams, rhetoric and reality, offers some handy guidelines for the beleaguered MIS executive trying to sort out the treasures from the trash in his or her tote bag of vendor literature. "Some people complain that integrated workstation products are gimmicks nobody needs," Zita notes, and he predicts that customized packages dedicated to particular end-user market niches will survive. What's not clear is whether the millions of pc—uh, workstation—users really want handsets connected to their ergonomic screens.

A final word: remember, all of NCC is divided into but four days! *

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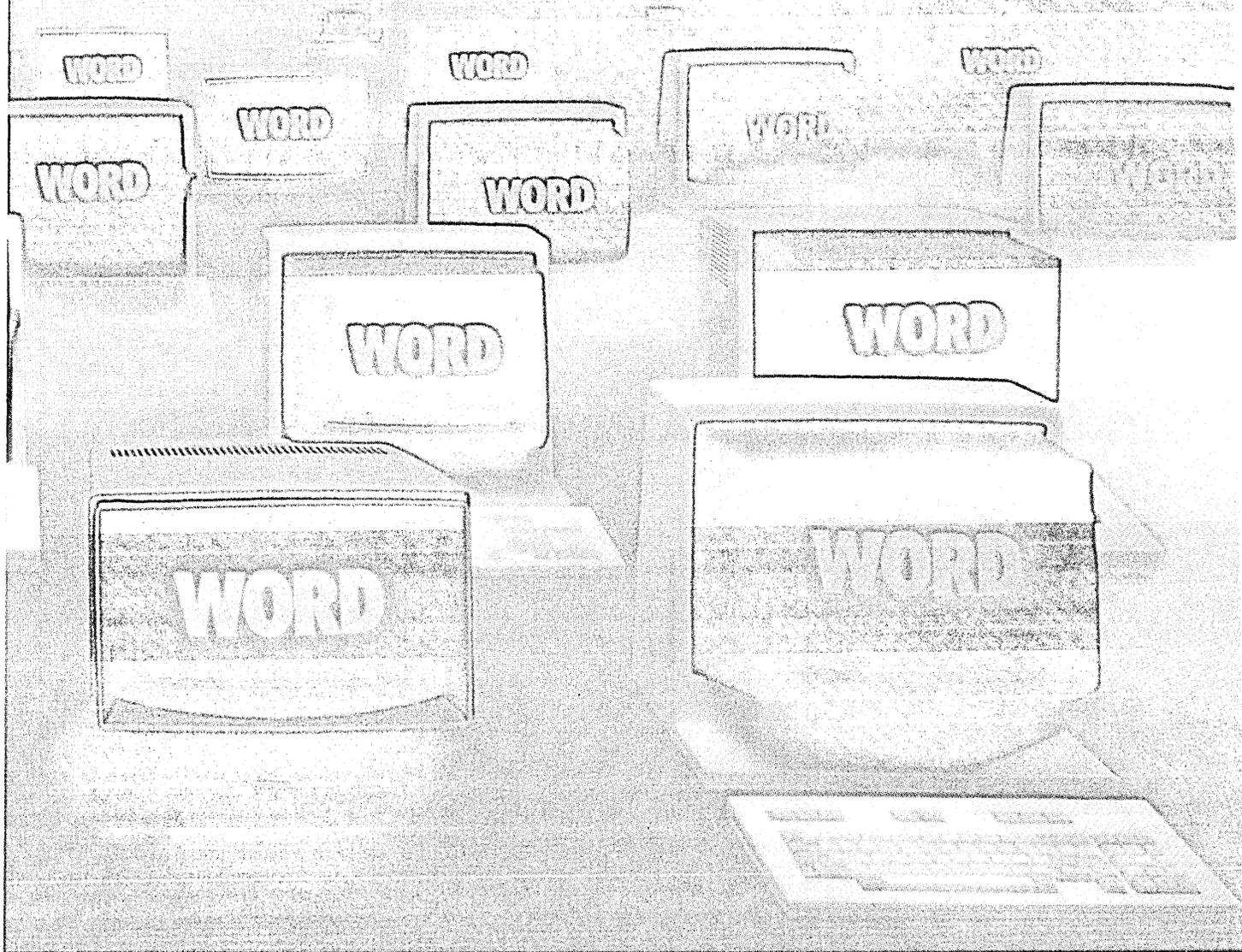
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Our DATASPEED Terminals incorporate Information Systems Architecture, the design principle that integrates our products so they perform as one system. As you grow, its flexibility allows for easy system expansion.

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CIRCLE 18 ON READER CARD

INFOCUS

CRAY CONQUERS H'WOOD

The new movie, *The Last Starfighter*, features 25 minutes of Cray X-MP-generated scenes.

by Edith Myers

Audiences viewing the Universal-Lorimar film, *The Last Starfighter*, which will premiere July 13, will be propelled to the far reaches of the universe.

Some of the technology behind the movie may have pushed the state of the art in filmmaking even farther than that.

Some 25 minutes of what audiences will see are images that never existed off-screen except as bits and bytes in databases. In some cases, the computer-generated images were combined with filmed reality, but only those who were in on the work could tell the difference.

The computer-generated portions of the film were the work of Digital Productions Inc., Los Angeles. Digital president John Whitney Jr. says his company was 12 months in physical production of its part of the movie and three months in preproduction for designing and planning.

Prior to *The Last Starfighter*, the greatest amount of digitally produced imagery in a major motion picture was in the Disney film, *Tron*, with about five minutes. "Comparing what was done in *Tron* with what we've done here is like comparing apples and cows," says Sherry McKenna, Digital's executive producer. "*Tron's* computer-generated special effects were combined with traditional special effects."

Whitney, who had worked on some of the *Tron* effects while with Information International Inc. (III), Los Angeles, says, "if we had worked on this [*Starfighter*] at the same rate we progressed at Triple I, it would have taken us 24 years to do the same work."

Gary Demos, vice president of technology for Digital and a cofounder, worked with Whitney at III. "That experience taught us what we needed to know," he said, "but we've done everything differently here. In this company we've solved all the problems we had there. We have more computer power and software people."

At III, Demos and Whitney were working with a PDP-10 and had written code for some 50,000 polygons in an image. With Digital's Cray X-MP, which last November replaced a Cray IS/100 they had had since the company's inception in early

1982, they have generated from 400,000 to 1½ million polygons per image. Whitney says *Gunstar*, a hero ship in *Starfighter*, "has three quarters of a million polygons in it. It's the biggest single object ever encoded. We're able to simulate more realistic detail than anyone has before."

The Last Starfighter is a basic good guys vs. bad guys adventure that author Jonathan Betuel admits was influenced by his love of the Arthurian legends. His Arthur is an 18-year-old boy named Alex who lives in a trailer park run by his mother. The only excitement in Alex's life is a video game called *Starfighter*, and he's good at it. So good, in fact, that he serves the purpose of those who placed the game in his trailer park and at other strategic spots on earth: to find terrestrials with the abilities needed by real *Starfighters* to save the Star League, a federation of distant planets protected by a cosmic frontier but facing destruction.

Alex is recruited by a space-age con man, Centauri (played, appropriately enough, by Robert Preston, the fast-talking Harold Hill of *The Music Man*). Centauri pulls up in front of the trailer park's arcade one night in a spacey automobile and asks Alex if he wants to go for a ride. The car Alex gets into, called the Star Car, was built

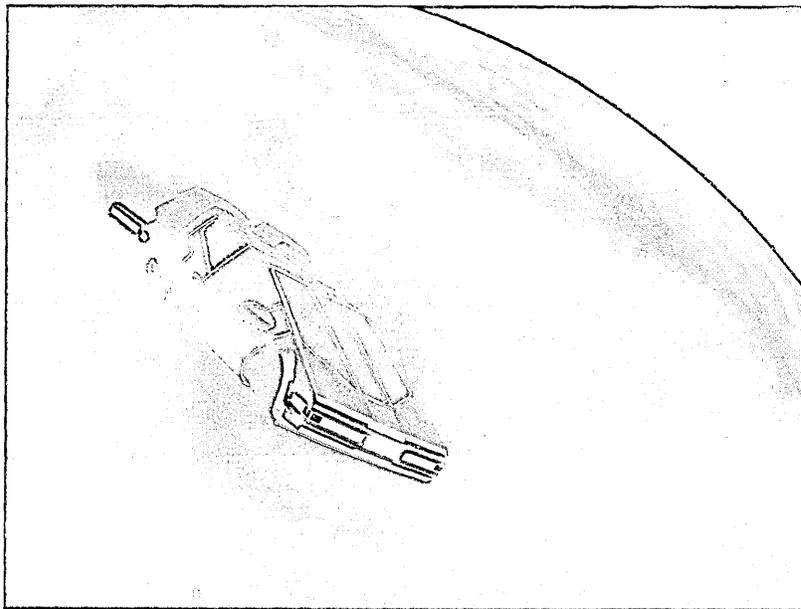
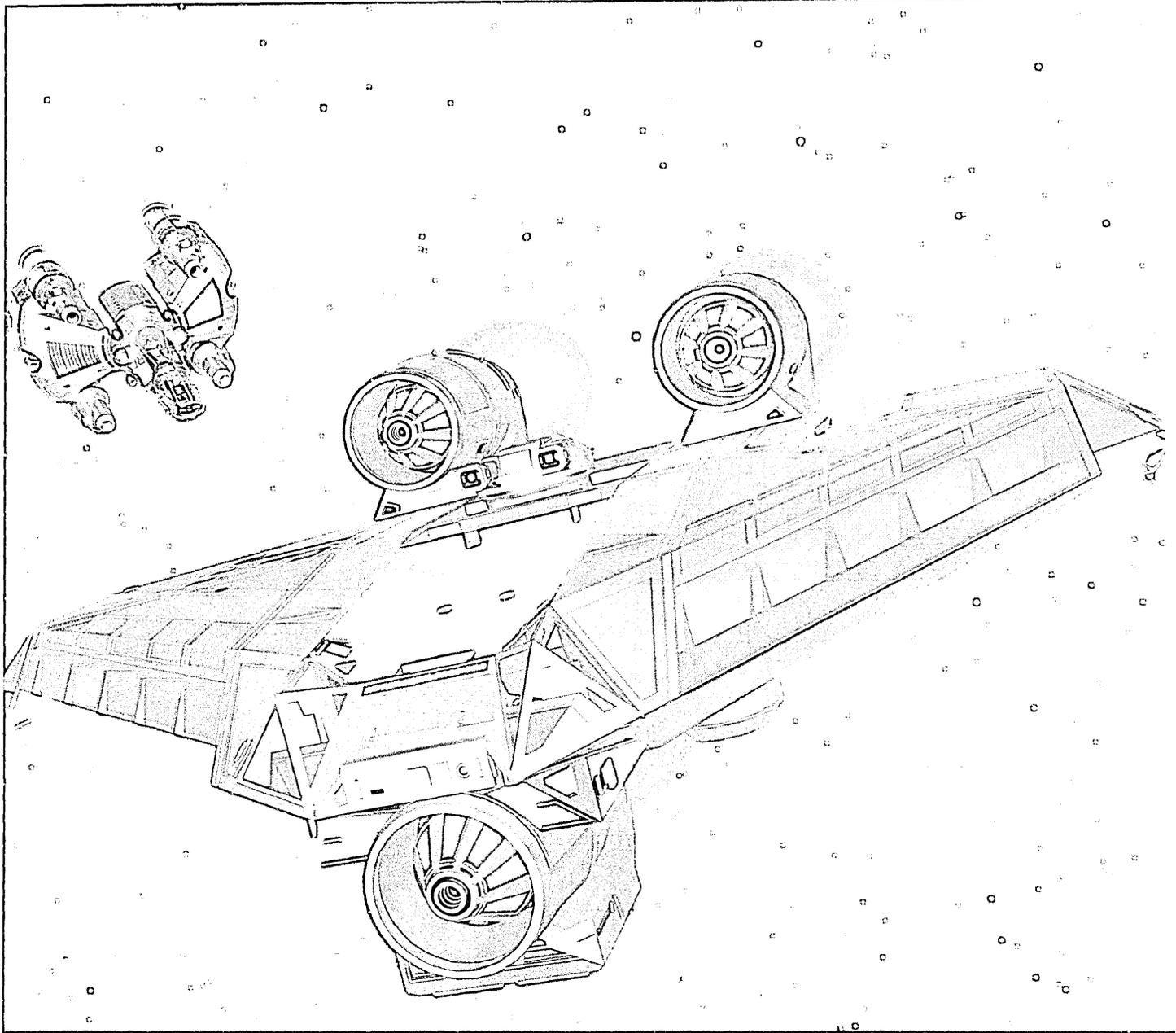
"Instead of physically building a prop, we mathematically build it."

in a traditional fashion by Lorimar. The one that takes off into space was digitally simulated by Digital Productions. It's impossible to tell the difference between the two when they are on the screen.

When Alex finds he's been recruited for a real life-and-death conflict, Centauri is forced to take him home because he didn't really volunteer. In the meantime, however, Centauri has put a substitute Alex, called a beta unit, in place of the real Alex at home. This makes for interesting interaction between the unit and Alex's girlfriend and mother.

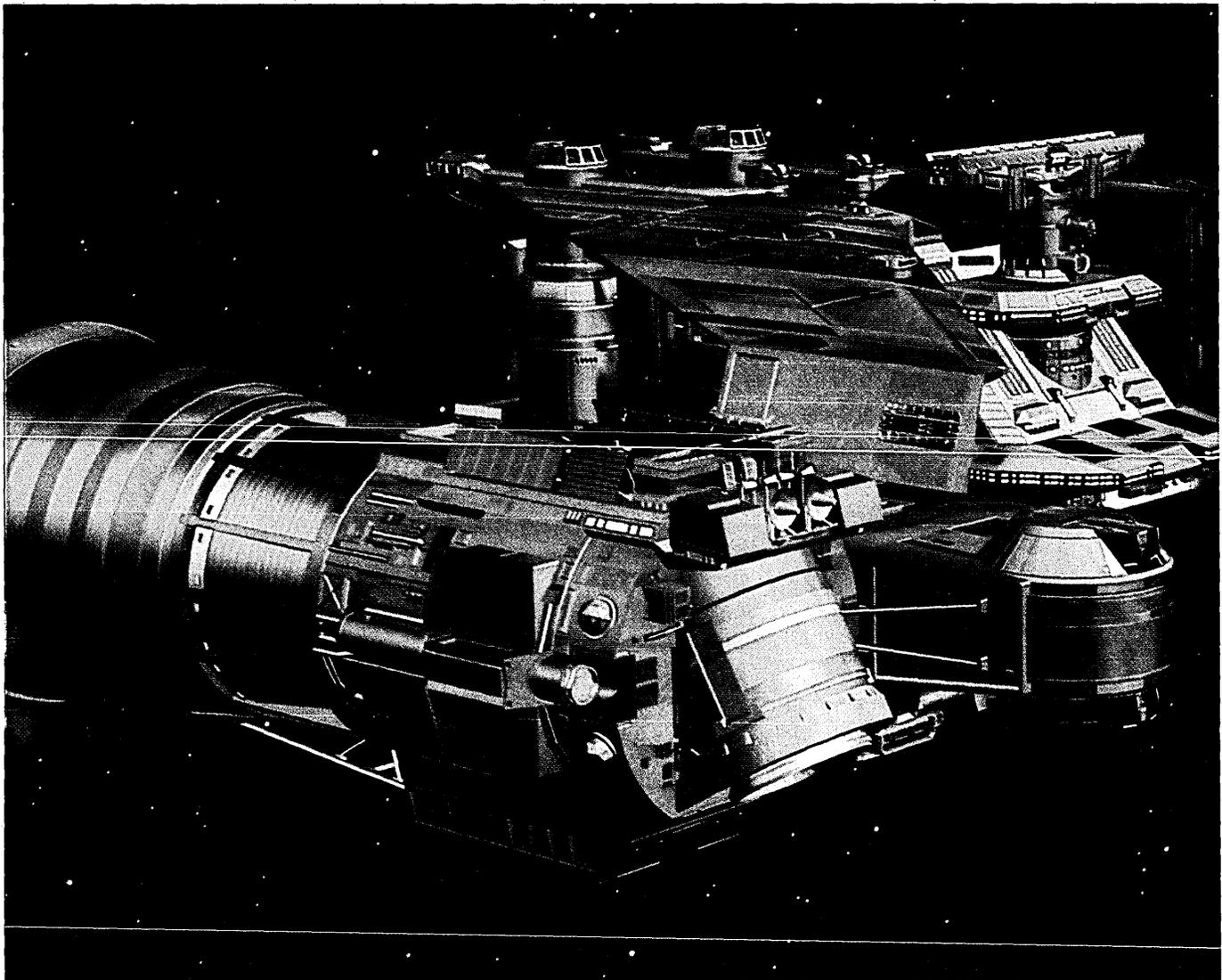
The bad guys, called the Ko-Dan, destroy the good guys, but believing Alex to be a full-fledged *Starfighter*, they dispatch an assassin to earth. He chases the beta unit, however, because Alex has seen the light and returned to space to do battle for the forces of right.

"We started with the script," says McKenna of Digital Productions' part in the film. Ron Cobb, an artist and production designer hired by Digital for the film, had to decide what was in the writer's mind. "He had to visualize what Jonathan intended, then break down all elements and put them into drawings," she says. "Then he had to get Lorimar's approval, the director's approval, and we added our input to make sure we could exploit all our technologies." There were, she says, instances where the



The Gunstar, in the background chasing a cargo ship, is the largest single object ever encoded with 750,000 polygons.

The car Alex gets into was built in a traditional fashion. The one that takes off into space was digitally simulated. It's impossible to tell the two apart.



Mothership is the headquarters of the bad guys, and typical of the "hard" images currently considered state of the art.

Digital capabilities exceeded what the artist was asking for and expectations were upgraded.

After the drawings, as in traditional filmmaking, come blueprints. "But," says Whitney, "instead of physically building what is in the blueprints, we mathematically build it."

The first group in the production team to take over the blueprints, he says, are the encoder/drafters. "They take the two-dimensional information in the blueprints, incorporate proper X, Y, and Z axes, and input it into the computer in three-dimensional form utilizing a digitizing table that is hooked into a VAX 11/782. Several monitors, including a vector monitor, let him see his work as it progresses. Each image is given a name and can be called up by name."

"When we have the images encoded," explains Whitney, "the next step is to put them on stage." This is the job of the technical director/managers. Working

with the movie director, the production designer, and the producer, the technical director/managers have a two-part job. "One," says Whitney, "is to create action in a scene, and the other is to create a look in a scene, so there are two kinds of workstations." The action workstations are standalone units in which the technical director/managers [there were eight on *Starfighter*] can work with the images interactively and in real time. They call them up by name and compose the scene the way the director says he wants it. "They can create choreography and performance in a scene," Whitney says. "This is like rehearsing. They can enter changes and optimize a scene in a real-time interactive way, until it meets everybody's satisfaction. They create an electronic storyboard which can be filmed and cut into the picture early so that special sound effects people can see the timing and start their work before the picture is completed.

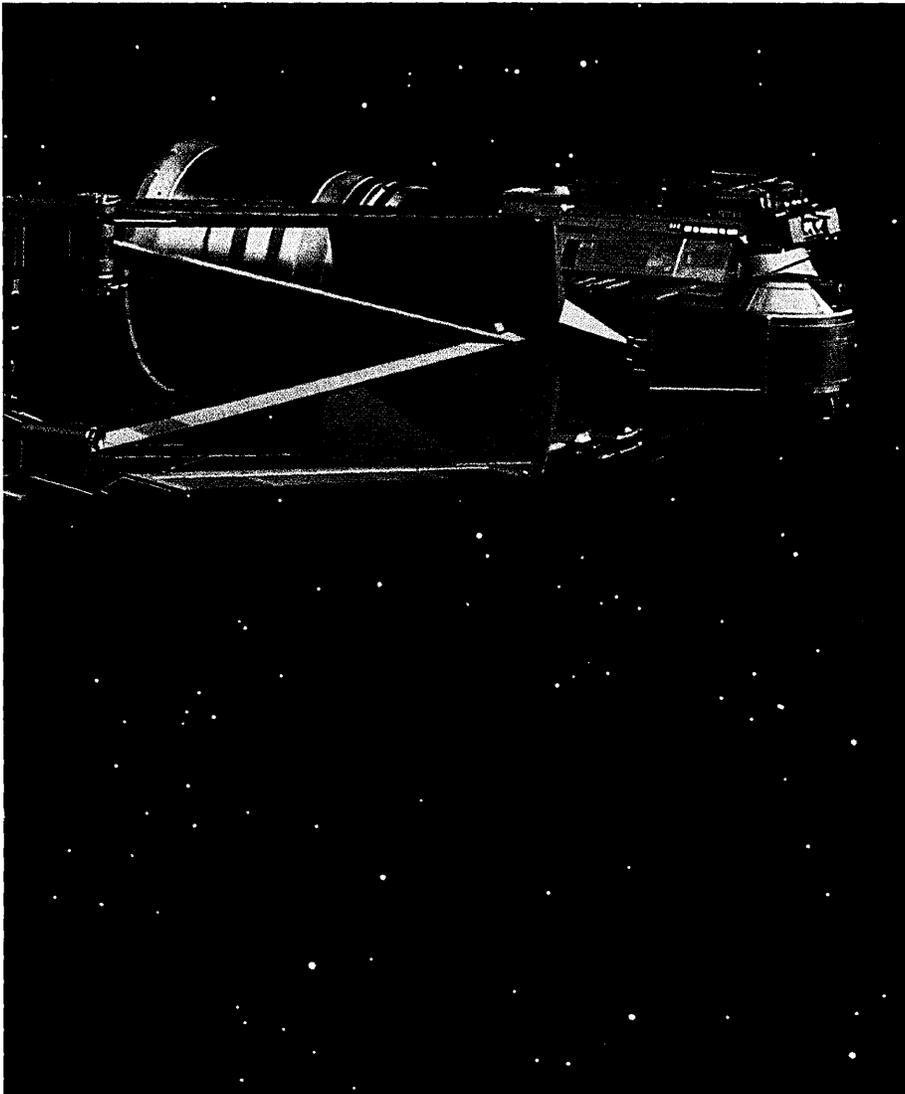
"After the action, then comes light-

ing, color, location of lights, how bright they are, making things transparent that should be transparent, creating shadows for a field of view, setting multiple light sources—key light, fill light, and ambient light," says Whitney. "All of these can be moved like any other databases. All can be dynamically placed in a scene in a totally three-dimensional way."

This step is neither real-time nor interactive, he explains. "It's a batch processing environment and combines everything that was done before. It's the first time the Cray gets into the act.

"These workstations consist of the most advanced equipment in the industry," Whitney continues. Top-of-the-line color monitors from Ramtek Corp., Santa Clara, Calif., the largest investor in Digital Productions, are driven directly off the Cray "using software based on what we started learning back at Triple I."

It was at Triple I, he adds, "that we evolved the laws that have guided us in



trespassing into the unknown. One of these was to give as much visual feedback as early as possible. Our software in code emulates the steps of producing a movie. The monitor is a window into a stage, one frame at a time. This is a mammoth computer problem and uses the full force of the computer. For preview, we use a lower resolution than for the final film because this is still a subproduct." Response time when a "look" element is entered into a scene is generally a minute or two, "but it can take up to five minutes if four other people are working at the same time."

When a scene's look has been deemed satisfactory, Whitney says, it becomes a file and goes to the Cray where it is stored in a queue for the final filming process. For this, Digital has its own "high-quality film recorder, which interfaces directly to the high-speed channel in the Cray and is capable of laying down a 35mm frame in seven seconds in red, green, and blue in computer-controlled combinations. The Cray feeds digital data streams to the film recorder, which trans-

duces them into reusable light energy, allowing for color, and exposes that directly onto ECN 5247 film."

Some scenes require more resolution than others. The Cray, Whitney says, allows any resolution up to 10,440 raster elements per access. "At least it can compute that high but it is leveraged down by two for recording for a resolution of 5,220 raster elements."

One advantage an image in database form has over a model or a life-sized tangible entity is that it can be replicated with ease. "You build one ship and you can create a fleet," says McKenna. "If you don't want them all to be exactly alike you can easily make minor changes."

Digital produced a commercial for General Motors' Pontiac Fiero. "General Motors sent us blueprints and they sent the wrong blueprint for the fender," she recalls. "They thought we'd have to build the whole car over from scratch but, with a new blueprint, we manipulated the basic data and had a new one in no time."

About one third of *The Last Star-*

fighter combines live action and digital images. "That's the future of filmmaking," says McKenna. "We had to go on the set with the live actors so we could plot them properly."

How did the actors feel working with props they could only imagine? "They considered it a real challenge," McKenna says.

For *The Last Starfighter*, all images simulated by Digital Productions are hard images, like Gunstar, Mothership (the command ship of the bad guys), deckfighters (the bad guys' fighter ships), and the starfighters flown by the good guys. A big challenge was a mammoth hangar for spacecraft. Lorimar built one side against which live action scenes were shot. Digital simulated the whole thing.

McKenna is excited about the fact that a new movie for which Digital Productions is in the preproduction phase involves images of soft objects like flowers. "We

"Our software in code emulates the steps of producing a movie."

had to prove to the director that we could do soft images before we could get the contract," she says. "That one will be innovative, too. We're crossing the bridge from the hard, cold computer image. We have a whole group of software people working on soft, warm images. Every day, we're writing software to simulate the work nature does so beautifully. The psychology of [creating] organic structure takes a lot of hard work."

Technology vp Demos elaborates: "The frontiers against which we're pushing are things like trees with their leaves waving in the breeze. This is difficult now. Hair and fur are difficult, though we have done people with rubber hair."

Another frontier Digital is pushing is the creation of characters. "Characters, to be believed, have to have expression," Demos observes. "We're working on that right now with Henson Associates [Jim Henson of Muppets' fame], and I believe it will be a major activity for us for the next few years. We're in the middle of that right now and we've had some exciting results, but we're not ready to release them."

Digitizing the human figure is another problem Digital is working on. "We have encoded a head and face and we're working on a way to give expression," says Demos. "We're researching this problem for a client but we'd do it even if there weren't a client. We don't cover any range of emotions yet, but it's on the horizon. It's very close."

While at Information International, Demos and Whitney did create a digitized figure, a juggler they called Adam Powers (see "Behind the Scenes," March 1982, p.

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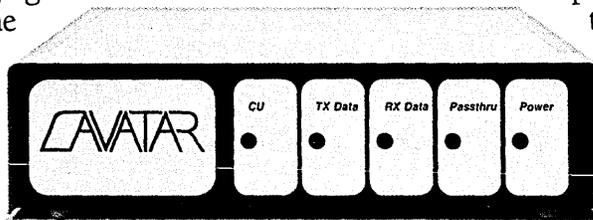
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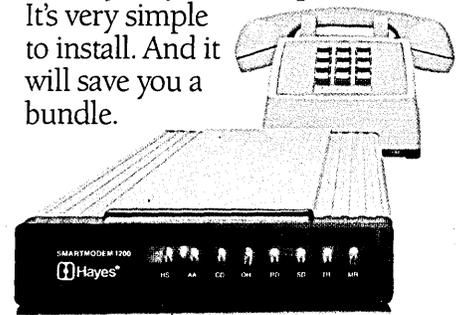
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36). Adam Powers was Whitney's idea, Demos recalls. "There was a guy at III who could juggle and we had a lot of data available from work done on two other films. So we only had to manipulate these files to produce a film, with a camera on a crane, of the person juggling. The essential effort was then to roscope each frame. We wrote the code to render the frames, and each of the shots had to be done by hand. The body construction and motion hierarchy were the most difficult efforts. The limbs had to be elastic and move, but we had to work with fixed cylinders or balls of constant size. There were other difficulties such as the need to describe the movement of the legs but these were filled in at times by approximation. This spare time work took about two years."

The Adam Powers film used from 25,000 to 30,000 polygons. Demos believes they've come a long way since then. "We have better tools now, lots better."

Texture, "where details of the texture cast shadows on each other," is another frontier Demos is pushing. "If grass waves in the breeze, the shadows have to move. You have similar problems with sand on a beach or a pile of straw where shadows are definitive," he says. "We're working on ideas to solve the problem efficiently but we're not there yet, even inefficiently."

Another problem, he says, is how to improve the algorithm for tracing rays of light and color. "This is a technique to make an image emanate ray light that is traced through the scene. This is slow, even on a supercomputer."

Demos believes "the least under-

"The frontiers that we're pushing are things like trees with their leaves waving in the breeze."

stood problem is how to simulate the effects of light on surfaces. Research has not dealt with the shape of light. In all the history of computer graphics, only point light sources have been considered. We need more full simulation of light, of distributed light sources. Depending on how much people want this, it could happen in a month or in 10 years."

Demos first became interested in computer graphics while an undergraduate at Cal Tech in the late 1960s. There, he was impressed by the films of John Whitney Sr. (see "From FORTRAN to Film," August 1982, p. 76) and met the son who is now his partner. The senior Whitney is considered by many to be the father of computer-generated art.

"When I first got out of school, I got into the field immediately," Demos recalls. First he went with Vector General as a consultant and later joined Evans & Suther-

land. In 1974 he formed a company called Picture Design Group, with Ivan Sutherland and John Whitney Jr., "to work on what we later did at Triple I. We worked at it for six to nine months but were unable to raise money." Thus the move to Information International, where he stayed for six years. "Leaving was a painful experience for me but they were not tuned into our thinking."

One thing both Whitney and Demos wanted at III was more computer power, something they certainly have with the Cray X-MP. Demos says it gives them the capability of cranking out two 90-minute features a year. "Look at Disney. They have been producing on the average of one film every two years." The X-MP handles 320 million instructions per second or 160 million floating point calculations.

Whitney wants more. "The visual problem is computer-bound. We can use every available processing cycle we have, then we're dead up against it. If we continue to follow the plan laid out for the company, we'll have to acquire 100-fold more computing power than we have. I think we'll have an improvement factor of 20 in cost performance in the next five years. We're actively trying to find ways to make that happen."

Demos thinks more computer power would help push some of his frontiers, "possibly the character problem." He sees the main issue though as "people power, good scientific research and thinking. It's like wine, where there's always a market for a small amount of quality product. But, if you decide to produce in mass quantity, you may well suffer in a poor market. We know that cable and tv markets are hungry for programming, but we need to produce quality material for them. If we can, then who knows the amount of power that will be needed."

Both Demos and McKenna would like to see Digital's work move out of the restricted arena of space films. "People tend to think that's all a computer can do. We've got to take off their blinders."

Traditional film production, she says, "is becoming more and more expensive and you know what you're locked into. The cost of computers is coming down and down and our software capabilities are growing. We're not locked into anything. This has a lot to do with the brilliance of our software people and, of course, with Gary Demos and John Whitney Jr. Without them it's a road we could not have traveled."

"Our software is never finished," says Whitney. "Our software team was our first big group and it always will be one of the biggest." Of 60 employees today, Digital has a software team of 12.

McKenna is a strong believer in marrying art and software and she thinks this has been done at Digital. "When I first

came here a year ago, there was a vocabulary problem. We had to create a vocabulary to allow filmmakers to talk to the software people and the technical directors. When we say we want the spaceship to move from here to there and we want it two stops brighter, we can't have a software person saying he or she doesn't know what an f-stop is. We had to teach them the language of filmmaking.

"We have encoded a head and face and we're working on a way to give expression. We don't cover any range of emotions yet, but it's close."

"We're not scientists. We're not likely to go to them [the software people] and say one and one makes two. We're more likely to say one and one makes three and make it happen. We're out from under the constraints of the last 50 years of filmmaking."

Digital scene simulation, says Demos, "gives us the ability to create pictures of objects that are now physically impossible to see." He talks of things moving through themselves. "Gravity is optional. All the laws of physics in a simulated world are optional."

Digital is doing some work for the upcoming *2010*, the sequel to the landmark *2001: A Space Odyssey*, in which the planet Jupiter is simulated. "We've created gaseous motor clouds on the surface, which we can move at any rate. We control the movement of these clouds. No one has ever seen these."

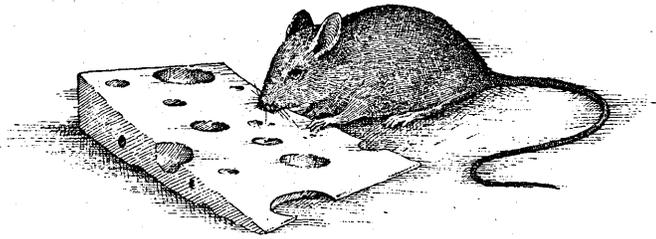
A Demos goal is for digital simulation to one day carry a story line and to be used to create an entire motion picture. "We're close to that, no more than a year or so away."

This would make McKenna happy. "To be able to control the costs as well as the images—as a producer, nothing would thrill me more."

One of McKenna's toughest tasks at Digital has been delivering the message. She travels all over the world talking to filmmakers and advertising agencies who could use simulation effectively in commercials. "It's a real educational process. We've got to open up minds and make them understand that we can build sets, backgrounds, and environments that either cannot be done another way or would be prohibitively expensive. The hardest thing is making people believe what I say to them.

"I once showed a digitally simulated scene to a group, explaining before that everything in it had been digitally simulated and my first question from those who saw it was, 'What part was computer-generated?' I guess I'll have to show them how we do it."

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She probably wouldn't be able to go to far with that. Digital Productions is a company that carefully guards its secrets. Mystery shrouded its part in *The Last Starfighter* prior to the film's release. The company's headquarters is hard to find. It doesn't front on any street, reachable only by a driveway, and bears no identifying sign. It is guarded around the clock and a sign in the lobby greets visitors with the warning that they might be seeing proprietary work and had better treat it as such. Signing the visitor register is tantamount to

signing a nondisclosure agreement.

Demos acknowledges that some aspects of their work "are pretty much jealously guarded secrets. It's a competitive issue. John Whitney and I have had bad experiences in the past."

Whitney believes Digital has a competitive edge well worth protecting. "If anyone else can make any scene that I can make, then I can do it faster and charge less."

Demos believes a key to all this is Digital's "generalistic" approach to digital

simulation. "A flight simulator, for instance, is a special purpose computer. Many simulation people can do great work with special purpose computers but along with that comes inflexibility. At the other end of the spectrum is what we have with the general purpose computer. We have the ability to change what we do, to work through a scene."

Credited by many with being the underlying genius behind Digital Productions, Demos allows that "the code is basically my code, the image creation algorithm is my design. The underlying structure is mine but there have been all kinds of additions, nice things. I'm pleased with what some of our people have been able to do."

He would like, "at some point," to be able to license Digital Productions' software to other supercomputer users.

One project Digital has under way right now is a 3½-minute 35mm movie for the Expo '85 Hitachi pavilion in Osaka, Japan. Whitney and McKenna take particu-

"People can do great work with special purpose computers, but with general purpose ones, we have the ability to change what we do, work through a scene."

lar pride in this, Whitney because some of his father's work is incorporated in it and McKenna because it uses simulation of organic structure.

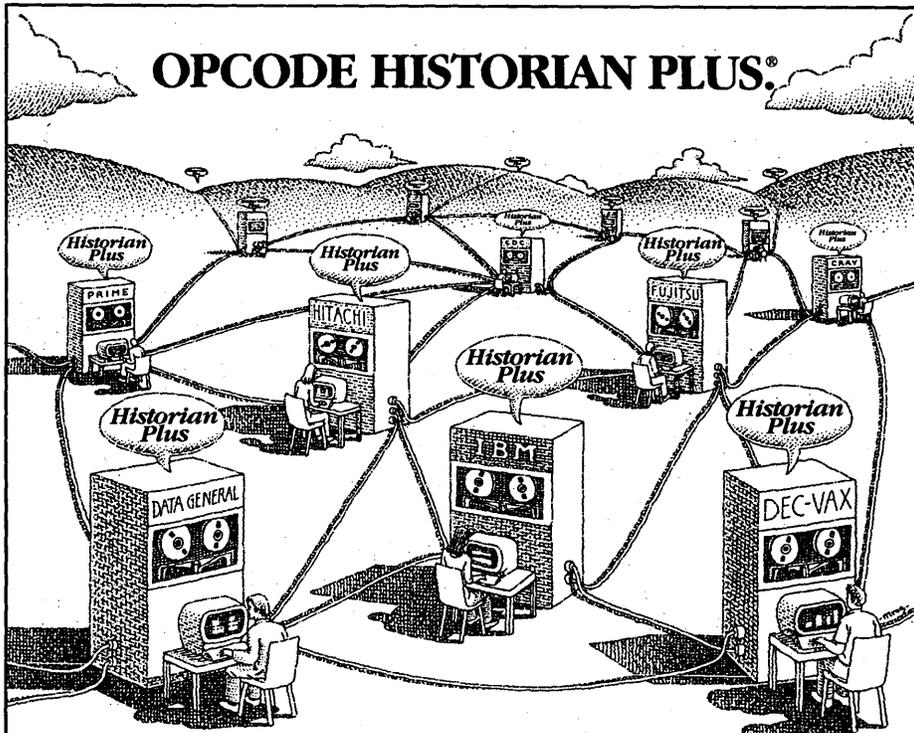
Demos believes what is being done at Digital is harnessing the power of the computer as an instrument for human creativity and interaction.

"Computers as they are today can be converted for much more natural kinds of communication, and one of the steps in doing that is to have them create imagery in a form that we can understand so that it will mean something to us. A lot of large computers, like the Cray, are being used to figure out gas flow, airfoil design, and other structural things.

"There is something physical involved but they still are coming out with just numbers or plots. If the computer came out with a picture of what you were interested in seeing, however, that would be much more natural. It would be like communicating with a scientist who also could paint you a picture."

Whitney believes their use of the Cray could popularize the supercomputer. "It could make it the dp manager's computer. Entertainment is close to the heart of the American people. Anything that puts forth an entertainment experience becomes attractive. As the computer moves more into entertainment, it has greater impact on all aspects of our lives."

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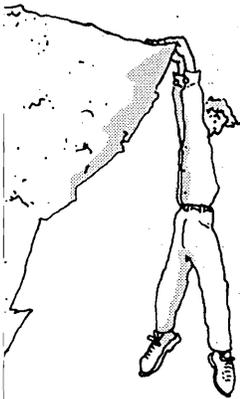
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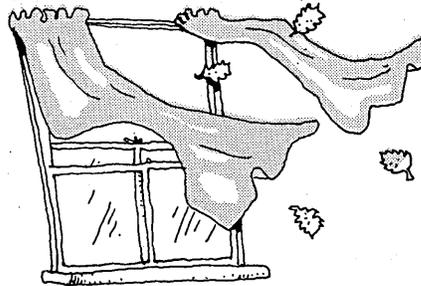
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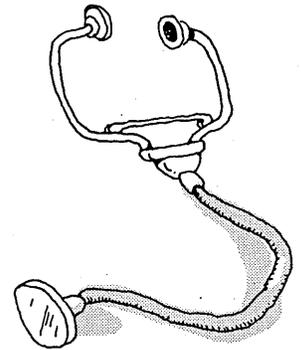
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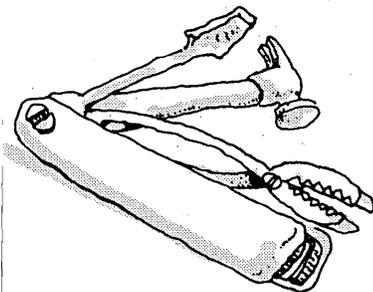
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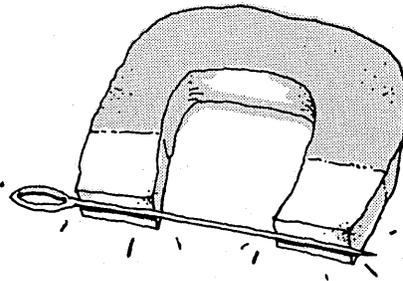
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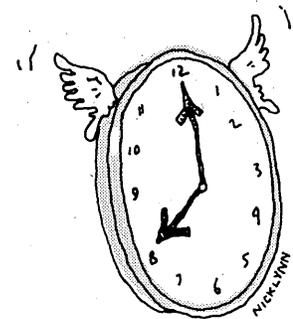
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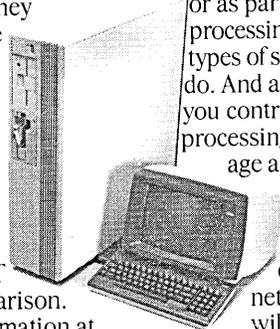
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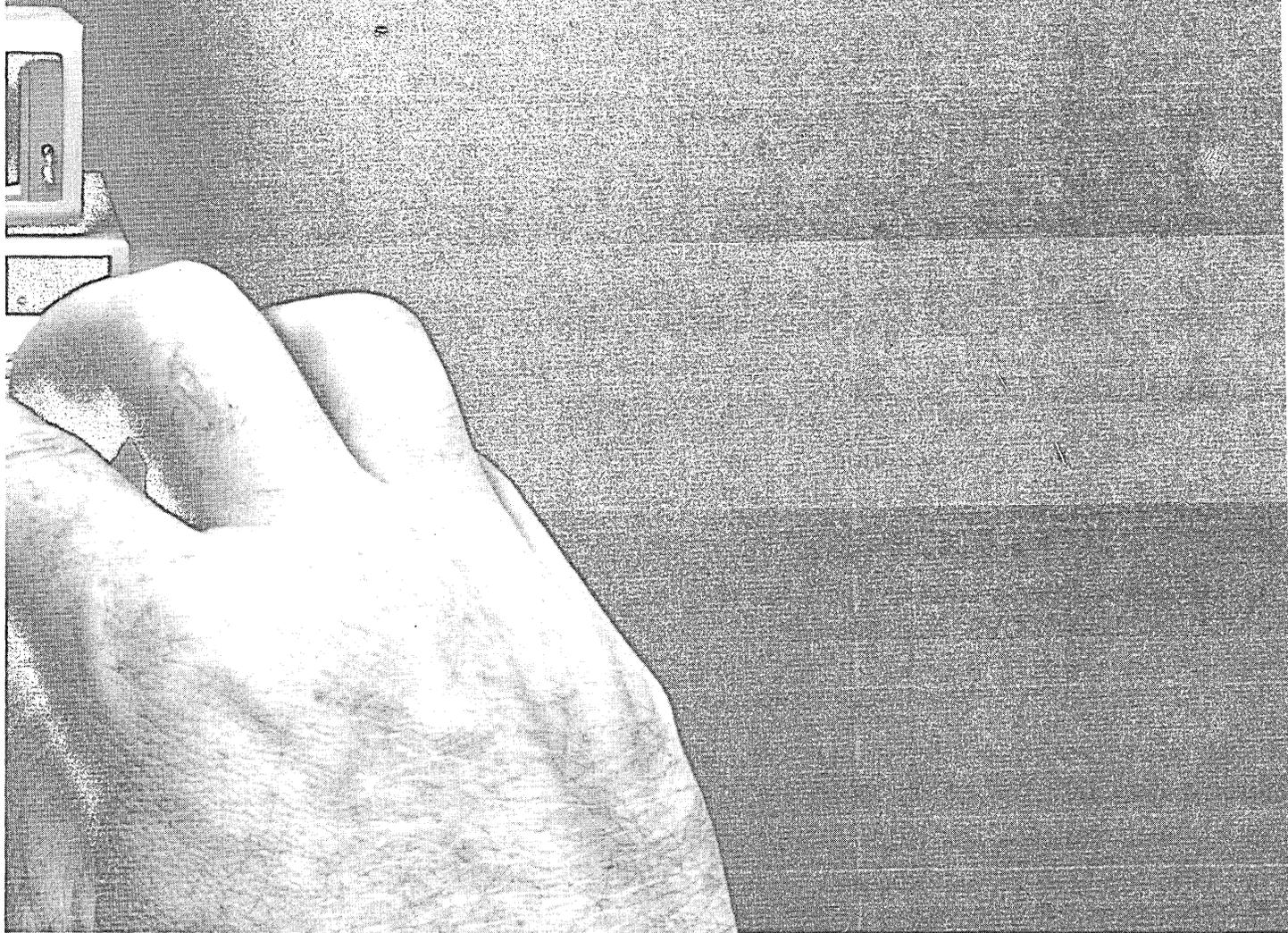
It is powered by the Motorola 68000 one of the most powerful 16-bit microprocessors around. It comes with other guarantees of high performance like a Winchester hard disk and the Intel Multibus.* And it offers you a choice of two operating systems—RM/COS and UNIX.* So it's simple enough for vice-presidents (just plug it in and go) or sophisticated enough for techies (you can do your own thing).

WHEN PERSONAL COMPUTERS AREN'T EXPANDABLE ENOUGH.

Any small business computer will grow as you grow. The question is, how far?

The Tower's storage capacity expand:

PERSONAL COMPUTER NOT ENOUGH.



from 40 million characters to 214 million. Translated, that means it will hold anywhere from 13,000 to 71,000 pages of text (it's not for short story writers) or from 260,000 to 1,420,000 names and addresses (you'd better have plenty of friends).

Even more important, up to twelve people can work on the Tower at once with additional work stations. On different projects. Or the same project.

WHEN PERSONAL COMPUTERS AREN'T ECONOMICAL ENOUGH.

Of course, you may save money in the short run by investing in a personal computer. But if it can't do everything you want it to, it could really cost you in the long run.

What's more, the Tower becomes more

economical as you add more work stations. With eight work stations, for example, it ranges from \$25,000 to \$36,000. Eight IBM XT's, on the other hand, will cost you \$45,000. Networking them all together would set you back even more. And you still wouldn't have anywhere near the power of the Tower.

Quite simply, the Tower gives you something no single personal computer or group of personal computers can: enough power, expandability and economy to handle your business problems. Put another

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NEWS IN PERSPECTIVE

MICROCOMPUTERS

PATCHING UP PCS

Mainframe service suppliers and new firms are jumping into the fight to maintain corporate America's pcs.

by Jan Johnson

It may not look like much of a problem now, the 50 or so nine-month-old personal computers sitting on corporate desktops, performing flawlessly—but wait a while. Wait until 500 or more of those little boxes are installed and users become dependent on them in their everyday routine. What happens, then, when things go down?

For the most part, pcs are still perceived as "hearty beasts that seldom break" and service contracts are a way for "vendors to make a bundle without doing much." Don't kid yourself, warn industry researchers. The nature of the beast is changing. As their numbers climb and as multitasking, micro-to-mainframe connections and easy-to-use software become realities, micros are becoming crucial to office productivity.

"People willingly indicate service and support will become more important in the future," observes Dick Munn, managing director of the Ledgeway Group, a market research and consulting firm in Lexington, Mass.

Most have just entered the early awareness stage. "They don't know what they want," finds Joseph Cleary, manager of Xerox's service business. The first step is education: see what's out there and what is being offered, Cleary says.

Among the better informed are the big boys. Some banks and insurance companies, already facing a battalion of desktops, are toying with handling service themselves. "The larger the installed base of pcs, the greater the tendency toward in-house maintenance," reports Steve Thurston, a principal with Ledgeway Group.

Taking control may sound great, but consider the management headaches and the budget consequences. Even companies that standardize on two cpu brands face an unruly ocean of peripherals from many vendors. IBM's PCs can support several types of monitor—black and white or color, graphics or text—and many brands of printers, plotters, and modems, depending on the application. And don't forget those little slots

in the backplane. There are add-in boards to meet most every whim.

Now the tough questions: How much of what does one stock where? Logistics is always a problem for a company spread across many cities, states, or even countries. How many technical people should be hired? What about the cost of training, diagnostic tools, and documentation for all the parts and components?

That's just the hardware. Without also considering software, how can the service person figure out why Jean in sales can't get her Epson to print? "If you take on hardware and not software you are not addressing the heart of the problem," says Walter Smith, president of Prognostics, a Palo Alto, Calif., market research firm.

It's one thing to do swap-outs and send the broken parts away to be fixed or replaced. "Then you only have to worry about managing a buffer inventory," says Darryl Olson, marketing manager for microcomputer services at Control Data Corp. "It's another thing to get into the repair business, into the big investment in parts, training, test beds, and people.

"Users should look very hard at the question, 'Can we succeed as a service company?' It takes focused attention to

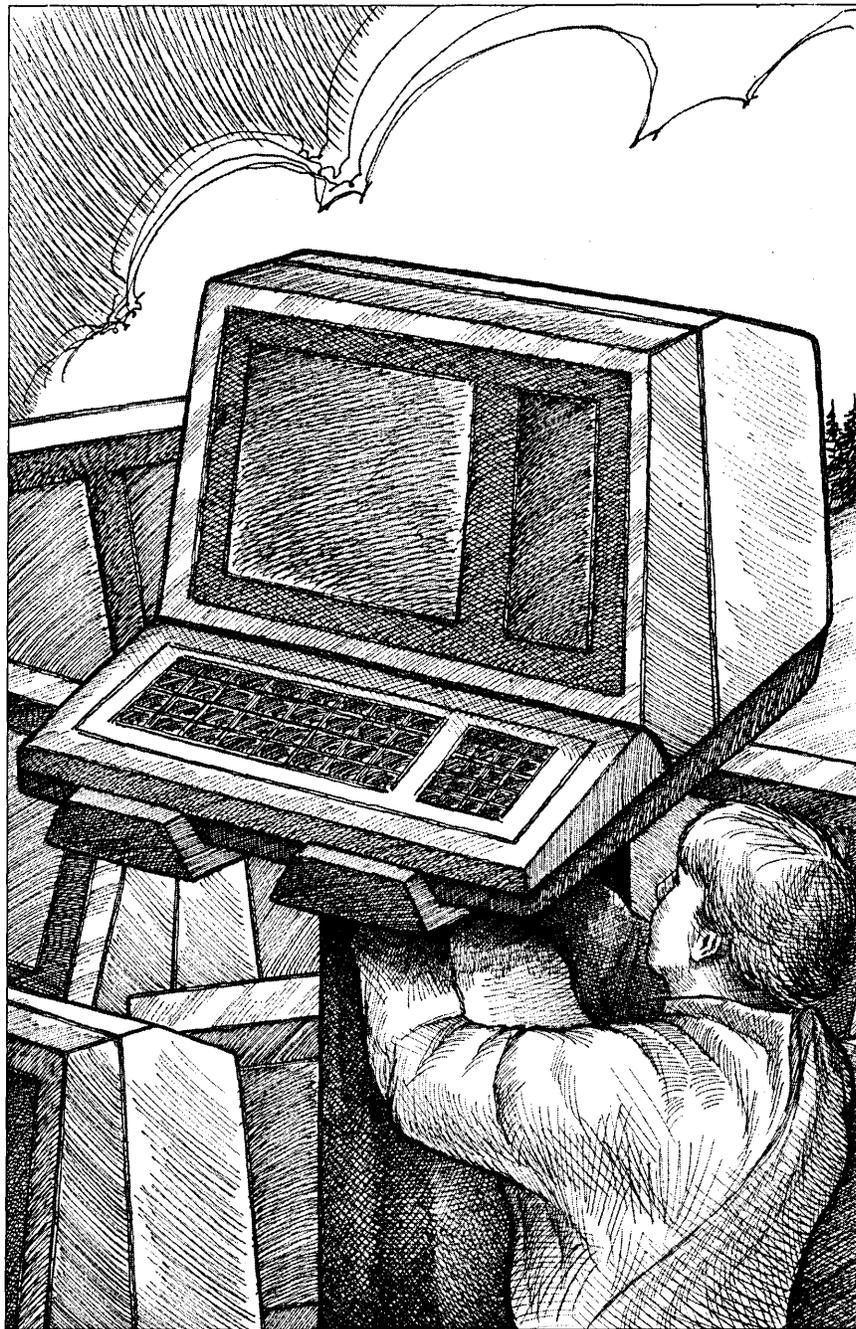
If the in-house service route looks rough, what about buying service directly from the pc vendor?

really do it right," Olson warns. CDC has been in the third-party maintenance business for 14 years, servicing IBM mainframes. It added Digital Equipment products to its list about six years ago. More recently, CDC pulled IBM's Personal Computer products under its service umbrella.

If the in-house service route looks rough, what about buying service directly from the pc vendor? That road is pocked with potholes as well. Most corporate environments are not single-vendor—they are a mixed variety of cpus, printers, monitors, modems, and add-in expansion boards. Most major vendors—IBM and Hewlett-Packard to name two—are not interested in servicing the other vendors' peripherals. That creates a problem for dp managers who aren't interested in dealing with multiple service vendors.

Don't despair. Third-party service companies are falling over each other to fill that gap. TRW, RCA, General Electric, MAI's Sorbus division, and Control Data, old service hands in the mainframe maintenance business, have targeted personal computers as the next big boom.

Easier said than done. Entry into the pc service business has required the vendor to rethink and restructure the way service is delivered.



MAI/Sorbus, in Frazer, Pa., for instance, has added a new distribution channel and a dealer and reseller program, to its traditional business of working with device manufacturers and major accounts. "Those dealers that don't want to get involved with service can turn their customers over to us," explains Mark Schulz, national program manager of Sorbus's micro products program. "Or we can be transparent. The customer deals with the dealer and the dealer turns the equipment over to us for servicing."

Sorbus claims to have 165 field offices, 16 computer repair centers, and 1,900 inventory locations. Although Schulz says it's too early to have numbers

on the pc business—"It's truly in an embryonic stage," he says—he has noticed a trend toward on-site service.

Traditionally, on-site maintenance has been expensive. Typically, the cost of an on-site contract runs about 15% to 17% of the purchase price of the hardware per year, says Ledgeway's Thurston. For the cost conscious there are ways, such as depot service, to slash as much as 40% off the on-site price. Thurston has found that carry-in contracts often run 10% to 12% of the hardware purchase price per year. Other types of depot service include pickup and delivery provided by the service company, and mail-in service.

Volume discounts are available for

both depot and on-site service, depending on the total number of pcs to be covered and where those pcs are located. The fewer the pcs and the farther apart they are, the higher the cost of the contract.

In contrast to Sorbus, Control Data's approach starts with a telephone call. The customer calls a CDC toll-free number with a problem. Working over the phone, CDC technical people try to identify the problem and determine what parts need to be replaced or repaired. Depending on the type of service contract, a CDC service person makes an on-site repair call or the customer swaps out the faulty item, and parts are relayed through a courier or the mail. CDC doesn't offer carry-in service, says Olson. "The sector we are going after doesn't want it."

Prognostics' Smith concurs: "Corporate users, on average, are not interested in anything other than on-site maintenance." That's no surprise, since on-site service offers the speediest remedy.

The goal at CDC is to have a service person on-site within four hours of hanging

Typically, on-site service contracts run 15% to 17% of the hardware's purchase price, while carry-in contracts are 10% to 12%.

up the phone. Depot methods, courier delivery, and mail-in can each take 24 hours or longer. Again, the trade-off is higher costs for quicker turnaround.

Sensitive to the price issue, Control Data has come up with a wide variety of pricing schemes. Customers can opt for noncontract or contract service. Noncontract work is charged on a per-incident basis or on a time-and-materials basis. Within those structures there are price breaks based on mode of delivery: on-site, courier, or mail-in.

Contract customers also have two choices: fixed fee or flexible fee service. Flexible fee is the most creative, offering a hybrid pricing scheme. "First you pay a low annual fee, approximately one third the cost of a fixed fee option," explains Olson. "Then you pay only if and when you need us, on a per-incident basis."

"Flexible fee customers are treated just like fixed fee customers," Olson says, "plus they get a discount on the incident charge because they are on contract. The upper end for a customer is that they will never pay more than 25% over what they would have paid had they signed up for fixed fee service."

Fixed fee is more traditional. A customer agrees to a certain price, which covers a certain period of time and certain predefined items. "We work up the price based on our judgment of the failure rates and the cost of the equipment to replace or

NEWS IN PERSPECTIVE

repair. We don't have a set percentage or list purchase price we work from. Every configuration is different," explains Olson.

Clever pricing schemes and reputation aside, the old hands don't have the pc business wrapped up. Several new names have sprung to life, most notably Serviceland and Xerox's Americare.

While Serviceland may be a newcomer to the business, its founder, George Harmon, is not. Considered by many to be the father of third-party mainframe maintenance, Harmon formed his first company, Comma Corp., more than 15 years ago. It was later sold to Control Data and became the basis of CDC's IBM service business. Prior to forming Comma, Harmon headed up field engineering at IBM.

His latest venture, Serviceland,

Before choosing a service vendor, dp managers should take stock of their corporate crop of cpus, printers, and add-in boards.

headquartered in Westlake, Calif., was formed in late 1982. The first store opened May 1983. Since then, two additional stores in California and one in Texas have opened. Targeting both on-site and carry-in service, Serviceland generally charges 15% to 20% below comparable service from IBM.

An on-site contract for an IBM PC with 64KB of memory, a keyboard, monochrome display, and printer sells for about \$230 per year. Those willing to carry in their computer would pay about \$150 per year.

Acknowledging that bigger companies already are moving into the pc service business, Frank Salowitz, a management consultant in Northridge, Calif., gives Serviceland "at least five to 10 years to grow." Serviceland is a client of Salowitz. Eventually, Salowitz suspects, "throw-away" designs and parts might take their toll on service. "With parts getting cheaper and labor going up, it may make good sense to build in redundancy or throw a keyboard or disk drive out rather than to fix it."

Formed about the same time as Serviceland was Xerox's Americare unit. Today, Americare claims to have 91 service centers nationwide specializing in microcomputer service. Xerox's Cleary believes the decision to specialize in personal computers gives Americare an edge over the traditional third-party vendors. "Sorbus, RCA, and TRW are upstream, servicing mainframes and minis as well. Since we had not been in the third-party service market, we were able to specialize, focus on an area. Others will have to divert resources away from something else."

Americare was one of the first, ahead of Sorbus, to announce a dealer-

oriented program. Americare provides participating dealers with training, advertising assistance, and incentive programs. In return, Xerox expects its dealers to generate at least \$1,000 worth of business per month. "If they sell three service contracts and put through one time-and-materials service transaction," that should cover the requirement, Cleary says.

By affiliating with Americare, dealers are better equipped to bid for major national account business. In the past, dealers couldn't compete. They couldn't offer nationwide service and support. "Now ABC dealership can offer service in Chicago and Des Moines via an arrangement with a local Americare affiliate," says Cleary.

Americare's contract options include on-site repairs, responding by the "next day," and a depot service, either carry-in or pickup and delivery. Turnaround on depot service is 48 hours. Currently, Americare supports the IBM PC and XT and ComuPro cpus; printers and plotters from Diablo, Okidata, and Epson; and several add-in boards and disk drives. Americare does not cover Apple, but is said to be negotiating with Kaypro, and is in "discussions" with Compaq.

About 3,000 dealers have "inquired about" Americare since its grand opening, says Cleary. "We are now in the process of culling those 3,000 to find out how many have been active." Cleary says he'd be happy with 1,500 "active" dealers.

That's phase one, the dealer program. In May, Americare launched its major accounts program. "Our effort there is to go in and try to understand the needs of the dp managers and tailor a service to meet those needs," explains Cleary. "We are not trying to seek fixed packages. Our pricing will depend on such things as the number of systems and their locations." Although Xerox insists its major accounts program is a "separate program for those not serviced directly by dealers," it remains to be seen if dealers will perceive it as a noncompetitive move and continue to support Americare.

That's the lineup of current major players and their offerings. Before choosing that route, or choosing among the vendors along any route, dp managers should take stock of their corporate crop of cpu types, printers, and especially third-party add-in boards. Make a list of the items, and compare it to the product lines supported by each service vendor.

Service companies vary significantly in the range of products they support, the type of service they offer, and their pricing options. The trick is to find the best match at a livable price. Almost all vendors support the IBM PC family. After that they wander off everywhere.

The pure third-party service companies tend to offer the broadest product

choice. Sorbus, for instance, claims to service all the IBM PC offerings, including the XT/370, plus Kaypro, North Star, and the Apple II Plus. Serviceland claims to cover a variety of lines within IBM, Apple, Radio Shack, and Convergent Technologies.

Notably missing from the vendors' support list is Compaq. Although Sorbus and Xerox's Americare group currently do postwarranty service on Compaq machines, Compaq will not sell parts at a discount, nor does it authorize third-party vendors to do warranty service.

According to H.L. "Sparky" Sparks, Compaq's vice president of sales and service, Compaq is reconsidering that position. "There are some large account situations that probably could do better with a third-party service like Americare," Sparks admits.

What he is trying to avoid, he says, is a dealer who farms out all service. He worries that if a Compaq dealer is relieved of warranty service responsibility, "it might not put in postwarranty service. Then where does that leave the person who walks in and buys one or two Compaqs? I'm trying to protect all my end users."

It's odd that with so many players in the market and such a broad base of service options available there is a "marked absence of any major accounts signing with a third-party service vendor," muses industry consultant Salowitz. That will change by the end of the year, predict several vendors. *

DATA NETWORKS

BRITISH VAN PLAN

The United Kingdom finds itself the target of much U.S.-inspired telecommunications activity.

by John Lamb and Paul Tate

U.S. Vendors led by IBM and AT&T are embarked on a grand European Tour, staking their claims to the Continent's developing telecommunications markets. In deals covering everything from data transmission components to network information services, the two American giants are sealing alliances with Europeans that can be used to set up rival trade routes across the Atlantic.

The activity is frenzied. IBM has already teamed up with the German Bundespost for the development of a national videotex system, and it is now talking hard

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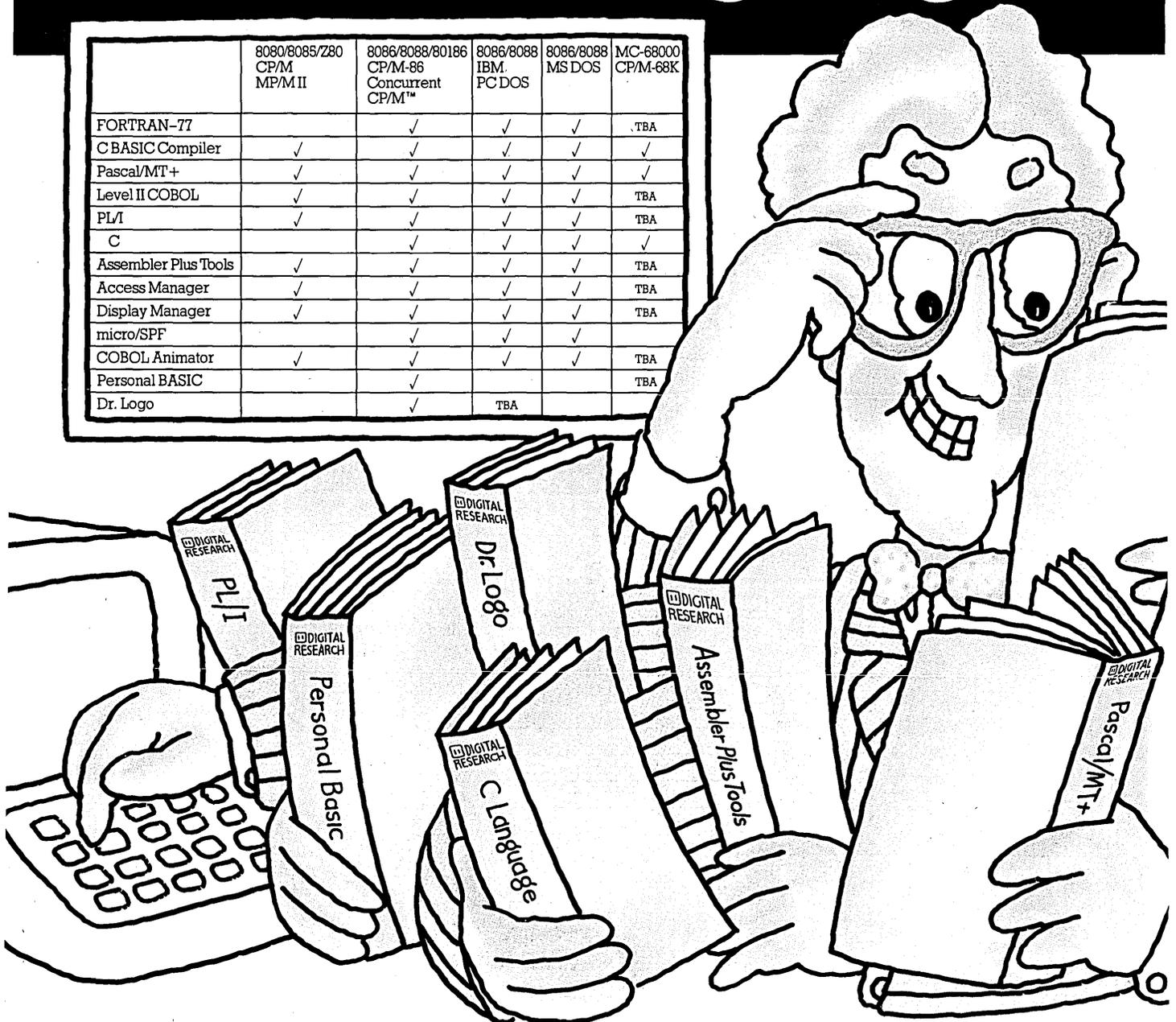
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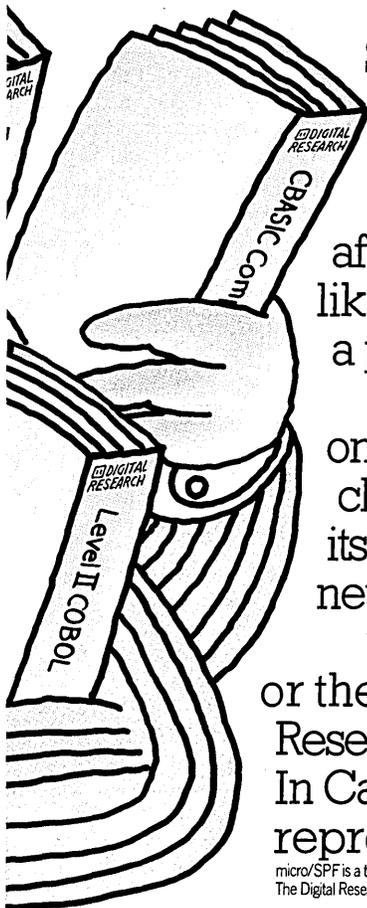
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NEWS IN PERSPECTIVE

with the French telephone authority about a computerized directory system. IBM also hopes for a deal with Italy's Italtel covering telecommunication switches—a worrying prospect for AT&T's prime European ally, the Italian local hero, Olivetti.

Nevertheless, AT&T is well positioned elsewhere. After a disastrous attempt to establish itself with Irish company Telectron, its joint venture to build switching systems with Philips in the Netherlands is beginning to offer products. Now AT&T is seeking to form a joint semiconductor manufacturing company for with Spain's Telefonica. AT&T, a onetime suitor, has also become a major customer of the British semi maker, Immos.

A prime battlefield for this U.S. thrust into European data markets is Britain, where the local telephone authority, British Telecom, is learning what it is like to live with a liberalized market. That is where AT&T has forged its latest cooperative link, with International Computers Ltd. (ICL). The two plan to set up a private network using British Telecom lines and offer value-added network (VAN) services similar to those offered under the Net/1000 name by AT&T in the U.S.

AT&T will supply packet switches, protocol converters, billing equipment, and advice on the installation and management of the national network owned and run by ICL. Early next year, if all goes well, the partners plan to link the British VAN with AT&T's fledgling Net/1000 network in the U.S., giving international customers access to services on both sides of the Atlantic.

ICL already runs several videotex VANS, including one that connects tour operators with travel agencies. More recently, the company won a major contract with the Article Numbering Association (ANA), the organization responsible for bar-coding retail products in Britain, to provide a network for the exchange of invoices and orders between retailers and their suppliers. Called Tradanet, the network will link some 2,000 ANA members and is due to begin operations on the new ICL net at the end of 1985. At peak Monday morning periods Tradanet is to handle some 1.4 billion transactions.

"We have a flourishing private viewdata business that has trebled over the past two years," says Miles Flint, marketing manager of ICL's network services division. "There is a tremendous interest here in VANS of all kinds." Flint predicts that the U.K. VAN market alone will be worth between \$850 million and \$1.1 billion by the end of the decade, with major growth beginning around 1986.

ICL's network will cover five major cities from six nodes using packet switching technology. In addition to the X.25 system operating over 64Kbps lines, ICL will be setting up local clusters of protocol convert-

ers (30 to 35 units, initially), which will feed IBM 2780 and 3780, SDLC, and ICL's own CO3 data streams into the X.25 backbone at a speed of 9.6Kbps. Work on the first three nodes and the Net/1000 gateway should be complete within four months. By the time the network is complete, 85% of the U.K. population should be able to reach it with a local call.

Apart from the retail system, ICL intends to run its own internal applications on the VAN net and is also developing four or five new services, half of which are aimed at multinational corporations.

The reasons behind the sudden upsurge of interest in European VANS are partly technical, stemming from the convergence of dp and telecoms; partly political, having to do with the trend toward deregulation of European PTTs like British Telecom; and partly economic. "A lot of companies are interested in VANS because they have now got cost savings on their internal dp sorted out and they want to apply the same savings to their external trading relations," says Flint.

Britain is up with Europe's best in exploiting network services. The first U.K. VAN, a public videotex service called Pres-

The reasons behind the sudden upsurge in European VANS are technical, political, and economic.

tel, now has over 40,000 subscribers and is being tested as a vehicle for financial and retail services. A home banking service has been running on the system for some time and residents of the Birmingham area can place orders for groceries and other items via Prestel. British Telecom, which runs Prestel, also operates a national electronic mailbox service based on the U.S. Comet system (designed and sold by Computer Corp. of America, Cambridge, Mass.), a security alarm service for homeowners in the southeast of England, and a public packet-switched service.

But these systems are only the first tentative steps in the VAN world. Britain's major banks, known as the clearing banks, are planning a direct-debit-at-the-point-of-sale system that would enable retailers to receive money from their customers directly through electronic funds transfer. That is where IBM steps in. Both British Telecom and IBM are among those negotiating for a slice of this pie, and a decision on the technical and financial details is expected shortly. Satellite Business Systems (SBS), in which IBM has a stake along with Comsat and Aetna Life, has also linked up with British Telecom with the idea of providing satellite links across the Atlantic. In addition, Big Blue has been approached by an independent operator to set up another VAN for travel agents, although a spokesman for

IBM says the firm has yet to make a full commitment.

The involvement of both IBM and AT&T in British VAN developments raises the question of whether SNA or the OSI standards become the network architecture norm for European VANS. Bob Holder, AT&T International's U.K. managing director, is in no doubt that this is an important issue for his company. "The real story behind the agreement with ICL is that there are going to be more VAN nets based on the OSI model," he says. ICL as a member of the European Computer Manufacturers' Association has been committed to OSI standards for some years, and the net it plans with AT&T will embrace the Tradacom's file transfer standards (developed for Tradanet).

Holder believes that once each European country has one or more VANS based on OSI standards in place, they will be open to providing Europe-wide VAN services, although the PTTs have yet to sanction any such move. "If the OSI model is embraced," he says, "the remaining technical decisions become regulatory and political rather than technical."

As far as American firms are concerned, the political aspects of operating in Europe's VAN market could still prove a bugbear. In Britain, the Department of Trade and Industry took over the job of issuing VAN licenses in 1982. Up to that time, British Telecom had a monopoly over such services, although it had done little to actually provide them. The 1981 telecommunications act, however, paved the way for deregulation in U.K. telecoms and was followed the next year by an announcement that the Industry department would issue very low cost licenses for "applicable systems." Exactly what that means, however, is tricky.

To begin with, electronic mail systems that connect subscribers directly to one another are out because the British Post Office has a monopoly on mail, electronic or otherwise. Mailbox systems are allowed, provided they are used for communications within organizations. General Electric Information Services (Geisco), for example, has a special license to operate an international service called Quick-Comm.

The position of computer service bureaus, though, is unclear. Many of the services they offer seem to come under the Industry department's definition of a VAN, which includes customers' databases, archiving, user management packages for accounting and statistics, as well as videotex, protocol conversion, and telesoftware.

"The definition of exactly what constitutes a VAN is a gray area," admits John Taylor, Geisco's director of client services. "We are a solution provider, not a VAN company, and at present, so far as Britain is concerned, we are watching what



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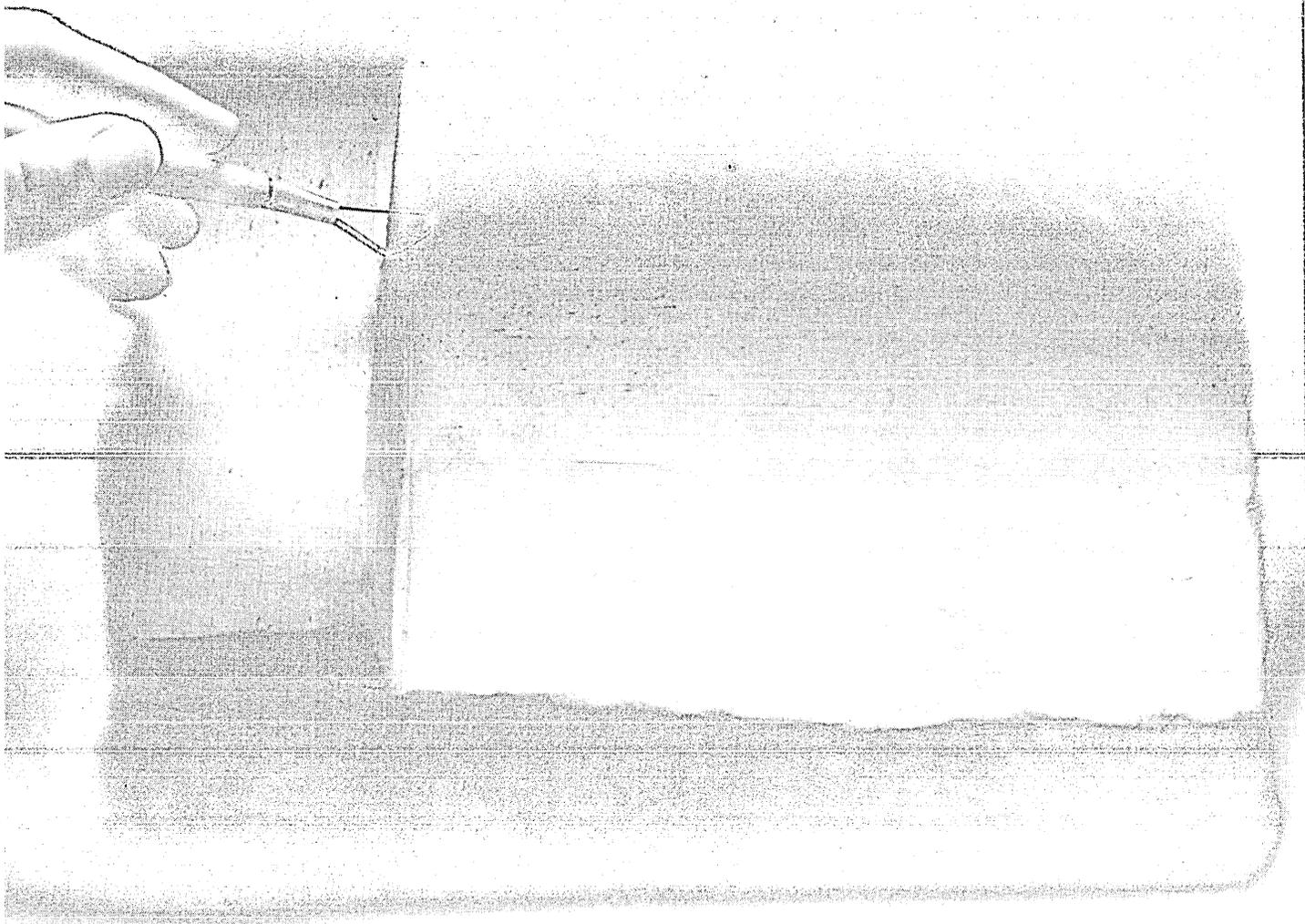


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happens." The company has bid unsuccessfully for several VAN contracts. According to Taylor, Geisco needs no license to operate data exchange services, provided the company is doing some processing, which in effect comes down to adding security features to the service or routing data to several different terminals at once. These activities appear to be a vital part of any VAN service.

The role of the PTT, British Telecom, in all of this is also unclear. The corporation is consulted by the Department of Trade and Industry before a license is issued, although both parties claim the PTT has no power of veto over any particular service. British Telecom, however, owns the very data transmission lines anyone running a VAN would have to use. Geisco's Taylor, for one, sees the question of ownership as a major stumbling block to providing third-party, transatlantic VANS.

"We have a VAN in the U.S. [Market], but we wouldn't be able to link it with a similar one in Britain unless we could find someone to carry it across," he says. "There are no agreements on this." Even AT&T has yet to receive international carrier approval for its gateway between the ICL network and Net/1000 in the U.S.

Whatever the obstacles posed by political and vested interests, it is clear that Europe wants VANS, and hardware, software, and expertise will be bought from the U.S. As U.K. junior industry minister John Butcher said at the time British Telecom lost its U.K. monopoly: "We now have the charge to become the Western world's leading entrepot traders in the growing and lucrative trade of information processing and handling." *

IBM'S IN IN THE RED

The industry leader's remote computing service now has some new software up its sleeve to help it attain profitability.

by R. Emmett Carlyle

It is two years since IBM's Information Network (IN) entered the timesharing and data services market, and it has yet to turn a profit. Analysts estimate the unit has lost hundreds of millions of dollars in startup costs and think it has a long, hard road ahead of it.

The Tampa, Fla., operation,

viewed by analysts of IBM as strategic to its future growth in many lucrative information and communication-related markets, has been troubled by internal squabbles over software that have hindered its marketing efforts. Moreover, some observers say, the operation's objectives have been poorly defined, leading to IBM's stumbling reentry into the service bureau business after a decade away from the game.

As reported (see "Local Nets' Genesis?" March 1982) the coast-to-coast bureau entered the market with a collection of "plain vanilla" services based largely on old APL language products running under the VM/CMS operating system. Internal politics evidently held back the European-written Applications System VM/CMS that had generated so much revenue for IBM's European Data Center (EDC) and which a 1979 IBM task group had recommended as the model for a return the following year to the remote computing services business in the U.S.

Rather than follow the European lead, IBM elected a fresh approach based on developing a front-end applications system for VM. This failed to materialize, however, by the Information Network's slated startup date of October 1981, and the following year the network began its life with a much reduced service and no integrated applications for users.

It apparently became clear to Information Network management in 1982 that some form of AS would have to be offered on the network in order for it to gain customers in key business computing markets. That, of course, meant an about-face for those managers and technical advisors who had voted against the European model, and left them open to charges that they had kissed millions of dollars in revenue goodbye from 1980 into 1982.

"It also opened the door for a chorus of 'I told you so!' in Armonk, where there were warnings against returning to the remote computer services business in any form," says one source.

Another unsavory aspect for the pro-VMers was that they would have to revert to an IBM software product that has been dead-ended in the U.S. for years. That product is Virtual Storage Personal Computing (VSPC), the ugly duckling of the three timesharing systems the company offers, the others being MVS/TSO and VM/CMS. VSPC, however, was the only one at the time that could handle AS.

In retrospect it seems ironic that in IBM terminology VSPC is deemed "functionally stabilized," that is, slated to be neglected in favor of other software. This essentially has been the product's status since 1981, although IBM didn't declare as much until 1983.

Further irony lies in the fact that those IBMers who voted against the task

group's VSPC/AS recommendation, in part because they didn't want to be stuck supporting a limited-support product, would have to do just that if they wanted to mount AS.

Despite the embarrassment for all concerned, the adoption of VSPC/AS early in 1983 was deemed preferable to continued heavy losses, but one further compromise, this time with the Dutch-based EDC, had to be ironed out first. The center had spent millions of dollars building a remote service around EDC, and under no circumstances wanted it to run on IBM customers' own machines. IBM in the U.S., however, had assured its U.S. customers that any time-sharing software offered by the Information Network would eventually be made available for in-house customer use.

The final compromise, sources explain, was a VM/CMS-hosted version of AS (also developed in the U.K.) with less per-

It seems ironic that in IBM terminology VSPC has been "functionally stabilized."

formance than VSPC/AS, but offered to customers as a program product for use on their machines. In addition, third-party use of VM/AS would not be allowed; some of IBM's big U.S. customers are service bureaus themselves and, like Control Data, already license VSPC. Another consideration was that a new sliding price scale would be introduced for VM/AS, which, though competitive with other vendors' offerings, would be higher priced than the remote VSPC/AS version, thus propagating a separate service bureau pricing scheme.

In May this year IBM set a one-time charge of \$50,000 for VM/AS, accompanied by a sliding scale of from \$1,600 to \$7,500 a month as the number of users concurrently signed on to a customer machine increases from 15 to a maximum of 120. In excess of 120, the process begins again, with the customer buying another \$50,000 license.

Once the compromise had been ironed out, VSPC/AS was ready to go live in Tampa. This occurred in February last year, and VSPC moved the Information Network into a net revenue position by the end of calendar 1983. Sources close to the situation claim IBM may have generated as much as \$40 million in revenues over the year. John Steuri, general manager of IBM Information Systems Business unit, which has direct responsibility for the IN, declined comment. So far IBM has not publicly acknowledged the existence of VSPC at Tampa, but some VSPC customers in the U.S. who pressed the company to get AS for their own machines are aware of the true status there.

Says Bruce Millar, supervisor of end-user support at Lockheed, Burbank,

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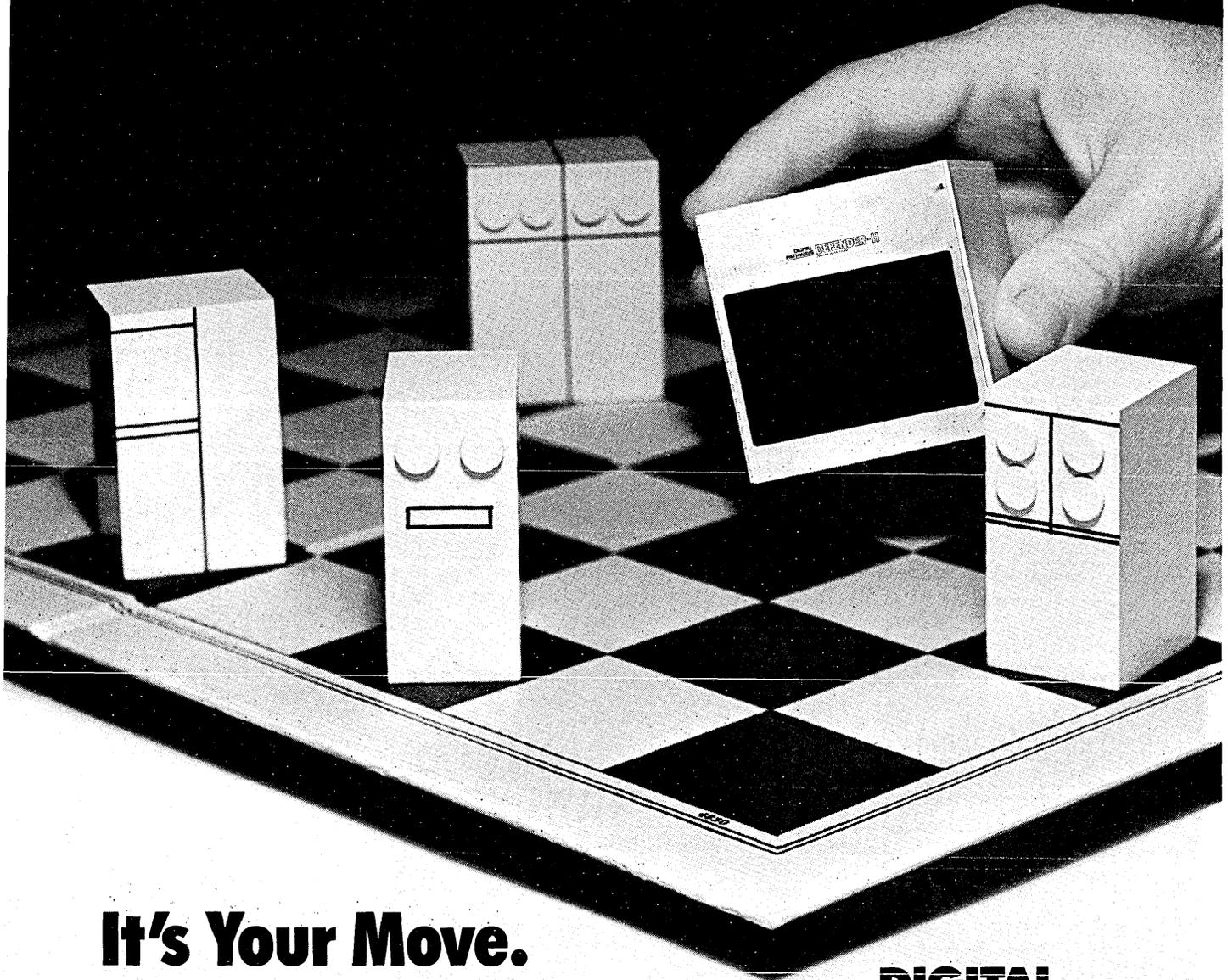
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NEWS IN PERSPECTIVE

Calif.: "We tried desperately hard to get VSPC/AS in-house, but gave up in the summer of 1982. We were told at that time that we'd have to get VSPC/AS from the bureau, and that VSPC would be running it.

But, according to William McCain, a VSPC consultant based in Palo Alto, Calif., IBM is being inconsistent in its policy of not allowing VSPC/AS to be used at customer sites. "I have it on good authority that IBM has made an exception with Sony Corp. in Japan, maybe because of the highly competitive nature of the Japanese market. There may be other cases," McCain says. IBM declined comment.

IBM, which obviously doesn't want to support three timesharing operating systems, has made it clear that now that VSPC has been put on hold as far as future enhancements go, it expects customers worldwide to migrate to MVS/TSO. But there are already signs that powerful users in Europe—like the French-based service bureau CISI and Dutch giant Philips—may band together to push for greater long-term support of VSPC. The chances are less likely of this occurring in the U.S., says Richard Gravois, VSPC project manager at the IBM user group SHARE.

"But by the same token I don't expect everyone to move over obediently to TSO, either," Gravois says.

Charles Parish, VSPC project manager at sister user group GUIDE, says that quite a number of smaller users of VSPC

"We tried desperately hard to get VSPC in-house but gave up in the summer of 1982," says one user.

might not move from it at all. "IBM has quietly let it be known that it expects to have to support VSPC for several more years," he confides.

When IBM announced its stabilization of VSPC, it said there would be one more release of the product, version 2.2. "It's basically to clean out the remaining bugs," says Lockheed's Millar, "because despite its beauty as an end-user system and its ease of use, it has been known to break more than a few times."

Sources say that a cadre of systems programmers from Europe are currently working at IBM's Santa Teresa, Calif., lab to complete the final version of VSPC. "They are mostly fixing bugs, but they are also improving the library system for improved service bureau use, which should keep the IN people happy," confides one.

Through the grafting of VSPC/AS to the heart of the Tampa complex, the IBM Information Network at least has a life-giving infusion, and has now entered a build-up phase. From its original two or three 303Xs, the complex is believed to have built up to some 10 cpus, including 308X

upgrades. About half the cpus are devoted to VSPC/AS—three for customers and two for support, sources estimate. Between 500 and 600 people man the complex, with about 100 of them added last year. IBM declined comment on these estimates.

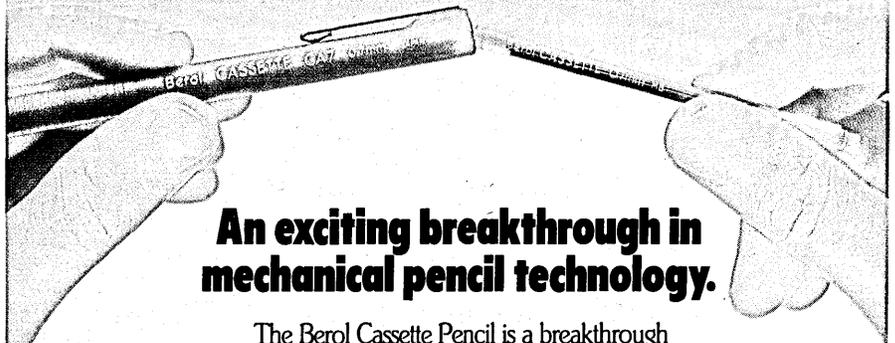
As far as can be determined, the IN will use VSPC for the indefinite future, or at least until it has a VM-based solution that delivers the same performance as VSPC. The first release of VM/AS was described by sources as significantly slower than VSPC/AS. A TSO version of AS is expected in

the latter part of the year and will be offered for sale to customer sites.

There have been other changes, notably the departure of Jim Hewitt, the man who built up the IN and was vice president in charge of the operation. Hewitt was recently moved to IBM's Trintex videotex operation (a joint venture with CBS and Sears, Roebuck) to coordinate an eventual link with IN. He has been replaced by Syd Heaton, former director of information systems.

Sources expect a push by IN of

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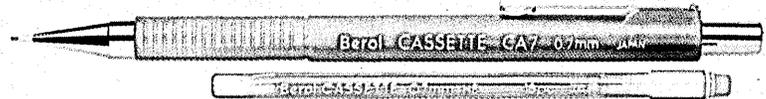


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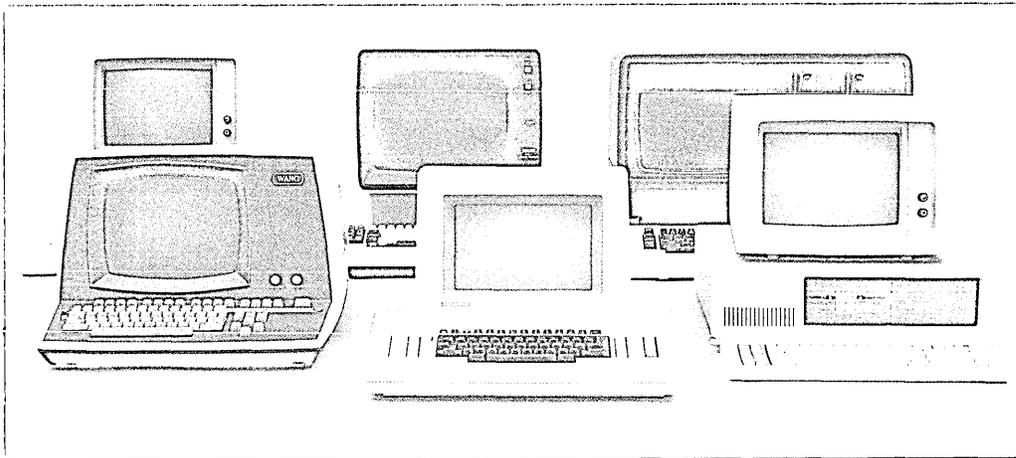
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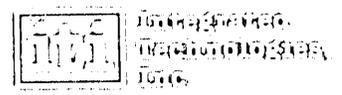
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packaged training and other software through retailers such as Sears, which is involved in the Trintex project. Other former colleagues of Hewitt say he may have been the "necessary scapegoat" that this saga of political intrigue and lost opportunities has created. IBM wouldn't elaborate on the Hewitt move, and Hewitt himself could not be reached for comment.

It's easy, in retrospect, to say that the IN wouldn't have gotten into such a mess if it had gone with the European model to begin with. EDC is tied neatly into SNA (as is

VSPC), whereas there is no such fusion between VM and SNA. In the end, it probably was inevitable that the internal momentum from IBM's technical divisions—an estimated 75% of whose products initially are developed under VM—would be reflected in the use of VM as IBM's premier account control mechanism.

As Lockheed's Millar points out, "Neither TSO nor VSPC has attracted the new software and applications to the same extent as VM/CMS" so perhaps even TSO eventually will fall victim to VM's evolution. But for

the present, it's VSPC that's on the block.

It seems clear that in the U.S., VSPC has reached the end of the line. Richard Gravois sighs that he'll be presiding over the next SHARE/VSPC session as "funeral director." VSPC certainly is dead; it just won't lie down.

In a May "statement of direction," the company hinted that AS will eventually be modified to work with the popular MVS operating system, support the PC, and interface to relational databases managed by SQL/DS and DB2. Further details of these enhancements would be made available in the fourth quarter of 1984, the company said.

IBM watchers generally agree that IBM's Information Network has not lived up to initial goals and that the operation has not been a model of IBM's sleek management style. "The main problem with IN is that it's trying to accommodate too many conflicting objectives at once," says Ken Bosomworth, president of International Resource Development, a Norwalk, Conn., market research firm.

"They figured erroneously that since they were building a large remote computer services vehicle, they might as well pit themselves against AT&T's phantom Net/1000 and get into the timesharing business as well," Bosomworth says. He notes that many market forecasters have predicted a rosy picture for remote computing services, a picture he doesn't agree with. "IBM may have been seduced by the prospect of easy pickings."

The insurance network is one of IN's bigger successes.

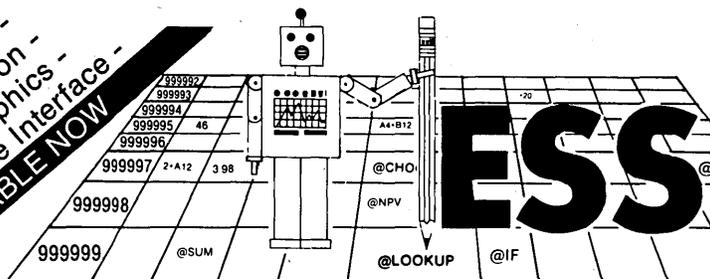
"IBM's idea," says Tim Tyler, a Palo Alto, Calif., consultant, "is to use such revenue to underwrite more ambitious plans to turn the Information Network into a vast network management vehicle sitting at the hub of big customer networks." He sees IBM's current project of building a value-added network for the insurance industry, the so-called Ivans network, as a trial run for bigger fish like the medical industry, which last year contributed 11% of the GNP.

The insurance network is one of the bigger successes for IN, which beat out AT&T on that firm's own turf to win the multimillion dollar contract. The network is designed to connect insurance agent offices to the home offices of insurance underwriters. IBM designed the network to handle data streams from a relatively wide range of machines and has stated that the insurance net's design is "generic" and thus applicable to many other industries.

IBM also says it has "several score customer processors and more than 7,000 terminals" attached to its network. Some "9,000 users are presently being serviced by the network," the firm claims.

Observers see IN as the backbone of

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many future offerings for the company, particularly in areas where datacom and processing are to be effectively combined.

Ulric Weil, industry analyst at Morgan Stanley, New York, suggests that IBM is "rethinking" IN's positioning in the marketplace and has decided that the network cannot be "all things to all people."

"Rather than adopting an Ivans approach to the brokerage community, IBM has bypassed it to build a network with industry leader Merrill Lynch. It could pick off other industry leaders in the same way," Weil says.

According to Al Berkley, an analyst at Alex. Brown in Baltimore, Md., pioneering new applications means more than just selling AS. "My impression is that IBM has brought little entrepreneurial verve to its new enterprise. It is turning its nose up at the small database companies that want to sell through IN in favor of soliciting only the large applications like Ivans. I know of numerous innovative startups that IBM has cold-shouldered. As a result the company hasn't yet put up anything compelling for its customers to use."

IBM may disagree, but it evidently has some work to do in polishing IN's image as well as beefing up its network's offerings. *

ARTIFICIAL INTELLIGENCE

SOVIETS AIM FOR 5TH GEN

Not to be left out of the race for future computer systems, the Russians have begun their own advanced computing effort.

by Paul Walton and Paul Tate

At a Moscow trade fair in the fall, the Soviets will announce their third five-year plan for computing. Running to the end of 1989, it will involve a strong collaboration between the USSR and the other six East European partners in the Council for Economic Mutual Assistance (CEMA). Part of that plan will highlight fifth generation technologies.

Fifth generation computing, as defined by the Japanese when they began their own efforts under that title in 1981, is to employ so-called artificial intelligence techniques to make computers easier to use and able to mimic several characteristics of human intelligence. The hope is to make machines that can speak, understand verbal communications, make inferences, and

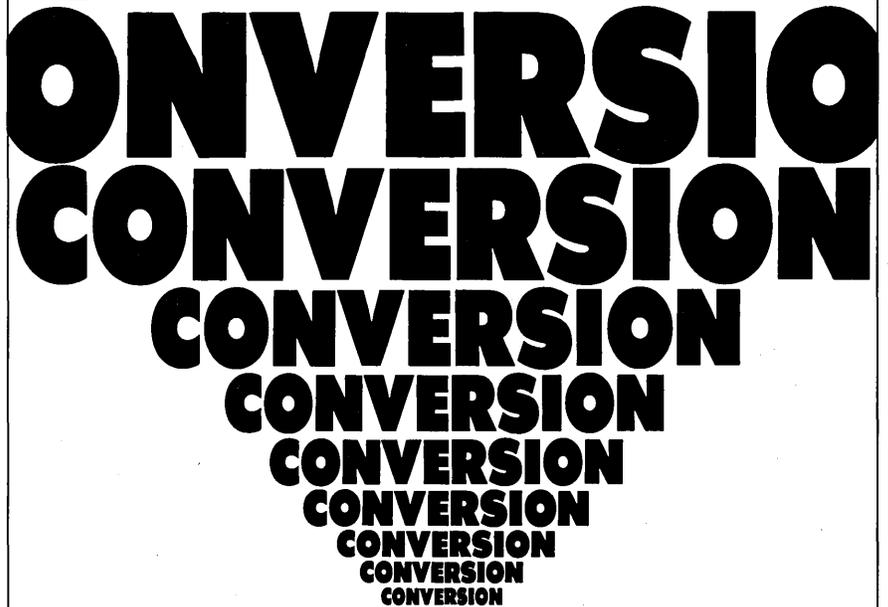
generally deal with "knowledge" instead of raw alphanumeric data.

The Moscow Academy of Sciences, which will coordinate the Russian program, confirmed that it will cover five strategic areas: design and manufacture of VLSI microprocessors, development of parallel and multiprocessor architectures, design of operating systems to better support logic programming, creation of problem-solving software and development of expert systems and user-responsive applications.

These goals are similar, if less am-

bitious, to those set out by the U.S. Defense Department in its Strategic Computing Initiative, which aims to design futuristic computers for battlefield management and to provide guidance for "autonomous" weaponry ("DARPA's Big Push in AI," Feb., p. 48).

According to the Moscow Academy, the Russian plan will be backed by an initial \$100 million of state funds, and a spokesman stressed it was very much a "civilian, not a military, initiative." What is more, one official explained, the academy



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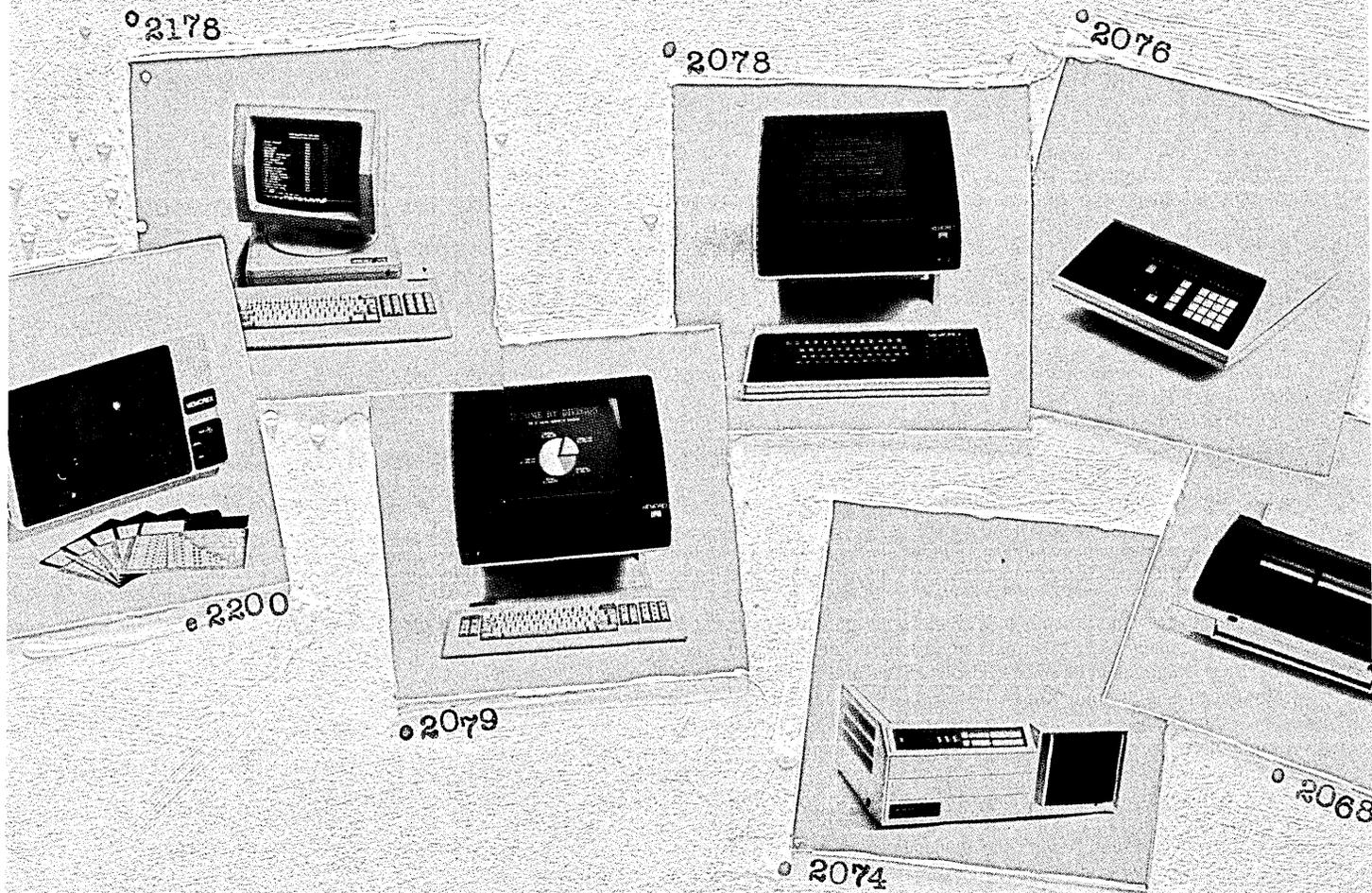
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NEWS IN PERSPECTIVE

would like to "offer our ideas and work together [with the West]."

One cannot expect to see U.S. AI research groups, particularly those in the highly military Strategic Computing effort, volunteering their work to the Soviets, however, and Western observers have already criticized the plan as underfunded and impractical, given the current state of Soviet technology. The low funding, which is five or 10 times less than the amounts planned to be spent by governments and major firms in the U.S., Japan, and Europe, does not surprise some Soviet watchers. "It's a very modest sum to spend, but that is my information too, that they are going to announce very modest moves in public," comments Malcolm Gotterrer, professor of computer science at Florida International University.

"To a certain extent," admits Gotterrer, "they could still sit back and let the West do the development work and then take advantage." After all, he adds, the

"We have overcome problems of no less complexity such as the creation of the atomic bomb and space rocket technology."

usual role of the academy is simply to do the necessary development work to interface Western advances into the local computer culture.

Yet, according to the academy, the new program is definitely one of innovation. Academy delegates have been scouring the Eastern Bloc for state-of-the-art researchers for nearly two years, and they have been seeking collaborations with nations like Japan.

Befitting its political and international status, the CEMA project will be run by the International Committee for Computer Engineering (ICCE), an influential technology body based at the academy. ICCE already coordinates computing among the other six European CEMA members, East Germany, Bulgaria, Rumania, Czechoslovakia, Hungary, and Poland. In 1982 these countries and the Soviet Union agreed to pool R&D resources in an open-ended commitment to a joint computing effort.

Some observers say, however, that despite ICCE, technical cooperation is often less than cordial between Soviets and their Eastern Bloc allies. The Poles, Czechs, and to some degree the Hungarians are still reticent to work too closely with the Soviets.

Officially ICCE is led by General Giorgi Constantinovich Scribn, general secretary of the academy's scientific section. But observers believe that the real architect of the fifth generation program is Yerengyi Velikhov. He heads the newly formed Informatics, Computer Technology, and Automation Division of the acade-

my and is viewed as the Soviet's foremost computer scientist.

The academy's foreign relations department described Velikhov's new "advanced computing division" as the home of the new project. He has a team of some 150 staff and it appears to be a young team. One observer suggests that up to 80% of these researchers may have graduated from universities only within the last five years. The division was formed by merging research teams previously scattered across the USSR, with the primary criteria for acceptance being the ability to support state-of-the-art research. Good researchers are few and far between, whichever country you are in, and due to the lack of experts, the Soviet specialists may also be called on to do more conventional development to keep the existing industry afloat.

In fact, these fifth generation projects are only part of a much wider scheme for computerization that the Eastern Bloc governments have now deemed necessary for their economic and military survival. In these respects, this scheme is no different from many others being operated throughout the world. The president of the Academy of Sciences, Alexi Alexandrov, set the new tone in the Soviet approach to computer technology in an article published by the workers' newspaper, *Izvestiya*, in January this year. He called for the "investment of significant state resources" to develop "information technology, computers, and automation for all spheres of activity."

He claimed that the socialist countries have the automation technology, but that they must carefully plan "the computerization of the economy" so as not to waste vast resources. He is well aware of the chronic shortage of skilled staff and the lack of an educational system to train them, and he concludes that the next generation of computers must therefore be simple to apply, reliable, and cheap.

According to Alexandrov, developing that next generation of computers is of paramount international importance—close to another space or missile race—and he hints that the East/West trade embargos on high-technology goods are beginning to bite. "The U.S. has imposed the strictest embargo on the import into our country of electronic technologies and techniques, hoping to slow or even halt our progress. . . ." he wrote. "However, in this they have forgotten we have overcome problems of no less complexity, such as the creation of an atomic bomb and space rocket technology. Our science and technology was able to develop these by itself, and in a short time as well."

Some might argue with such claims of self-sufficiency, recalling the Soviets' dependence on U.S. and British atomic secrets and German rocket research, but a spokesman for the Moscow Academy

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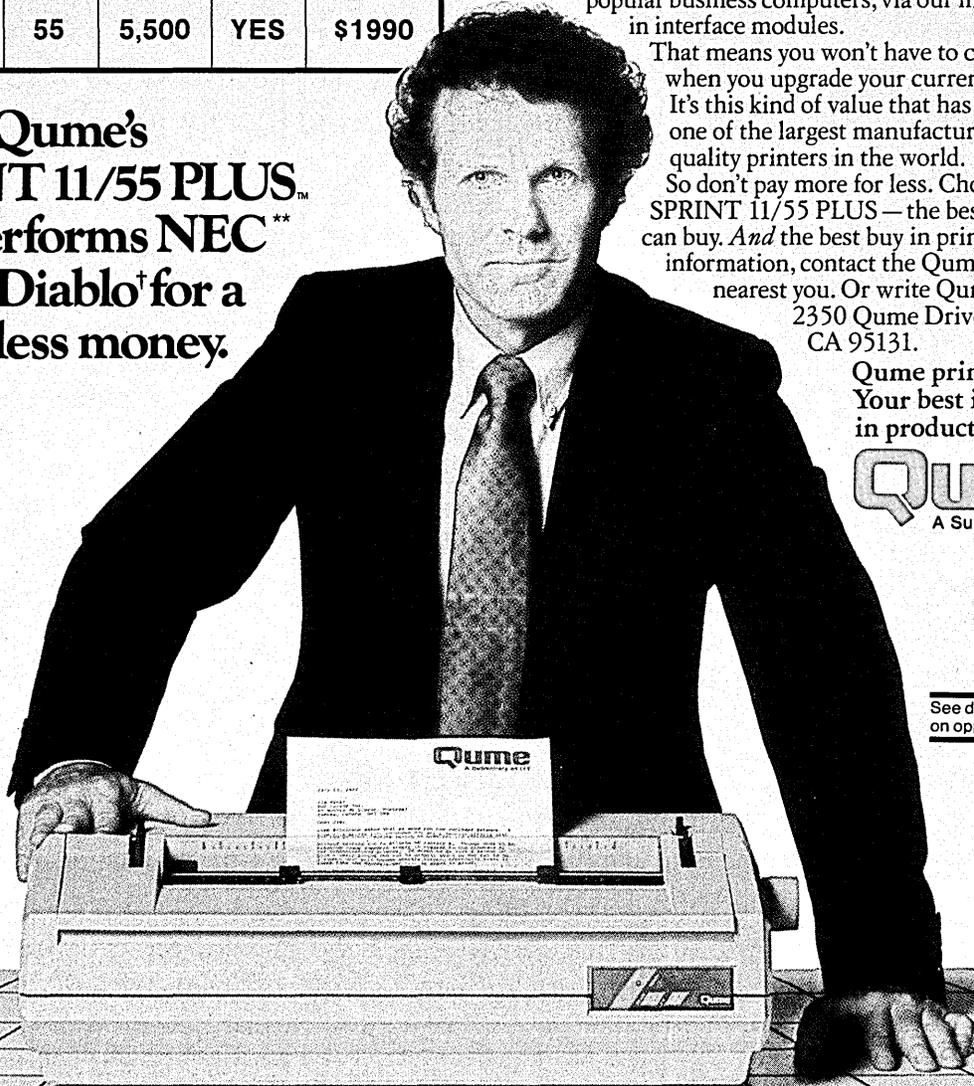
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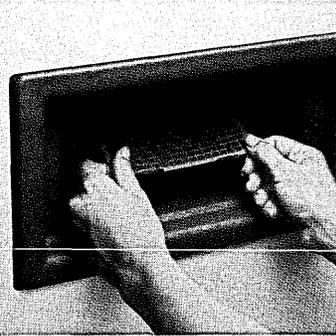
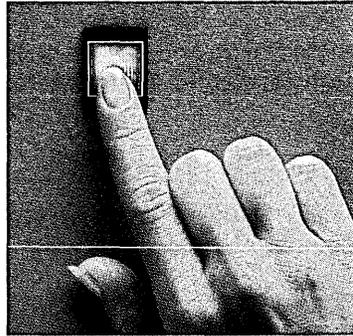
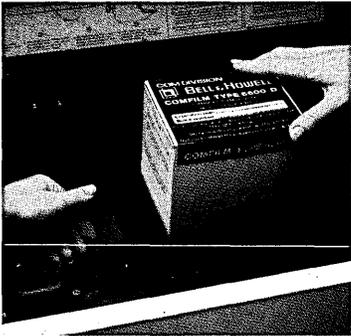
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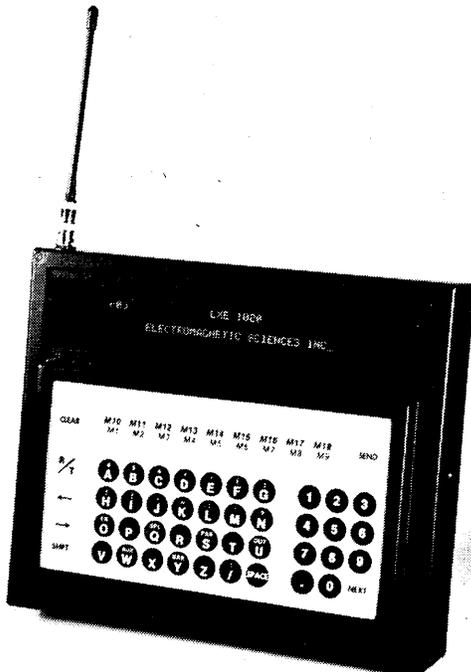
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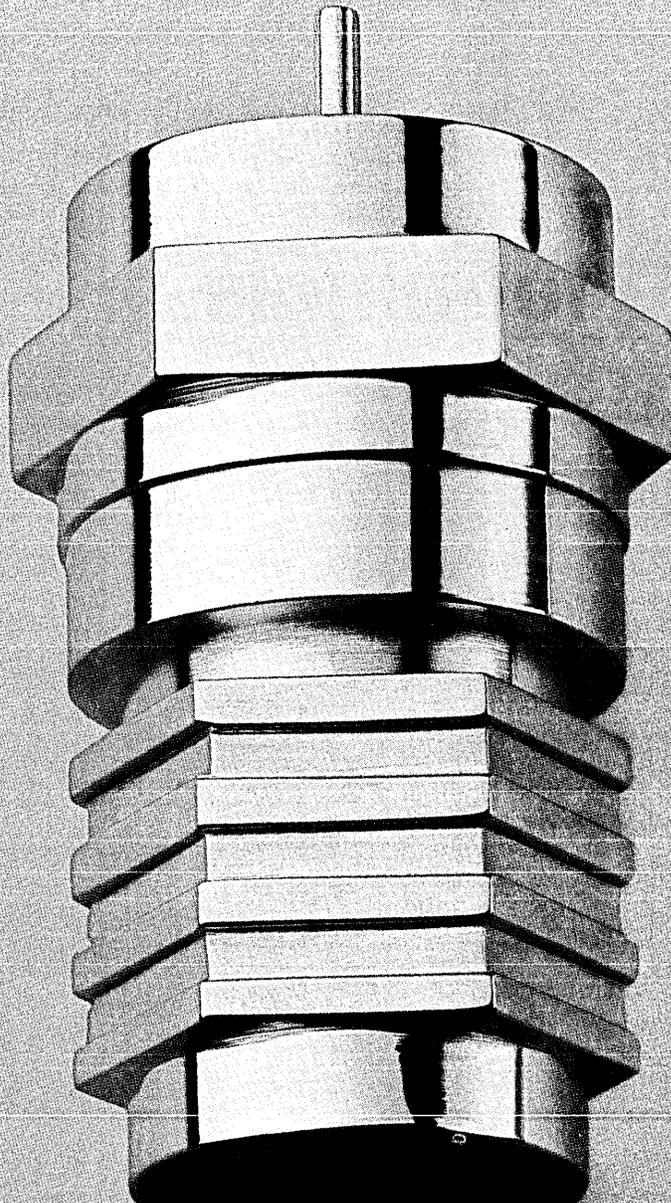


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NEWS IN PERSPECTIVE

states: "We think we can become self-sufficient in these new technologies in ways in which we are not in the technologies around today."

That statement says a great deal about the problems now facing the Eastern Bloc's computer industry. It is not self-supporting, it is hampered by limited production facilities, and it is sorely lacking in innovative dynamism. Soviet specialists, say sources, are just as adept at solving technical problems as their Western counterparts, but the essential difference is that the Eastern Bloc does not have the industrial or market infrastructure to stimulate or support advanced developments.

What is more, there is much less of a tradition of indigenous development in socialist countries. Following competent advances in the '50s, there has been increasing dependence on imitations of Western technology over the last 20 years. The Ryad mainframe range with its IBM 360-like design, the DEC-copy SM series of minicomputers, and more recently the Agatha personal computer have much in common with the Apple II, and each is a key product of the Soviet industry.

The policy of imitation has been a two-edged sword for the Soviets, according to Seymour Goodman, professor of management information systems at the University of Arizona. "It is doubtful that the So-

The Soviet Union is planning another revolution in October, only this time the new hope for the future is not first generation communism but fifth generation computing.

viet industry would have been able to come as far as it has in the past 15 years solely on the basis of domestic efforts," says Goodman, "although the domestic efforts needed to acquire and assimilate Western technology should not be underestimated. Nevertheless, the overall gap between the Soviet and principal Western industries and user communities is growing."

In a draft memorandum on the Soviet industry prepared for the Center for Strategic and International Studies at Georgetown University, Goodman also points out that the research environment doesn't lend itself to innovation. "The Western computer-related R&D community functions in a milieu that is inconceivable in the USSR. A large part of the inability of the Soviets to innovate on any broad and deep scale is due to the lack of experience with, and exposure to, a huge, world class, dynamic user community."

Not all observers are as convinced as Goodman that the Soviets lack technical initiative. John W. Kaiser, a Washington-based researcher, argues that the Soviets

and East Europeans are "right up there with us and the Japanese [on some fifth generation technologies]. You talk to anyone who's dealt with the Russians and they tell you that they are working on the same problems as we are—at least intellectually, even if they can't make things like we can."

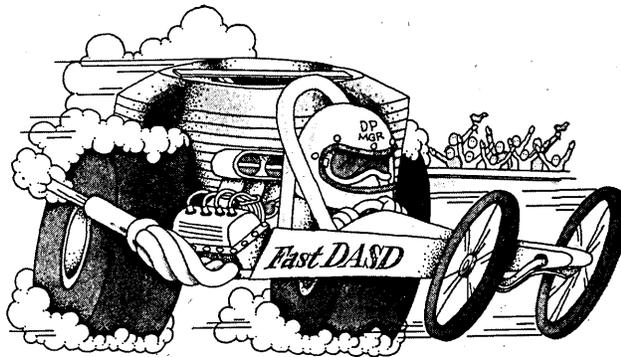
Certainly they suffer from a shortage of up-to-date computer aided design and chip making equipment, thus hindering their VLSI work, yet what they have they seem to use productively. Soviet copies of U.S. chips are even imported to the U.S. to

supply the present industry famine for 64K dynamic RAMs for Intel 8080-family microprocessors. The U.S. importer asserts that the Moscow Academy now has a prototype 256K dynamic RAM "to match anything in the West."

British Soviet industry researcher Paul Snell at the University of Birmingham adds that the Eastern Bloc "might not be at the forefront of technology, but they are producing their own unique chips, not just copies." He has identified some 15 families of native Soviet chips from patent listings.

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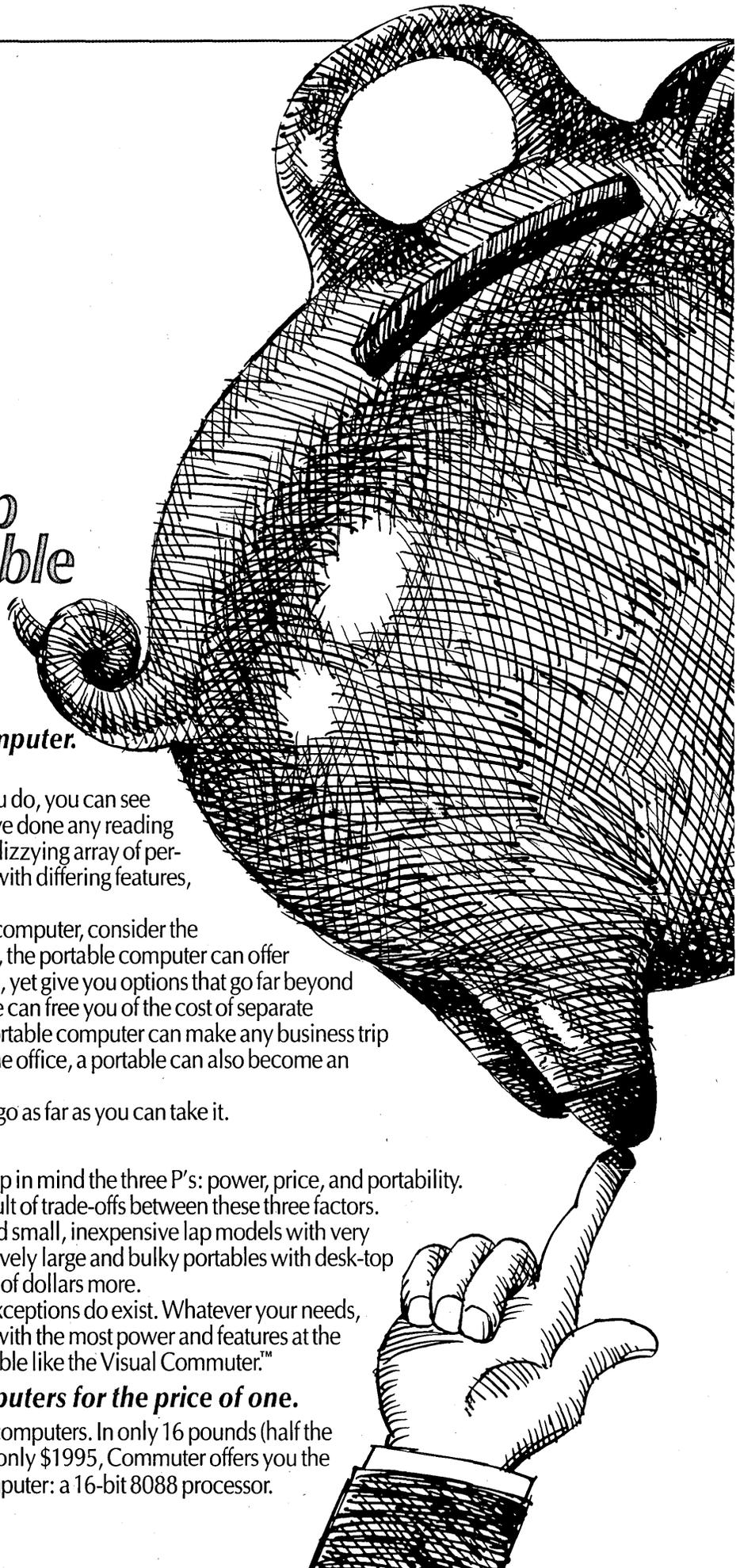
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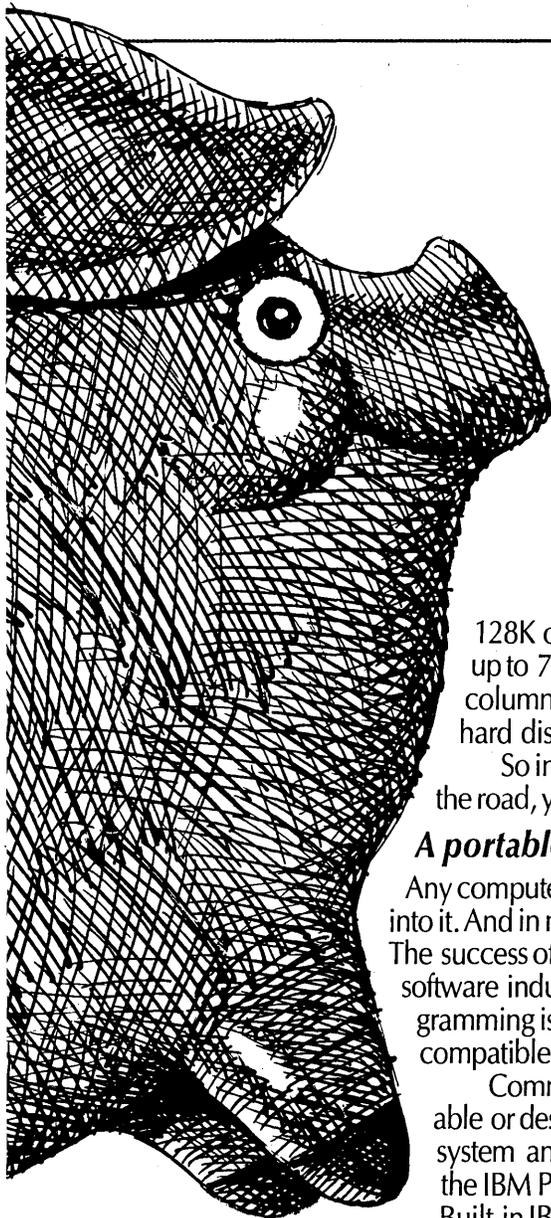
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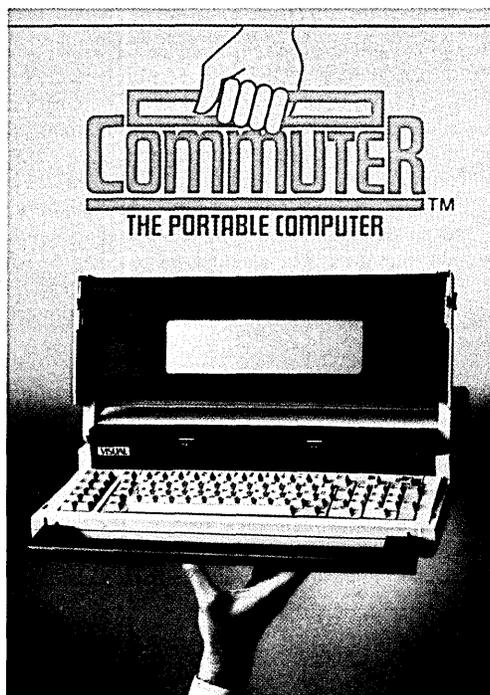
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CIRCLE 39 ON READER CARD

NEWS IN PERSPECTIVE

There is also some considerable disagreement over the Soviet's capability in hardware design. Snell argues that over and above current microprocessor architectures, "the Soviets would seem to be ahead of the world in some respects." According to other analysts, many of these so-called advances are little more than rhetoric. "I have heard them claim the parallel application of off-the-shelf 8-bit chips as an advance," scoffs one.

Nevertheless, the Soviets built a parallel processor machine for process control applications called Elbrus in 1977, and in the new plan they have the well-advanced Hungarian Prolog researchers, of which there is a growing number, to help them.

Again, however, these Eastern Bloc teams will face the formidable inertia in the Soviet industry, whatever they manage to develop, and perhaps the international cooperation the Academy of Moscow says it wants is as much to ensure further development of their own research as it is to glean ideas from outside the bloc.

Whatever the level of success of the Soviet effort, its announcement will add a new dimension to the international race for dominance and independence in the computer technology of the '90s and beyond. At worst, it will give a much needed fillip to Soviet R&D. At best, it could provide the kind of systems that would make it easy for the Eastern Bloc to institute a massive computerization scheme in both the commercial and scientific fields, and help to open up international trade routes. In any event, workers on fifth generation projects in Japan and, especially, in the U.S., will watch its progress closely. *

BENCHMARKS

BARS BOEING: Investigators from the U.S. Department of the Interior accused a Boeing Computer Services unit of obtaining and benefiting from confidential bidding information in competing for a \$5 million contract from the National Parks Service. As a result, BCS's Federal Systems Group has been barred from receiving federal government contracts at least until next May. The Parks Service contract has been rescinded as well. Government investigators found that BCS officials had helped write some of the criteria that were later used to choose the winning bid, and failed to disclose the conflict-of-interest violations to the government. Investigators also charged that Boeing had obtained parts of documents submitted by competitors in the bidding competition. Under federal law, Boeing can be barred from competing for any government contracts if a federal agency finds evidence of major legal or ethical violations in obtaining a previous contract. Interior Department sources said that the

matter will probably be turned over to the Justice Department for possible prosecution. No other BCS units were named in the charges.

BOWING OUT: Raytheon Co. has called it quits in the commercial data processing business, having decided to close down its Data Systems division, which showed a \$24.3 million loss last year. Approximately 1,600 workers are to be laid off. The company evidently suffered the onslaught of IBM's 3270 and PC marketing efforts as well as extreme competition in the word processing market. Raytheon entered the dp market in 1971, building terminals and minicomputers. Word processing was added in 1977 when Lexitron Corp., Chatsworth, Calif., was acquired. With the write-down of inventory and other closing costs, Raytheon Data Systems is expected to show an after-tax loss of \$95 million. Part of the division's troubles were said to stem from delays in shipments of a workstation from Convergent Technologies, a situation that is understood to have affected other office systems and terminal suppliers. Data Systems contributed less than 10% of Raytheon Co.'s total revenues, the majority coming from weapons systems.

BACK SCRATCHING: IBM and Cray Research have entered into a nonexclusive cross-licensing agreement covering information processing patents. While not unusual in the dp marketplace, the agreement gives added weight to speculation that IBM is readying its own entry into the supercomputer sector. The agreement covers existing and future patents through Jan. 1, 1989. No money was exchanged, according to Cray, which said this is the first deal of this kind it has signed. Cray could benefit from having access to IBM patents covering 370-type processors, which Cray might need in order to build front ends to its vector processors. "As Cray further expands into the commercial world there are more opportunities for us to hook to front ends in ways unique to a customer's environment," a Cray spokesman said.

QUITS OLIVETTI: John Douglas, president of Docutel/Olivetti Inc., resigned his post after the banking systems firm reported a \$26 million gross operating loss for the year. He was replaced by Giovanni Fei, formerly president of Olivetti of Japan and 30-year veteran with the Italian company. Fei will take office June 30. Docutel/Olivetti reported that its net loss for 1983 was \$18.3 million, compared to a \$6.7 million profit in 1982. While the loss was expected, analysts say, the severity of it was not. Some \$10.1 million of the loss was due to inventory write-downs, the company said, while \$8.1 million came from increases in accounts-receivable reserves and \$3 million

was due to the reorganization of the company following the Docutel-Olivetti merger in 1982. Douglas said only that he was leaving "to pursue other interests." Fei has served with Olivetti as manager of the company's European division, as general director of British Olivetti Ltd., and chief financial officer of Docutel/Olivetti.

TROUBLE AT FRANKLIN: Still recovering from its courtroom traumas of the past year, Franklin Computer Corp. lost its president and vice president of manufacturing. Avram Miller and Vabarem Erdekian resigned in the wake of Franklin's agreement not to use certain software in its Ace computer line that Apple Computer charged in court violated its copyrights. Since that agreement, Franklin has had difficulty selling the Ace line of micros, and recently cut its work force by 70 employees, bringing the total to 480. It reported sales of \$71 million for its fiscal year ended March 31, 1984. R. Barry Borden, Franklin's co-founder, chairman, and ceo, will replace Miller as president, and vp of research and development William L. Sydnes will take over the manufacturing post.

WINS STORAGE PACT: Control Data Corp. snared a contract with AT&T Technologies Inc. to manufacture the disk and tape drives for AT&T's 3B line of computers. The contract, one of CDC's largest ever, is worth \$540 million over at least three years. Control Data and AT&T would disclose neither the exact length of the contract nor the names of other firms that competed for the contract. (Industry sources, however, believe that Storage Technology Corp. was close to winning the contract.) Under the agreement, CDC will manufacture three disk drives, including 14-inch Winchester drives for the 3B superminis, and 5¼-inch drives for the 3B2 desktop model. CDC will also provide AT&T with tape drives and media. CDC said deliveries under the contract had already begun, and the total volume would be in the tens of thousands of units.

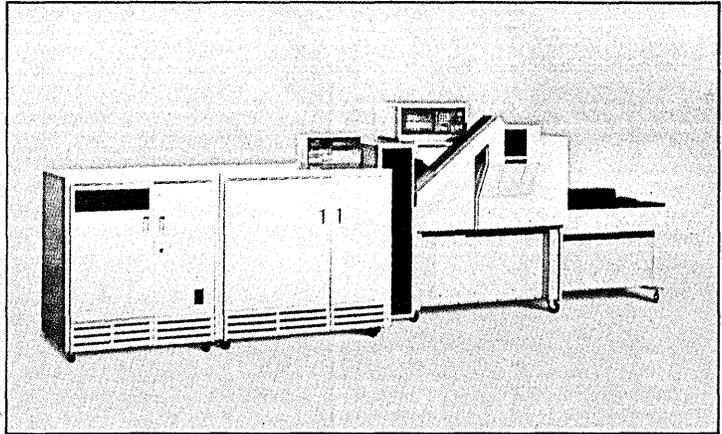
INDEFINITE DELAY: Amdahl Corp. has indefinitely delayed manufacture and shipment of two models of its 580 series IBM-compatible mainframe. The top-of-the-line 5880 and 5868, both multiprocessors, have been stopped in favor of smaller attached processor models just a month and a half before first customer shipments were to have been made. The company said it had received little demand for the high-end cpus but had strong demand for the smaller machines. Little effect on revenues was foreseen by the company. The 5880 had already been delayed twice when the company said it would have to put the machine through further testing. Amdahl said it would now be able to devote more manufacturing resources to smaller cpus. *

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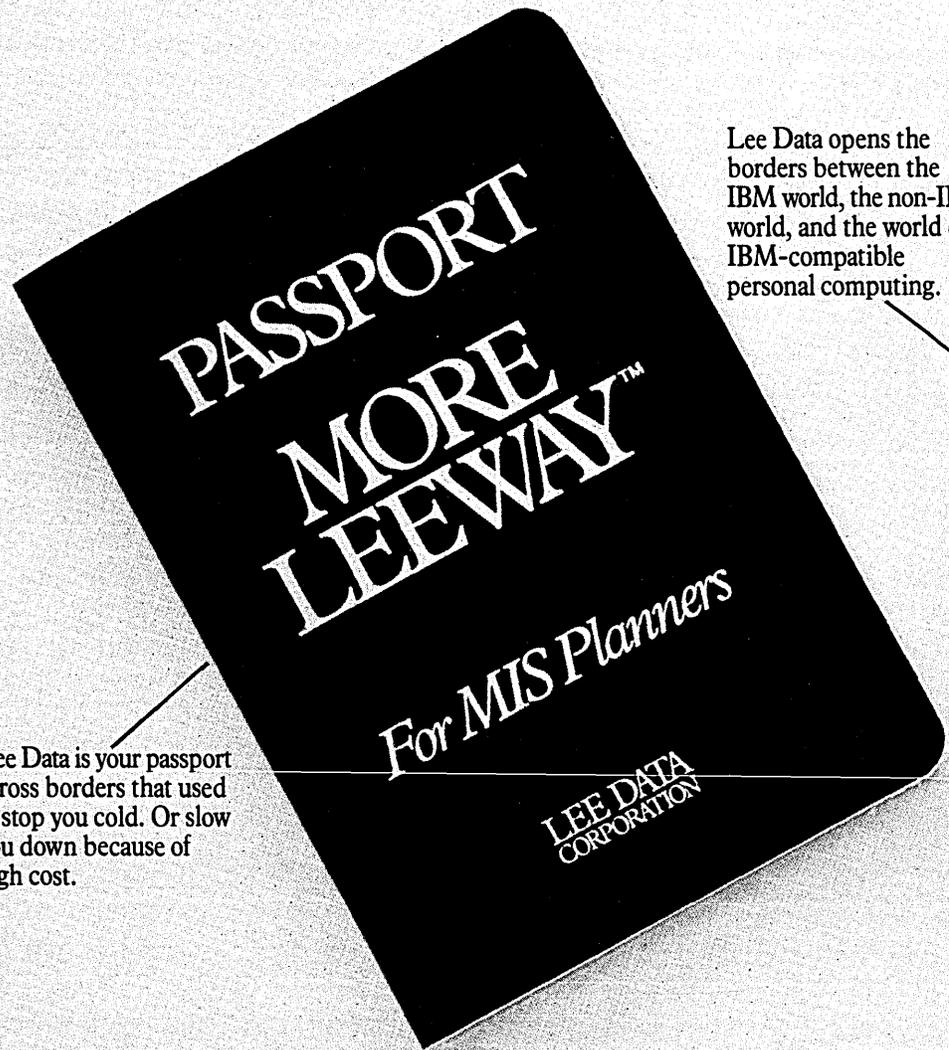
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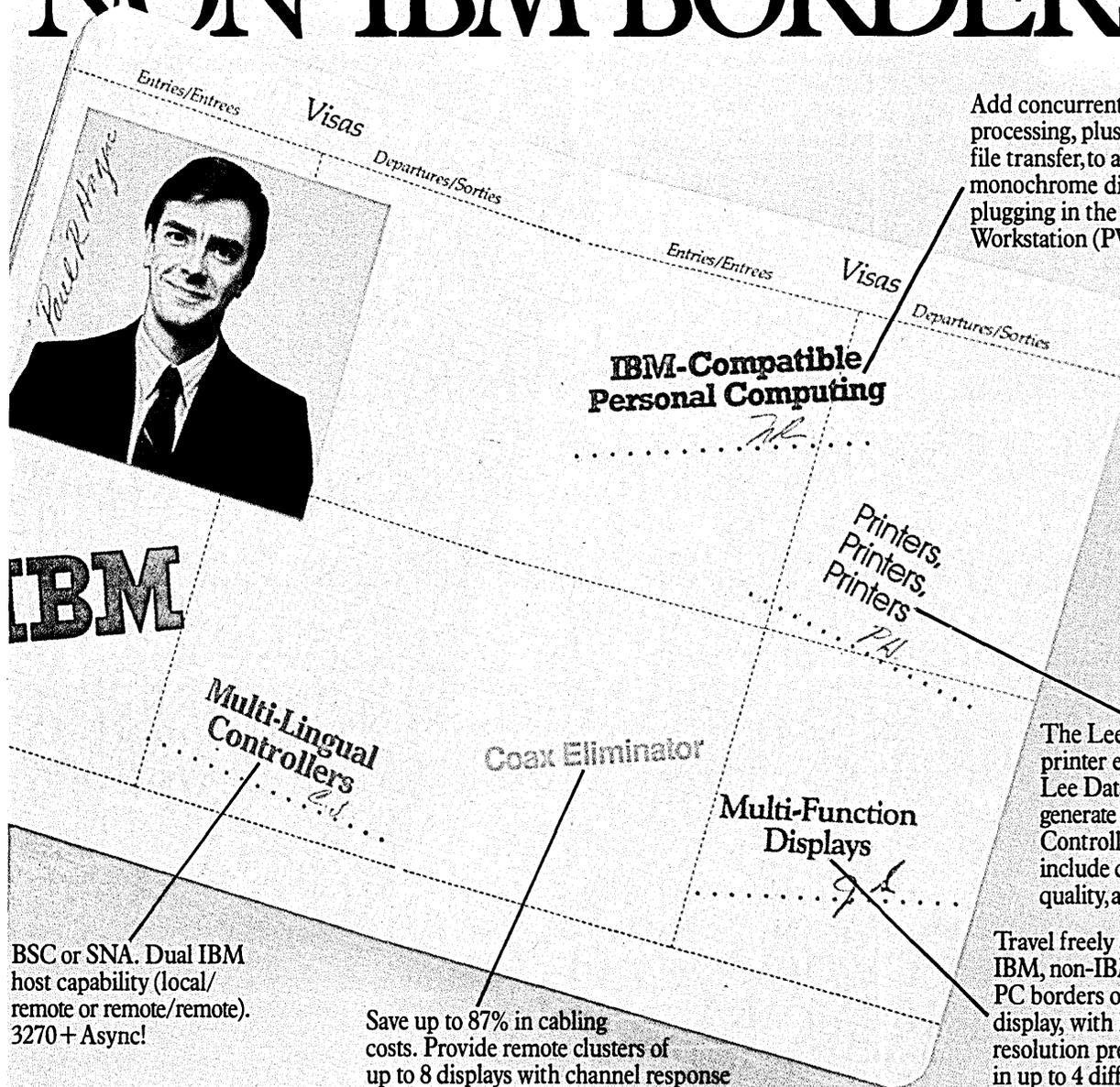
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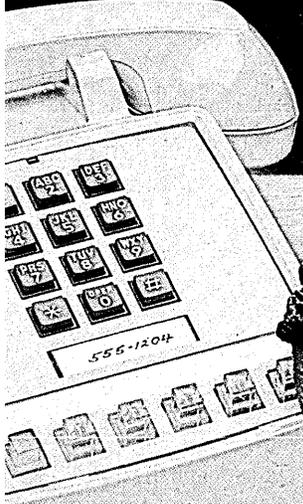
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The din and smoke are impressive. But what's really at stake in the war of the workstations?

THE BATTLE FOR THE DESKTOP

by Michael Hammer

According to late reports from the front, the desktop is about to become the free-fire zone of the office. The war of the workstations has been joined. Every vendor in existence (as well as many just moving into or out of that state) is seeking to capture the real estate atop managerial and professional desks. Like Arnold's "ignorant armies that clash by night," vendors are locked in a fearsome struggle, "swept with confused alarms of struggle and flight." Each believes it has the magic formula that will make its device as common a managerial tool as a Cross pen and pencil set: voice/data integration, bit-mapped screens, built-in coffee makers, pointing devices, etc., etc. What concerns me is that the innocent bystander is usually the major victim of flying shrapnel.

The term "workstations" itself is, of course, both posturing and misleading. Its vagueness allows everyone to use it without fear of contradiction or FTC suit. Humpty-Dumpty must have had it in mind when he told Alice, "A word means precisely what I want it to mean, no more and no less." The proliferation of workstations and of workstation companies has far exceeded the bounds of good taste. Even the venture capitalists, never known for self-restraint in the face of tasteless phenomena, have cottoned on. I recently heard one fund manager describe a business proposal he was reviewing as JAWS—Just Another WorkStation.

DIORAMA BY KATHY JEFFERS/PHOTO BY WALTER WICK

No man is an island; neither is any workstation.

As the Buffalo Springfield had it, "Something's happening here/And what it is ain't exactly clear." Is this all just another of the mass delusions that seem to afflict the computer industry when the moon is full? Or should we, in fact, be preparing for a major onslaught of devices onto desks and into briefcases? And, if the latter is true, what ought we do about it, and what will be the impact on our overall information system environment?

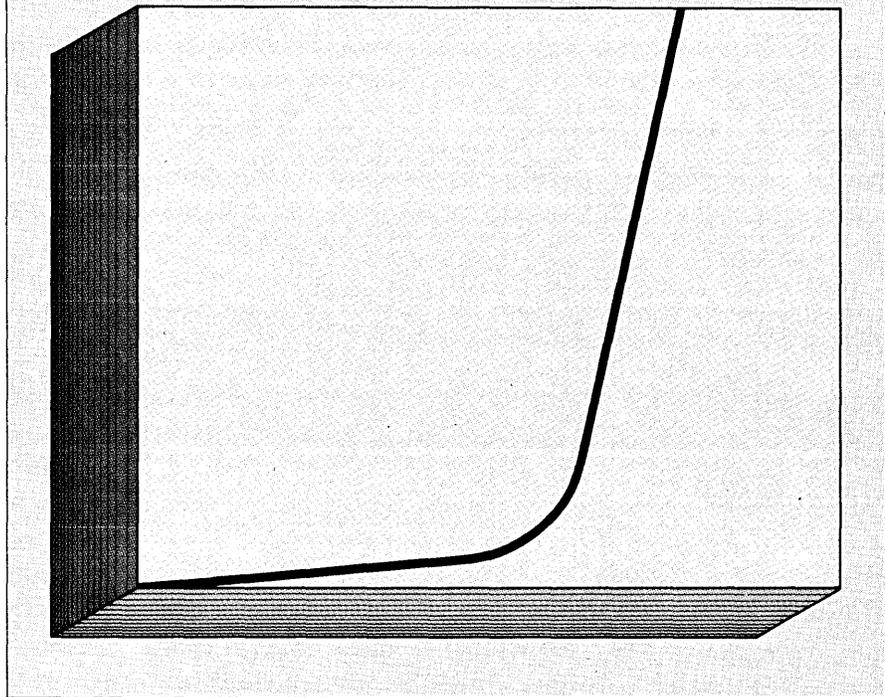
In order to come to terms with the issue, we need to begin with a reexamination of the fundamental question in the area: what is a workstation really for? The answer to this turns on a distinction between classes of computer applications and computer system beneficiaries, which has been obscured by some recent terminology. While the advent of the personal computer has had an enormous and salutary effect on the information systems arena, the phrase "personal computer" has sown widespread confusion. There is nothing personal or impersonal about any computer; what is important about the pc is that it is *cheap*. Because it is cheap, it can be acquired by individuals or by small work groups; because it is cheap, its resources can be expended on providing a palatable user interface, rather than on simply getting the job done; because it is cheap, it can be employed on a single-user basis, thereby providing the high degree of interactivity that we have come to expect from pcs. The term "personal" should be applied to certain applications, not certain machines.

PERSONAL, INSTITUTE BENEFITS

Although the picture is actually a bit more complex, we can usefully distinguish between *personal* and *institutional* computer applications. In a personal application, the beneficiary of the system is the actual user of the system, as an individual. A manager who uses a spreadsheet program to compute his budget more rapidly and thereby gets to have dinner with his family, or the professional who uses a word processor to produce a document that is a better representation of his work, are both deriving personal benefit from their applications. The clerk who is the user of an order-entry system derives little or no personal benefit from that system; the real beneficiary is the corporation, which is spending less to process orders, or is shipping its goods faster. Note that the beneficiary of an application is quite a different issue from the platform on which the application runs. There is no inherent reason why a personal application might not run on a corporate system, and vice versa. On the other hand, there is nothing personal about a safety deposit box accounting system that happens to run on a microcomputer lo-

FIG. 1

HAMMER'S GENERIC GRAPH



cated in a branch bank.

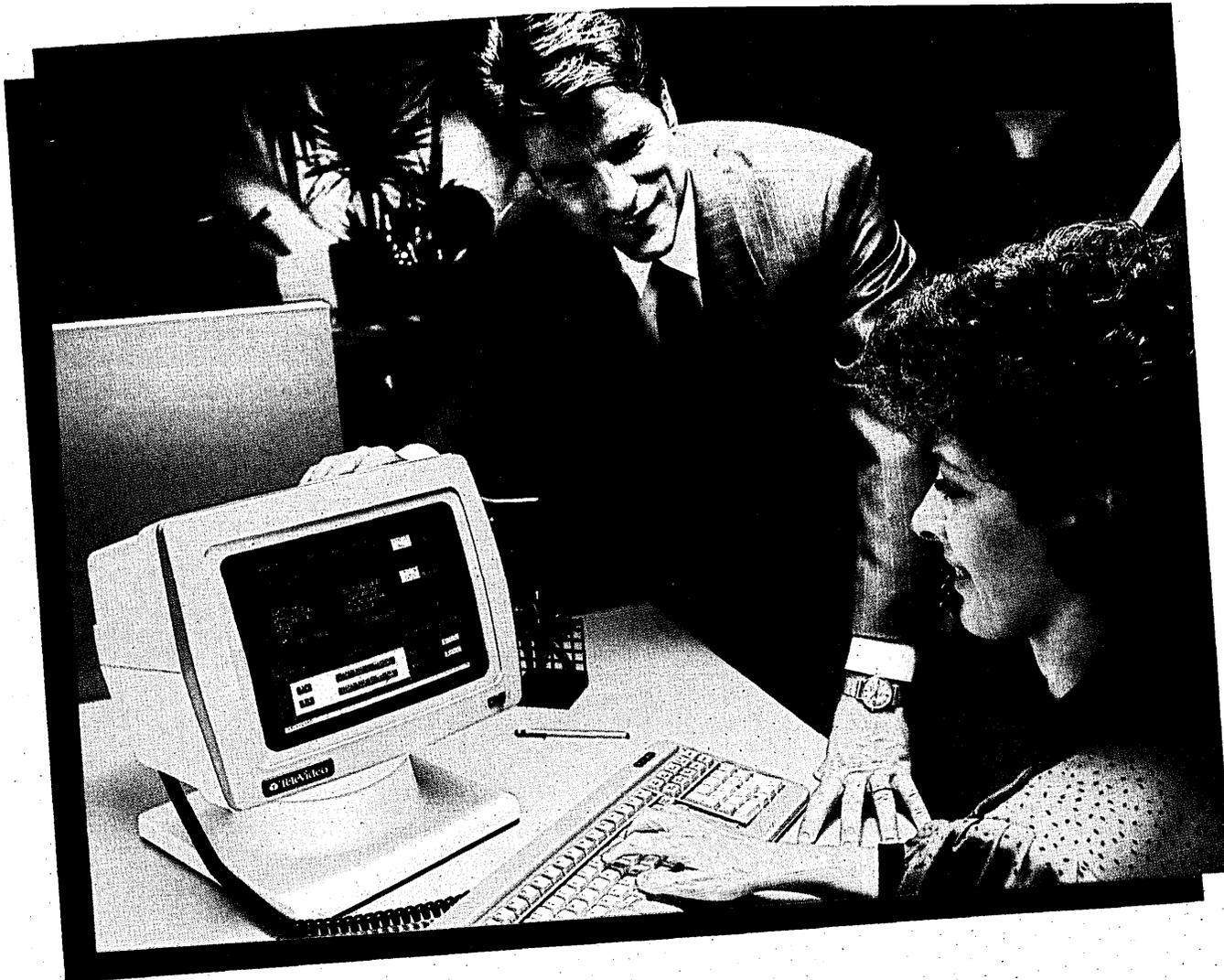
A workstation, then, is the preferred locus of execution for *personal applications*, which support the individual in his or her work and are of direct and personal benefit to the individual. The nature of these applications, and consequently of the principal functionality derived by a workstation, will depend on the individual's position and the work that he or she performs. A secretarial workstation will emphasize document processing; a financial analyst's workstation will offer spreadsheet processing; a managerial workstation will provide database access and decision support; and a senior executive's workstation will support him with, well, something that's no doubt very important.

These various types of workstations will inevitably have different features and characteristics, in terms of both software and hardware. The requirements of an engineer who performs intricate computations and displays complex diagrams are different from those of a manager who needs occasional access to financial information. In this sense, the notion of a universal workstation is just wishful thinking on the part of manufacturing engineers lusting after economies of scale. Something that's equally good for everyone isn't worth a damn to anyone; something that serves very different user populations equally

well isn't addressing the major needs of any of them. In another sense, though, a user's workstation needs to be universal (or at least galactic) in that it ought to be the single point of contact with the entire information resource environment (personal, corporate, and public). Depictions of workspaces containing a dozen or so crts and resembling the flight deck of the Starship Enterprise may make for good photos in Sunday supplements, but would probably require daily retraining sessions after lunch.

No man is an island; neither is any workstation. A company is not simply a collection of atomistic individuals; there is a difference between an organizational chart and a telephone directory. People work together in groups variously known as offices, departments, divisions, and the like. If these groupings are not vacuous, then any such department has a particular business mission to discharge, a mission that transcends the individual, personal tasks performed by department members. Every department deserves a system of its own, whereon will reside the shared data and shared applications that are used by members of the group.

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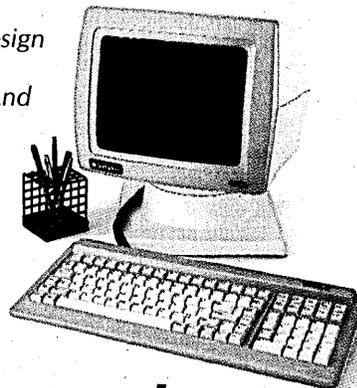
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Any organizational unit that is more than a dumping ground deserves its own system for its own data and applications.

vidual's workstation, because they do not belong to any individual; they are not mine or yours, they are *ours*. Just as I have my system (workstation) and you have yours so we should have ours. Should these data and applications then reside on a corporate mainframe? No. Why should *our* data and applications sit on *their* machine?

Any organizational unit that is more than a dumping ground for the chairman's brother-in-law deserves its own system to support its institutional applications and data. To this system will be connected the workstations of people in the unit and the systems of its subsidiary units. There is an old rule in software development, known as Conway's Law, which states that the structure of a software system mirrors the structure of the organization that developed it. (There are those who believe that this law describes the root cause of all sorrows in the world.) An updated version of the law advises us that the architecture of a corporate information system should mirror the structure of the corporate organizational chart.

THE DIS IS THE HEART

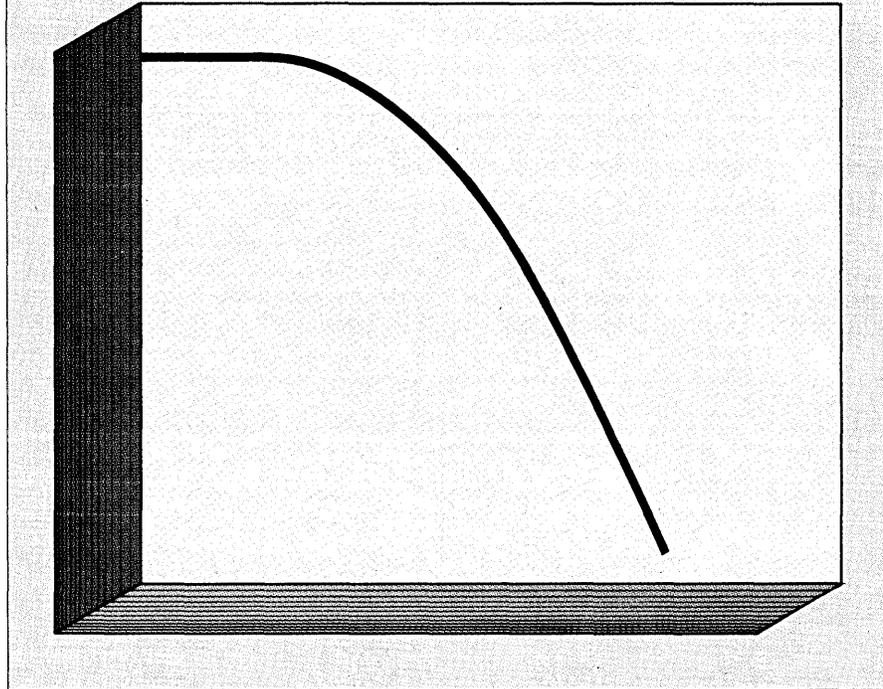
The departmental information system (DIS) is the heart of the organization's system architecture. It provides "server" functions (filing, printing, and communications) to its attached workstations. It is also the platform for departmental applications. Consequently, its software components should include database management and decision support tools, as well as languages to support rapid, user-driven application development. It should also have a "virtual workstation" facility to provide the capabilities of an intelligent workstation to a user of a dumb terminal.

As a rule, a DIS, with its single, shared processor is not an appropriate means of delivering highly interactive, processor-intensive personal support applications. As the Stalinists would say, "it is no accident" that the invention of the electronic spreadsheet followed the development of the "personal" computer, with its dedicated processor and very high bandwidth between this processor and the screen (and therefore the user). There are no longer any significant economies of scale in "pure" processing; quite the contrary. Sharing a common processor is a very ineffective way of delivering capability to most users. Some individuals are, however, likely to have too occasional and intermittent a need for personal applications to warrant owning a full-function workstation. The DIS can provide them with these capabilities, delivering them through a significantly less expensive terminal.

The DIS and the workstation need to operate in close harmony. Ideally, the user

FIG. 2

HAMMER'S OTHER GENERIC GRAPH



should not be aware of the degree of intelligence in his workstation, or even of the site at which his current application is running. He should be able to compose a document with his local word processing facility and dispatch it as electronic mail, without going through the contortions of linking the systems, moving control from one to the other, transferring the document, and so on. This should occur automatically, through the miracles of technology and common operating systems.

The DIS, not the workstation, is the centerpiece of a distributed processing strategy (whether that of a vendor or of a user). The workstation is an appendage of the DIS: the DIS barks, the workstation wags. Some vendors seem to have a concept of capturing the desktop, and of using that beachhead to land the heavy artillery. Though this may have worked in Normandy, it doesn't figure in the office. It is in the DIS-based data and applications that the real investment occurs, and that vendor specificity becomes a significant issue. Workstations are rapidly becoming indistinguishable commodities. With the more popular software packages available on many different workstations, there is little to differentiate them and tie a user to any one model.

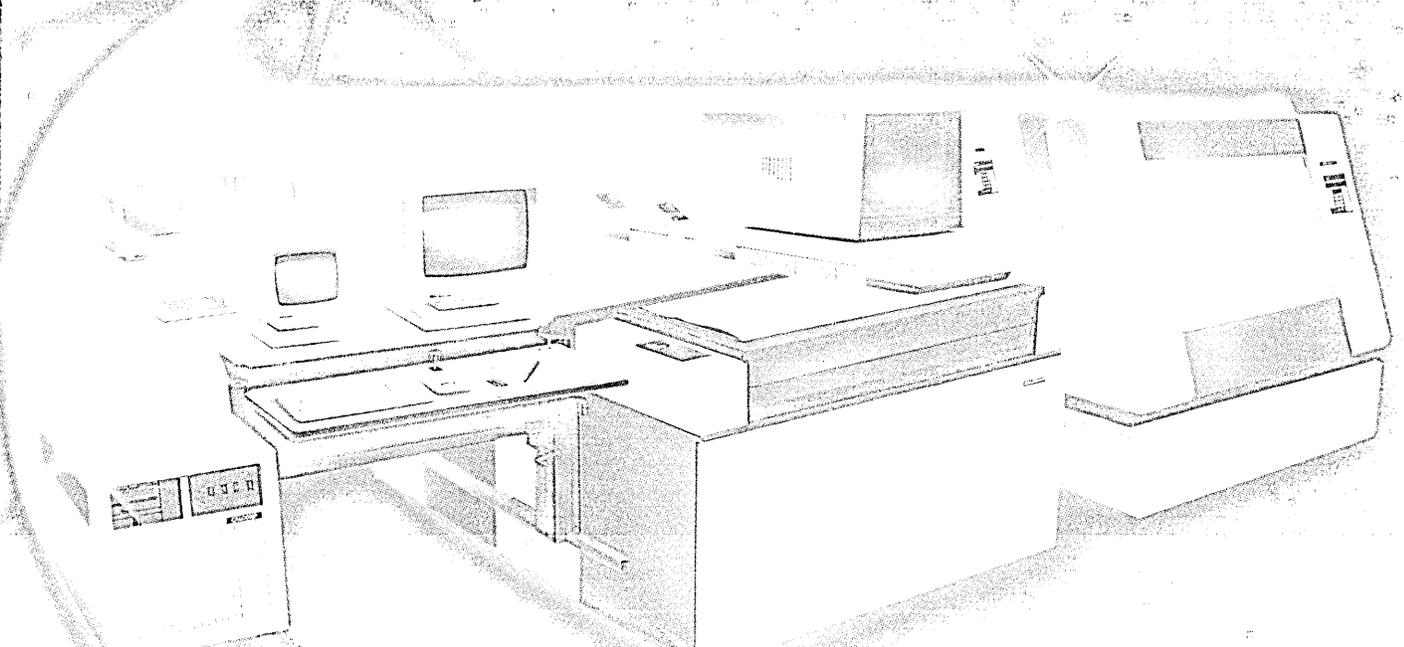
The various DIS offerings, however, are very different. In particular, their major

software packages are vendor, rather than third-party, supplied. Once a customer selects a particular system, the remarkable phenomenon of lock-in begins to manifest itself. Users soon find themselves committed to idiosyncratic and nontransportable application packages, database systems, and software development tools. Old workstations may be discarded for new and fancier ones, but the DIS will persist. The battle for the desktop is nothing compared with the battle for the hall closet. Account control in the office is based on the departmental controller, not the workstation.

Apple Computer appears to have ignored this principle, much to its regret. Its workstations may be good or bad, but they don't connect to anything in a significant way (3270 emulation is not that significant). Apple offered no departmental system with which their workstations could operate in harmony. Perhaps such a product would have violated Apple's deeply held theological views; or perhaps Apple was simply unfamiliar with the implications of corporate organization, since until recently, it seems, they were not burdened with one themselves.

Today, the DIS is typically implemented by means of a superminicomputer: DEC VAX, DG MV, Wang VS, HP 3000, etc. Indeed, the mini vendors have identified the DIS

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Looming on the horizon is the supermicrocomputer, which will offer DIS capabilities at greatly reduced prices.

(under a variety of marketing guises, from "productivity centers" to "departmental clusters") as their essential market strategy. While they offer their own lines of compatible workstations, many of them have also chosen to support the ubiquitous IBM PC. Indeed, to many of these vendors, the workstation is a decidedly mixed blessing. Because of the intense price competition in this area, and the high costs of the oem components many use, margins on workstations are significantly lower than they are in the rest of their product lines; selling too many workstations could hurt their gross margins, terrify the innocents on Wall Street, and bring on a rash of early retirements. Not too surprisingly, these vendors are increasingly structuring their workstations as downsized versions of their minis. Their intent is to have a compatible family of devices that can serve as workstation, departmental controller, and divisional resource.

LUKEWARM TO DIS CONCEPT

IBM, on the other hand, seems until lately to have been somewhat lukewarm to the entire DIS concept, emphasizing instead the desktop machine and the mainframe. It did not offer a clearly identified DIS product; rather, it presented a range of alternatives (8100, 5520, Series 1, System/38, etc.). User views of these products as departmental information systems cannot be printed in a family magazine. IBM actually went so far as to claim that the inadequacies of its offerings were beneficial, because they freed users from needless generality; users were to pick that system with the precise subset features each needed. In my neighborhood, we would call that making a feature out of a bug. (Anyway, IBM probably thought it would be better if all those PCs were connected directly to the mainframe, in order to degrade its performance even further and hasten the next upgrade.) More recently, however, IBM seems to have jumped on the DIS bandwagon, and is actively promoting the System/36 for this role.

Looming on the horizon is the supermicrocomputer, which will offer DIS capabilities at greatly reduced prices. These new devices will create serious problems for the minicomputer, which will in turn create serious problems for the minicomputer vendors. At the 1983 Hammer/Seybold Forum, I asked Julius Marcus, then vice president of business and office systems engineering at DEC, if the (just announced) Micro VAX would not butcher the VAX 730 and even the 750. His reply: "I'd rather butcher myself than have someone else do it." Mr. Marcus is no longer associated with DEC.

Conspicuous by its absence in the foregoing architectural discussion is any

mention of the mainframe. Its role has been well expressed by one of our clients: "The mainframe is a network peripheral." The big MIPSers are still out there, and while we're all grateful for them, they are no longer the hub of the computing universe. The DIS, with its workstations waiting in attendance, is the new belle of the ball. The mainframe is becoming a utility, to support large-scale transaction processing and the databases to which all wish access.

The foregoing analysis is based on architectural principles, application analysis, and logical principles, and consequently will appeal to dp managers and others whose early training in bathroom skills was a trifle on the exigent side. Unfortunately, an entirely different and even contradictory force is at work, which threatens to make a mockery of our systems planning work. This other phenomenon is related to a remarkable bit of analytics that I have termed Hammer's Generic Graph (see Fig. 1). This graph has the singular advantage that its axes are not only unnumbered, they are also unlabeled, thereby greatly increasing the domain of its applicability. For the purposes of this discussion, let us interpret the horizontal axis as "cost of a system," and the vertical axis as "amount of justification required to purchase the system." The graph then expresses the reality that below some price threshold, people buy systems just for the hell of it. Not only don't they know what the benefits will be, they're not even sure what they'll do with it. But it is fashionable and fun, so they join the party.

We have seen this occur with the telephone. When the typical company hires a white-collar worker, he is given a telephone on his desk. No cost-benefit analysis is done; no consideration is given to the sharing of a telephone, or using one in the candystore down the block. We have also seen this occur with the copying machine, and we may be about to see it occur with the workstation. The critical question is, what is the price threshold at which impulse buying sets in? The word from the stable is that the breakpoint (in 1984) is somewhere between \$1,000 and \$1,500. But do not be deluded into believing (as some vendors have been) that price is the only criterion. The product must offer some real, value-added functionality that is personally useful to the individual user. Only the most senior managers are naive enough to pay \$1,000 for a paperweight.

NOBODY'S PERFECT GRAPH

This phenomenon is exacerbated by another trend, which cannot be adequately described by Hammer's Generic Graph (nobody's perfect). For that reason, we introduce Hammer's Other Generic Graph (Fig. 2). Once again, the vertical

axis is "amount of justification required," but now the horizontal axis is "experience with a system." This graph shows that once we have a sufficient amount of experience with a particular type of system, we begin to take its benefits for granted, and acquire new instances of it without much fuss. Pretty soon, it becomes a necessity rather than a luxury, and soon after that, a standard fixture of business life.

There is one wrinkle that may impede the applicability of our Generic Graphs. That is the fact that despite the low individual cost of new workstations, their aggregate cost can still be quite significant. (Buying a \$1,500 workstation for each of 10,000 employees amounts to \$15 million, which still warrants a line item in most corporate dp budgets.)

At least we have identified the principal combatants: on one side, the mainstream minicomputer vendors, seeking to offload function onto workstations tightly coupled to the departmental information system; on the other, standalone workstation vendors, seeking, with a combination of low price, sex appeal, and novelty, to populate lots of desks while no one is looking. Who will win? Who will lose? What will distinguish the successful workstations from the losers? If I had the answers to those questions, I would be taking very large short positions in selected publicly traded equities. But I can divulge one trade secret that provides useful tactical guidance, one that is particularly appropriate given the timing of the publication of this article: Beware the NCC Kiss of Death. Each year, at the close of the NCC, the grand panjandrums of the press and consulting fraternities meet in closed session at the Bohemian Grove and anoint one of the newly displayed products as the pick of the charts. A tidal wave of articles and reports soon follows. My advice: avoid it like the plague. Think back over the last three years. What were the sure winners? Xerox Star, Grid Compass, and Apple Lisa. Let us be kind, and not dwell on their subsequent marketplace misfortunes. Let us note, however, that the superficial glitter and novelty that attracts the pundits with their three-minute attention spans is usually inversely correlated with utility and real value.

Who will win the war of the workstations? I quote again from the Buffalo Springfield: "Battle lines are being drawn/But nobody's right if everybody's wrong." My advice is to keep your eye on the ball and your hand on your wallet, and don't let all the workstations prevent you from getting some work done. *

Dr. Michael Hammer is president of Hammer and Co. Inc., a Cambridge, Mass., consulting firm specializing in new information technologies.

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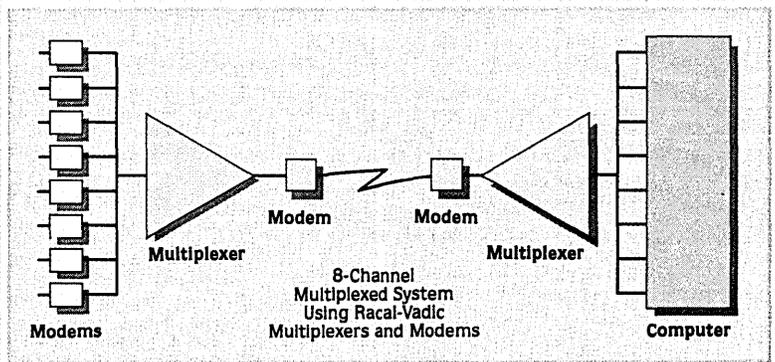
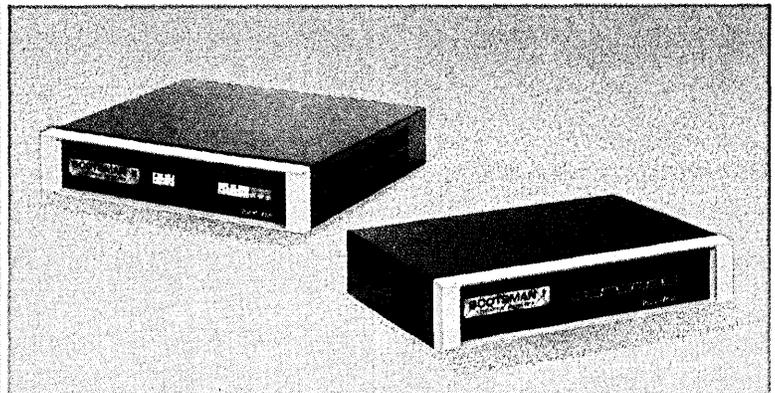
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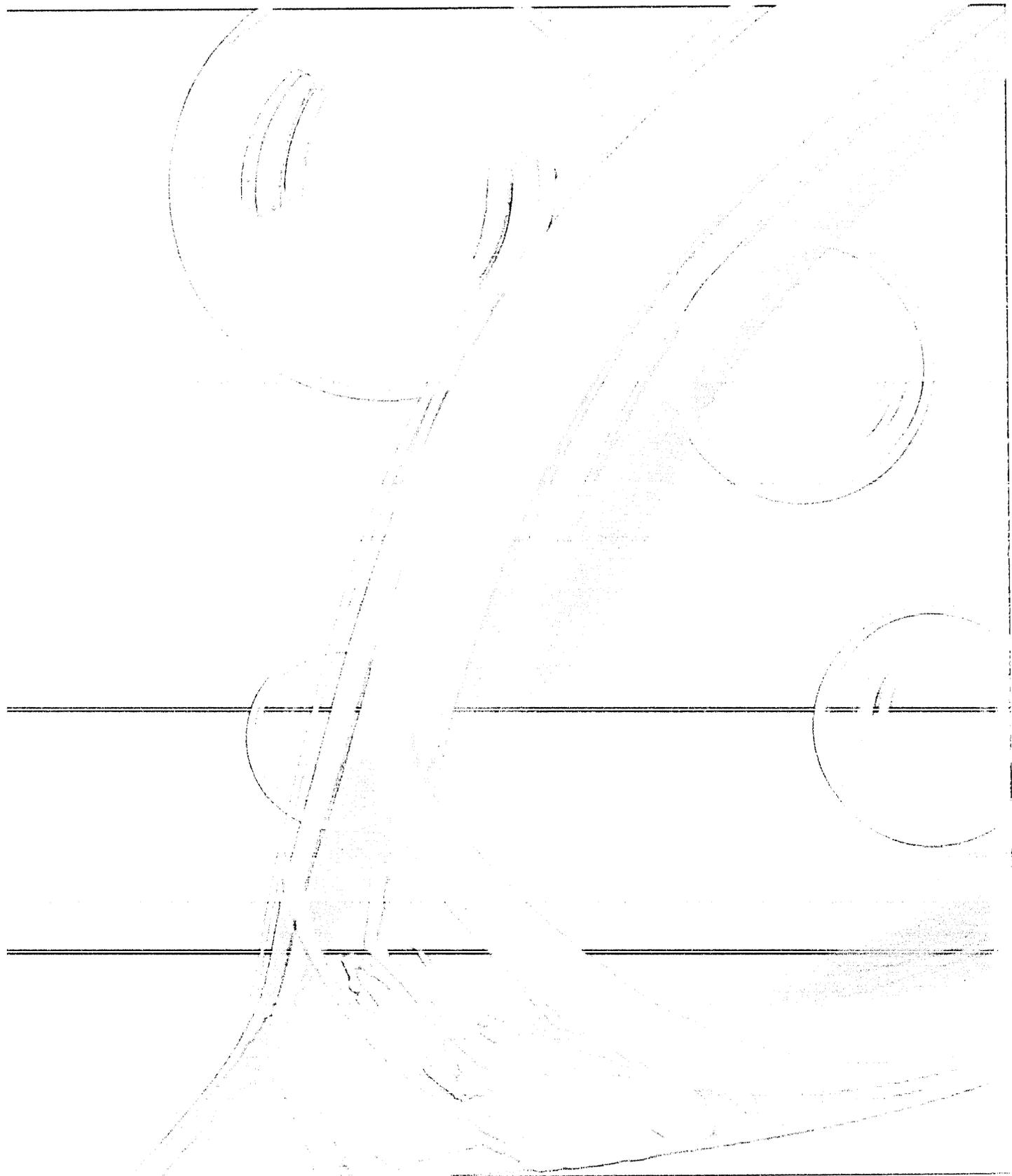
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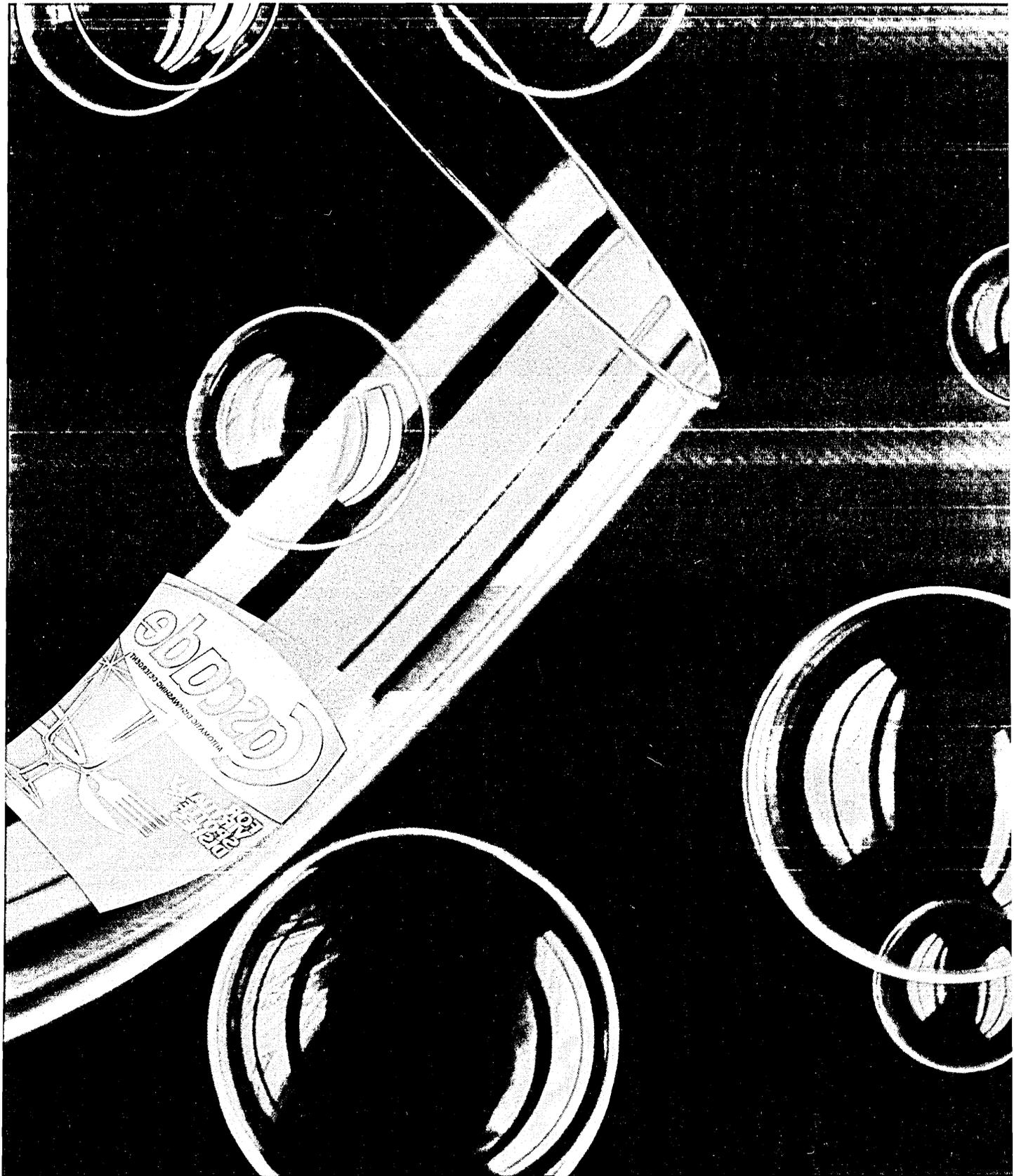
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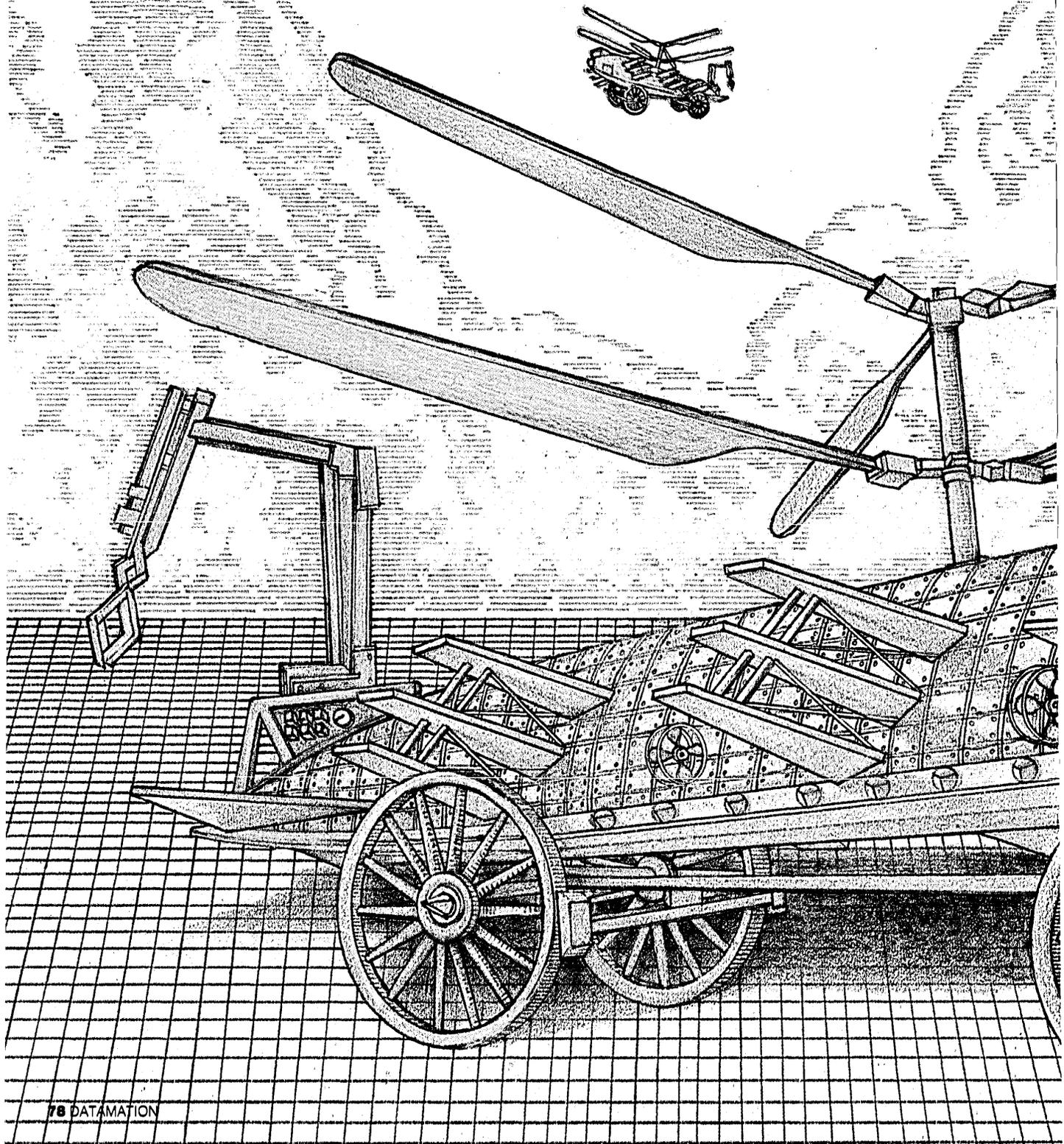
Voice/data workstations may make sense, but that doesn't mean they'll capture the hearts, minds, and desktops of corporate America.

by Ken Zita

A new class of fighting machine has joined the legions of pcs and terminals currently battling for space on corporate desktops: terminal equipment that can switch both voice and data. Users are not yet surrendering in droves, but that hasn't tamed the mettle of a host of vendors.

In the market wars, the integrated voice/data terminal (IVDT) is a weapon with considerable strategic value. It offers computer vendors a chance to get involved in a customer's telecom affairs, and it puts telecom vendors in the data business. It also rep-

THE LITTLE ENGINES THAT MIGHT



resents a niche many startups are finding attractive. But IVDTs may prove difficult to sell precisely because they fit into what is currently a no-man's-land. While the technology is relatively straightforward, the devices require corporate planners to think about electronic communication in a new way.

This varied genre of products still lacks a proper name and, depending on what you're reading, you may find them referred to as ComputerPhones, Integrated Voice/Data Terminals (IVDT), or Executive Workstations (EWS). They resemble computer terminals that have made amends with the telephone handset. There are dumb ASCII termi-

nals garnished with software and telephone capabilities, and there are electronic telephones with elaborately expanded LED displays and qwerty keyboards. Some pack a sensational, multitasking, user-friendly wallop: a so-called two-line PBX, business card directories, programmable keys for communications and other functions, and 8088/MS/DOS downloading. Others are \$1,200 answering machines, lap computers with autodialers and speakerphones, or modified 3270 terminals.

The traditional demarcation of vendor desktop territories grows increasingly blurry as telephone station and data terminal prod-

ucts not only look more alike, but wind up doing exactly the same thing. This is straining the ingenuity of marketing departments. PBX vendors see their products ideally positioned to capture the user's fancy, but are finding established telephone distribution and support channels inadequate. Computer vendors may be better situated to capture the business of large organizations, but they have yet to produce devices that match the user congeniality of products derived from the telephone.

The common user perception is that telephone vendors sell telephones and computer vendors sell computers. They don't

ILLUSTRATION BY C. STODDARD

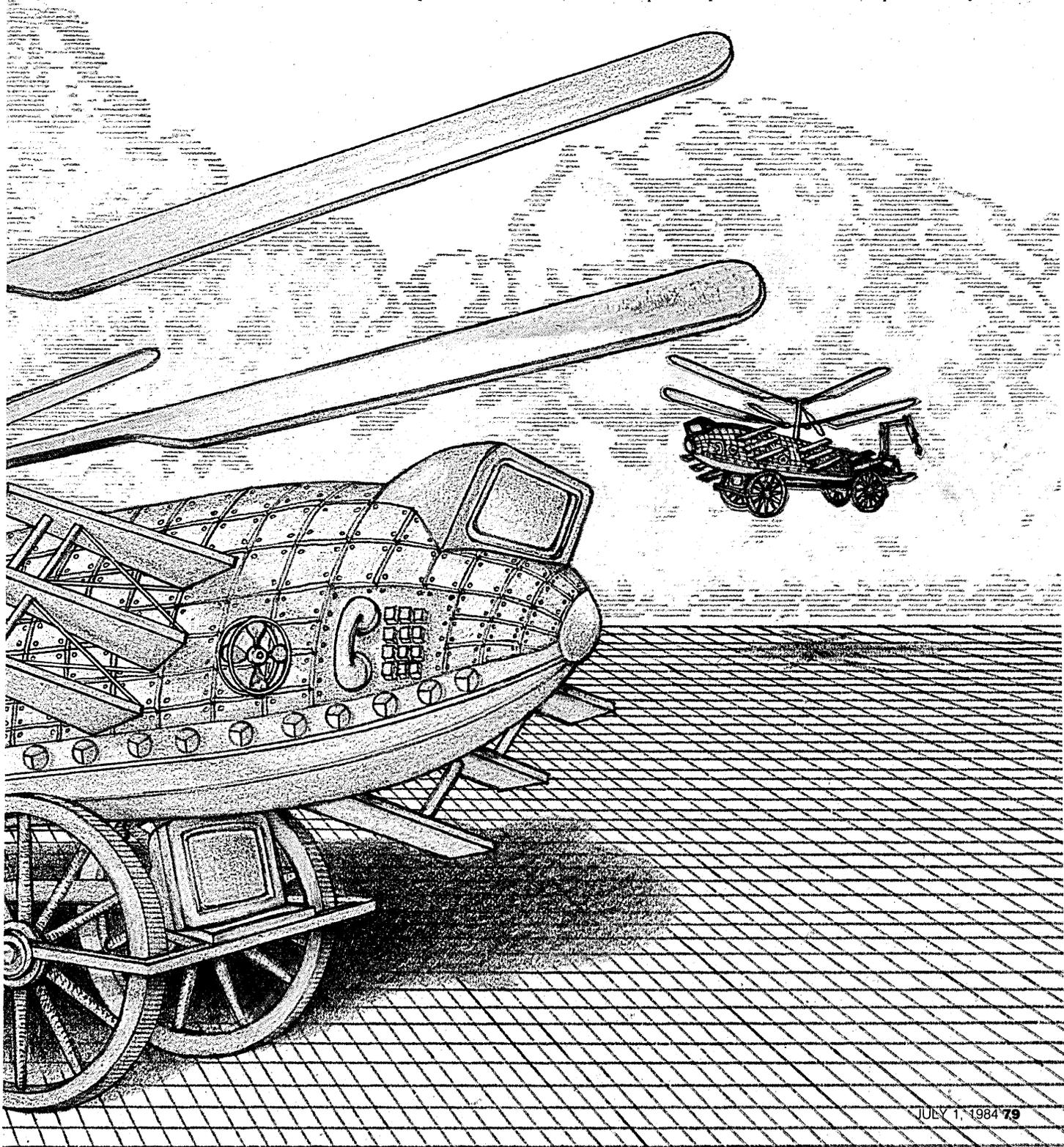


FIG. 1

VOICE/DATA WORKSTATION VENDORS

BOARDS & PERIPHERALS	ASCII	ASCII HYBRIDS	LIMITED PROCESSING OR IBM-COMPATIBLE	FULL PROCESSING	UNIX
Artsci, North Hollywood, Calif.	Televideo, Sunnyvale, Calif.	Basic Telecommunications, Fort Collins, Colo.	Ambi, Stamford, Conn.	Mitel, Boca Raton, Fla.	Integrated Office Systems, Cupertino, Calif.
Wilcom, Atlanta, Ga.	Tymeshare, Cupertino, Calif.	Northern Telecom, Mississauga, Ontario	Convergent Technologies, Santa Clara, Calif.		Sydis, San Jose, Calif.
	AT&T, Morristown, N.J.	Rolm, Santa Clara, Calif.	Cygnat Technologies, Sunnyvale, Calif.		
			Davox Communications, Merrimack, N.H.		
	GTE, Reston, Va.	Telrad-Solcoor, Long Island City, N.Y.			
		Zaisan, Houston, Texas			

know who to believe for an integrated product. And some people complain that integrated workstation products are technology rather than market driven, and that the boxes are gimmicks nobody needs.

There are currently 18 manufacturers in the domestic market, if you include all the product varieties—the all-in-one stations, plus the pc add-ons and peripherals and plug-in circuit boards (see Fig. 1). Most are produced by the telecom industry and are distributed by national accounts, authorized dealers, and interconnect companies, and (to a lesser degree) large equipment supply houses. It is reasonable to expect every PBX vendor to have its own, or an oem, version of one or more integrated workstations on the market by late 1985. Several large computer companies are known to have products ready for market, though none has formally announced one. More than 50% of the remaining companies are venture capital startups building products explicitly for this market.

Since Northern Telecom announced the Displayphone two years ago, the total number of integrated voice/data terminals shipped by all vendors is fewer than 30,000 units, valued at no more than \$40 million. Estimates differ on how many will be sold. One research firm predicts the market will top \$2 billion by 1990; it expects every desk that currently has both a computer and a telephone to have an integrated device within the next 15 years.

NO MOVE WITHOUT A FIGHT

But the equipment currently inhabiting corporate desks is unlikely to get up and migrate without a fight, and most forecasters expect a \$1 billion market by 1990, or a total of one to three million units shipped. Price per station is expected to drop from the current average of

about \$1,400 (depending on complexity), to between \$600 and \$800, competitive with PBX station equipment.

This immature market should start moving after expected major product announcements from Northern Telecom and AT&T appear later this year. It won't be until mid-1985 that users will start laying down cash for what many still perceive to be just another roadside attraction. And then there is the eternal question: whither IBM? There is a cocktail party theory that says IBM will move quickly, if only to remind AT&T that its adolescence in the terminal industry is not going to be uncomplicated.

ROLM, Northern Telecom, Mitel, and AT&T—the big four—are the only PBX vendors currently manufacturing and distributing their own integrated workstations. While the announcements have been less than thrilling, some of the marketing tactics are proving more interesting. One trend is to give terminal equipment away sometimes to purchasers of large PBXs and sometimes just for the PR value. The idea is to get users better acquainted with the utility and undeniable sex appeal of integrated station products. Test drives seem to be working. Northern Telecom, for instance, recently donated 35 Displayphones to the New York University School of Business Administration. The school, which does most of its switching via New York Telephone Centrex, says they want a bunch more to wire all students and faculty into an electronic mail network by the end of next year.

Startups hope to make a killing with big-name procurement agreements. Once the paper is signed and orders are placed, the company makes its first public stock offering, and the founders make a mint and forget they ever heard of fourth-round financing. Venture capitalization just barely funds R&D and initial production, even when investor

interest is flowing freely. Everyone knows a national/major accounts sales force costs a bundle. So why not design a product and find someone willing to take the end-user marketing off your hands? The startups thus avoid noisome sales support and fussy service contracts and stick to what they know best: building the box.

Convergent Technologies is a case-book example. The much touted N-Gen, which isn't yet configured for voice, will be sold by Prime, Gould, and Raytheon, and even bigger clients are expected. The company has \$2 billion of "commitments to buy" from oems.

A startup has to turn around a revenue-generating product before the cash runs out, and this rarely happens overnight. Roy Dudley, director of marketing at AMBI, Stamford, Conn., points out that "the period of time from the first knock on the right door at an oem, to when the product actually hits the user's desk, privately labeled with the oem logo, can be one and a half to two years." Dudley feels AMBI's early strategy of oem-only distribution was naive, and the company has expanded its product line to enter products for direct sales.

Some of the PBX and computer vendors have no intention of building their own products. They have the resources to sit back and watch the market develop, and then enter with complete product families manufactured largely by startup vendors. They'll offer one model for the order-entry clerk, another with database access for the accounts manager, standalone processing for the financial analysts, and a full range of personal maintenance software for executives. AT&T, for instance, has the design and production power to generate OA terminal products for every conceivable type of user.

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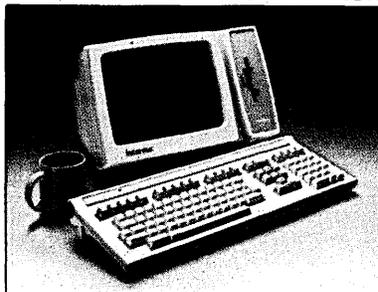
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Startups hope to make a killing with big-name procurement agreements.

the big switch and computer vendors and the startups: the big guys can afford to turn out a series of products to address different applications, while the startups begin with the specific need. PBX vendors depend on the "total system" sale. To be competitive in the integrated terminal business—and they cannot afford not to be—they must either generate an entire family of products of their own, or second-source other devices that fill out their product lines.

STARTUPS GO AFTER NICHE

Because they lack an array of products, the startups go after niches. AMBI is seeking friendly oems and systems houses to customize its products for point-of-sale and credit verification machines and host terminal emulations. The company changed its original strategy (to take greater control over corporate and product definition), but the overall tack has remained the same: specific terminals for specific applications.

Several startup companies have a strong enough product purpose to sell themselves directly. Integrated Office Systems, Cupertino, Calif., has targeted its product specifically for large companies with sales people frequently on the road. Many kinds of organizations might find the system useful—it's a VAX and Unix-based voice/text electronic mail system with battery-powered briefcase terminals—but the manufacturer had sales professionals in mind from the beginning. This is the clearest strategy yet unveiled in the integrated workstation market.

Workstations with predefined, pre-programmed applications are attractive to users. They do not have the same flexibility as a pc with interchangeable or flexibly programmable software, but they do meet actual, specific needs, and that makes it easier to justify their cost.

According to Coleman Washington, who handles marketing for Zaisan, Houston, the largest organizations are interested in integrated terminals as entry-level data equipment: terminals for the first-time data user. MIS managers, Washington reasons, are worried pcs erode their direct control over network access, and are anxious to maintain spending clout. By expanding the number of workers on the corporate databases with simple integrated ASCII devices, the MIS directors can more accurately keep track of who does what.

Access to the database and host communications protocols is ROM driven, and most integrated terminal equipment demands a healthy amount of programming. The MIS staff runs circles around the telecom manager and a new realm of hardware is added to the MIS empire. Best of all, MIS can more legitimately dip its fingers into that part of the budget slated for telephone station equipment.

Another product line aimed at a specific, well-defined market comes from Davox, based in Merrimack, N.H. The company is selling integrated terminals that are, in essence, extremely flexible 3270 terminals for multiple communications protocols. Davox president Dan Hosage says he would be de-

lighted to see IBM come out with products to compete with his. "IBM is in the business of legitimizing markets. Right now we still occasionally hear reservations about the workstation concept. If they did make an announcement, it would perfectly validate our existence and mission."

Another class of products aimed at a specific niche are pc add-on or adjunct equipment. Three million corporate desks have IBM PCs, and at least two million more are expected to acquire one this year. Most of these desks also have telephones. Asher, made by Atlanta-based Wilcom, is a plug-in board for the IBM PC and compatibles. Lift the housing off your box, slip in the board, plug two telephone lines and a handset into the modular plugs in the back, and slap the handset on the computer's side with a special adhesive. Asher's software automatically boots into a 128K partition in the PC's RAM. Price is \$900.

ARTSCI, North Hollywood, Calif., makes a similar, simpler product for the Apple Macintosh, but with no significant electronic messaging or referential directories. It's little more than a primitive telephone line with an interface to a computer, and cannot justifiably be called an "executive workstation," no matter how loose the definition. Its function, however, is clear: this is integrated data and voice, and the price is \$200.

Virtually all of the vendors sing praise to "multitasking software" as the means by which they control voice and data integration. But most haven't yet effectively exploited the potential. The obvious exceptions are the Unix-based systems which, when properly configured, may establish absolute simultaneity of communications resources. Every conceivable communications operation—speaking, reading, or writing—may be organized and reviewed (or at least recognized) simultaneously. A standard telephone line becomes the conduit for multiple communications channels, and simultaneity becomes the measure of efficiency. Sydis from San Jose has the premier Unix executive workstation product.

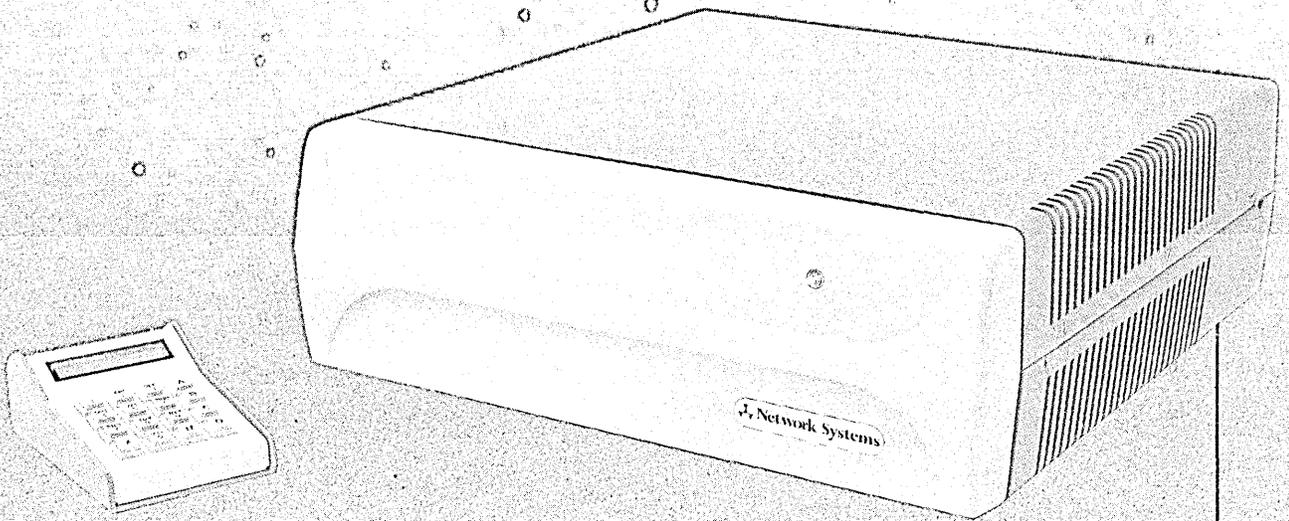
The question one is left with is whether the new products are significant, or merely clever. Will integrated workstations contribute to lasting changes in the way we communicate? The next 10 months will give some sporting insights. *

Ken Zita is a senior analyst in charge of the subscriber equipment division (PBXs, key systems, and integrated terminal equipment) of Northern Business Information, a New York-based telecommunications research firm. He was formerly associate editor of *Teleconnect* magazine.



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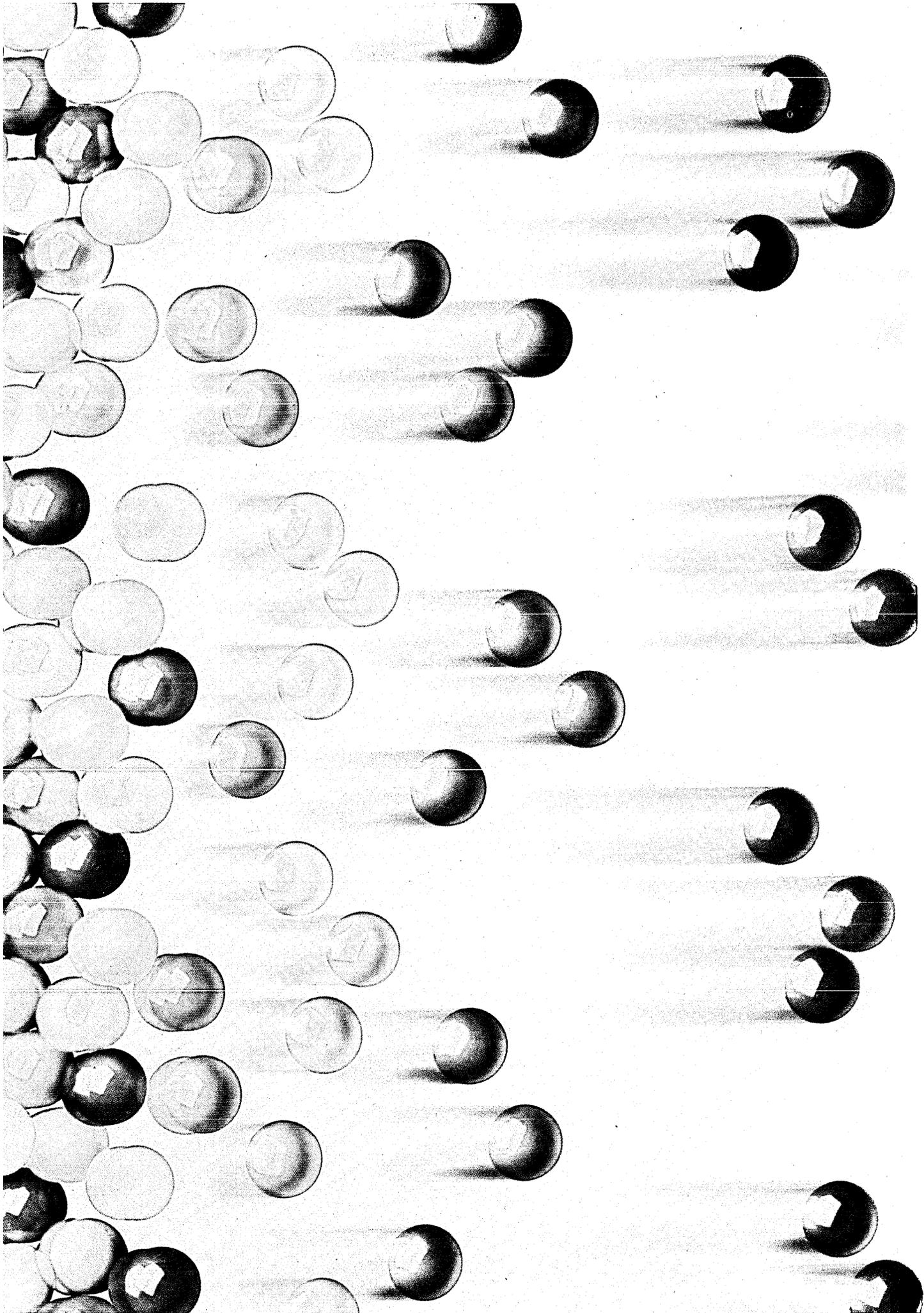


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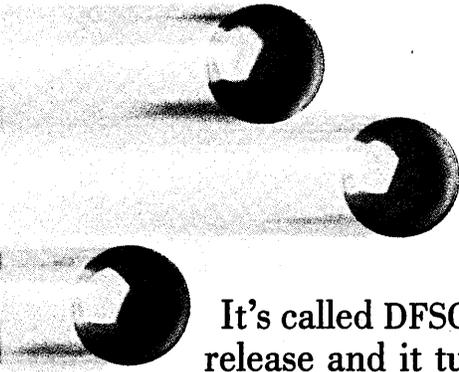
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NCC PRODUCT PREVIEW

by Robert J. Crutchfield

Well, it's time to trade in the Mouse Ears for a wide brim hat and sunglasses as the National Computer Conference moves from Anaheim, Calif. to Las Vegas, Nev.

The theme for NCC '84 is "Enhancing Productivity," though it might be argued that it's hard to be productive in this convention city. Barring the distractions, NCC will offer a conference program featuring more than 90 technical sessions and 20 professional development seminars. A highlight will be the keynote address by John F. Akers, president of IBM.

There will be more than 650 exhibitors at the show, many introducing new products. But in a scant four days it will be difficult to visit every booth. Veteran conference goers contend booth visitation criteria should range from legitimate interest to interest in giveaways. To aid in the process, DATAMATION has compiled a sneak preview of what some vendors are introducing at the show.

So, bring comfortable shoes, lots of suntan oil, stake out a cool place in the shade, and get ready to participate in the computer industry's annual bash.

ALPHA DATA INC. Chatsworth, Calif. DISK DRIVES Booth A1146

This vendor will introduce a mass memory disk drive. It is a Winchester-style device with 128MB of storage. It has an 18 msec average access time based on a combination of disk head seek and settle times.

The unit has a rotation speed of 3600 rpm, and an average latency time of 18 msec. It has a 1MB cylinder and 54 heads per sealed chamber. The disk drive will process 50 to 60 commands in 72 msec, and not be saturated, according to the vendor.

The machine has an integral spindle and a brushless DC motor that runs at both 50 Hz and 60 Hz. It also has a rotary actuator. The retractable heads are mounted on a patented head lifter and never touch the disk surface. The vendor says the unit doesn't need a landing track for the heads because there is no disk contact when starting or stopping. It uses the ANSI/SMD interface. The At-

las Mass Memory Disk Drive costs \$6,000 each in a quantity of 100 units.

FOR DATA CIRCLE 400 ON READER CARD

AMPEX CORP. Redwood City, Calif. WINCHESTER DRIVE Booth A1034

This vendor will introduce Centaurus, a new line of 14-inch Winchester disk drives offering up to 825MB of performance in a rack-mountable configuration.

The products will offer the oem with 330MB, 660MB, or 825MB of unformatted capacity. All three models offer an average access time of less than 25 msec using a linear voice coil actuator in a closed loop dedicated servo system. Other features include a direct drive DC spindle motor, built-in tester, universal AC power supply, automatic spindle/cartridge locks, and SMD interface with dual port capabilities.

The units support the data transfer rate of 1.859MBps while maintaining the standard SMD interface protocol. Track capacity is increased to 40,320 bytes per track with a 50% increase in the data transfer rate, the vendor says.

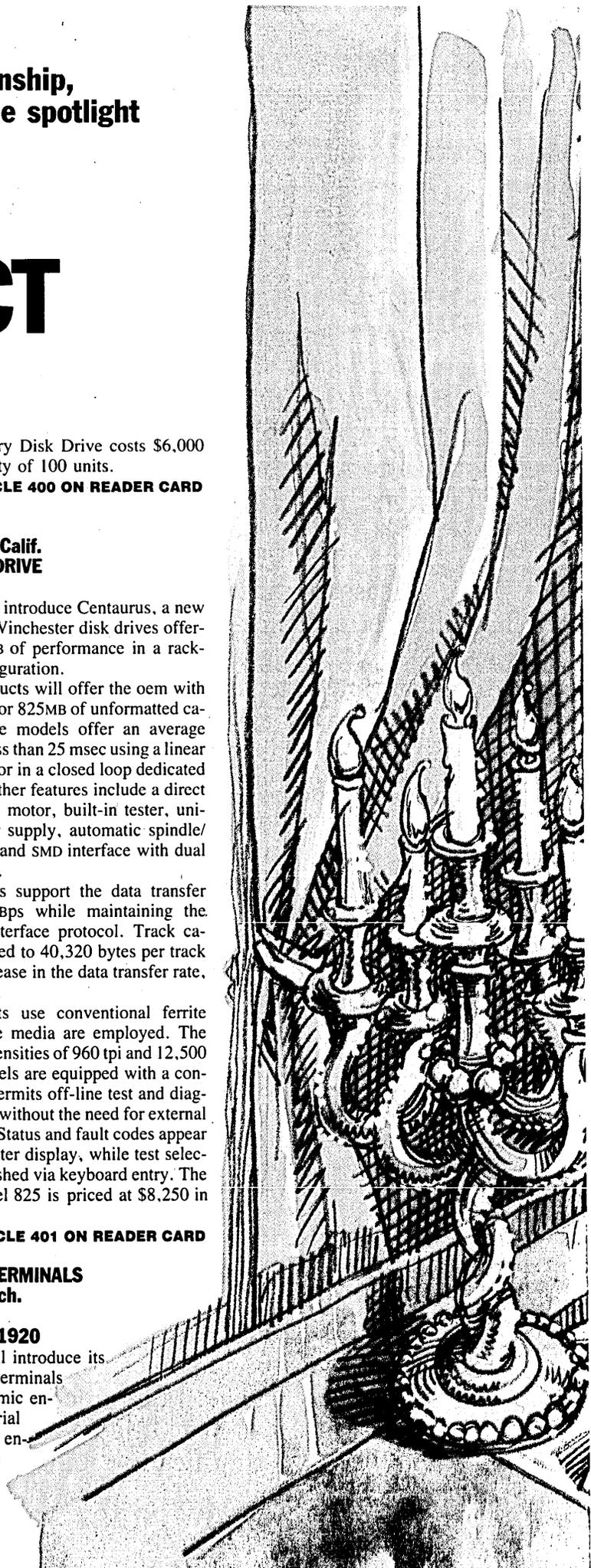
The units use conventional ferrite heads and oxide media are employed. The drives support densities of 960 tpi and 12,500 tpi. All the models are equipped with a control panel that permits off-line test and diagnostic functions without the need for external test equipment. Status and fault codes appear on a four-character display, while test selection is accomplished via keyboard entry. The Centaurus Model 825 is priced at \$8,250 in oem quantities.

FOR DATA CIRCLE 401 ON READER CARD

ANN ARBOR TERMINALS Ann Arbor, Mich. TERMINALS Booth A1826-1920

This vendor will introduce its current line of terminals in new, ergonomic enclosures and serial keyboards. The entire line of ANSI standard and graphics

ILLUSTRATIONS BY GERRY GERSTEN





NCC PRODUCT PREVIEW

terminals will be housed in this new package. Terminals to be featured in the new housing include the Genie, Genie Plus, Ambassador, Graphics Master, Guru.

FOR DATA CIRCLE 402 ON READER CARD

AUDIOTRONICS CO. **North Hollywood, Calif.** **CRT DATA DISPLAY** **Booth A1434**

The 14DD981 is a color crt data display terminal. It has a 14-inch diagonal screen with a deflection angle of 90 degrees. Its usable display is 210mm by 280mm, and has a resolution of 720 dots by 396 lines. The video bandwidth is 25 MHz. Its power consumption is 75 watts. It has a D-type, nine-pin interface connector, and weighs approximately 25 pounds. The unit is available in kit form or integrated neck-mount format and costs between \$400 and \$500 in quantities.

FOR DATA CIRCLE 403 ON READER CARD

BATELLE SOFTWARE PRODUCTS CENTER **Columbus, Ohio** **RELATIONAL DBMS** **Booth C4336**

DM is a database management system designed to take advantage of the relational access method, while storing the data in "flat files" or relations that let users work with two-dimensional tables. DM uses indexes that are independent from the data records to support the various data structures. Indexes are optimized for on-line retrieval, and any individual record can be directly accessed by using a key that uniquely identifies the record. It handles large textual as well as numeric databases, and supports both information center retrieval and transaction-oriented production environments.

The package is fully integrated by a multithreaded central processing kernel that handles up to 511 simultaneously executing programs manipulating up to 125 databases at a time. Each user may operate on as many as 10 data files at once. Each DM kernel can support up to 2,000 databases and 65,000 users. Depending on the installation's requirements and hardware configuration, up to nine additional copies of the kernel may operate in conjunction.

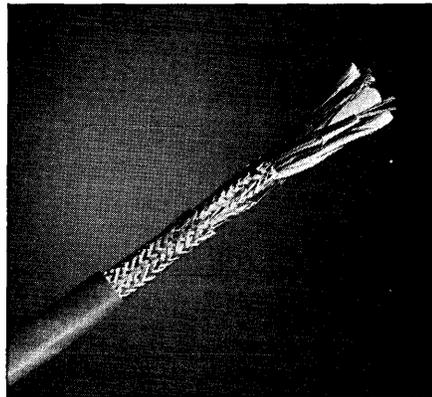
Components include a fundamental query and manipulation language, formatted screens with windows, a report writer with forms capability, COBOL and FORTRAN pre-compilers, high-volume loader, and a complete complement of system maintenance utilities. DM is currently available on DEC VAX minicomputers and will soon be available on IBM and CDC computers. The standard purchase price depends on the modules selected. Prices start at \$29,000 for mini versions.

FOR DATA CIRCLE 404 ON READER CARD

BELDEN ELECTRONIC WIRE AND CABLE **Geneva, Ill.**

DATA CABLES **Booth C4511-13-15-17**

The 8162 series is a line of extended distance multipair data cable. The combination of low capacitance (12.5 pF/ft.) and shield effectiveness in these cables allows extended distance data transmission in EIA RS232 and RS422 applications. The series is part of the vendor's new standard line of multipair and multiconductor cables.



The Belden 8162 series has 24 AWG conductors insulated with Datalene foamed polyolefin. Each pair is covered with a Beld-foil shield to reduce crosstalk and improve signal integrity between pairs.

The cables have a braid shield and a chrome PVC jacket. The series is made up of eleven cables with 2, 3, 4, 5, 6, 7, 8, 10, 18, and 25 pairs. A representative price for the Belden 8162 Series is \$465 for 1,000 feet.

FOR DATA CIRCLE 405 ON READER CARD

CALIFORNIA SOFTWARE PRODUCTS INC. **Santa Ana, Calif.** **RPG II SOFTWARE** **Booth H822**

Baby/36 is a software system developed for the IBM PC and PCXT that allows programs and systems written for the IBM System/36 to be transported to the PCXT where they may be executed as is.

The software may also be used as a standalone development system. The components include an RPG II compiler, operations control language processor, screen format generator, source entry utility, sort utility, workstation I/O, data exchange utility, and data file utility. Baby/36 sells for \$3,500.

FOR DATA CIRCLE 406 ON READER CARD

CINCOM SYSTEMS **Cincinnati, Ohio** **NETWORK MANAGEMENT** **Booth A2434**

Net/Master is a network management software system that integrates a multi-cpu,

multi-application computer network into a single, integrated operating unit. Currently running under MVS and VS/1, Net/Master realizes the full potential of the SNA and ACF/VTAM environment while protecting users from its complexities.

Users of the vendor's TIS relational database and application software can integrate multiple TIS installations on different cpu's operating systems, as well as link diverse teleprocessing applications. For example, Net/Master can integrate IMS, TSO, CICS, TIS-DC, and Environ/1 into one integrated network.

The product features include network security with user identification and password controls; multiple application interface so any terminal in the network can access other operating systems simultaneously; distributed processing services; activity logging; network error warning system; network operation facility; network partitioning facility; network command language; timer commands; multi-cpu network control facility; and broadcast services so the network operator can broadcast messages and stay in touch with terminal operators.

The system is designed for large corporations with complex, multisite networks. Net/Master costs \$15,000. There is a one-time installation fee of \$3,000. Lease and rental agreements are available from the vendor.

FOR DATA CIRCLE 407 ON READER CARD

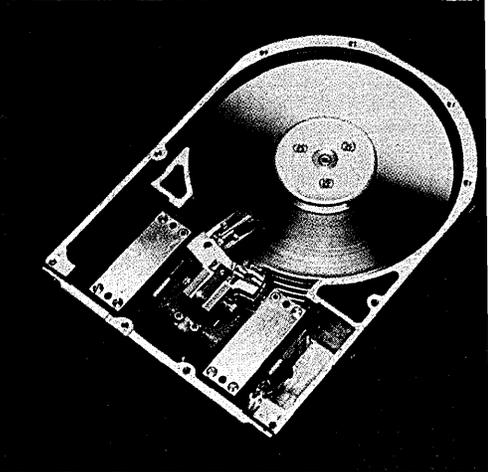
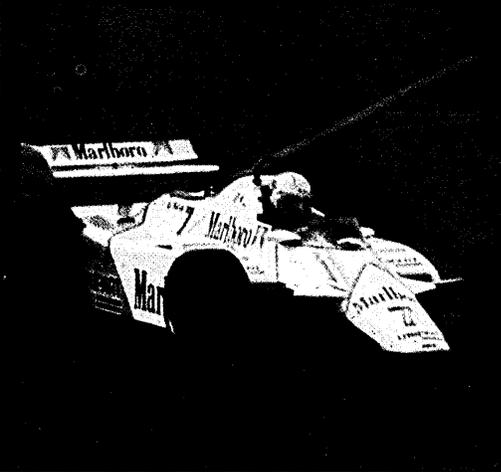
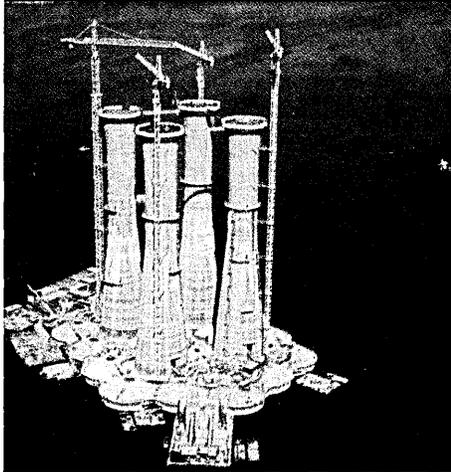
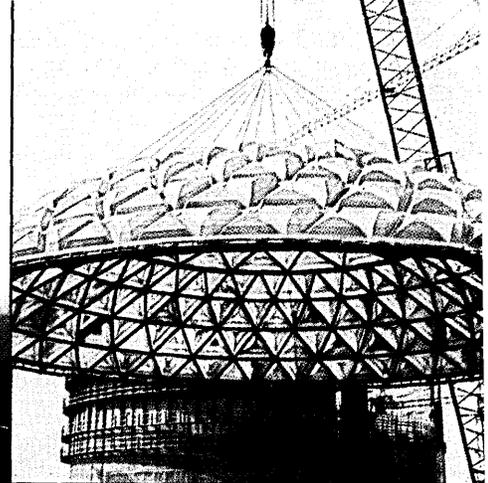
CIPHER DATA PRODUCTS INC. **San Diego, Calif.** **TAPE DRIVE** **Booth 4118**

This vendor introduces two GCR CacheTape products, the Model M990 and Model M991. Both incorporate cache technology and employ the standard Cipher 1/2-inch tape interface for hardware integration. The units have an error-free interface with outboard error (defect management) that relieves the host system from the performance-limiting tasks of handling media defects, the vendor says.

The M990 feature cache size of 128KB and a maximum transfer rate of 450KBps. The M991 has a 256KB cache size and a 790KBps maximum transfer rate. Maximum block size is 32KB for the M990 and 64KB for the M991. The M991 features downstream erase, which eliminates tape repositioning on write error retries.

The 1/2-inch tape drives are 14 inches high and have front-loading and threading design along with a front-panel work display for operators and service maintenance messages. The M990 is priced between \$6,000 and \$7,000. The M991 costs between \$7,000 and \$8,000.

FOR DATA CIRCLE 408 ON READER CARD

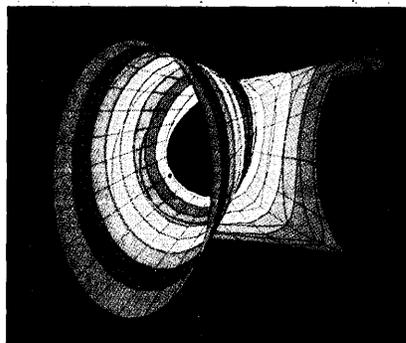


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required to prove the structural integrity of Priam's disc drive base casting and spindle assembly.

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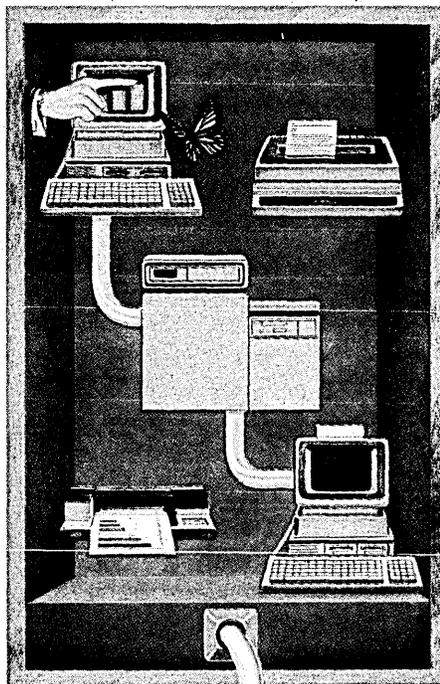


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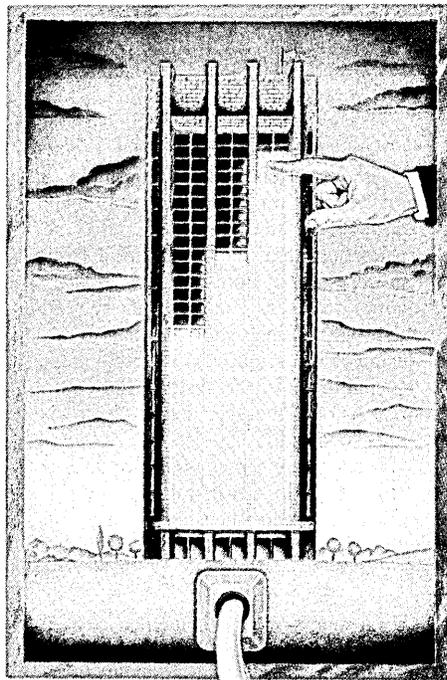
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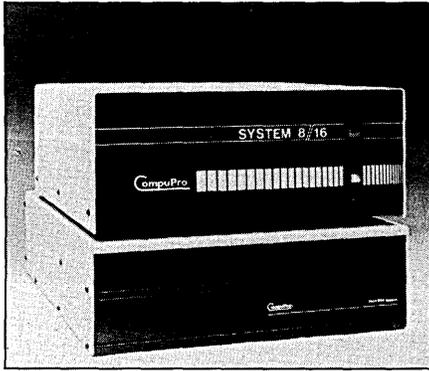
**HEWLETT
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CIRCLE 50 ON READER CARD

NCC PRODUCT PREVIEW

COMPUPRO Hayward, Calif. MICROCOMPUTER SYSTEM Booth H854

The System 816/G is an IEEE 696-compatible, NS16032-based microcomputer. The unit is based on National Semiconductor's 6MHz cpu, with NS16202 ICU and NS16082 MMU. It also features 512KB of 16-bit static memory, expandable to 16MB, 12 serial ports, one Centronics printer port, one parallel port,



1.2MB of floppy disk storage, 40MB of hard disk storage, and 1.5MB of MDrive/H solid-state disk storage.

Software provided includes Unix version 4.2, Unix C, and Unix FORTRAN programming languages. The System 816/G costs \$20,000.

FOR DATA CIRCLE 409 ON READER CARD

COMPUTER-LINK CORP. Burlington, Mass. TAPE MAINTENANCE SYSTEM Booth A1232/1234

The Series 3000 Tape Cleaner/Evaluator is a tape maintenance system that utilizes a microprocessor and permits preprogrammed error limits, tape lengths, leader lengths, and stripping lengths to provide one-button maintenance. The unit automatically analyzes test results and positions the tape to the optimum stripping location. The user select mode allows operators to preselect all tape acceptance criteria to customize to the user's specifications.

This tape evaluator utilizes a crt screen, and visually allows checking of results, programmed criteria, and operator checks. In addition to a summary of errors shown on the crt screen, a microprocessor-controlled printer shows exact location, within each foot, of all types of computer errors, e.g., one track, two track, three track, edge, gross, permanent write errors, and write skips.

If a tape doesn't meet the error acceptance levels, the unit automatically analyzes the acceptance levels compared with actual error levels and automatically aborts the test.

The Series 3000 Tape Cleaner/Evaluator costs \$18,000.

FOR DATA CIRCLE 410 ON READER CARD

COMPUTER POWER SYSTEMS INC. Los Angeles, Calif. CONTROL SYSTEM Booth 4282

This environmental monitoring system is for use with small and large computer mainframes. The Environmental Data Acquisition and Control System (EDACS), microprocessor controller of the vendor's new 4000 series of power distribution and regulation peripherals, provides computer users with a sophisticated, electronic data acquisition monitoring system through which the entire computer room environment can be managed.

The control provides a method of collecting data on all aspects of the computer room. The user selects the environmental functions most appropriate to the computer operation before the system is delivered. These functions are then programmed into EDACS to create a custom-designed environmental monitoring system. Once on-site, additional programming by the user is also possible using the microprocessor-based, interactive capabilities of the system. For example, new halon zones can be added to the system as required.

Because the Series 4000 provides an active response to out-of-tolerance conditions, the user can operate a completely unattended computer room if desired, according to the vendor. The system is based on CMOS components and has full battery backup power. The system's interface includes a 320-character LCD display unit and a 16-key user keyboard for interactive communication. The displays are in formats using common dp language terms. An optional 40-character data logger line printer is available as well as full mainframe and remote diagnostic communications. The Series 4000 product line is priced from \$7,000 to \$30,000, depending on configuration.

FOR DATA CIRCLE 411 ON READER CARD

DATARAM CORP. Cranbury, N.J. GRAPHICS CONTROLLER Booth 1314

This vendor will introduce the GC-20 Graphics Controller for use with monitors on DEC's LSI-11 minicomputers. The unit consists of two standard DEC quad boards, the GI-20 graphics interface board and the RM-20 refresh memory board.

The GC-20 generates a 1,024 by 1,024 interlaced image, with four bits per pixel. It emulates the Tektronix 4010, 4014, and 4065 terminals. Emulation is also provided for DEC's VT-100 alphanumeric terminal and Re-

GIS protocol support provides emulation for the VT-125 and VT-240 graphics terminals.

The unit can operate in either a programmed I/O or a DMA mode. It uses an on-board 68000 microprocessor, supported by a 128KB scratchpad RAM and a 128KB EPROM firmware set. The controller uses a rear edge cable to interface to the RM-20. The RM-20 contains four 7200 VLSI graphics controllers, each of which drives one of four 1,024 x 1,024 planes. One 7220 per plane allows modifications of entire pixels, rather than individual bits, with a single memory update, according to the vendor.

Vectors, circles, and arcs are drawn at a rate in excess of one million pixels per second. Four bits per pixel provide for the simultaneous display of 16 colors from a palette of 4,096 colors. Zoom capability from 2X to 16X is provided, and the pan is smooth vertically and coarse horizontally.

The text capability provides four screens of 64 lines by 80 characters. Blind and underline features are also provided. Four RS232 serial ports are standard and can be used to support required graphics peripherals. Current and voltage requirements are 9.6 amps on +5.0 volts and 0.4 amps on +12 volts. Six coax-to-BNC cables, up to 75 feet each, can be used. The GC-20 Graphics Controller is \$5,900 in single quantity.

FOR DATA CIRCLE 412 ON READER CARD

DIGITAL PATHWAYS INC. Palo Alto, Calif. PROTOCOL CONVERTER Booth C3130

The Defender II/II's protocol converter allows asynchronous ASCII terminals to communicate with an IBM or equivalent host computer using SNA/SDLC or BSC protocols.

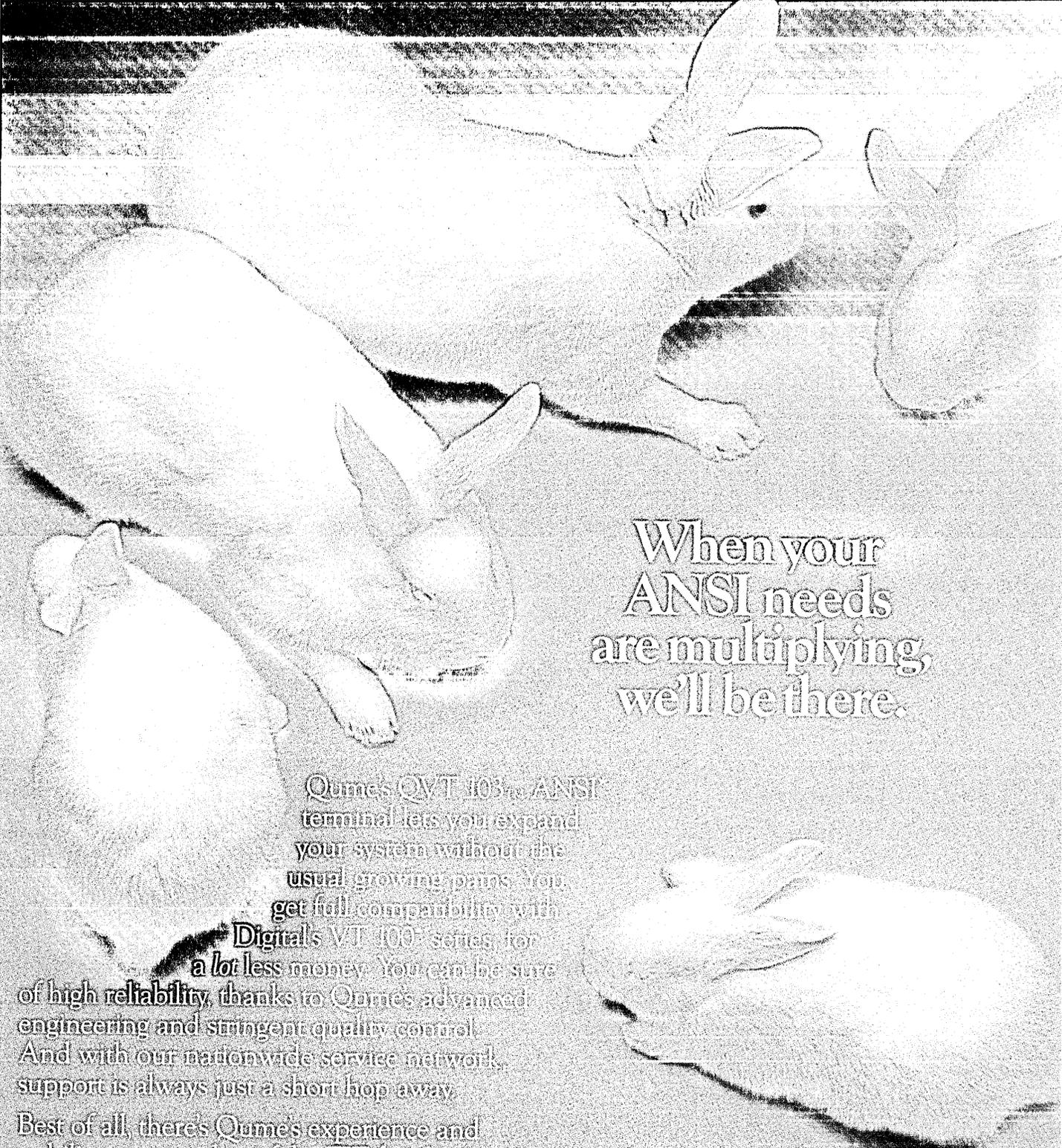
The unit has full screen mapping, maintenance of an internal image buffer, operation of remote full screen applications at low baud rates, menu-driven setup capabilities, backup memory, and support of terminals with full color and extended highlighting features.

The device supports over 100 types of asynchronous terminals. The protocol converter, installed in the Defender II/II's chassis, is available in an eight port configuration and sells for \$5,500.

FOR DATA CIRCLE 413 ON READER CARD

FUJI PHOTO FILM U.S.A. INC. New York, N.Y. FLOPPY DISKS Booth B3315 and B3317

This vendor will introduce its full line of floppy disk products to the American market. These include the FD Series 8-inch standard, MD and MH series of 5 1/4-inch hard and soft sector mini, and the 3 1/2-inch micro, and 3-



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CIRCLE 51 ON READER CARD



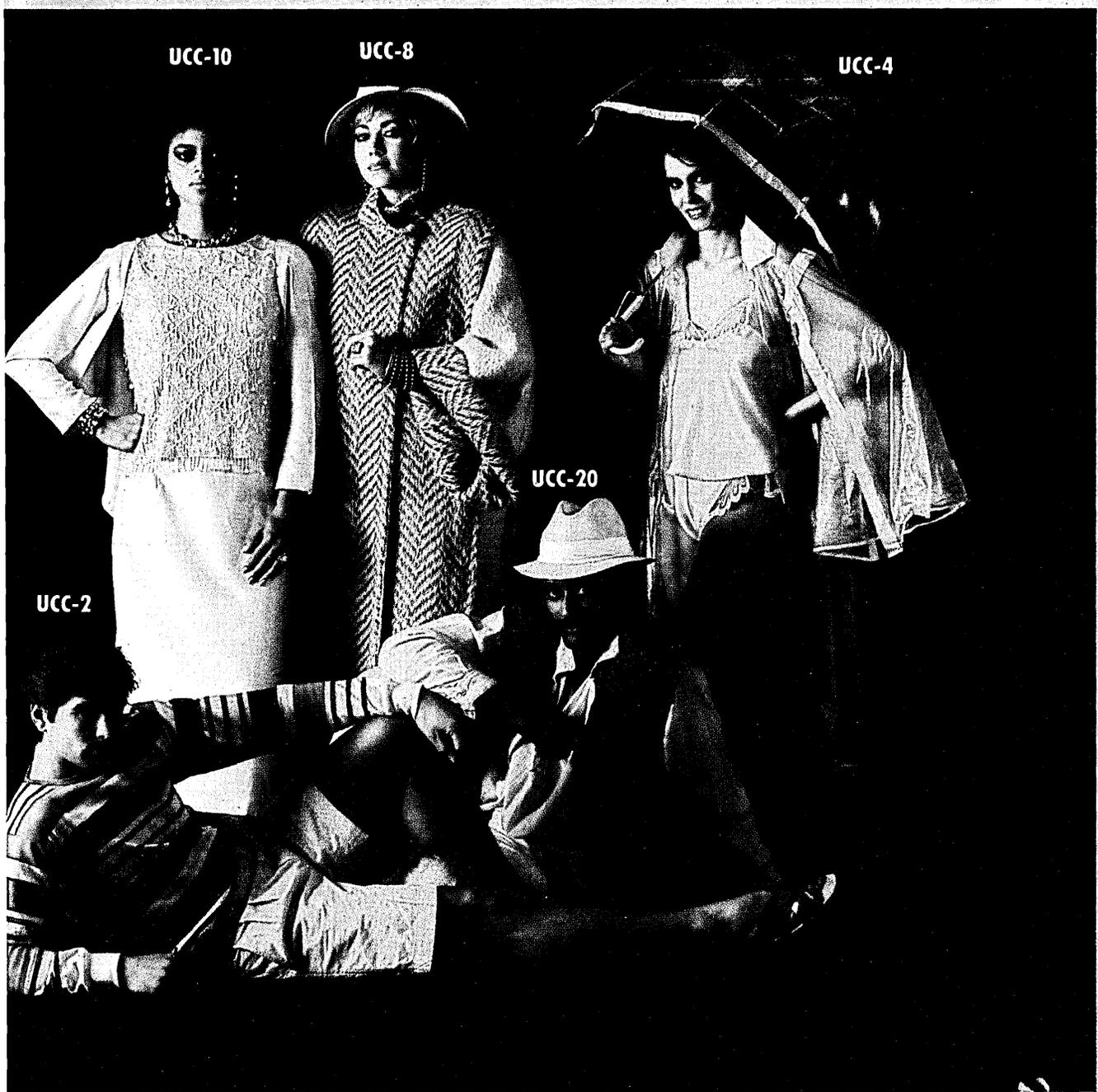
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UCC-10

UCC-8

UCC-4

UCC-20

UCC-2

UCC-10. A Data Dictionary/Manager which automates the communication and control needed to effectively manage the IMS data base operation. **UCC-8.** An online, integrated system designed to manage the complex support activities of today's data centers. Key areas of use are: problem management, change management, customer support, inventory management and TP network control.

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CIRCLE 52 ON READER CARD

NCC PRODUCT PREVIEW

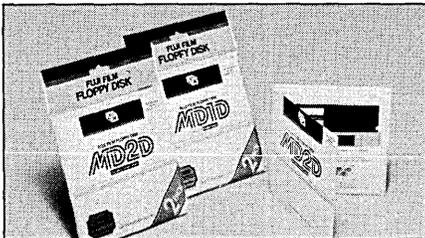
inch compact floppy disks.

Employing the vendor's three-dimensional RD Binder System, the company offers heavy-duty floppy disks that meet or exceed international industry standards, including IBM, Shugart, ANSI, ECMA, ISO, and JIS, the vendor says.

The disks feature a metal shutter on the head window that automatically opens when the disk is inserted into the disk drive and closes when removed. The products have a write/protection mechanism, which features a sliding tab that when open exposes a write/protect notch, thus preventing the accidental erasure of data. When the tab is slid shut, new data can be written. The disks are also equipped with a durable hub ring, made of special plastic on the compact disk and metal on the micro disks.

In addition, the vendor says the floppy disks perform superiorly even after 10 million passes under extreme temperature and humidity conditions. The vendor certifies that every track is guaranteed to be error-free. The floppy disks are engineered to micron tolerances of 1/1,000mm.

The 3 1/2-inch micro floppy disk has a recording capacity of 500KB one side (un-



formatted) and 1,000KB two side (unformatted). It has a data transfer rate of 200KBps and a track density of 135 tpi at 80 tracks and 67 1/2 tpi at 40 tracks. The recording density is 8.717 (side 1).

The 3-inch compact floppy disk has a recording capacity of 250KB one side (unformatted) and 500KB two side (unformatted). It has a data transfer rate of 250KBps and a recording density of 9.0. Track density is 100 tpi and the number of tracks per side is 40.

The 5 1/4 floppy disk MD-2D has the same recording capacity, data transfer rate, and number of tracks as the 3-inch compact floppy. Track density is 48 tpi and the recording density is 5.876 (side 1). Prices for all the floppy disk products start at approximately \$5 for single quantities.

FOR DATA CIRCLE 415 ON READER CARD

GENICOM CORP. **Waynesboro, Va.** **PRINTERS** **Booth C3308**

The Genicom 4000 models operate at speeds from 300 lpm to 600 lpm and incorporate a

resonant print module system with three printing modes: draft, NLQ, and graphics/plotting. The units are available with standard serial and parallel interfaces and are designed for high-throughput, heavy-duty cycle printing operations.

Some of the other features include character expansion printing, automatic bold and underline printing, automatic superscripts and subscripts, nine popular bar codes, and the capability to download characters. There is also a software interface package for the Diablo 630, Epson MX80, Graftrax Plus, and plug-in type fonts with faces such as Courier, Italic, and OCR A and B as well as a plug-in system to add additional line buffering up to 6.144KB.

FOR DATA CIRCLE 416 ON READER CARD

GIMIX INC. **Chicago, Ill.** **C DEVELOPMENT SYSTEM** **Booth B4016-4018**

The GMX 6809 CPU III performs high-speed DMA transfers from memory to memory and uses memory attributes and illegal instruction trapping to protect the system and users from program crashes. If a user program crashes, only that user is affected. Other users are left undisturbed.

Intelligent serial I/O boards reduce system overhead by handling routine I/O functions, thus freeing the host computer for running user programs. This improves overall system performance and allows user terminals to be run at up to 19.2K baud, the vendor says.

The system also includes 1MB of CMOS static RAM, a 72MB hard disk drive, a 6MB removable pack hard disk drive, and a 96 tpi double sided, double density floppy disk drive.

The C compiler runs under OS-9, a Unix-like multi-user, multitasking operating system. Also included is an editor, assembler, debugger, Basic09, RMS, DO, and Flex. The system costs \$19,000.

FOR DATA CIRCLE 417 ON READER CARD

INNOVATIVE ELECTRONICS INC. **Miami, Fla.** **PROCESSOR/CONCENTRATOR** **Booth A1333**

The Netmaster is a multifunction microprocessor-based concentrator providing IBM SNA conversion to NCR Poll/Select in a credit card inquiry/data entry network. The system consists of an IBM SNA host with a front-end processor, leased communications line, one or more netmasters (per location), and one or more NCR controllers connected to point-of-sale terminals (POSTS). The general purpose of the network is to connect distributed POSTS to a host for credit authorization and data

collection, in conjunction with the CICS application programs.

Functions of the Netmaster in the network include SNA/SDLC to NCR poll/select protocol conversion, preprocessing POST data inbound and outbound to reduce mainframe processing, packing and unpacking 3270 virtual screens, and providing mass storage of print data so mainframe pacing is not required.

Standard features include a 16-bit microprocessor, 32KB EPROM, 256KB RAM, seven segment displays, three status LEDs, and up to four communications ports. Local storage options include one to four 320KB floppy disk drives, one to four 640KB floppy disk drives, and up to a 5MB Winchester hard disk. The SNA Netmaster costs \$3,000.

FOR DATA CIRCLE 418 ON READER CARD

INTERSTATE VOICE PRODUCTS **Orange, Calif.** **SPEECH RECOGNITION BOARD** **Booth B3628-B3632**

This speech recognition board (SRB) is custom designed for the IBM PC and PC XT Personal Computers. The SRB is a plug-in printed circuit board that contains all analog-to-digital, processing, memory, and I/O interfaces needed to convert the spoken word to digital code.

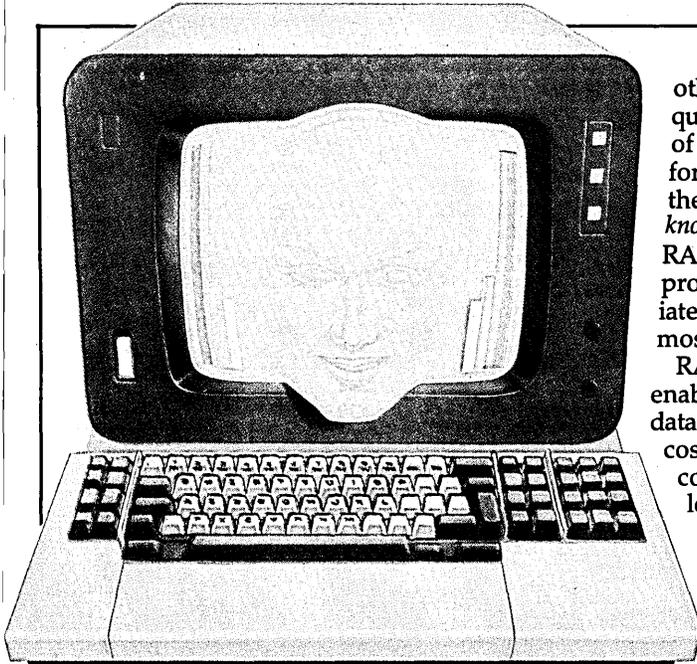
The board incorporates a 16-bit Intel 80186 microprocessor as well as 128KB of dynamic RAM, and 32KB of EPROM (expandable to 64KB). The unit incorporates the vendor's proprietary ASA-16 spectrum analysis chip, which converts speech input from sound waves into spectral patterns.

The SRB comes equipped with a menu-based utility program, including a set of subroutines written in BASIC and supplied in source code. The program prompts its user with questions and instructions via the PC's display. A help display is available at each menu level.

Instructions are spoken in English, transmitted through a microphone, and converted by the SRB's audio spectrum analyzer from sound waves into spectral patterns representing the time and frequency characteristics of each utterance. Through a process of coding, compressing, and dynamic programming techniques, the voice recognizer translates the spectral data into binary patterns, which are then compared with previously stored reference patterns to determine the actual word spoken.

The system uses speaker-dependent, isolated word technology. To acquaint the voice recognizer with speech characteristics of a particular voice, the system must initially be trained by a speaker so that it understands each of the words uttered by that particular speaker.

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DTM7/1

NCC PRODUCT PREVIEW

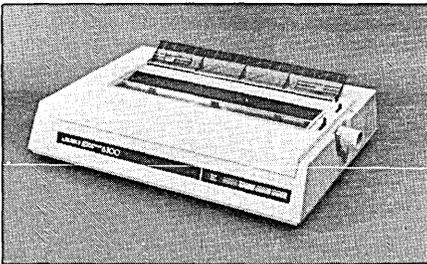
The SRB operates in two modes. The keyboard mode simulates keystrokes based on speech input. The PC mode accommodates users who prefer to write their own application software incorporating speech input. In this mode, the user has over 50 commands available to control the SRB, although only a few are required in general use.

The SRB recognizes 240 utterances (words and short phrases) with an accuracy of approximately 99%, the vendor says. In addition to the utility program, the unit also comes equipped with a connecting cable, user's manual, and a choice of either of two noise-canceling microphones. The standard lightweight head-mounted microphone, suitable for factories and other environments where freedom of movement is important, has a standard 5-foot cord. The SRB costs \$2,000.

FOR DATA CIRCLE 419 ON READER CARD

JUKI AMERICA **Saddle Brook, N.J.** **DAISYWHEEL PRINTER** **Booth A2644 and 2646**

The Model 6300 is a daisywheel printer with a 16-inch-wide platen and a noise level of



60dba. It is Diablo-compatible for the ribbon and daisy-wheel, and has escape sequence codes that are the same as the Diablo 630 API.

It has a maximum printing speed of 40 cps and 32 cps in shannon text. It uses a Diablo 96-character daisywheel. Spacing at 132 characters is 1/10th of an inch, at 158 characters it is 1/12th of an inch, and at 197 characters it is 1/15th of an inch proportional spacing. Character spacing is 1/120th of an inch and line spacing is 1/96th of an inch.

It uses the Diablo Hytype II multistrike ribbon. It can use a Centronics parallel or RS232C serial interface. The unit has a 3KB buffer memory standard that is expandable to 15KB.

FOR DATA CIRCLE 420 ON READER CARD

KENNEDY CO. **Monrovia, Calif.** **HARD DISK** **Booth A1344**

This vendor is introducing an 8-inch Winchester disk drive called the Model 73160. It has a rotary actuator to give an unformatted

capacity of 165MB. One-track access time is 5 msec, average access time is 20 msec. Average latency time is 8.33 msec based on a disk speed of 3,600 rpm. The actuator arm is balanced to compensate for gravitational forces, allowing the unit to operate in any position without adjusting the actuator servo-mechanism electronics.

The disks have a density of 9,980 bpi on the inner cylinder and 823 tracks per surface with a track density of 800 tpi. Heads fly 14 to 17 micro-inches above the recording surface with a loading of 9 1/2 grams. The unit employs modified frequency modulation techniques with 9.67 MHz data transfer rates.

The disk drive has six platters with 10 data surfaces and one servo surface. The servo surface is on the bottom of the middle disk to compensate for thermal expansion and towering effects on the head stack and spindle assembly. Incorporating a low power, DC brushless direct motor, the unit requires +5Vdc at 1 1/2A and +24Vdc at 4A peak running, 5A starting. Total dissipation is less than 96W rms. The Model 73160 with SMD, ANSI, or PICO interface is priced at \$4,700.

FOR DATA CIRCLE 421 ON READER CARD

KEYTRONIC **Spokane, Wash.** **SPEECH RECOGNITION KEYBOARD** **Booth B4206**

The 5152 Speech Recognition Keyboard is designed for business, professional, and industrial applications. It provides a 100-word vocabulary and is speaker-dependent. The unit recognizes the unique sound patterns of the person for which it was trained, and responds when that individual issues commands.

Alternate vocabularies can be stored in external memory and downloaded with a



utility program. The vendor says the unit has a speech recognition accuracy of 98% or better. Words from any language can be used, since the system is trained by the operator. The intelligent keyboard recognizes discrete words and phrases lasting no longer than 1/4 seconds, with a brief pause of a quarter of

a second between words.

Voice input from the IBM PC-compatible keyboard is transparent to the host computer. All required electronics are contained in the keyboard enclosure. The messages sent to the host computer when a word is recognized are identical to the ones sent when keys are depressed. Software that accepts input from the unit will accept input from the voice recognition unit. The speech recognition Keyboard costs \$1,500, and the vendor says volume discounts are available.

FOR DATA CIRCLE 422 ON READER CARD

LIEBERT CORP. **Columbus, Ohio** **UPS SYSTEM** **Booth A1722**

The Programmed Power Center is designed to be an integral part of the data center environment. According to the vendor, the system is quiet, has a compact design, and is low in weight. With front access, the unit can be installed and serviced easier. It occupies minimal floor space. Additional access improvements facilitate customer access to terminals and other internal components.

A battery pack for the system can be placed next to the unit itself in the data center. Depending on requirements for battery backup time, this option eliminates the need for a remote battery room. The vendor says enhanced performance features offer a high level of safety, reliability, and efficiency. One benefit of the system's high DC-AC conversion efficiency is reduced battery requirements. The system is basically cost-effective in delivering watts per pound, watts per dollar, and watts per square foot, the vendor adds.

The Programmed Power Center is available for loads of 50 kVA to 200 kVA. The system can be configured in a redundant, parallel, or parallel redundant mode. System costs range from \$75,000 to \$120,000.

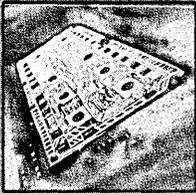
FOR DATA CIRCLE 423 ON READER CARD

MEGADATA CORP. **Bohemia, N.Y.** **INTELLIGENT TERMINAL** **Booth C4036**

The Model 8188-7 VIT is an intelligent terminal configured for user-selectable emulation of Univac UTS-400, U100/200, and IBM 3271/3277. Also included is TTY emulation for communication with Unix-based systems. An alternate operating system is available for CP/M-80 and will soon be available for MS/DOS.

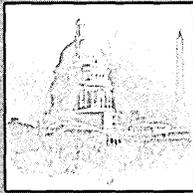
The VIT utilizes a Motorola 68000 microprocessor with 128KB to 1,024KB of RAM, which provides two RS232 host interfaces and one printer interface. Options include a serial printer and dual floppy disk drive. The Model

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A milestone for new standards in office information systems from the company that started it all.

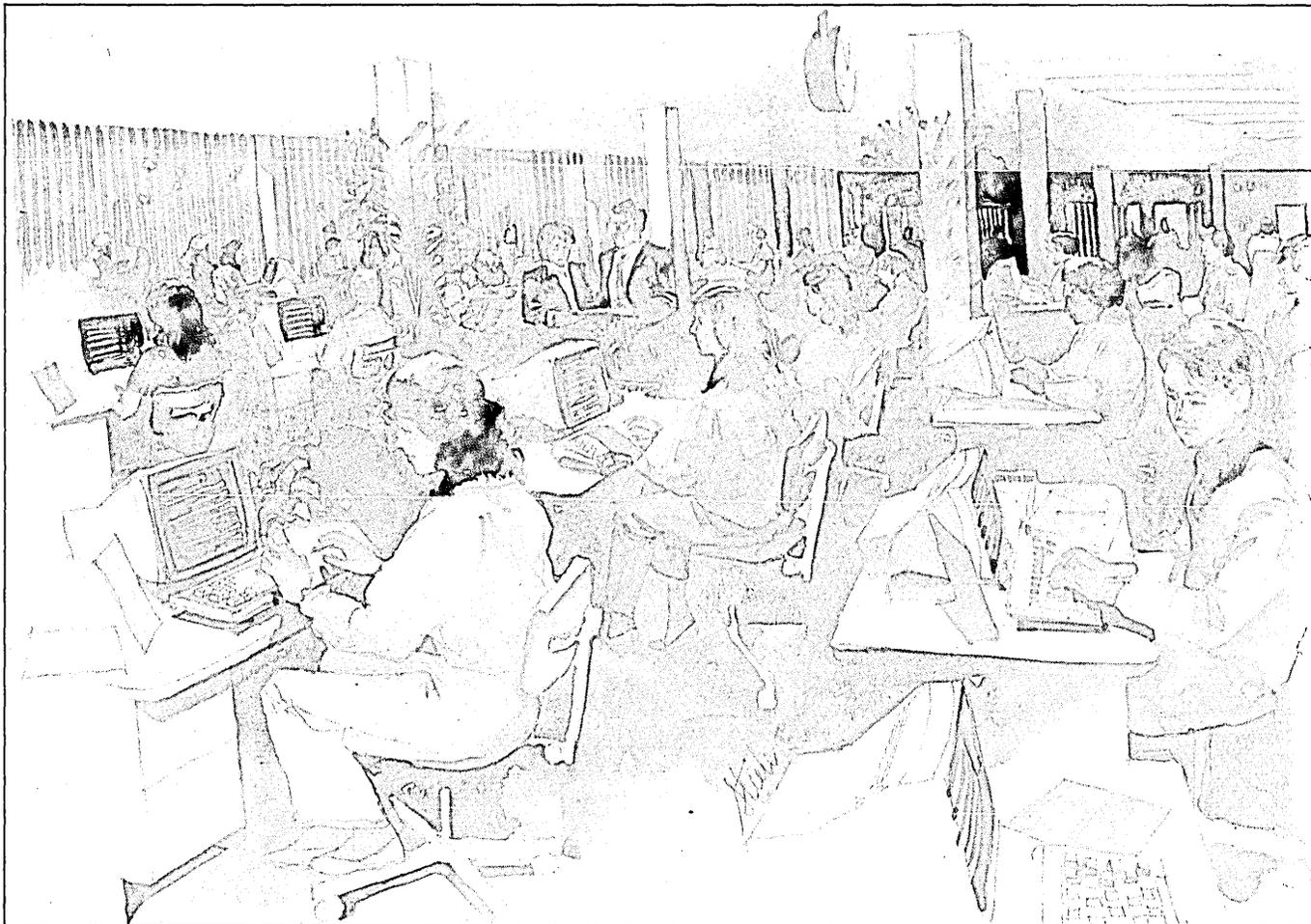
From the moment Four-Phase introduced the world's first all-LSI computer in 1970, we have consistently presented the industry with innovative hardware and software products to help make business more profitable and productive.

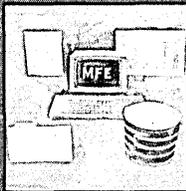
Today, as a member of the Motorola Information Systems Group, Four-Phase once again unveils another milestone in information processing—the new 6000 family of office information systems. Compact, powerful

processing units and flexible, capable software have been fused together into a family of systems that deliver maximum results today, with substantial expansion capabilities for tomorrow.

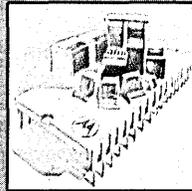
Technology for the real world.

Motorola/Four-Phase systems are tough enough and smart enough to deal with the real world—where speed, power, and reliability in a multi-user environment are prime considerations. The new 6000 systems feature the high-performance 32-bit Motorola 68010 CPU and an operating system derived from UNIX* System V under license from AT&T. We created





1978
Four-Phase announces The **MULTIFUNCTION EXECUTIVE®** (MFE), the first DDP operating system to allow multiple applications to run concurrently and independently.



1982
Four-Phase is acquired by Motorola Inc., combining our information processing expertise with one of the world's leading manufacturers of semiconductors and electronic equipment.

integrated system software that combines these two industry standards into a powerful, multi-user, multi-tasking environment that can stand up to practically any application.

There are two systems in the 6000 family. The 6300 supports 1-8 users, making it perfect for the smaller user or a remote office. The 6600 is a high-performance system designed to support up to 128 users. Both systems offer complete and integrated solutions—whether they're working in an operations-oriented environment where efficiency and precision are needed, or a results-oriented environment where flexibility and quality are key.

Service and support to match our technology.

At Motorola/Four-Phase, our commitment to you goes beyond providing quality, high-performance hardware and software. Support is just as important. Our award-winning Customer Support Operation is staffed with over 1,400 customer support specialists in over 175 cities across the nation. One phone call to our

Operations Center will ensure prompt response from the nearest available specialist. And you can call the Center 24 hours a day, 365 days a year.

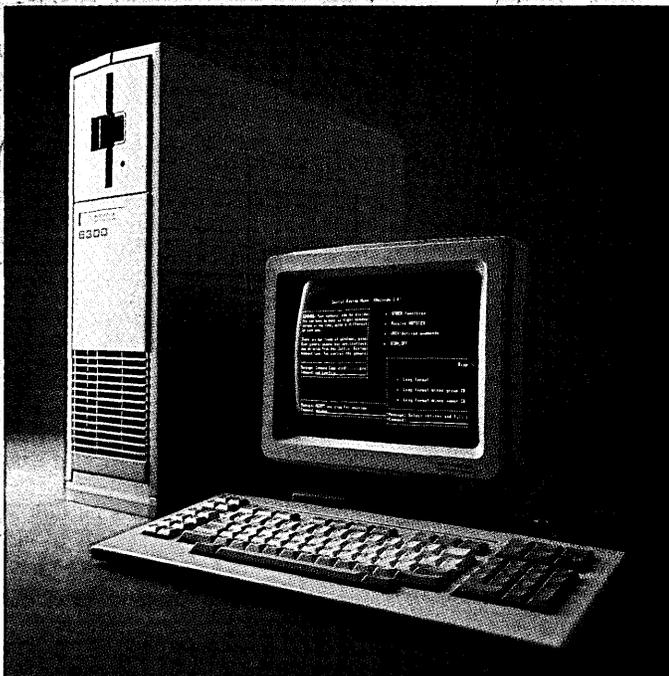
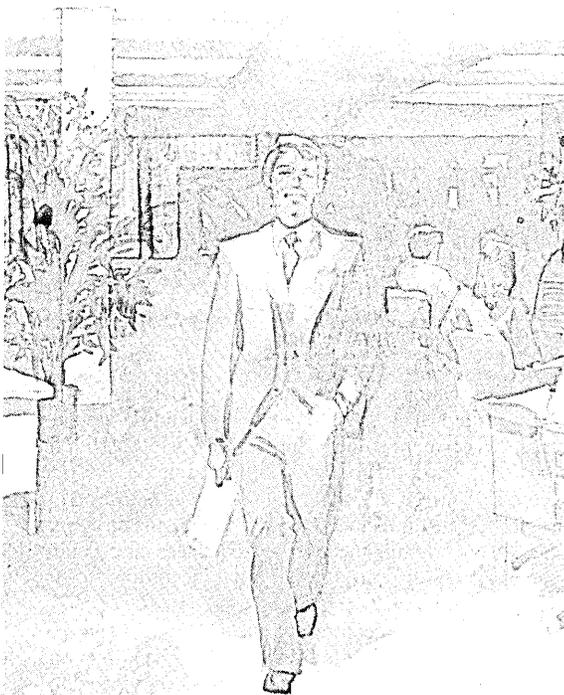
If you're a DP/MIS manager or OEM, find out what the latest milestone in office systems can mean to you. Contact Motorola/Four-Phase today at 1-800-528-6050, ext. 1599. In Arizona, call 1-800-352-0458, ext. 1599. Or write us at 10700 North De Anza Blvd., M/S 52-3B1, Dept. S., Cupertino, CA 95014.



MOTOROLA
Four-Phase Systems

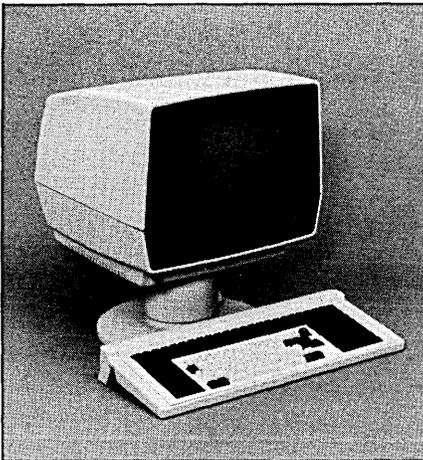
During NCC, see us at the Motorola Information Systems Group Booth B-3238.

Motorola and  are registered trademarks of Motorola Inc. Four-Phase is a registered trademark of Four-Phase Systems, Inc. *UNIX is a trademark of AT&T Bell Telephone Laboratories, Inc.



1984
Motorola/Four-Phase announces The 6000 Series—a milestone in productivity that delivers information processing performance today, and expansion capabilities for tomorrow.

NCC PRODUCT PREVIEW



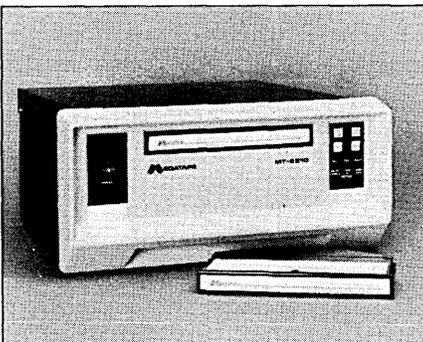
8188-7 VIT costs between \$2,500 and \$3,500 depending on quantity and configuration.
FOR DATA CIRCLE 424 ON READER CARD

MEGATAPE CORP.
 Duarte, Calif.
CARRIDGE STREAMER
 Booth C4362

The MT-2210 and MT-2220 are 500MB streaming tape drives. Both operate at 200 ips and employ a book-sized cartridge of 1/2-inch wide magnetic recording tape but differ in physical packaging.

Both drives operate in a 200 ips or 50 ips streaming mode and a 50 ips start/stop mode. The data transfer rate at 200 ips is 240 KBps. When operating at 200 ips, the units are capable of backing up or restoring 500MB in 36 minutes, the vendor says.

A 24-track, bit serial, serpentine format is employed along with a packing density of 9,600 bpi (12,000 frpi). Data is encoded into a 4/5 GCR format. All encoding and decoding of data is accomplished in the integral formatter and is totally transparent to the controller. The formatter accepts byte-wide data from the controller and encodes it into bit serial data during a write operation. During a read operation, data is decoded and presented



to the controller as a 9-bit byte (eight data bits plus odd vertical parity).

The 24-track serpentine format is

achieved through the use of a two track read/write head assembly, which is stepped 12 times to create 24 tracks. A true read-after-write operation is performed during the write mode to ensure data reliability. The vendor says a record stored in the cartridge can be accessed in an average time of 30 seconds.

The drives incorporate a positive loading mechanism with a three-point reference to ensure proper positioning of the cartridge, which employs precision tape guides on either side of the head and a simple tape path so only the heads touch the oxide surface. A calibration track is written on the tape if one was not previously written. During a subsequent read operation on the same or another drive, the calibration track is read and internal logic positions the head at the optimum position for data recovery from that particular cartridge. The M-2210 costs \$5,500 and the M-2220 sells for \$5,750.

FOR DATA CIRCLE 425 ON READER CARD

MICROPOLIS CORP.
 Chatsworth, Calif.
DISK DRIVE
 Booth D3000

The Models 1353, 1354, and 1355 are 5 1/4-inch Winchester disk drives that offer capacities of 85MB, 127MB, and 170MB with sub-30 msec average seek time. The drives are compatible with EDSI controllers available from major controller suppliers.

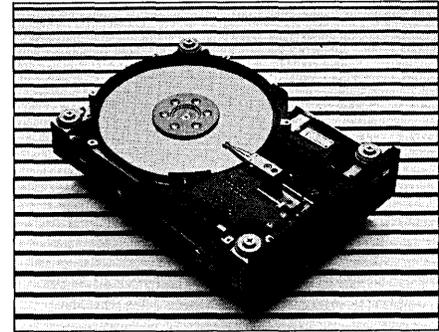
According to the vendor, the company went with EDSI controllers because of the products' popularity. The 1353 (85MB) sells for \$1,500. The 1354 (127MB) costs \$1,700, and the 1355 (170MB) retails for \$1,800. All prices are in oem quantities.

FOR DATA CIRCLE 426 ON READER CARD

MICROSCIENCE INTERNATIONAL
 Mountain View, Calif.
WINCHESTER DISK DRIVES
 C4366

The HH-725 is a 5 1/4-inch Winchester disk drive designed as a half-height solution for microcomputers, including portables, for a wide range of applications. The hard disk provides 25 1/2 MB of unformatted storage. A closed-loop servo positioning system centers the head in the data track regardless of thermal expansion or hysteresis of the stepper motor. A stepper motor, which half-steps at 0.9 degrees, allows microstepping to keep the head on track.

A single printed circuit board contains all drive electronics, and uses LSI circuitry to reduce the amount of generated heat. All drive control functions are performed by a single microprocessor. An access time of 80 msec is achieved through a buffered seek.



The 3.24-pound drive features a self-diagnostics system which continuously monitors the unit's operation. Selection of the drive is indicated by a red LED located on the front panel. In the event of an error, a green LED indicates the exact error that occurred via a 4-bit flashing code. The HH-725 costs \$1,000.

FOR DATA CIRCLE 427 ON READER CARD

MICRO-TERM INC.
 Fenton, Mo.
DUAL FORMAT CRT
 Booth C3926 and C3948

This vendor is introducing Twist, a dual format crt that can display data in both an 80-column by 24-line format (landscape) and an 80-column by 72-line format (full page). The dual format function is achieved by rotating the crt screen 90 degrees to the new position, landscape or full page. All data is retained during the rotation procedure, and the characters automatically reorient themselves upon the twisting of the screen in less than one second, the vendor says.

In the landscape mode, the unit displays 16 by 20-dot characters of a 15-inch screen. Three pages of memory are standard in this mode, increasing the terminal's capacity to 72 lines. In the full-page mode, the unit reverts to a 7 by 9-dot format to display 760 characters on a single page. The native mode of the terminal is ANSI 3.64, and is completely compatible with Digital's vt102, with the exception of the 132-column mode. For non-ANSI users, the terminal may also be used in a custom mode. In this mode, the user may program the escape sequences and control codes into the terminal according to the system.

Features of the terminal include 16 user-definable function keys, bidirectional pass-through printer port, five video attributes, double high, double wide characters in landscape mode, scroll in landscape mode, editing keypad, nonvolatile soft setup mode, alternate character generator, 25th status line, five keyboard LEDs, block mode with protected fields, settable tabs, settable margin bell, and P-4, P-31, or amber phosphor.

FOR DATA CIRCLE 428 ON READER CARD

AUTOSCOPE™

**A New Way of Seeing Your Network
A New Way of Controlling Your Network
A New Way of Improving Your Network**

AUTOSCOPE

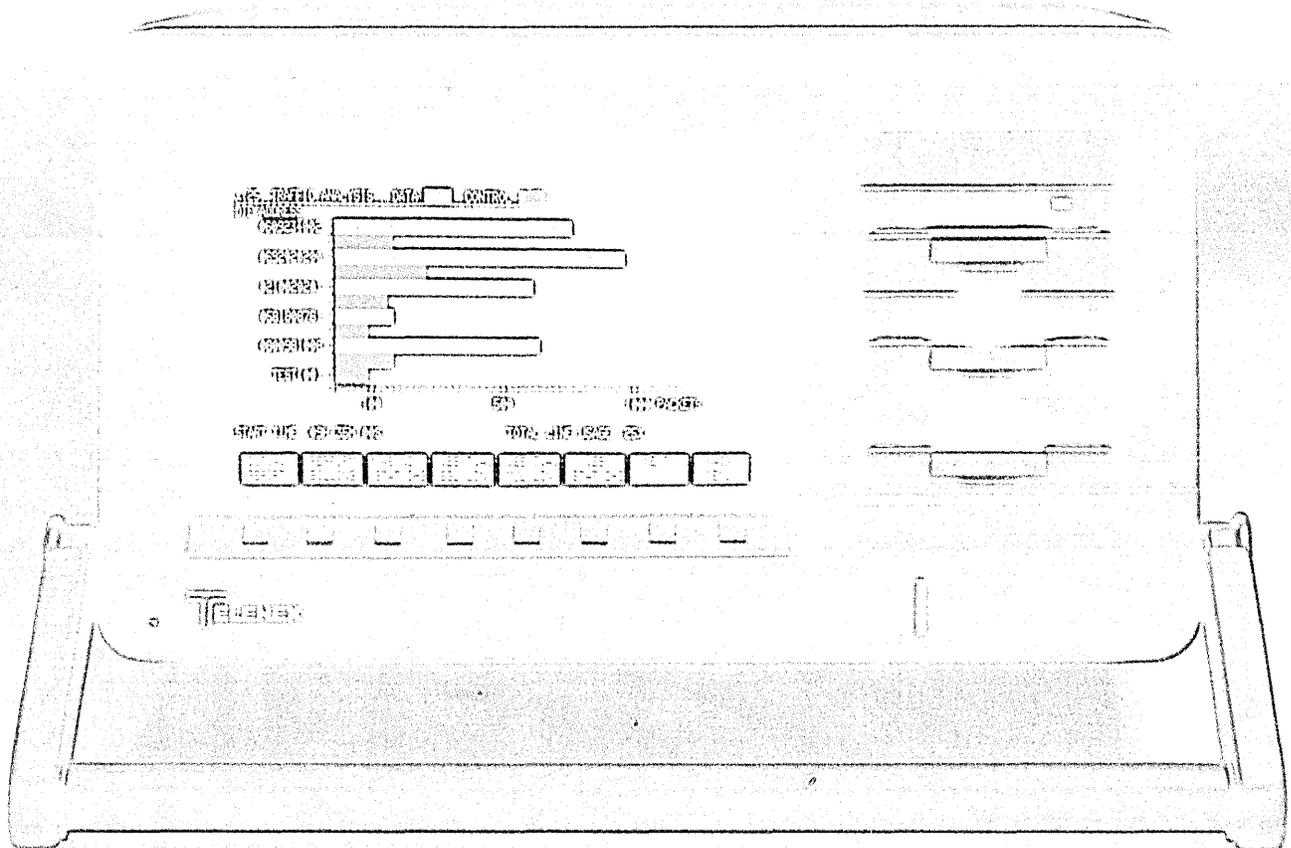
is a Completely New Way of

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AUTOSCOPE

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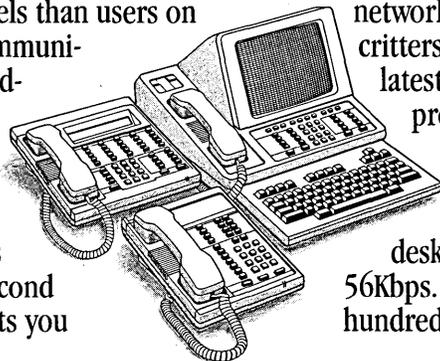
TELENET
CORPORATION

CIRCLE 56 ON READER CARD

OUR BUS WON'T GET STUCK IN TRAFFIC. EVER.

There are always more channels than users on your ROLM® CBX II business communication system. (Our ten-thousand-user system has more than twenty-three thousand channels to handle voice and data.) No blocking at any time. Ever.

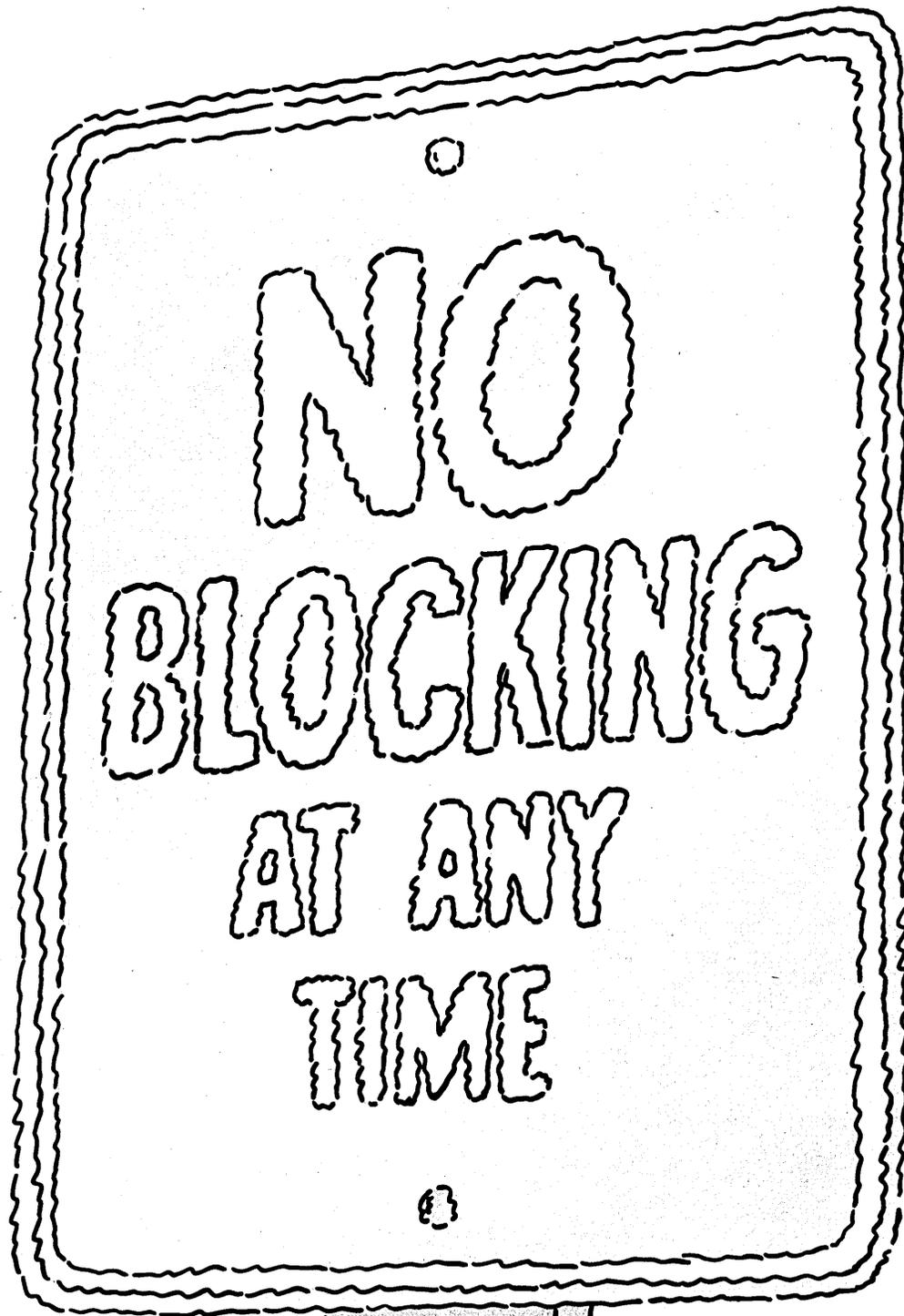
And, thanks to its parallel bus and about 4½ billion bits per second system bandwidth, the CBX II lets you



network a whole company full of common digital critters — telephones and terminals — plus all the latest high-performance devices: PCs, word processors, graphics terminals and computers. You can even network networks.

On one system.

ROLM can deliver voice and data to the desk at speeds well beyond the much-discussed 56Kbps. CBX II's advanced architecture gives you hundreds of kilobits, using existing telephone wire;



megabits, using other media. Try that on your favorite serial architecture.

**Are the steps killing you?
Take the Ramp.**

CBX II is a breakthrough communications controller. It's the centerpiece for a totally digital, absolutely expandable communications system.

Instead of the typical stops and

starts of expansion, CBX II lets you grow smoothly, easily and very, very cost-effectively. You move up the ROLM Ramp with each new need for voice and data management. And you do it all on one system.

If you want to know how fast, how far a business communications system can go, don't miss the bus.

ROLM

4900 Old Ironsides Drive, M/S 626, Santa Clara, CA 95050
800-538-8154. In Alaska, California and Hawaii, call 408-986-3025.

CIRCLE 57 ON READER CARD

NCC PRODUCT PREVIEW

ORANGE MICRO INC. **Anaheim, Calif.** **MULTIFUNCTION BOARD** **Booth 4442**

Mr. Chips is a multifunction card that adds memory, printer ports, and a clock to the IBM PC. Every card comes with software for RAM disk and printer spooling.

Some of the features of the multifunction card include a parallel port, serial port, 64KB to 256KB of RAM, clock/calendar, dual game port, real world interface to monitor and control equipment like thermostats, BSR AC line controller to control electrical devices, Chipdisk RAM disk to set the memory to act like a disk drive, and the Chipdisk print spooler for the PC memory will serve as a printer buffer. Mr. Chips sells for less than \$500.

FOR DATA CIRCLE 429 ON READER CARD

PELIKAN INC. **Franklin, Tenn.** **RIBBON PRODUCTS** **Booth D3506**

This vendor will display a broad range of new ribbon products. The company will introduce word processing ribbons for Brother, NEC, and Qume products. Also, the vendor will introduce matrix printer ribbon products for C. Itoh, Centronics, IBM Mannesmann, and Seikosha printers. Prices vary.

FOR DATA CIRCLE 431 ON READER CARD

PRINTRONIX INC. **Irvine, Calif.** **DOT MATRIX PRINTER** **Booth 4166**

This vendor introduces the MVP 150B dot matrix line printer designed specifically for plug compatibility with the IBM PC and compatibles.

The unit offers large system printer power to the microcomputer users in a compact, office quiet unit. It supports applications from graphics to word processing for many of the spreadsheet and integrated software packages.



The unit prints high-quality office correspondence at 80 lpm and drafts reports at 200 lpm. Under software control of the microcomputer, the printer prints a 132-col-

umn data processing report on 8½ by 11-inch paper. It can compress, shadow, or bold print for emphasis in word processing or forms generation applications.

Using the block graphics character set, users can generate custom business forms from a variety of horizontal, vertical, and diagonal lines, corners, and other graphics characters specially designed for forms generation.

For business, scientific, or industrial graphics applications, the printer plots at 100 by 100 dots per inch and is compatible with leading graphics software packages. The MVO 150B carries a suggested end-user price of \$3,750.

FOR DATA CIRCLE 432 ON READER CARD

QUALITY MICRO SYSTEMS INC. **Mobile, Ala.** **NONIMPACT PRINTER** **Booth C4150**

The Lasergrafix 800 Model II is a low-end addition to this vendor's line of intelligent, nonimpact page printers. It is an eight-page-per-minute word processing printer with limited graphics capabilities. It is based on the Canon LBP-CX print engine with a QMS raster image processor. The printer has a resolution of 90,000 dots per square inch, and is seen as a daisywheel replacement printer for the office automation environment. The Lasergrafix 800 Model II ranges in price from \$5,000 to \$6,000.

FOR DATA CIRCLE 433 ON READER CARD

RANDOMEX DATA MAINTENANCE INC. **Signal Hill, Calif.** **AUTOMATIC DISK CARTRIDGE CLEANER** **A1039-1041**

The Model 850 is a combination disk cartridge cleaner that cleans CME (Phoenix 1204) cartridges, front-loading cartridges and top-loading cartridges .05 inches to .075 inches.

According to the vendor, the unit utilizes a three-step purging action. It brushes loads with proprietary MMS cleaning solution, which emulsifies and floats away oily contaminants, and moves to the inner edge of the disk. The brushes then move outward, and are rinsed with filtered solution.

According to the vendor, the unit was drive manufacturer tested to a 9-micro-inch clean level—half the read/write head flying height. The operation of the machine involves mounting the cartridge and pressing the cycle switch, which begins a four minute cycle. Disks are ready for immediate use. Disk release button eases removal of the cartridge from spindle, and eliminates jarring. Optional mounting blocks and spindle adapters permit conversion to clean other cartridge types. The 850 disk cartridge cleaner costs

from \$4,250 to \$4,500 depending on quantity and configuration.

FOR DATA CIRCLE 430 ON READER CARD

RENEX CORP. **Springfield, Va.** **PROTOCOL CONVERTER** **Booth B4027**

The Translator RT51 provides interface for asynchronous ASCII devices to connect to an IBM system/34,36,38 network. This protocol converter lets users connect terminals, personal computers, printers, and paper terminals.

The unit appears to the host as an IBM 5251-12, and requires no modification to the host software. The attached asynchronous devices act like 5251-11 workstations, 5292 display stations, or 5256 printers.

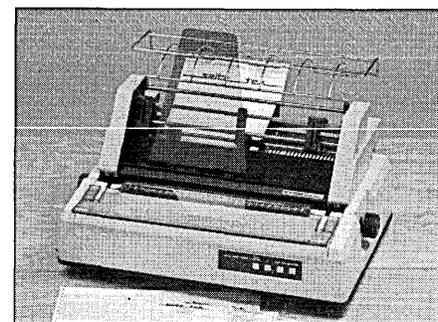
The RT51 is available in configurations of five, seven, or nine asynchronous ports permitting direct connection or dial-up accessibility. Communication between the unit and the host is via RS232 interface using modems or direct connection.

Standard features include passwords for access security, a user-settable inactivity timer to free up unused ports, a graphics (ASCII) pass-through facility, automatic baud rate detection to 19.2K baud, and a disconnect notification to the host. All interaction with the RT51 is done using menu-driven prompts, and no dip switches or internal settings are required. Prices for the RT51 range from \$4,900 to \$6,900.

FOR DATA CIRCLE 434 ON READER CARD

SEITZ TEK **Torrington, Conn.** **MULTIPAPER FEEDER** **Booth 4038**

The ST-150 is a multipaper feeder. It combines a sheet feeder and bidirectional tractor



drive in one mechanical unit. Features include an antibacklash drive, and holds up to 150 sheets of paper in all sizes up to 14 inches by 14 inches. The paper feeder takes continuous fanfold multipart forms. The ST-150 is compatible with most letter-quality and near-letter-quality printers. It costs \$600.

FOR DATA CIRCLE 435 ON READER CARD

Tally Technology Works Great On Paper.

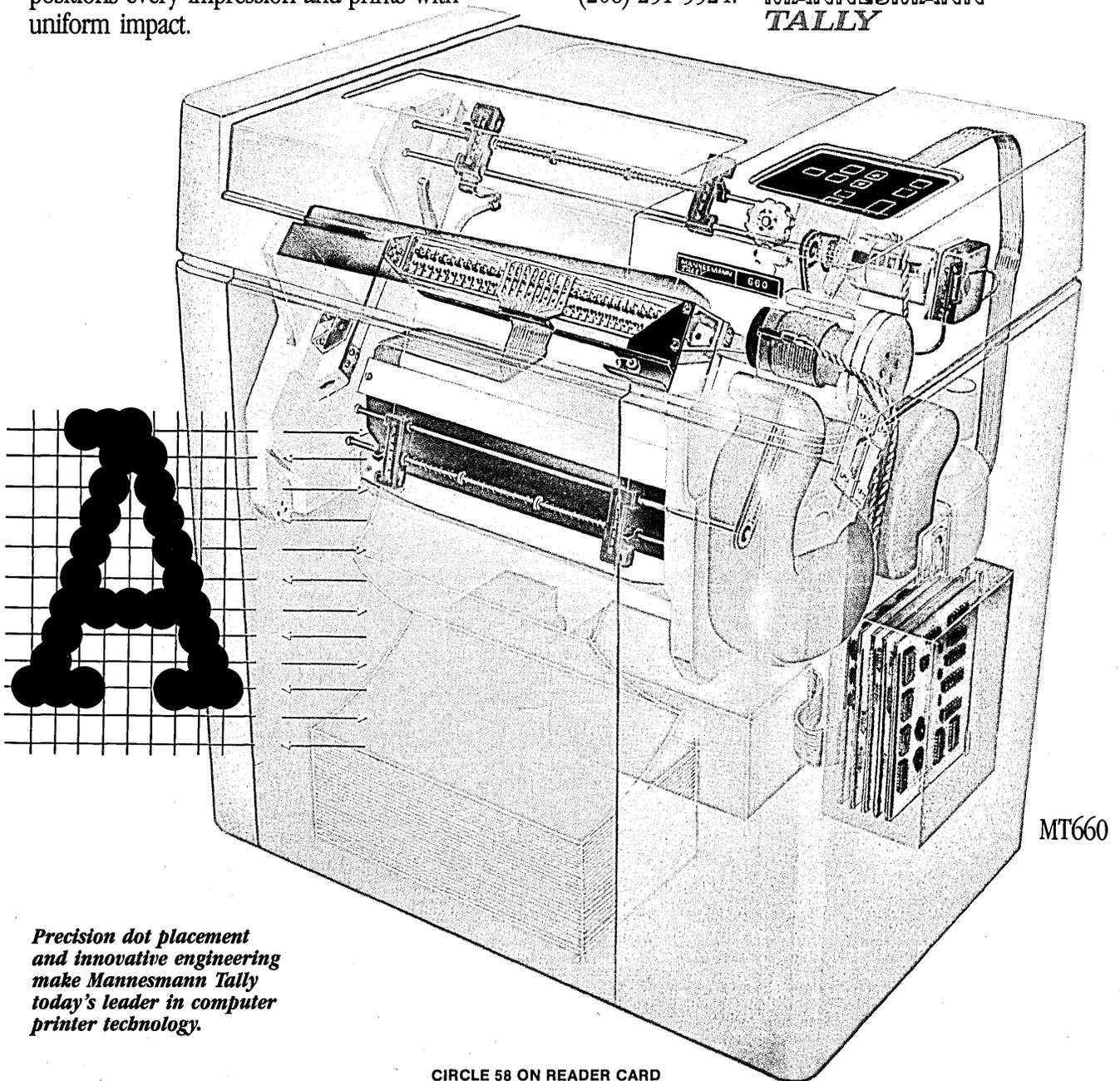
No other 600 LPM line printer is engineered like a Tally. So nothing else performs like a Tally. Or prints like a Tally.

- ▷ The proof's on paper.
- ▷ Everything from high volume report printing to high resolution graphics. And a quality, fully formed look for correspondence.
- ▷ All in one machine. All the result of Tally technology. Like the MT660's innovative hammer bank and linear "shuttle" system that perfectly positions every impression and prints with uniform impact.

▷ There's also more than enough resident intelligence and paper handling versatility to make programming shortcuts easy. For operator convenience, status reports are illuminated on a scrolling display. And it's quiet enough—at 60 dBa—to go almost unnoticed.

▷ Precision printing at its reliable and repeatable best. From Mannesmann Tally.

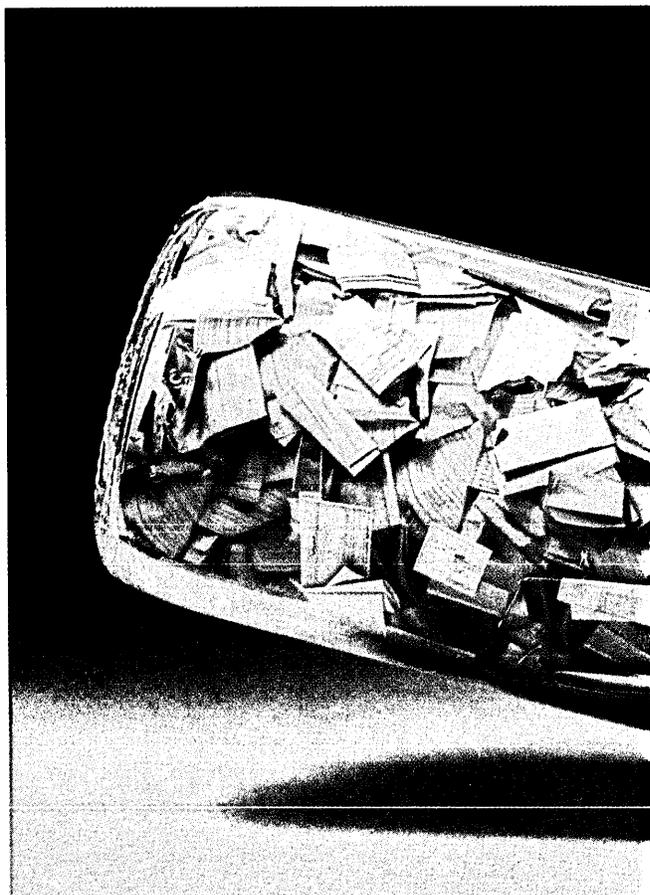
▷ For more information on the world's most advanced, most productive line printers call now: (206) 251-5524. **MANNESMANN
TALLY**



*Precision dot placement
and innovative engineering
make Mannesmann Tally
today's leader in computer
printer technology.*

CIRCLE 58 ON READER CARD

A sure cure for the problem of information bottleneck.



Programming backlog is the source of the problem. Eliminate it, and you eliminate the bottleneck.

Which is precisely what Sperry has done with the MAPPER™ System.

With MAPPER, you work with the computer directly. You ask questions in plain English. And you get immediate answers.

And if the information you get raises other questions, you can ask them right away. With no delay for programming. Or reprogramming.

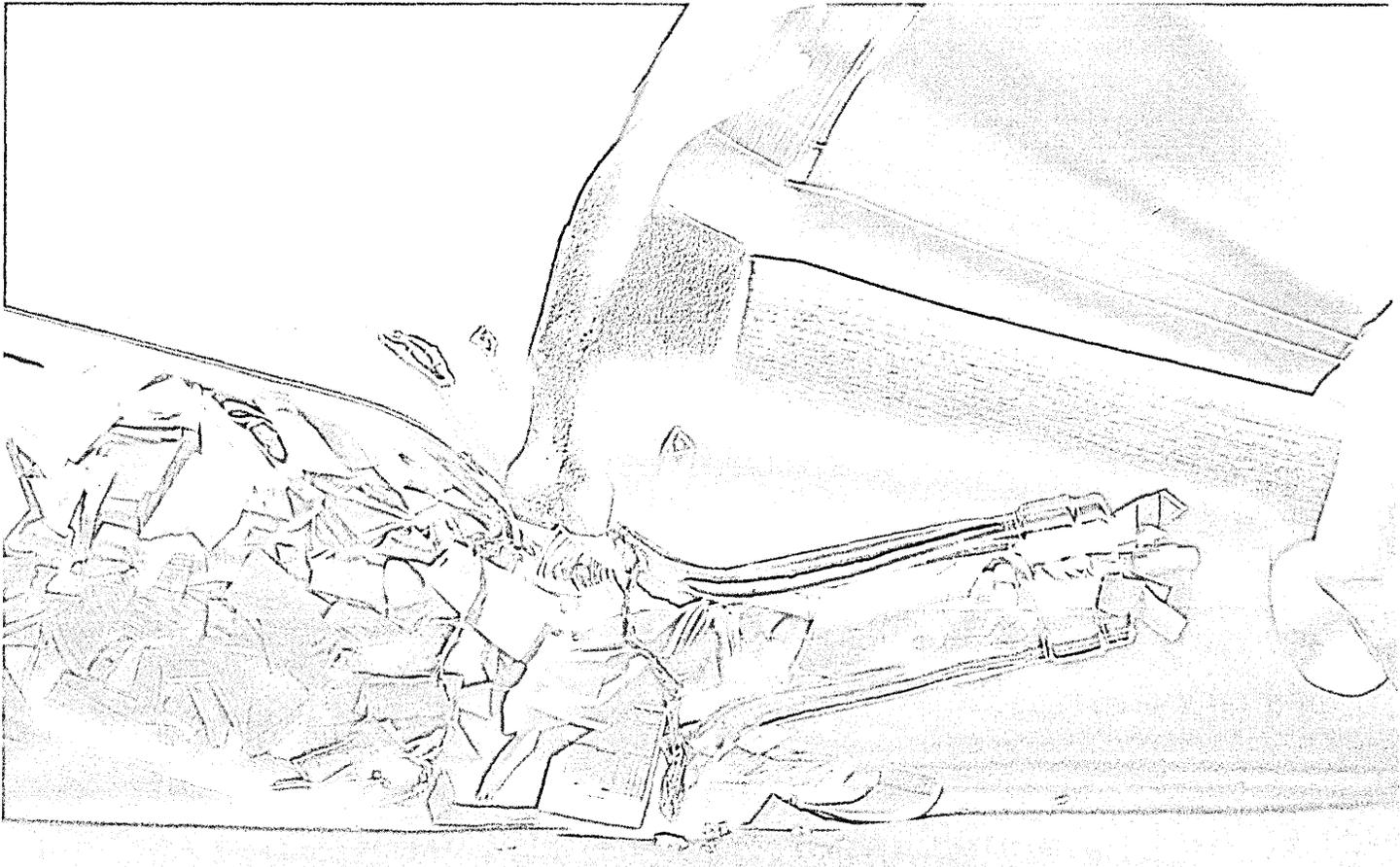
MAPPER is that powerful. It allows you to manipulate information in almost any way you want. And, interesting to note, it can even help your programmers become more productive.

AN AFFORDABLE SYSTEM.

You don't have to be a large company to have a MAPPER System. MAPPER can be scaled to the real and present needs of just about any size company. The cost of a MAPPER System makes it practical for even a department

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MAPPER SYSTEM

within a company to own its own system. Or you can time-share through a Sperry service bureau.

What you get for your money is a whole new order of efficiency in your day-to-day management tasks. Because you'll have the information you need right at your fingertips. Literally.

SEEING IS BELIEVING.
We've made some promises

here that may sound extravagant. But if anything, our claims are on the conservative side.

And to prove it, we offer you the opportunity to see a demonstration of MAPPER at work.

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But first, you might want to look over our MAPPER brochure. A copy is yours for the asking. Call toll-Free:

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NCC PRODUCT PREVIEW

SPECTRA LOGIC CORP.
Sunnyvale, Calif.
CONTROLLER
Booth A2122, A2124

The S120 is a fully emulating disk controller and tape coupler in a single printed circuit board. It is fully compliant with FCC regulations with Data General's recently introduced hardened chassis. The unit and its companion disk-only controller are capable of emulating both DG's 606X and 616X series of disk subsystems with virtually any SMD-type disk drives. The tape coupler emulates DG's 6021 tape subsystem. The S120 costs \$4,500 in quantities of 50.

FOR DATA CIRCLE 436 ON READER CARD

TRANSEND CORP.
San Jose, Calif.
COMMUNICATIONS SOFTWARE
Booth C3698

This vendor is introducing two communications software packages. One is for the IBM Personal Computer and the other works on Apple hardware. Transend PC software is an electronic mail and terminal communications package. The vendor's PC modem card is a plug-in Hayes-compatible modem.

The Apple Transend communications product line consists of three software and two modem products. Transend 1 is an intelligent terminal software program. It allows users to communicate interactively with another computer and send and receive Apple text files. Transend 2 includes all the features of Transend 1, plus it allows users to send and receive large DOS files using error detection and data verification. Transend 3 offers all the features of Transend 1 and 2 plus a text editor. Prices for Transend PC start at \$190. Prices for Apple Transend start at \$80.

FOR DATA CIRCLE 437 ON READER CARD

VERBATIM CORP.
Sunnyvale, Calif.
FLOPPY DISK
Booth B4132

The Datalife 3½-inch Microdisk is protected in a permanent, nonremovable hard plastic case. It has an autos shutter that protects the media from dust, debris, and fingerprints. When the disk is placed in a drive, the auto-shutter automatically opens for data reading and recording. The Microdisk can be used only in systems that have drives with an automatic shutter feature. It will not work in systems requiring the user to manually slide open the shutter on the disk before inserting it into the drive, the vendor says.

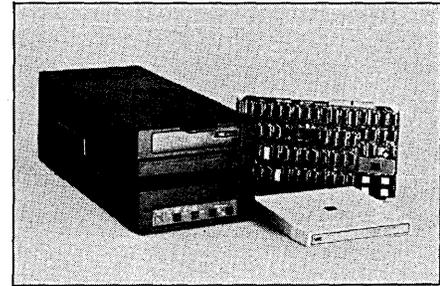
At the center of the disk is a metal drive hub that holds media centered for accurate reading and writing. The device also has a write/protect system. An adjustable window in the corner of the product works with the write/protect mechanism in the disk drive. With this window open, the data is protected from accidental erasure and over-recording. Close the window and the user is free to write on the microdisk.

Microdisk is a single-sided, double density unit. It is 70 track-compatible and works at 80 tracks/135 tracks per inch. It is compatible with several microcomputers that accept 3½-inch disks. It has a storage capacity (single side, double density) of 500KB. The Microdisks sell for \$6 each.

FOR DATA CIRCLE 438 ON READER CARD

VERMONT RESEARCH CORP.
North Springfield, Vt.
HARD DISK SUBSYSTEM
Booth D3326-D3328

The 81MB is a fixed/removable hard disk subsystem designed for OEMs and system integrators who are configuring systems around



the Intel Multibus. The subsystem is designed for the Intel System 310 and operates under iRMX 86 or Xenix software.

The main system component is the VRC Model 8520 8-inch fixed/removable hard disk drive, which stores 10MB on a removable cartridge and 10MB on a fixed disk. The controller mounts in the CPU card cage. The system operates a 0°C to 55°C range.

FOR DATA CIRCLE 439 ON READER CARD

WOLF COMPUTER PERSONNEL TESTING
Oradell, N.J.
PC PROGRAMMING TEST
Booth A1106

This programming aptitude test is on a diskette that can be run on various microcomputers. Several of the vendor's tests will be available on 5¼-inch disks to evaluate programming aptitude in several languages such as COBOL and BASIC.

Some of the advantages of this product, according to the vendor, are immediate evaluation in user departments of potential programmers, close simulation of work environment, programming to allow reading and execution of test questions, instructions, and a candidate's report is provided. The general programming aptitude test costs \$200.

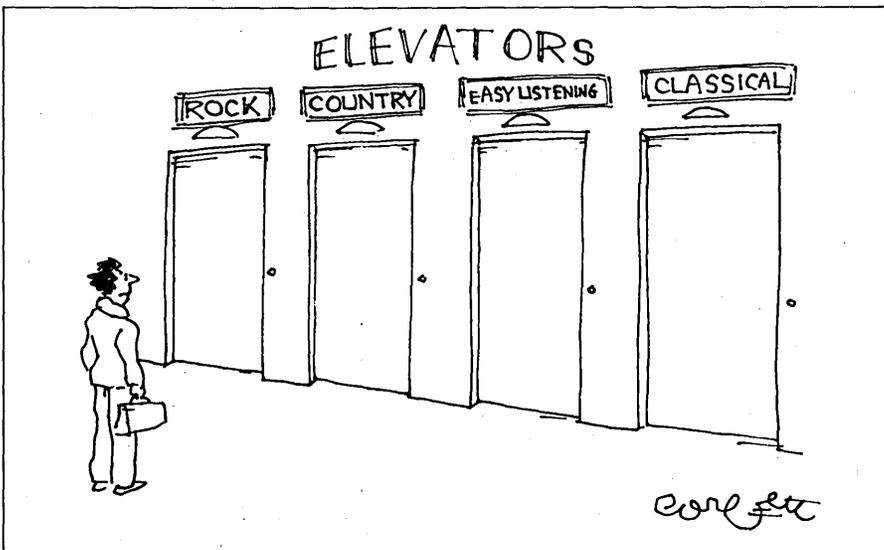
FOR DATA CIRCLE 440 ON READER CARD

ZAX CORP.
Irvine, Calif.
CIRCUIT EMULATOR
Booth H338

The ICD-178 In-Circuit Emulator is designed for the Motorola 68000 series of microprocessors. This standalone emulator emulates the 68000, 68008, and 68010 in one unit to 10MHz. It has 128KB of emulation memory expandable to 256KB.

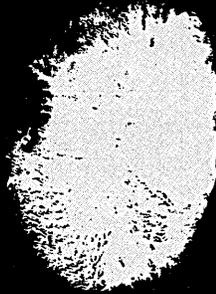
It has a 4KB-deep by 48 bits-wide real-time trace buffer. The unit also features an external event probe for triggering logic analyzers. It has three hardware and eight software breakpoints. This unit can also be connected to the IBM PC with an optional software package that turns the PC into a complete development system for the 68000. The unit is 4.2 inches high by 8.2 inches deep by 11.8 inches wide and weighs less than 10 pounds. The ICD-178 68000 costs \$8,000.

FOR DATA CIRCLE 441 ON READER CARD





“No man goes worse shod than the shoemaker.”



Engineers have used the computer to automate every industry but their own.

Software engineers have developed the technology to automate the secretarial world, banking, printing, defense systems, manufacturing, communications...even the Stock Exchange. But here we sit in the dark ages in our own industry, still documenting with pencil and paper, still manually assimilating, still groping with the ambiguities of translating the original idea into written form.

Introducing TAGS,™ Technology for the Automated Generation of Systems developed exclusively by Teledyne Brown Engineering.

TAGS is the first automated system designed specifically for the field of software development in order to give computer aided design (CAD) capabilities to the software engineer. It consists of a specific, unambiguous language called

IORL® (Input/Output Requirements Language) and a series of software application packages that automate the system design process, documentation, configuration management, and static analysis of your system specification. TAGS also permits computer simulation code to be generated automatically from the IORL specification which then provides for *dynamic* analysis, statistical evaluation and the fine tuning of system and application software long before your system is built and implemented— an automated capability never before afforded to the software engineer.

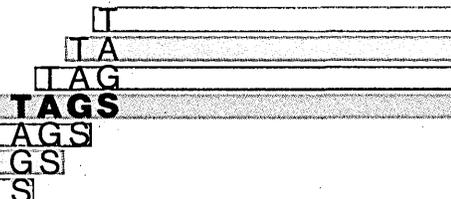
TAGS gives systems/software engineers what they have needed from the beginning, the ability to finally harness the computer to automate and aid in the design, testing and maintenance of systems. The dramatic cost reduction,

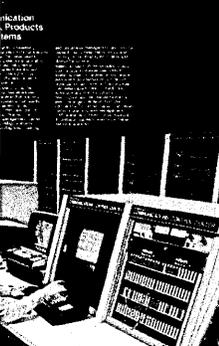
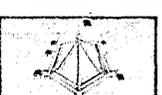
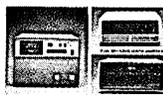
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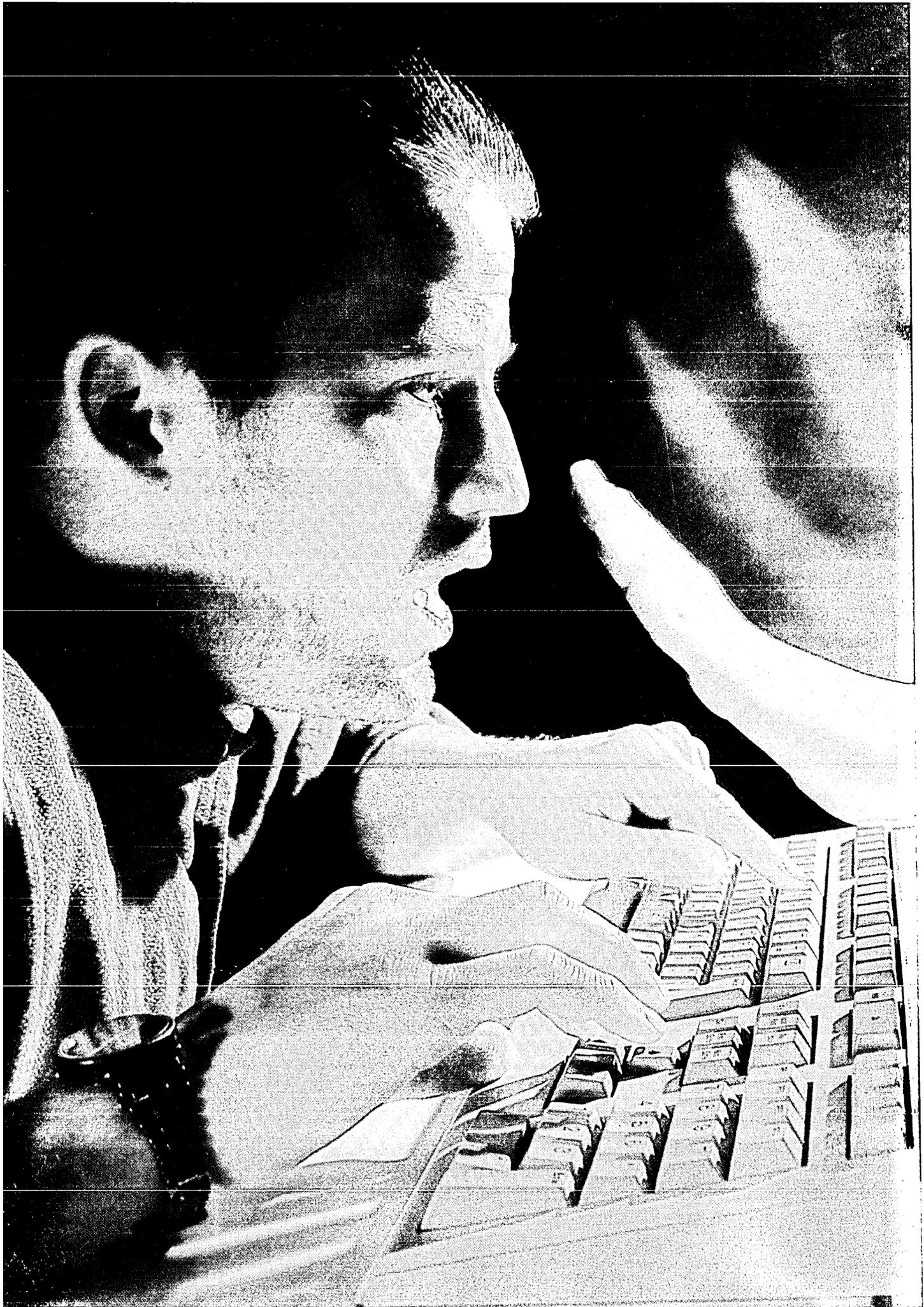


 <p>RSLB Mark II RSLB Mark II is a... RSLB Mark II is a... RSLB Mark II is a...</p>	 <p>Data Service Units Data Service Units... Data Service Units... Data Service Units...</p>	 <p>Multiplexers Multiplexers... Multiplexers... Multiplexers...</p>	 <p>Autonomous Channel Card Option Autonomous Channel Card Option... Autonomous Channel Card Option... Autonomous Channel Card Option...</p>
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THWARTING THE HACKERS

Keeping intruders out of your system is tough; port protection devices can help.

by Gene Troy

If you saw the movie *War Games*, or read about the 414 Gang's activities last summer, then you have an idea of the damage computer-hackers can do to inadequately protected computer systems. Dr. Carl Hammer, Sperry's recently retired director of computer sciences and a well-known computer pioneer, often speaks of the recent, massive technology transfer in which highly sophisticated computer technology has become available and understandable to anyone—even a child. Many people are now "technically smart," and with those "smarts" comes the ability to wreak mischief. Indeed, a subculture has arisen around the use of microcomputers as playthings, with business computers and public communications networks (including the telephone system) serving as the playground.

What are the potential risks of this situation and what do top managers need to do about it? At the National Bureau of Standards' (NBS) Institute for Computer Sciences and Technology, we have been studying computer security problems for several years. One of the jobs of our Computer Security Management and Evaluation Group is to develop guidelines for pro-

PHOTOGRAPH BY GUY A. LAWRENCE FOR ENR

It is seldom a good practice to let users assign their own passwords.

tection of information-based resources. Recently we began gathering information on a new class of protective devices that hold some promise for many otherwise unprotected computer systems that use dial-up telephone communications. NBS's findings will be published later this year as guidelines for the federal government and private industry. At this time, however, we can provide what we already know about the new devices and describe how we see them improving computer security.

First the bad news: any computer system that can be reached through the public telephone system is potentially vulnerable. Hackers, as well as more serious computer criminals, can use inexpensive, hobbyist-type computer equipment to discover unpublished computer telephone numbers by programming a random search of telephone exchanges. From there, they can detect the type of computer being accessed and use well-known techniques to attempt entry. Further, we can expect that computer access telephone numbers and passwords, once discovered, will become popular items of hobby exchange between hackers of all ages, similar to the trading of bubble gum baseball cards in a previous era.

Before we describe the new security devices, it is important to discuss security measures that should be considered for any multiple-user computer system, whether the computer is large or small.

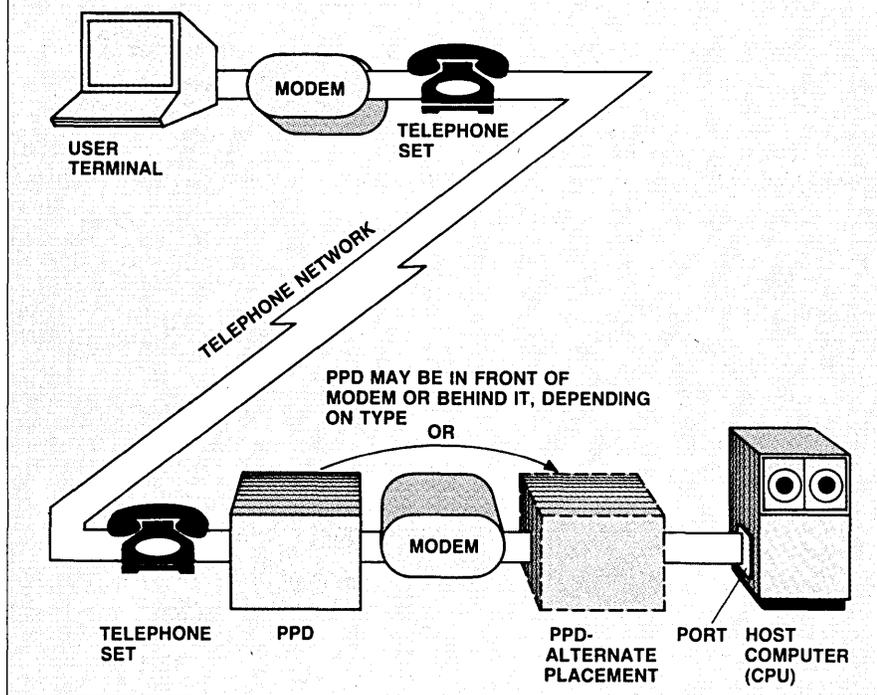
A desirable first level of protection on any computer system is some form of user identification code and passwords, which are administered by the operating system to govern log-on access to the computer. When properly used, these alone may be adequate protection for some systems. Serious problems often exist, however. For example, some computer systems retain the codes that were installed by the manufacturer for test purposes. The system owners rarely remove these codes, thereby creating an easy access path for anyone who knows their type of computer. A method like this was probably used by the 414 Gang in their computer break-ins at both the Los Alamos Nuclear Laboratory and the Memorial Sloan-Kettering Cancer Center. In other cases, employees quit or are fired from their organizations without immediate revocation of their user privileges and passwords.

SELECT EFFECTIVE ID CODES

There are three primary requirements for an effective computer log-on system. The first requirement is to select and properly administer a set of user identification codes and passwords that have a very large number of possible combinations. This reduces the chances for success of

FIG. 1

TYPICAL CONFIGURATION PORT PROTECTION DEVICES



an outsider who either guesses the codes or uses a computer to make repetitive "brute force" attempts under program control. The passwords should consist of randomly selected groups of at least four alphanumeric digits. It is useful for the passwords to contain pronounceable combinations of characters so users can easily remember them and avoid writing them down. A five-digit alphanumeric password would have 36 to the fifth power (60,466,176) possible combinations. In security jargon, the number of possible combinations is called the "keyspace." This keyspace size sounds very large, but it may not be large enough if two further security requirements are not met.

One note of caution: it is seldom a good practice to permit users to assign their own passwords. A review of password files in systems using this approach often shows that the effective keyspace is trivially small. People tend to use personal names, dates, and other readily guessed information. That type of password system is very easy to break.

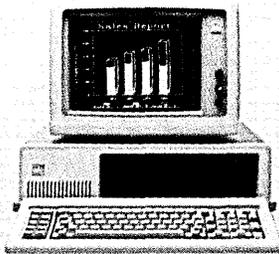
The second requirement for effective log-on security is automatic disconnection of the incoming terminal line after a small number of invalid password attempts have been made. The usual limit is three to five attempts. This disconnection, which requires the perpetrator to hang up and redial after

every few tries, can increase the time required to perform a brute force penetration by a year or more, depending on password characteristics. The programmed attack favored by hackers is then rendered useless. A related and very valuable feature is automatic deactivation of a user identification code if it is used in multiple, invalid log-on attempts.

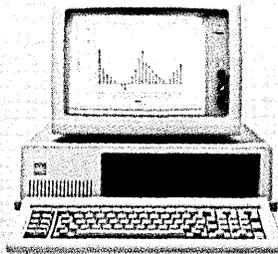
The third requirement for log-on security is an operating system module that logs and reports invalid sign-on attempts and other "events" with security implications. These could include, say, an unauthorized person attempting to run sensitive applications programs, such as human resources systems, or using high-powered system utility programs to copy or modify files. This feature will reveal whether attempts at computer vandalism are taking place, so that further, more positive means can be used to report and apprehend the hackers. Security reports can also be used as evidence in police or FBI investigations and trials.

If your computer system effectively uses all three of the security procedures described above, then it can be considered reasonably resistant to penetration via telephone by unauthorized persons using random or computer-assisted search patterns. A most important additional ingredient is careful security administration that focuses mainly on

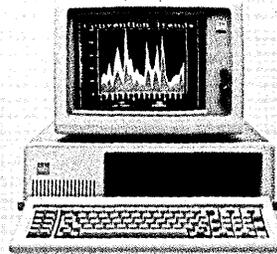
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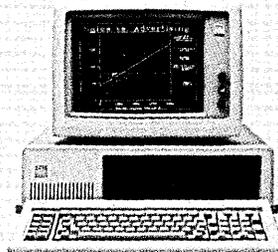
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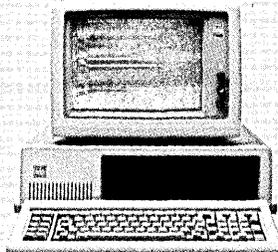
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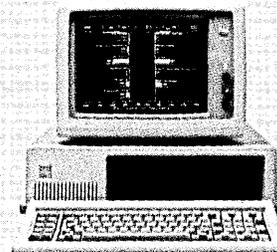
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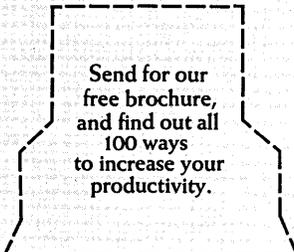
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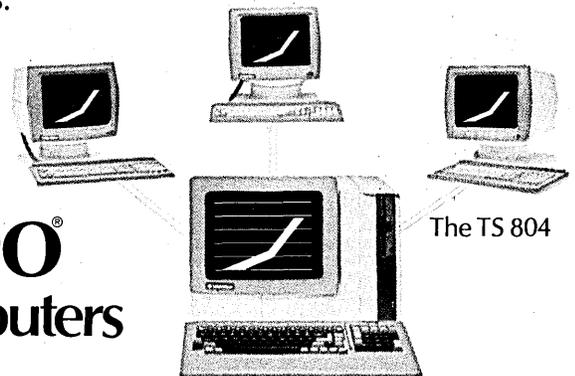
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FIG. 2

PORT PROTECTION DEVICES AND THEIR CHARACTERISTICS

PRODUCT	VENDOR	NO. PORTS/LINES PROTECTED	NO. USER ACCESS CODES	CAMOUFLAGE OF PORT
Gateway	Adalogic, 1522 Wistaria Lane, Los Altos, CA 94022, (408) 996-8559	1	20	Partly (Blank Screen)
Dialsafe 3 & 3 Plus	Backus Data Systems Inc., 1440 Koll Circle, #110, San Jose, CA 95112, (408) 279-8711	3	65 (Optional to 200)	No
Sleuth (Formerly Sherlock, Esq.)	C.H. Systems, 8533 W. Sunset Blvd., #106, Los Angeles, CA 90069, (213) 854-3536	1	74	Optional (Originate-only Modem)
Defender IIS	Digital Pathways Inc., 1060 E. Meadow Circle, Palo Alto, CA 94303, (415) 493-5544	16	1,000	Yes
Defender II		48 Std. (Optional to 384)	1,000 (Optional to 4,000)	Yes
Entercept	Integrated Applic. Inc., 8600 Harvard Avenue, Cleveland, OH 44105, (216) 341-6700	1	1 (Shared by all)	Partly (Blank Screen)
Barrier	International Anasazi Inc., 2914 E. Katella Avenue, Orange, CA 92667, (714) 771-7250	1	1 (Shared by all)	Partly (Blank Screen Optional)
Micro Sentry	Int'l Mobile Machines Corp., 100 N. 20th Street, Philadelphia, PA 19103, (215) 569-1300	1	16	Yes
Computer Sentry		1	8	Yes
Multi Sentry		16 Std. (Optional to 128)	1,000	Yes
SAU (Secure Access Unit)	Lee Mah Inc., 729 Filbert Street, San Francisco, CA 94133, (415) 434-3780	1	99	Yes (Silent on Answer)
SAM (Secure Access Multiport)		2 to 64 (22 Std.)	256 (Optional to 2304)	Yes (Silent on Answer)
Data Sentry	Lockheed-GETEX Co., 1100 Circle, 75 Parkway, Atlanta, GA 30339, (404) 951-0878	1	16	No
Oz Guardian	Tri-Data Inc., 505 E. Middlefield Road, Mountain View, CA 94039, (415) 969-3700	1	160	No
Lineguard 2001	Western Datacom, 5083 Market Street, Youngstown, OH 44512, (216) 788-6583	1	64	No
Lineguard 3000		2	100	No
Lineguard 3060		15 Std. (Optional to 60)	100	No

CALLBACK CAPABILITY	EVENT LOGGING CAPABILITY	PRESENTATION (CODE ENTRY METHOD)	STD. CONFIG. COST PER PORT/LINE
No	Yes (List on Command)	Terminal	\$395
Yes	Yes (Printer Optional)	Terminal	(Gross \$895 for 3 Ports) \$299/Port
Yes	No	Terminal	\$465
Yes	Yes (Printer or Disk)	Touch-Tone (Terminal Option)	(Gross \$6,000 for 16 Ports) \$375/Port
Yes	Yes (Printer or Disk)	Touch-Tone (Terminal Option)	(Gross \$9,800 for 48 Ports) \$204/Port
No	No (Audible Alarm)	Terminal	\$595
No	No (Visible Alarm)	Terminal	\$369
No	No (Visible Alarm & Shutdown)	Touch-Tone or Voice	\$695
No	No (3 Alarm Modes with Shutdown Optional)	Touch-Tone or Voice	\$1,495
Yes	Yes (Printer Optional, 3 Alarm Modes, Shutdown Optional)	Touch-Tone or Voice	(Gross \$21,500 for 16 Ports) \$1,343/Port
Yes	No	Touch-Tone	\$1,195
Yes	Yes (Printer Optional)	Touch-Tone	(Gross \$13,750 for 22 Ports) \$625/Port
Yes	Yes (Bad Phone Nos & IDs Saved)	Terminal	\$895 Includes Modem
Yes (May Include 2nd Password)	Yes (No. Invalid Attempts)	Terminal	\$750 Includes Modem
Yes	Yes (No. Invalid Attempts)	Terminal	\$695
Yes	Yes (No. Invalid Attempts)	Terminal	(Gross \$1,120 for 2 Ports) \$560/Port
Yes	Yes (Monitor Optional)	Terminal	(Gross \$3,730 for 15 Ports) \$249/Port

procedures for the distribution and changing of passwords. If these procedures are either missing or poorly administered, then the security problem increases greatly. Users should be reminded of the need to protect their passwords from disclosure.

If your computer system does not have or cannot fully use these three operating system security features, its vulnerability to dial-up telephone attacks can still be reduced. A new class of device can reinforce the protective measures just described. This type of device, totally external to the computer system, was introduced about a year ago. Now, there are at least 11 manufacturers supplying them. The device can be viewed as a black box placed between an incoming telephone set and the computer to screen out unauthorized callers (see Fig. 1). These can be called "port protection devices" (PPD), because they are completely external to the computer's dial-up access ports. Most do not communicate with the computer host in any way and are completely transparent to it. The PPD units are frequently combined with modems or communications network controllers within the same enclosure.

All PPDs have on-board microprocessor or intelligence, which is used to add a layer of external password protection to any communication line. The PPD will require a potential dial-up terminal user to enter some form of password as a first step toward connecting with the host computer. The PPD then matches this password code with a table of valid user codes stored in its own memory. If the match is correct, the user is connected with the host and permitted to go through the routine log-on sequence. If the code provided by the user is invalid, the user cannot access the host, and the call is terminated.

The important point to remember with these units is that this password checking is completely external and independent of the host computer system. The potential user cannot even contact the host unless the initial password code is correct. Most of these devices are also resistant to the brute force password discovery attack described earlier. Of course, once users pass the obstacle of the PPD, they will be required to deal with any security measures for identification, authentication, and authorization that may be in use by the host's operating system and application programs.

The PPDs discussed in this article do not protect the password or any data passing between the terminal and host from monitoring by unauthorized parties, i.e., wiretapping. When this type of protection is required, encryption devices using the Digital Encryption Standard (DES) developed by NBS should be used on all external communication lines.

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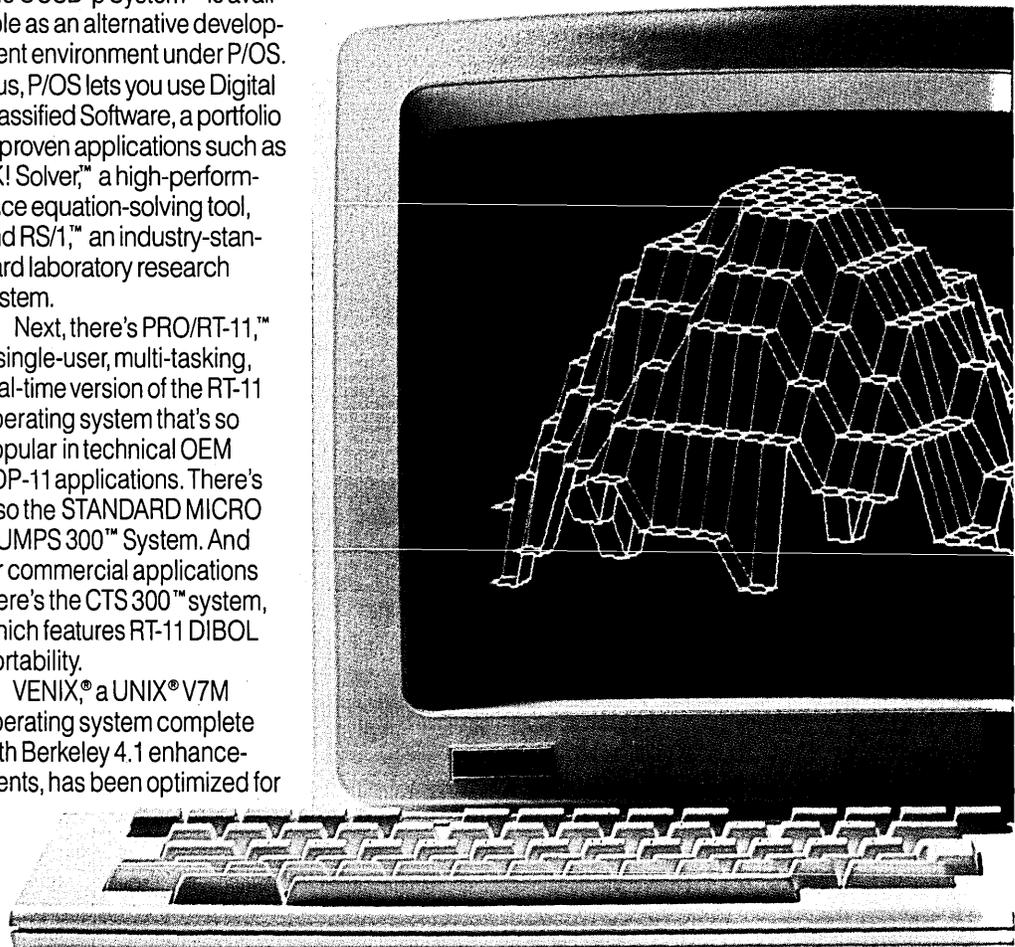
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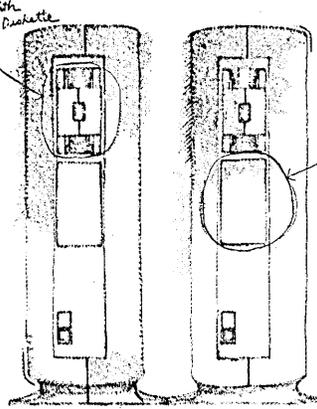
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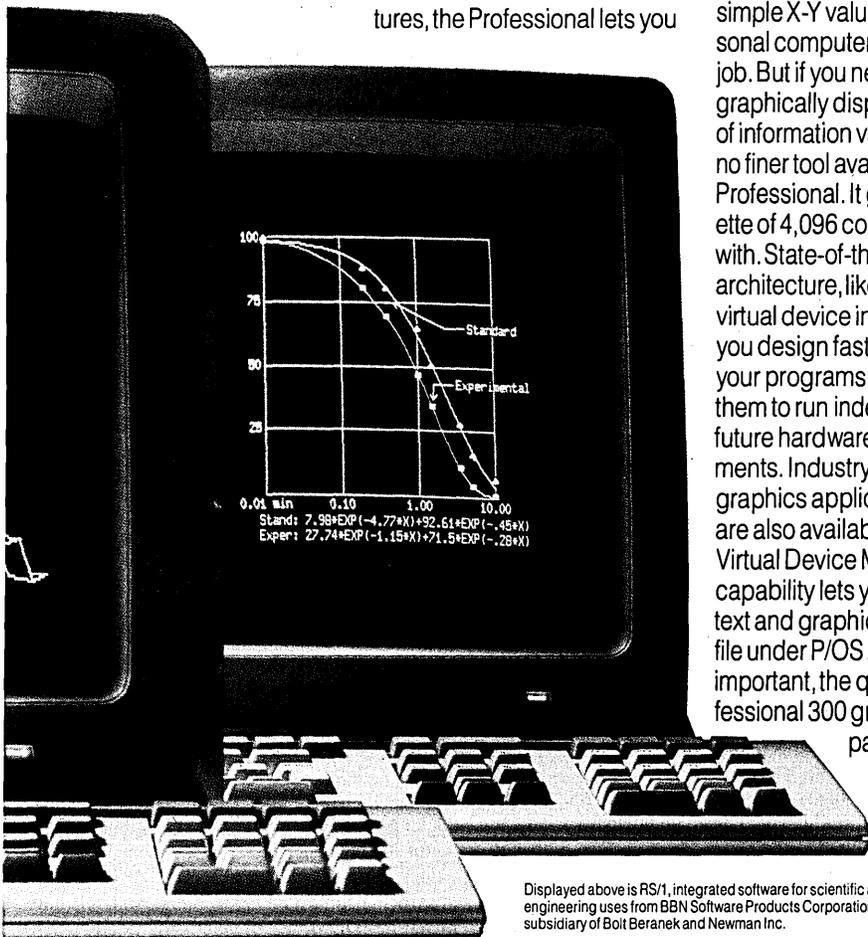
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The callback feature provides more communications security, but also causes some problems.

EXTRA SECURITY FEATURES

In addition to the special password required, most PPDs have one or more extra security features. Some *camouflage* the telephone line so that the existence of a computer port on the line is not obvious to a caller with an autodial modem. For example, IMM's Computer Sentry answers with a synthesized human voice, and Lee Mah's Secure Access Multiport (SAM) is completely silent once it picks up the line. Hiding the high-pitched carrier tone of the modem significantly deters the common hacker ploy of using an autodial modem and hobby computer to search telephone exchanges for computer telephone numbers.

On the negative side, many portable terminals and personal computers designed for use as terminals will have problems working with strictly voice-oriented PPDs. It is becoming very common for these machines, such as the Tandy 100 "knee-top" computer, to be equipped with internal modems and plugs that connect directly to the telephone line without using a standard voice set. For these, the user would have to place a separate call using a voice telephone for the sole purpose of interacting with a voice-oriented PPD, then, some means must be available for switching over to the direct-connect modem after clearance to the host is given.

Callback is a feature available on several PPDs, such as the Tri-Data Oz Guardian and the Western Datacom Lineguard units. The assumption here is that each legitimate user of a computer system should have a routine terminal work location and associated telephone number. A PPD equipped with this capability can keep a person who has stolen its password from masquerading as a valid user. To do this, the PPD independently places a return call to the expected terminal location once it verifies the password code on the first call. For example, the user would dial the computer telephone number, engage in dialog with the PPD, enter the password, and would then be instructed to hang up. The PPD would scan its internal table to check the code's validity. For each valid user, the table in memory would contain both a password and an associated telephone number. Within a few seconds, the PPD would place a call to the indicated number and proceed to connect the user to the computer's modem or port.

While the callback feature does provide an additional layer of communications security, it also causes some problems. One possible drawback of this feature is that the computer host, rather than the terminal user, is billed for all dial-up telephone connect charges. But if the PPD is equipped to keep a running record of all calls and their durations, better accountability of toll charges is gained. Another potential concern is that there often

must be some method of deactivating or getting around the feature for special groups of users, such as traveling salespeople, who cannot have fixed telephone numbers for their terminals. Finally, this feature adds a significant delay (up to a minute) to each dial-up access because of the time needed by the PPD to disconnect and redial. System users may find these additional steps bothersome.

LOGGING VARIES WIDELY

Communications *logging* capabilities, which can help bolster any inadequacy in the security logging capabilities of the host computer, vary widely among the different products. At one end of the spectrum we find PPDs, like the C.H. Systems' Sleuth, that do not have this ability. Others, such as the Adalogic Gateway, store in memory the number of invalid attempts made since the device was last checked. At the other end of the spectrum are devices like the Backus Dialsafe 3. These PPDs are integrated with multiport communications controllers and can collect an extremely wide assortment of communications usage information in addition to noting details of security events, such as time and line of each failed log-on. A printer is usually connected to these devices for continuous display of the log.

A valuable security feature common to all PPDs is that they may be administered separately from the computer host's operating system. This makes it possible to establish a separate communications security job function that has no connection with the function of systems programmers, who handle the computer's passwords and internal access control. Such separation of duties is a very powerful security mechanism because it requires collusion between persons performing different job functions before violations can occur.

Not every PPD has all the features described above. They also vary in the ways in which they implement these and other features, for example, their methods of *presentation* to the user. As described earlier, several use a synthesized voice to communicate. These PPDs require the user to answer either by voice or telephone touch-tone keypad. This system has the advantage of *camouflaging* the port. As an alternative, several of the newer devices on the market, such as the Lockheed-Getex Data Sentry and the Integrated Applications Entercept, permit the user to enter the password directly via a terminal keyboard. These PPDs operate on the digital side of the modem rather than the voice side, so they can communicate directly with terminals. When the user dials a computer telephone equipped with such a device, the PPD automatically makes connection to

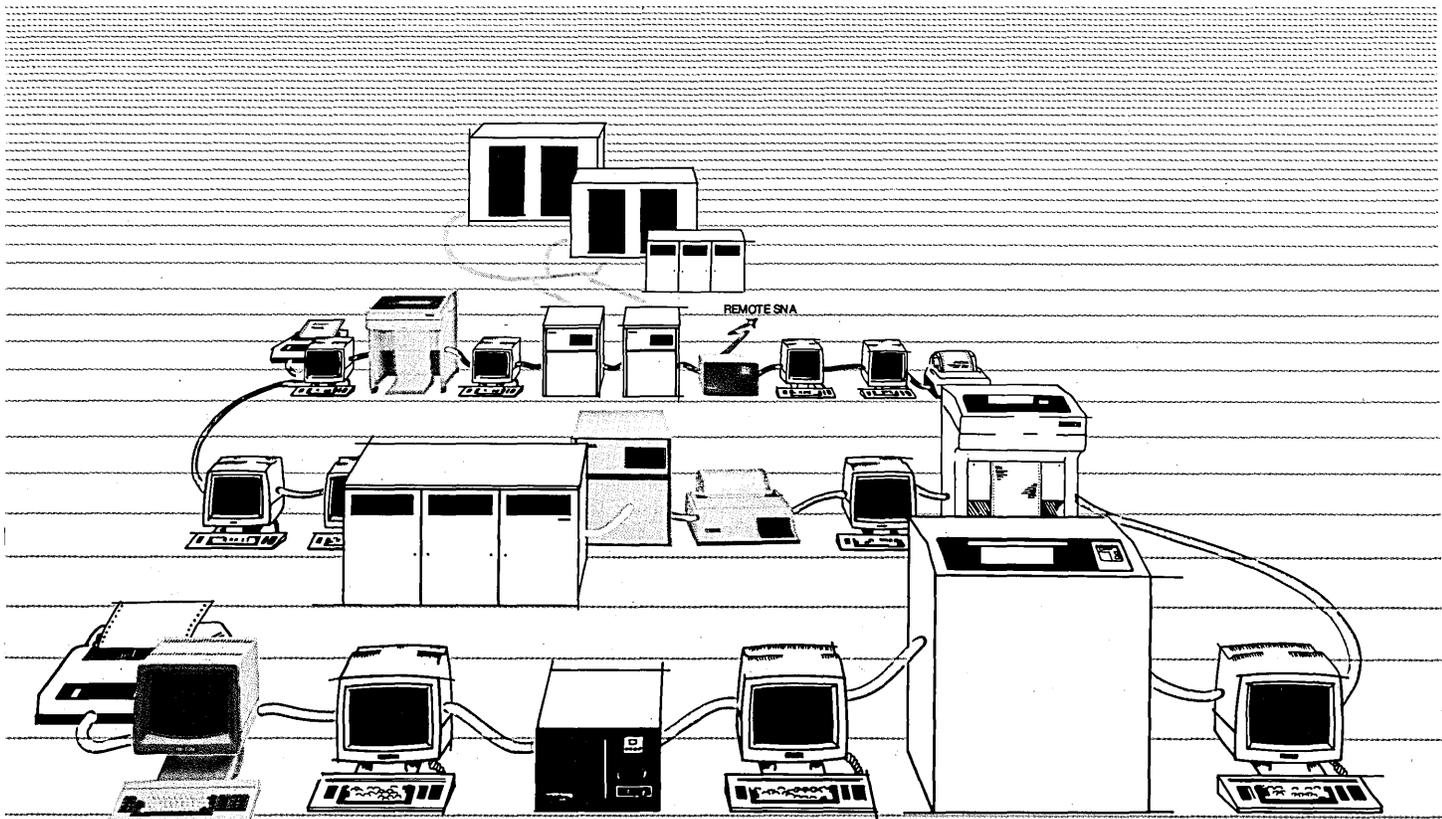
the terminal through the modem. The user must then key the password on the terminal keyboard.

Using the terminal rather than the telephone to enter the password has a very important advantage for high-security applications, because a much larger selection of characters are available for use in the password. The keyspace for devices of this type may include most of all of the 128 ASCII characters that can be generated on the keyboards of terminals commonly used for dial-up access. These characters consist of uppercase and lowercase letters, numbers, special and graphics symbols, and even nonprinting "control characters." A short five-character ASCII password can have a keyspace of over 34 billion combinations. This lies in contrast to a telephone touch-tone keypad, which has a maximum of 12 available characters (0 to 9, #, *). A five-character, touch-tone password would have a keyspace of less than one-quarter million, well within brute force cracking range. Voice-entry methods have even smaller potential keyspaces, because they typically use only the numbers from zero to nine.

How are PPDs generally configured in computer systems, and what do they cost? On the smaller side, a device like International Anasazi's Barrier protects a similar telephone line or port and stores one ASCII password code, which all users share. The Digital Pathways Defender II, on the other hand, protects up to 384 lines simultaneously, with a maximum potential user community of 4,000. Most PPDs now on the market are single-line devices and usually permit the storage of about 100 user codes. These single-line devices cost about \$500 each, with a separate autodial modem (required for callback) adding another \$600. For multiple-line devices, the cost per line on small configurations is very high initially but goes down proportionally to about \$400 per line (plus the autodial modems for each line) in the largest configurations. This declining cost per line occurs because the large PPDs consist mainly of expensive chassis and power supply components, with circuit boards added as required for more telephone lines and user password tables.

Fig. 2 lists 11 currently known manufacturers of PPDs and their devices, along with a comparison of some key features. Within the next few months a number of new devices will be introduced into this rapidly growing market. Although we can expect few new security features to be announced, the prices should come down soon as the competition heats up.

This article attempts to provide general information on PPDs—it has no expectation of being exhaustive. Devices included herein have been identified from several sources.



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Hardware port protection devices add a valuable extra layer of security.

We have canvassed the Computer Security Institute, the new products editors of several popular computer and electronics magazines, and knowledgeable users of security products. In addition, NBS has begun to collect its own database of computer security products from these sources, advertisements, and vendor literature.

We would be pleased if readers who know of other devices in this class would bring them to our attention.

EVALUATE NEED FOR PPDs

Potential users of PPDs should ask themselves the following questions before making any decisions concerning these devices:

1. Do I need a PPD at all? Does my computer's operating system inadequately handle user identification codes and passwords, failed access attempts, and security event logging?

2. Do I need callback authentication? Will the shift in telephone charges be burdensome? Will users put up with the additional delays in connecting to the host?

3. Is my communications environment so complex that I need a sophisticated

multiline protection device?

4. Do my dial-up terminal users normally communicate with a direct-connect modem in which no voice traffic is involved? If so, can I expect them to support reversion to voice for authentication purposes?

5. How much communications event logging do I need? Is my dial-up traffic so easily controlled that extensive logging is extraneous?

6. Am I willing to pay the additional salary overhead costs for maintaining tables of user password codes and possibly also callback telephone numbers for each user?

7. Is it likely that dial-up communication will be monitored or interfered with by unauthorized individuals? If so, then DES-based encryption devices should be used instead of or in addition to PPDs.

Hardware port protection devices add a valuable extra layer of security when dial-up terminal communications are needed and the host computer operating system cannot be wholly trusted to screen out hackers and other computer criminals. Many small business computer systems now using telephone terminal access fall into this category. For these systems, the PPD can be a very cost-effective

and easy-to-use security measure.

One final note: PPDs are no solution to shoddy computer security administration practices. It is just as easy to be lax in maintaining PPD password tables, thereby causing major security risks, as it is to be ineffective in administering the present computer host access controls. *

Gene Troy, a CDP and computer scientist at the National Bureau of Standards, is engaged in research and consulting in computer security. Prior to joining NBS, he worked in private industry for several years as a security consultant and seminar leader. Mr. Troy holds an MS in system theory and cybernetics from George Washington University.

NOTICE: Mention of products in this article in no way constitutes endorsement of them by the National Bureau of Standards or the author. Product descriptions are based on information provided by the vendors. All products of this type known to the author at the time of writing have been included.

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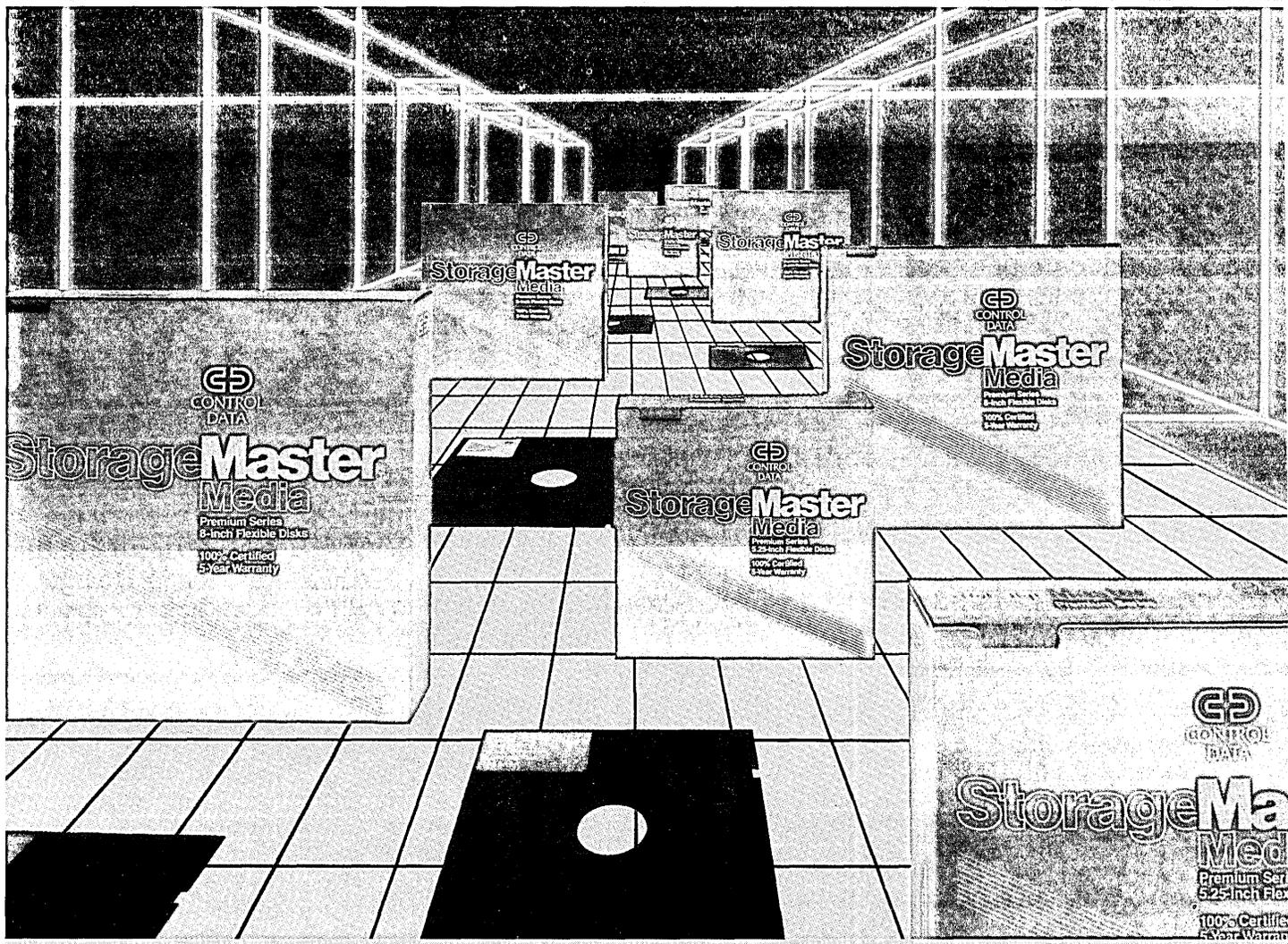
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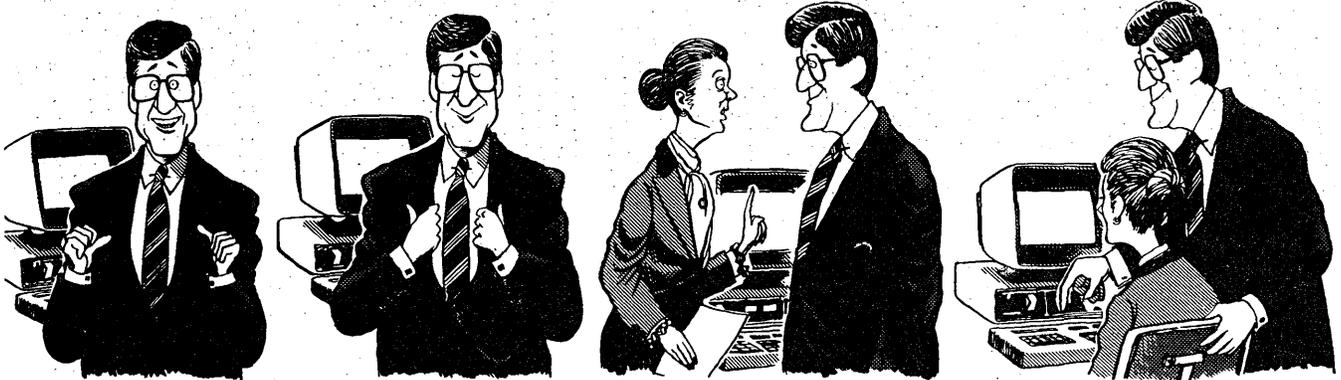
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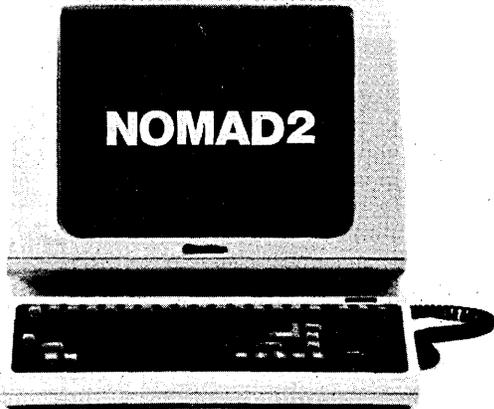
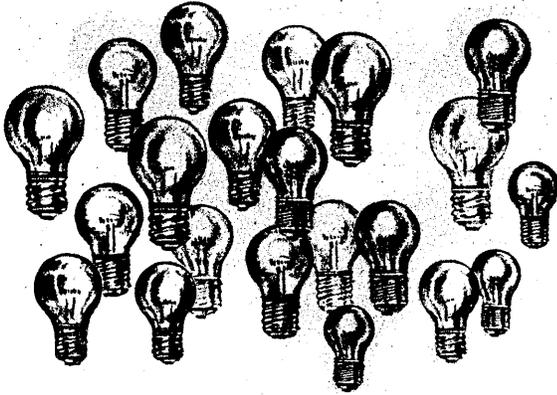
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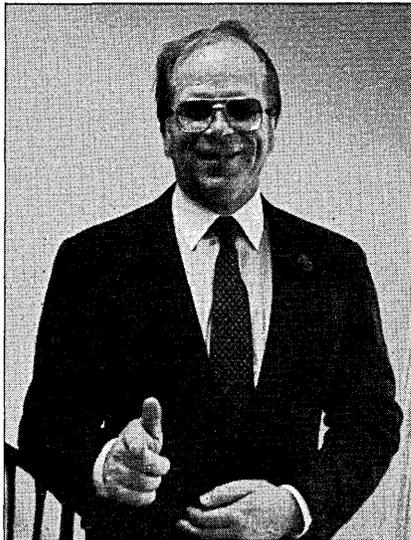
A MAN WITH A PLAN

For the past 14 years he has been called everything from "eccentric" to "missionary." Most people who have been exposed to David L. Childs over this period have come away shaking their heads in wonder and disbelief. "You get the feeling that there is something in what he says," notes one enthusiast, "but you don't really understand his language."

Childs speaks the language of set theory—or, more precisely, the underlying mathematics of a concept he terms "intelligent storage management."

Says Childs, "It's been a case of having a solution for a problem that is only now beginning to manifest itself in dp circles." Simply put, the problem is to summon information quickly from auxiliary memory at a time when new, unstructured applications from end users are placing tremendous demand on that same storage. "The main computer now has to slog through every bit of information in secondary storage to find what is requested, and as disk memory gets cheaper and secondary storage larger, the user only compounds his problem. The searches are taking longer and longer," Childs explains. Several MIS managers contacted by DATAMATION confirm, in addition, that emerging relational DBM systems put tremendous pressure on their underlying central support structure, the IMS production database.

"Our percentage of relational data



DAVID CHILDS: The problems stem from the way data are captured and preserved in secondary storage, namely, in a rigid, predefined structure or hierarchy."

grew from under 2% to 15% of the total corporate database in just two years," says Peter Hill, IMS project manager for Bank of America, San Francisco. He estimates that in more mature manufacturing and process industries, the percentage is already 25% relational and increasing fast. "Financial services will go that way too, with increased deregulation and demand for decision support systems."

Childs contends that this trend has supplied the necessary momentum for his Ann Arbor, Mich.-based Set-Theoretic Information Systems (STIS) to cocreate a company to market his idea. The new concern, SMC (for Storage Management Control) Technology was formed in collaboration

with the PDC Venture Group, Dallas, and is reportedly seeking \$6.3 million of venture funding to begin field testing of a system created from Childs's long-standing theoretical model.

An early investor in SMC Technology is Gould Inc., which is determined to diversify from its battery business into high-technology and artificial intelligence systems, and has already purchased the Florida-based supermini company, Systems Engineering Labs.

This sudden flurry of commercial activity has come none too soon for Childs, who has been eager to make the transition from theoretician to businessman, from "mathematical philosopher to marketeer," as he puts it.

While it's true that as a missionary, Childs hasn't yet made any converts at MIS sites, at least he has their attention when he makes his pitch. Sources claim that both Exxon and Equitable Life Assurance are well disposed to SMC and may have big enough database problems to give the Childs prototype a test platform. What has pricked their ears, it is believed, is Childs's focus on what he terms the "irrelevant data" that flow between the host and secondary storage when using IMS.

"It's not uncommon for the host to have to slog its way through a 10-page record just to get one item, and thus to be tied up in nonproductive I/O operations," creating what he calls the growing "I/O bottleneck." As a result Childs believes that only about 4% of the information transferred between the IMS host and secondary storage is relevant, or what he calls "informationally dense."

"All the problems stem from the way that data are captured and preserved in secondary storage, namely, in a rigid, predefined structure or hierarchy," says

PEOPLE

Childs. He believes that he has surmounted this problem using the mathematics of set theory to allow records to be kept in pieces that dynamically combine to form records and files and then destroy themselves after use, returning to their piecemeal form. Childs estimates that using this method, an IMS database can be stored in one tenth the disk capacity of current systems, and that data can be retrieved by the host at rates up to 40 times faster than at present.

These estimates are based on a University of Michigan system that, since 1972, has been running a version of Childs's theoretical model alongside its own relational model, Micro, which was developed by a university team headed by Professor Malcolm Cohen during 1970-72.

Cohen, now president of Condor Computer Corp., in Ann Arbor, says many MIS managers have visited the university's installation complaining that their relational models were proving to be slow and impractical except on small amounts of data.

"I think their perception was that the university system was extraordinarily fast compared to their own. But without specific benchmarks, one can only speak in generalities." Cohen says that the university's database, while not large by commercial standards, handles 50,000 accesses a year, ranging from one minute to eight hours each, and contains around 100 million to 200 million characters in all. The biggest IMS databases are currently between 5 billion and 10 billion characters, according to experts.

The storage management software provided by STIS for the university was described by the director of the university's

business school systems research group, Jim Fry, as "third" generation. "With the new prototype, STIS seems to have created a fourth generation that, rather than running inside the host as it does at the university, runs outside it on an outboard processor," says Fry, a noted expert on Codasyl database systems. The logic behind this move (apart from the opportunity it affords SMC Technology to get into the hardware business) is to preserve the integrity of the system and make it totally fail-safe. Fry points out that an "inboard" is subservient to the host and operating system, and must be shared with many people who could conceivably wipe out the code.

Fry describes the SMC prototype as a combination I/O processor and "content analysis" machine. "The company has said 'let's analyze the database on content, and create content indexes that dynamically create and destroy themselves around each incoming query.'" Adds Fry, "The company appears to be building a dedicated I/O processor to perform this continual content analysis, but it's by no means certain that it can be done with the cost and performance of current hardware, or how difficult it might be to maintain these constantly changing content indexes over time.

"Perhaps the most significant thing the company might have already achieved is that the new processor apparently will work with *any* DBMS software in physical store, whether it's IMS or IBM's relational DB2 and SQL/DS, or Adabas, IDMS—you name it. This is something IBM is far from achieving as far as anybody knows," he concludes.

There is speculation that because of

the Gould tie-in, the hardware for the new SMC processor will be based on an SEL supermini. The company is noted for its fast scientific and engineering processors and very fast data bus. Sources say a seven to eight MIP SEL cpu will be used to host the STIS code, and that SEL will handle field service.

None of the participants in the SMC Technology venture would discuss their prototype processor, as they are in the process of seeking new investors and had entered an SEC-dictated "quiet period."

Childs, however, reverts to his usual chatty self when asked about the future of intelligent storage management. "Relational DBMS software is acquiring the reputation of being a poor performer because it is coupled with a rigid and inflexible physical storage structure. If, on the other hand, you couple your relational model with intelligent storage management, it will provide greater applications functionality and better performance than even the most optimistic forecasters can imagine. Together they provide the perfect tool for breaking the I/O bottleneck."

IBM's current approach to the bottleneck problem is essentially to throw more MIPS and disk storage at it, including its upcoming Trout mainframe family ranging from 20 MIPS to 50 MIPS/256MB main memory challengers. IBM is not exactly delirious about the idea of somebody else making its existing mainframes more productive, because it is working on the equation that bottleneck equals big business. It recently predicted a 50% per annum growth rate in MIPS demand from its customers over the next few years.

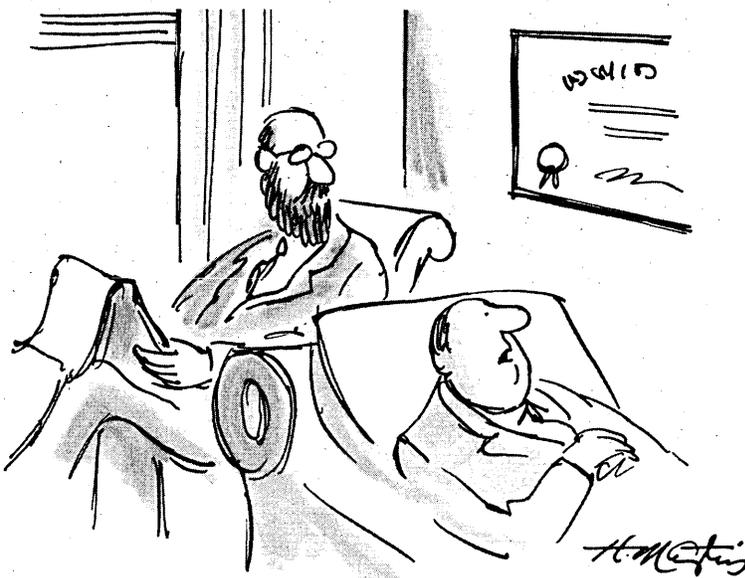
Companies such as Britton Lee and Teradata are promoting the use of back-end database machines to run IMS (or its equivalent) and take the strain off the host. IBM, cagey as ever, now owns 20% of the largest of these, namely, Intel/System 2000, and will presumably push to introduce the technology at its own pace.

The bottleneck is also being addressed by bleeding off IMS data into separate information centers where they are converted into table form, at the same time creating extra demand for IBM technology on all levels from the pc to mainframes, observers point out.

As far as Childs is concerned, these approaches don't even address the real problem: speed of data retrieval between the host and secondary storage. "The back-end DBMS machine just creates a new I/O bottleneck between itself and the host; relational host and IBM hosts do the same thing as they communicate."

Childs believes that sooner or later IBM's customers will have to come to terms with this fact. "When they do, we'll be waiting."

—by R. Emmett Carlyle



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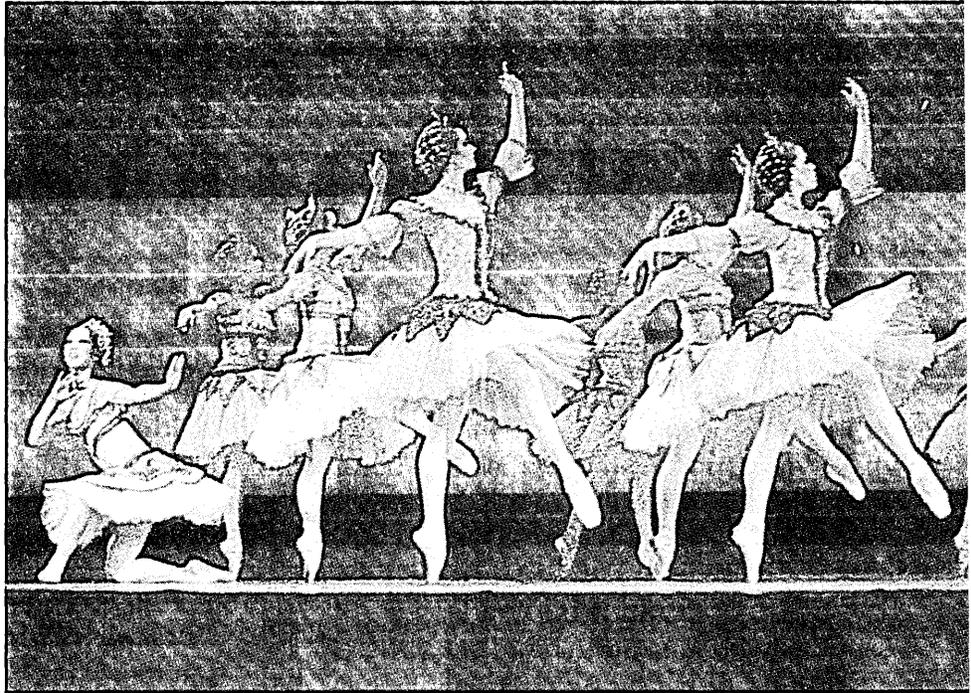
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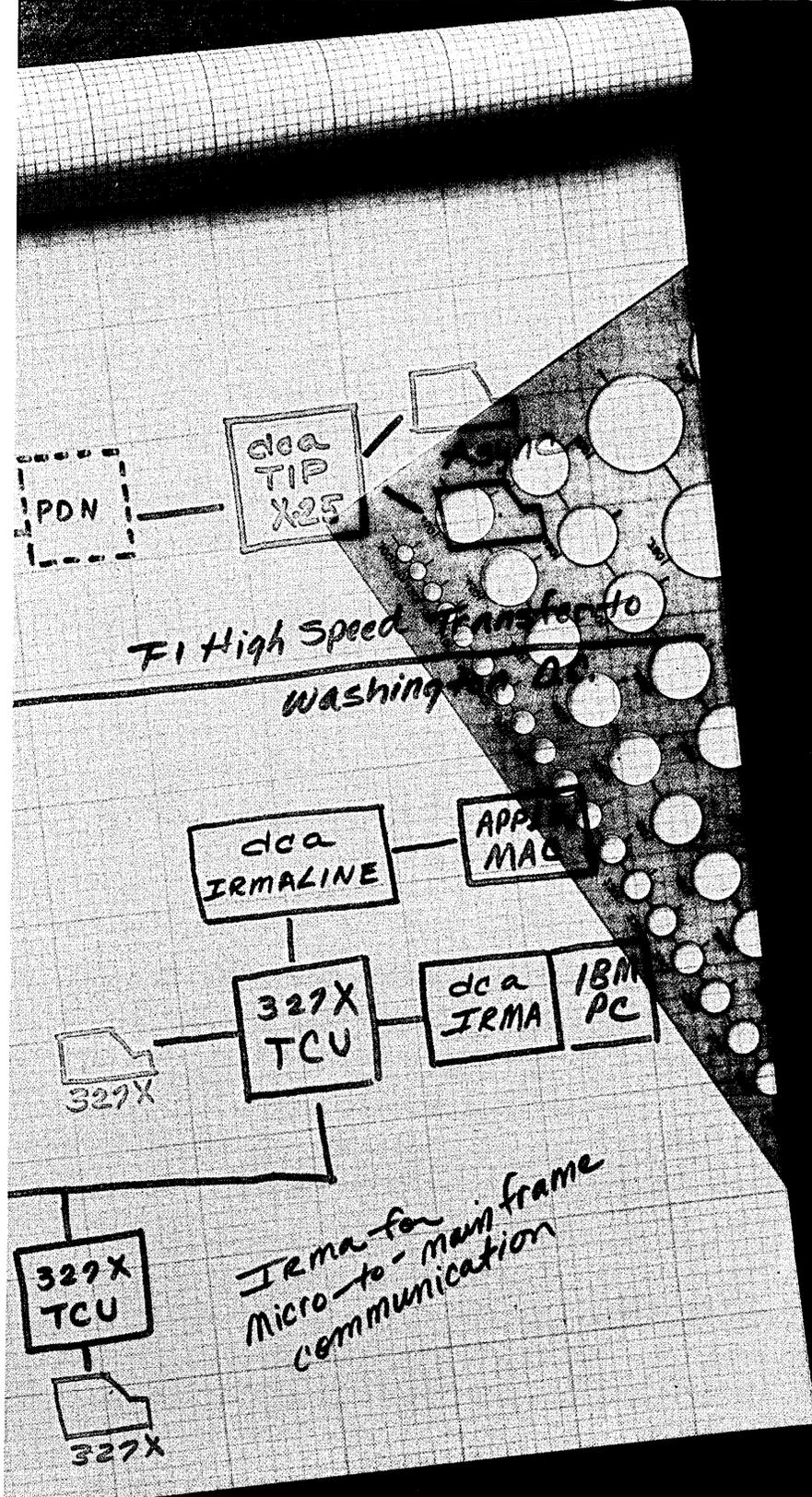
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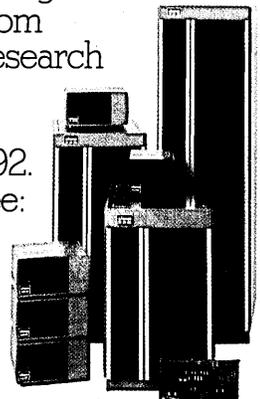
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For operator convenience, the ADM 1178 terminals come with a full tilt and swivel monitor that stops positively in any position, an easy-to-read non-glare screen, and a detached, low-profile DIN standard keyboard.

The ADM 1178s are available with a standard 12" green or amber screen and an RS-232C serial printer port. They can be easily modified for OEM applications and are available with such options as 14" green or amber screen, answerback memory, current loop or RS-422 interface, and international character sets.

These Lear Siegler High Touch terminals are made in America—designed, engineered, manufactured and shipped from Anaheim, California. With this total, on-shore capability, and a complete worldwide network of sales and service centers, OEMs as well as end users can be assured of the best local support available in the industry.

Call our ADM 1178 product specialists today for complete information on products and protocol converters.



Small footprint saves desk space.

Green or amber screens, 12" or 14".

Operator information area—separated by a horizontal line.

IBM extended character set.

True 3278 keyboard layout.

3 key rollover.

Adjustable keyboard tilt.

Hooded bezel reduces glare.

Five visual attributes: underlining, blink, blank, bold and reverse video.

Tilt and swivel for operator convenience.

On/off, contrast controls on front of unit.

24 Program Function (PF) keys.

Two Program Access (PA) keys.

Selectable Numeric or PF Keypad



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HARDWARE

OFF-LINE

Embattled Franklin Computer Corp. recently unveiled its new line of postlitigation microcomputers. The three products introduced are in the \$1,000 to \$3,000 range for home and professional use. In addition to running Apple software, the CX series of portable computers also run CP/M and MS/DOS under Franklin DOS (F/DOS). This company will market its latest offerings through the computer retail channel. Joel Schusterman, who returned to Franklin as executive vice president and acting president following the resignation of Barry Borden, contends that Franklin had developed F/DOS operating system before the suit filed against them by Apple Computer Co. over Franklin's BIOS. Schusterman says his company submitted documentation to Apple on the CX series, but neither the Cupertino, Calif.-based computer manufacturer nor its lawyers has responded. Franklin's acting president summed up his company's woes by saying, "the last five months [have been] quite difficult," and optimistically added that "with the CX series, together with a reconstituted organization, Franklin can thrust forward into its important role in the personal computer business....Franklin is in a position to be a continued force in the ferociously competitive personal computer business." When asked if he saw litigation as a new competitive tool used by large companies against smaller ones, Schusterman said that if nothing else, the lawsuit established that BIOS was protected under copyright laws, and now the way was paved for large computer companies to sue smaller ones for being too compatible. Schusterman predicts Franklin will have a "long and healthy future in the marketplace." He added that

the company is aggressively searching for a new chief executive officer. Any takers?

The Franklin CX series of personal computers is typical of most of the new offerings filtering their way into the office, home, and school computer marketplace. Most of the new entries seem to be adopting the Sperry Corp. micro philosophy (at least its advertising philosophy). First Sperry said that when you're late, you better have something more to offer. And the company's machines did; besides running MS/DOS, they could also run CP/M. That isn't good enough anymore. Sperry now says that it isn't enough to be IBM-compatible. Most of Sperry's, and for that matter IBM's, competition seem to concur. Nearly all of the new players on the personal computer field tout how much better, faster, and cheaper their machines are. Another characteristic that is common to the competition is a chart filled with little boxes. For the most part, the competition's boxes are marked yes and IBM's boxes are marked no (except for voltage and operating system). What does this mean for IBM? No one can say, but for computer users, it means a lot of choices with many features at lower price points. At least in the micro world Big Blue is getting a run for its money.

Well, the computer industry can breathe a sigh of relief. IBM finally announced its plans in the area of local area networks. The cabling system is permanently wired with connections made to outlet plates in office walls within a building or site. No surprise that Rolm Corp. has announced its plan to support, bid, and install the IBM cabling system, which still seems to support a token ring.

MULTI-USER SYSTEM

The Micro/PDP-11 Team Computer can support eight users at a time, with all users sharing resources and information. The system's PDP-11/23 engine is a member of the vendor's PDP-11 family. In addition to the PDP-11/23 Plus cpu, the accounting system has 512KB parity memory, 10MB Winchester disk, dual 400KB disk drives, and six terminal printer ports all packaged in a compact system unit.

The system integrates the Team Computer with Digital Equipment accounting software. With this integrated package, users can move from one accounting task to another with just a few keystrokes, according to the vendor.

The computer components feature modular design. Disk drive, printed circuit boards, the front panel, and power supply all can be easily replaced. Maintenance starts every time the system is turned on. It runs tests on systems components and reports results. Additional tests can be run on floppy disks.

Users can hook the DECmate II, Rainbow, and Professional series to the Team Computer in addition to the VT200 terminals. The Team Computer Accounting System sells for \$20,000.

The vendor has also announced a more powerful Rainbow, the 100B. It has a base memory of 128KB. For graphics, it offers 16 shades in monochrome and 16 displayable colors from a palette of 4,096 colors. It runs under CPM-86/80 and MS/DOS.

The Rainbow 100B costs \$2,750 not including keyboard and monitor. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 301 ON READER CARD

COMMUNICATIONS WORKSTATIONS

This vendor will concentrate initially on distributing to private line communications networks in the transportation, health care, and financial services industries. Particular emphasis will be placed on medium-sized end users who are too small for mainframe

HARDWARE



manufacturer attention and too dispersed for local dealer sales and service, the vendor says.

The multi-user, multitasking workstations provide an integrated information management system designed for communications distribution and office task processing. The workstations, which will serve multipoint communications networks that require a full range of message distribution, word processing, spreadsheet, and graphics capabilities, will support the Xenix operating system. They have 16-bit microprocessors, 256KB of memory expandable to 1MB, 10MB hard disks, expandable to 40MB, up to 2 million character floppy disk storage, bit-mapped graphics, and detachable keyboard. Prices start at \$7,000. RCA, New York.

FOR DATA CIRCLE 306 ON READER CARD

FAULT TOLERANT COMPUTERS

The XA 400 and XA 600 are two extended architecture models of the vendor's Stratus/32 Continuous Processing System. The XA 400 cpu employs four logical, independent Motorola 68010 processors, each capable of running a different program. The

XA 600 uses six logical, independent 68010s, each accelerated by dedicated memory and a hardware arithmetic processor. The arithmetic processor provides commercial and decimal arithmetic in addition to IEEE double precision floating point.

Each 68010 provides full hardware support for VOS's virtual memory environment. The 68010 also accelerates many common instruction sequences.

The basic XA 400 contains a 20-slot chassis, two multiprocessor cpus, 4MB of duplexed memory (four logical and eight physical), two communication controllers, two disk controllers, tape controller and tape drive, and system software. The XA 400 may be configured with up to 8MB of duplexed memory, 21GB of disk storage, 128 workstations, and three tape drives.

It contains a 40-slot chassis, two multiprocessor cpus with cache memory and arithmetic processors, 8MB of duplexed memory, two communication controllers, two disk controllers, tape controller and tape drive, and system software. The XA 600 may be configured with up to 16MB of duplexed memory, 42GB of disk storage, 256 workstations, and three tape drives.

The XA 400 costs \$185,000. The XA 600 sells for \$270,000. There is also a field upgrade program to bring the vendor's existing units up to the XA models. STRATUS COMPUTER INC., Natick, Mass.

FOR DATA CIRCLE 307 ON READER CARD

NETWORK MANAGEMENT

Overlord I is the first of four levels of a network management system offered by this vendor. Each level will offer an additional functional control capability as well

as performance enhancement. This product, using a DEC minicomputer, provides centralized automated control of T-Bar switching equipment located in data networks and multicomputer data centers. It is designed to build up a database of operational intelligence and, through the control of the physical switching equipment, provide a user with configuration alternatives.

The information system software package is also contained in the system, designed for data collection and database management.

The unit provides color graphic displays, database printouts, and a trouble ticket reporting and monitoring feature that will allow an operator to open or update an outage ticket. This information can be stored, retrieved, and printed for daily, weekly, and monthly reports. Prices for Overlord I start at \$60,000. T-BAR INC., Wilton, Conn.

FOR DATA CIRCLE 309 ON READER CARD

SMALL BUSINESS SYSTEM

The I-Tower is a small business system utilizing hardware architecture of the vendor's Tower 1632 system combined with the RM/COS operating system. The vendor says the system is designed to provide solutions specifically for the small business computer market via a range of application software, including RM/COBOL and compatible application programs.

The nucleus of the I-Tower is comprised of a 16-bit, 10MHz Motorola 68000 processor. The dual-bus design of the unit combines a multibus I/O subsystem with a high-speed processor memory bus.

Peripheral devices for the system include 5¼-inch and 8-inch Winchester disks, streaming tape, a wide range of printers, and several crts. It can be expanded to 2 million characters of error correcting memory, up to 260 million characters of disk storage, and can support up to 16 concurrent users.

The list price for the I-Tower configuration, which includes the processor, 512KB memory, 46MB Winchester disk, 1MB flexible disk, 20MB streaming tape, 125 lpm matrix printer, crt display terminal, eight RS232C I/O ports, 2780/3780 remote batch communications, RM/COS, and RM/COBOL compiler package is \$28,900. NCR CORP., Dayton, Ohio.

FOR DATA CIRCLE 310 ON READER CARD

LASER SCANNER

The OBM Laser Two is an optical character recognition (OCR)-based, data entry system that reads select machine print fonts and handwritten documents. It is designed for a high-volume data entry environment. The system can read a wide variety of forms ranging from small payment stubs to full legal-size pages.

The system consists of a microproc-

HARDWARE SPOTLIGHT

MAINFRAME COMPUTERS

This vendor introduces its Cyber 180 computer line with a wide range of supporting software and peripheral equipment. The models offered are the 810, 830, 835, 845, 855, and 990. These systems range in performance from the Supermini 810 to the top-end Model 990 that is 60 times more powerful, according to the vendor. The 990 is designed for use in such industries as manufacturing, petroleum, education, electric utilities, environment, and research as well as by government agencies.



The 180 series employs a multistate architecture that allows users to simultaneously run two Control Data operating systems—Network Operating System (NOS) and the new Network Operating System/Virtual Environment (NOS/VE)—in the same memory and central processing unit. According to the vendor, NOS/VE runs programs originally developed by other sources with little or no code conversion.

User address space is organized into segments, and each segment of the virtual memory has a 31-bit address range. Users have up to 4,096 segments for each process. The 180 computers will support a Unix system, database management system, and a distributed communications network. Prices for the Cyber 180 systems range from \$250,000 for a Model 810 to \$6 million for a fully configured high-end Model 990. Model 810 shipments begin this month, and Model 990 shipments will start in 1985. CONTROL DATA CORP., Minneapolis.

FOR DATA CIRCLE 300 ON READER CARD

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Whisper Writer is about the size of a portable typewriter. It incorporates all of 3M's four Whisper Terminal functions and can be used in an office, or on the road. Its built-in text-editing software, battery-maintained memory, and quiet 35-cps printer make it a versatile performer at a competitive price.

Whisper Reader: a terminal that weighs just 2 lbs.

This book-size unit does most of what Whisper Writer does, with the obvious exception of printing. Like Whisper Writer, it lets users prepare text offline to save on telephone,

and Telex charges.

Whisper Screen: a smart terminal that communicates.

3M's intelligent CRT terminal has a standard RS-232C interface, plus a built-in modem for communications at 1200 or 0-300 baud. A 16K memory with print spooler is standard, as are a variety of automatic dialing, log-on, polling, and answering features.

Hard copy output for both the Whisper Screen and Whisper Reader is provided by 3M's complete line of low-cost, quiet Whisper Printers.

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CIRCLE 71 ON READER CARD

HARDWARE

essor-controlled laser OCR and a data editor/formatter, an operator console, flexible disk unit, keyboard, optional line printer, and optional magnetic tape drive. It can read OCR-A, OCR-B, Farrington 7B, MICR-E13B, 1403 Numerics, PB600 Matrix Numerics, and Numeric Handprint. The OBM Laser Two costs \$74,900. COMPUSCAN INC., Fairfield, N.J.

FOR DATA CIRCLE 311 ON READER CARD

MICRO CAD

The Control Data Corp. personal computer aided design (CDC/PCAD) system includes a workstation and schematic design and documentation software. According to the vendor, the CDC/PCAD system provides 80% of the schematic and documenting functions an engineer needs at 20% of the cost; manual design, drafting schematics, and writing documentation comprise most of the 80%.

The system enables engineers to design a circuit in hierarchical schematic form by using symbols that represent components. Users can access Cybernet data services for advanced simulation, analysis, and design verification. Engineers can enlarge portions of a circuit and add to portions of it not on the screen. Design documentation can be developed through word processing, spelling checks, electronic spreadsheet, and database management.

A fully configured CDC/PCAD system includes an IBM PC-compatible microcomputer, software for schematic entry, directory to several design software packages, a dot matrix printer/plotter, 10MB Winchester hard disk drive, 360KB floppy disk drive, and mouse. It costs \$15,800. Users with an IBM PC, PC XT, or compatible can purchase the computer add-ons, software, utilities package, and mouse for \$7,800. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 312 ON READER CARD

GRAPHICS WORKSTATION

The PowerStation 5000 is a 32-bit superminicomputer based on the Unix operating system. It is targeted for computer-intensive electrical, mechanical, architectural, and engineering applications, and allows all PS5000 workstations to communicate with the vendor's PowerNode in a network. Users can create drawings on terminals and transmit them to the host system database.

The PS5000 system contains a 32-bit virtual application processor and display processor. The applications processor can perform computations associated with drafting, design, solids modeling, and database manipulation. It is dedicated to display manipulation, operator interaction, and graphics management.

The graphics subsystem displays both color and monochrome graphic output, and includes a 19-inch display monitor, keyboard, and mouse. The unit has a resolution of 1,280 by 1,024 pixels with 8-

bit planes of image memory for 256 colors out of a palette of 16.7 million.

The UTX/32 operating system is based on the Berkeley 4.2 version of Unix. TCP/IP, UUCP, and CU communications provide interaction within this Unix-based network. It can be linked to Ethernet, RS232, synchronous bit serial, and high-speed parallel ports. The price for a PS5000 system with 2MB main memory, 32KB cache memory, cartridge tape, 80MB disk, and graphics subsystem is \$99,000. GOULD INC., Computer Systems Division, Fort Lauderdale, Fla.

FOR DATA CIRCLE 313 ON READER CARD

LINE PRINTERS

The LW400 and LW800 are line printers that use technologies such as linear, free-flight hammers, and VLSI components. According to the vendor, these printers produce near letter-quality printing at a speed of 400 and 800 lpm.

The printers come in floor-length cabinets and have a 62db sound level. The units have an intelligent control panel with touch switches and a four-character, alphanumeric display that reports the status of the printer and identifies the source of print malfunction. Print bands may be changed for a selection of character sets and font styles. They each have an 80-yard cassette ribbon. The price of the LW400 with a Data-products or a Centronics-compatible parallel interface, acoustic cabinet, and paper basket is \$6,000. The LW800 with the same features is \$8,000. An optional RS232 serial interface costs \$500. SYNERGY PRINTER SYSTEMS INC., Palo Alto, Calif.

FOR DATA CIRCLE 314 ON READER CARD

LOGIC ANALYZER

The HP1630G is a 65-channel logic analyzer. It provides software performance analysis plus state and timing analysis in one instrument. It has a nonvolatile memory for storing a disassembler and instrument configuration, mass storage device, and full compare mode. According to the vendor, the unit is suited for applications involving 16-bit microprocessors and multiple bus monitoring.

The unit can display the order in which state values occur in a program. With this feature, the user can view any piece of program flow, and dual cursors can help locate specific addresses for further analysis. This mode spots infinite loops, erroneous jumps, and activity in forbidden areas of memory.

With the HP-IB (interface bus) and HP-IL (interface loop) built into the HP 1630G, the user can choose from many peripherals to simplify setup, testing, and documentation. Combining the unit with a desktop computer results in fully automated data acquisition capability. A kit is available for upgrading an HP 1630A or an HP

1630D to an HP 1630G. The HP 1630G costs \$12,100. HEWLETT-PACKARD COMPANY, Palo Alto, Calif.

FOR DATA CIRCLE 315 ON READER CARD

PERSONAL COMPUTER

The Royal Alphatronic Personal Computer is targeted for professional business applications as well as home use. The unit, which runs on C/PM, includes a Z80A microprocessor with 64KB RAM, 32KB ROM. According to the vendor, any color or black and white television or professional quality RGB monitor can be used with the unit. Depending on the monitor, it can display either 80 or 40 columns by 24 rows.

The 79-character keyboard has six double programmable function keys (ASCII layout), separate numeric keypad, and separate cursor controls. Built-in interfaces connect to a cassette recorder, two disk drives, and Centronics-type printers. The Royal Alphatronic Personal Computer costs \$700. ROYAL BUSINESS MACHINES INC., Windsor, Conn.

FOR DATA CIRCLE 316 ON READER CARD

MICROCOMPUTER SYSTEM

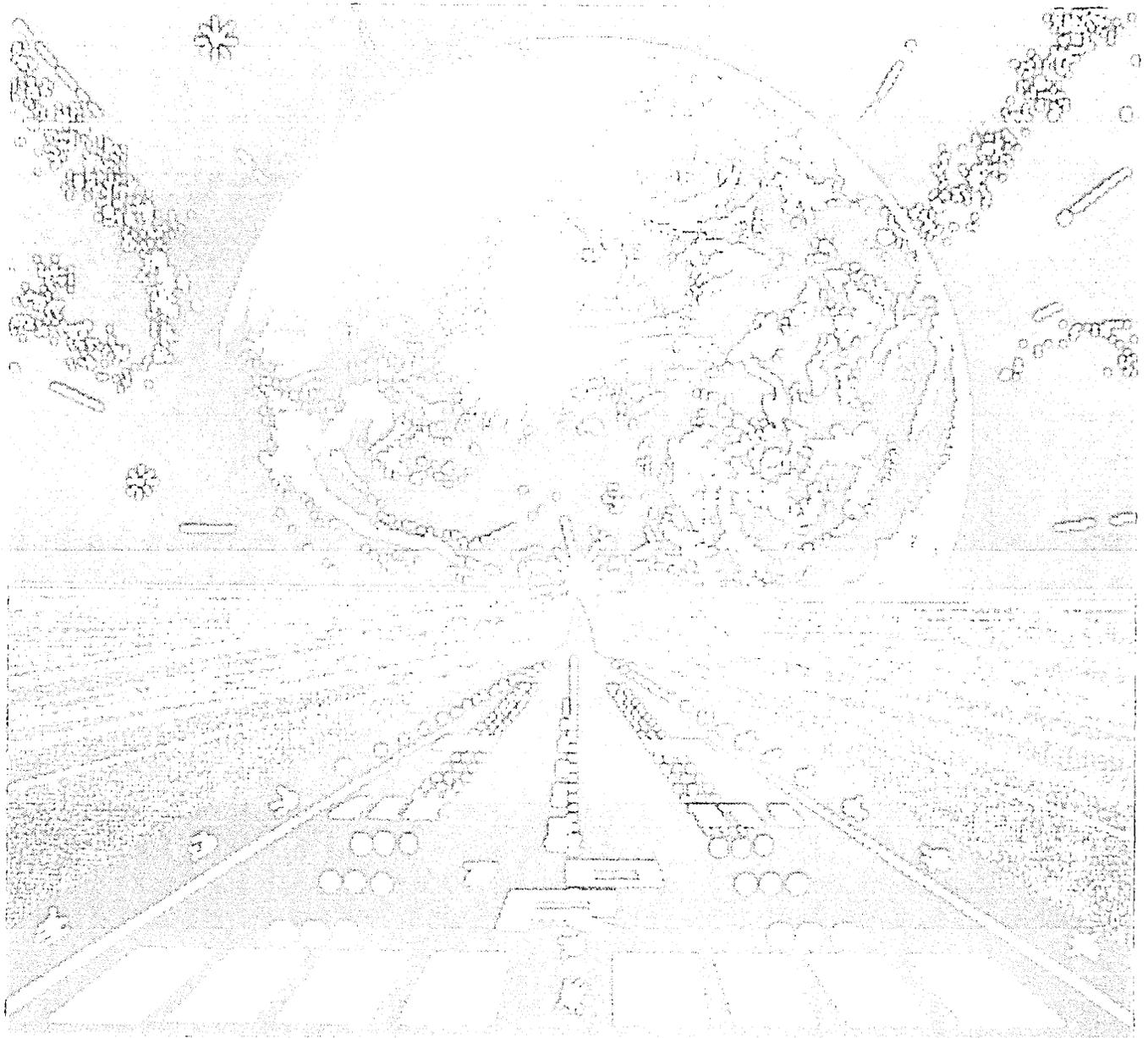
This vendor has introduced the B 25 desktop microcomputer system and the XE520 shared resource processor, which complements it by supporting clusters of up to 32 B 20 and B 25 workstations. Both units are designed for the business market.

The basic standalone system includes a central processor with a 256KB RAM memory, a 12-inch display, keyboard, and a dual floppy disk storage module. Expansion to 40MB, color, and graphics will also be available on the system. The operating systems for the B 25 include the B 20 Operating System (BTOS), MS/DOS, and CPM-86. According to the vendor, BTOS allows MS/DOS and CPM-86 to be used in a cluster environment.

A B 25 master can support up to five additional workstations. The workstations also have their own local dedicated disk storage, printers, and data communication lines. The larger workstation clusters can be configured using the XE520 shared resource processor. The unit utilizes multiple dedicated processors to provide file handling and I/O management. Memory size can range from 1 to 4½MB. The unit has a disk capacity up to 262½MB, the ability to drive high-speed printers at up to 600 lpm, and the capacity to expand communications capabilities. A broad range of applications software will be available on the B 25. Additionally, more than 250 third-party applications software packages are also available. The B 25 costs \$4,000. A cluster workstation is priced at \$2,700. The XE520 shared-resource processor sells for \$26,000. BURROUGHS CORP., Detroit.

FOR DATA CIRCLE 302 ON READER CARD

—Robert J. Crutchfield



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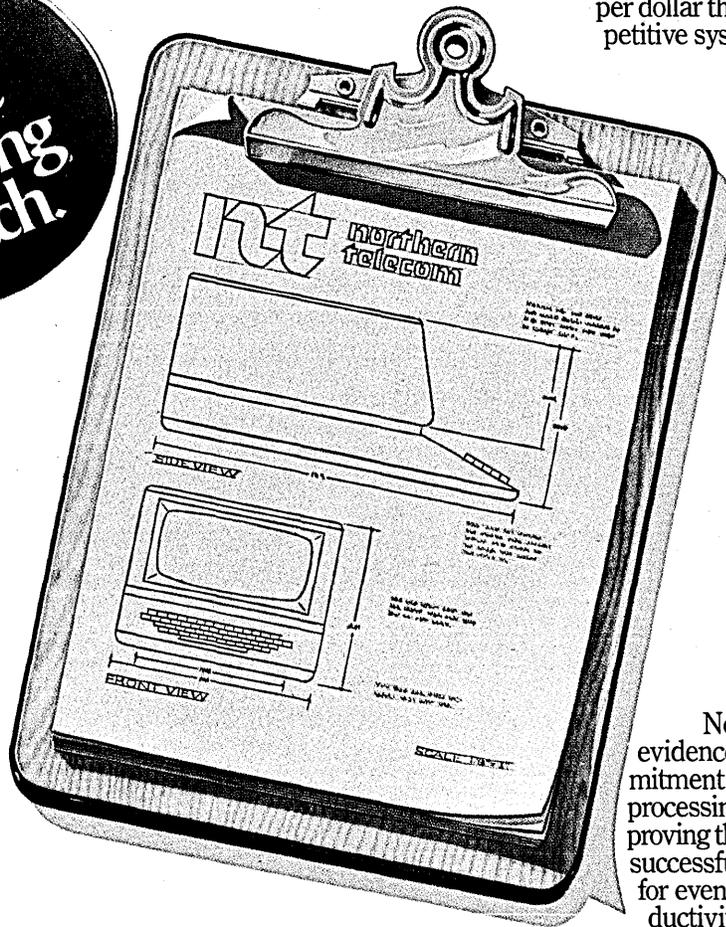
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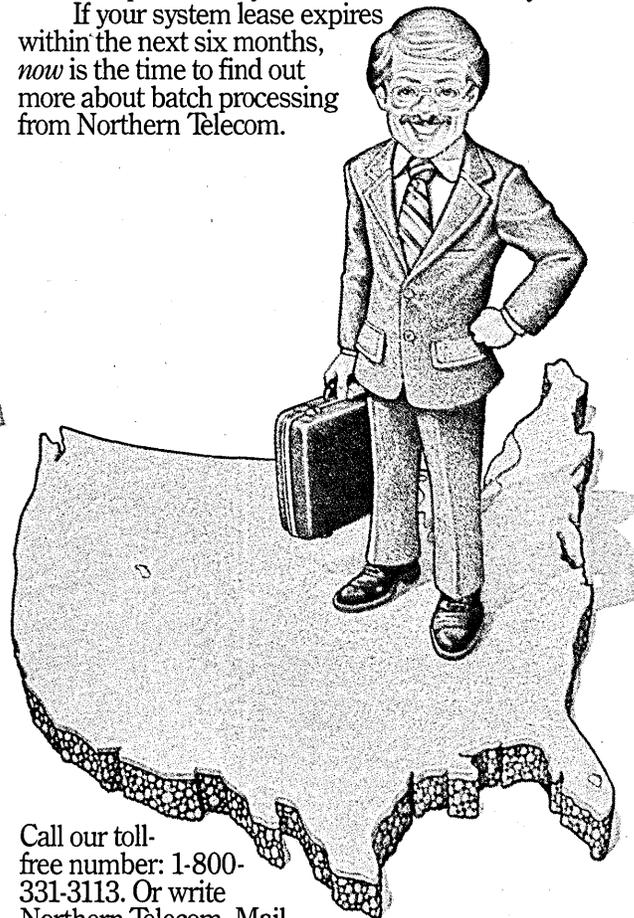
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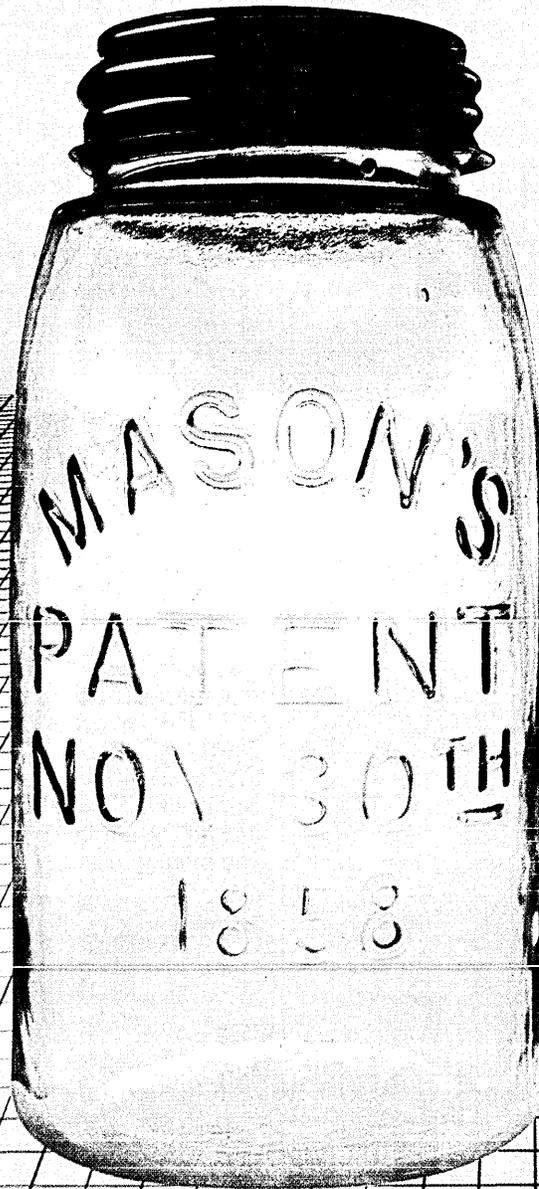
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SOFTWARE AND SERVICES

UPDATES

"One of the worst pieces of advice you can give youngsters today is to become a computer programmer," says Professor Edward Feigenbaum, a computer scientist at Stanford University and author of The Fifth Generation. One of the pioneers in the field of artificial intelligence, the educator predicts automation of software development will take place in this decade and in the 1990s, adding "programming will inevitably be automated."

According to the professor, the world is entering the second computer age, moving from computers that file and calculate to computers that do "reasoning and understanding." He says computers are approaching zero cost, and by 1990, they will be in three fourths of all homes, compared to only one in 12 today. Feigenbaum observes that more than half the U.S. is involved in information processing and the computer is the knowledge worker's tool. "Most information processing involves reasoning and problem solving, not calculating and data processing." In his remarks before the Stanford School of Humanities and Sciences meeting in New York, he said that corporate interest in computers and knowledge engineering is so great "it's on the verge of killing us" in academe. He said that 200 of the Fortune 500 firms have established laboratories and have become "vacuum cleaners" for talent. The "best example," he says, is Digital Equipment Corp., which has about 135 people working in artificial intelligence. He theorized that past gains in the popular standard of living have come not because people worked harder, but because they got smarter. Quoting Winston Churchill, Feigenbaum said:

"The empires of the future are the empires of the mind." Rule Britannia!

A less esoteric view of data processing but one that is equally interesting is expressed in a survey conducted by General Employment Enterprises Inc. The Chicago-based firm found that dp professionals seem to be taking a more open-minded view of relocation today than they did a year ago. The survey found that 65% of the 3,522 data processing professionals polled would consider relocating if presented with a good career opportunity elsewhere. Only 17% said they would not consider a position that necessitated a move, while 18% said they were unsure. Among those who would relocate for a better career opportunity, 24% said location was not a concern. Some 40%, however, expressed a preference for the West Coast. Only 10% would opt to move to the Southwest. Asked about the remaining geographic regions, 8% said they would prefer a position in the Southwest, 4% would choose New England, and 3% would prefer to work in the Middle Atlantic region.

This item should be of interest to business professionals looking for a little diversion from manipulating a spreadsheet package, or a startup microcomputer manufacturer with an IBM PC-compatible product: Microsoft Corp. has announced a new release of Flight Simulator with enhanced graphics, RGB color monitor support, and PCjr compatibility. The company also announced its Multiplan will run on the Apple IIc (which should make Apple very happy, since this vendor has been emphasizing to the press and in its advertising how many software packages run on its unit).

COBOL SYNTAX CHECKER

The COBOL Syntax Checker, running under Unix System V, allows programmers to edit and check the syntax of COBOL programs before they are transmitted to mainframes and for compilation and execution.

According to the vendor, the software increases the chances of a clean compilation and reduces the chance of a program being rejected due to syntax and simple semantic errors. As a result, mainframe central processing unit time is reduced. The product complements the software development features of Unix System V. The COBOL Syntax Checker is available in source code under license agreement from AT&T. It costs \$7,500 for the first cpu and \$3,750 for each additional cpu. It is available on tape media for the vendor's 3B20 computers as well as other development microcomputers. AT&T SOFTWARE SALES AND MARKETING, Greensboro, N.C.
FOR DATA CIRCLE 326 ON READER CARD

DATA MANAGEMENT

This vendor is offering three data management packages that run on its DECsystem-1095 and DECsystem-2065 mainframe computers. The software packages are Datatrieve-20, DBMS-20, and Traffic-20.

Datatrieve-20 is syntactically compatible with software packages for the VAX, PDP-11, and Professional 350 computers. The package enables users to access and manipulate data in the TOPS-20 record management services (RMS) files. The record-oriented query language permits users to define, store, update, and display data.

DBMS-20 is a CODASYL-oriented package that enables users to define, access, and maintain data systematically, establishing structures in either hierarchical tree or network forms. Database records can be referenced through COBOL- or FORTRAN-based application program data manipulation statements. Traffic-20 is a collection of general-purpose routines that enables users to develop on-line data entry, update, and retrieval applications.

SOFTWARE & SERVICES

Datatrieve costs \$10,000. DBMS-20 and Traffic-20 are priced at \$34,500 each. DIGITAL EQUIPMENT CORP., Maynard, Mass.
FOR DATA CIRCLE 328 ON READER CARD

INTEGRATED PACKAGE

This vendor has rewritten its Context MBA integrated software package to run under the MS/DOS operating system and has added 3270 communications to enable connections into IBM mainframes.

The package, Corporate MBA, is said to run up to five times faster than the previous version, which was written in UCSD p-System Pascal. The software is aimed at midsize to large corporations and is being sold through dealers and through a direct sales force. It offers word processing, database, graphics, and spreadsheet functions, as well as a new programming facility that captures long strings of keystrokes for future execution.

Also added is a data exchange facility that enables files to be transferred to and from such popular packages as WordStar, VisiCalc, and dBASE II. The product is designed to run on IBM, DEC, Hewlett-Packard, and NEC personal computers. Corporate MBA is priced at \$895 and comes with a self-running tutorial disk. CONTEXT MANAGEMENT SYSTEMS, Torrance, Calif.

FOR DATA CIRCLE 327 ON READER CARD

FINANCIAL MANAGEMENT

The Smart Checkbook is a total personal financial management software program. It is available for PC/DOS, MS/DOS, CP/M, and CP/M-86. The product is designed to accommodate sophisticated financial needs. The program produces complete financial records, including family budget reports, net worth statements, tax records, custom reports, and summary tables.

Money market, checking, savings,

credit card, and cash accounts can be tracked individually or in any user-desired combination. Income and expenses can be organized with up to 200 budget and 200 tax categories. Any amount can be split among any 15 budget and 15 tax categories.

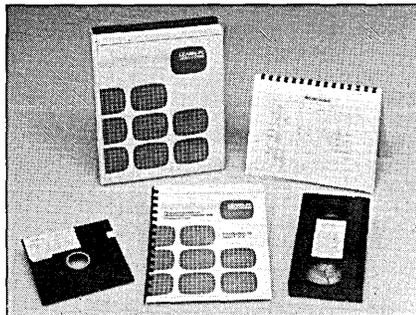
The product has a reconciliation process that corrects errors and pinpoints discrepancies between user and bank account records. It locates duplicate entries and shows items returned by the bank that aren't in the account. SOFTQUEST INC., McLean, Va.

FOR DATA CIRCLE 330 ON READER CARD

VIDEO TRAINING

"Introduction to Lotus 1-2-3" is a complete hands-on training system that includes a videotape, computer disk, guidebook, and command chart of all of 1-2-3's commands.

Users first watch a procedure demonstrated on the videotape. Then they use



the LearnPC disk and guidebook to complete the same procedure on their computer.

According to the vendor, the videotape shows exactly what keys to press and how the computer screen looks. Additionally, the entire program is written in plain English. The color tape runs almost two and a quarter hours. It is available in VHS, Beta,

and ¼-inch videotape. The complete program sells for \$500. Additional guidebooks and computer disks are available for seminars and department training sessions. LEARN PC VIDEO SYSTEMS, Minneapolis, Minn.

FOR DATA CIRCLE 332 ON READER CARD

BANKING SOFTWARE

Bankplan2 is a strategic planning software package for banking institutions, which can simulate the financial effects of an acquisition, using either purchase or pooling methods of accounting.

The modeling package is for bank decision makers who need to investigate the financial effects of alternative investment strategies, deal structures, regulatory policies, and economic conditions before making an acquisition decision.

The product provides answers to questions relating to the current and likely future condition of the acquiring institution; what the financing mix should be; financial impact of the deal on the acquiring bank; and which potential candidate has the financial characteristics of interest to the buying bank. Bankplan2 is available for installation on IBM or IBM-compatible mainframe computers for a \$25,000 license, or it can be leased on a monthly basis. CHASE DECISION SYSTEMS, Cambridge, Mass.

FOR DATA CIRCLE 331 ON READER CARD

PRINTER SOFTWARE

Printer Basher is a printer utility program that provides full menu-based operation of all control functions and print modes of all Epson printers. It allows users to send all of the printer control codes necessary to set up the printer by making menu selections using just a few keystrokes. In addition, it downloads into the FX series printers the three IBM character sets that are not included in Epson printers, the vendor says.

The software runs on the IBM PC, PC XT, Apple IIe, and Epson QX-10 personal computers and compatibles. It drives the MX-80, MX-100, FX-80, FX-100, RX-80, and RX-100 Epson printers.

To operate the package the user loads the program and a menu appears. Pressing a few keys to indicate printer modes and functions desired is all that is necessary. When the printer is up, the software's menu retires until called again. SPEER RESEARCH CORP., Rowayton, Conn.

FOR DATA CIRCLE 333 ON READER CARD

COMPUTER GRAPHICS SOFTWARE

The Architectural Interactive Design System (AIDS) is designed for a broad range of applications by architects, engineers, and others in the design and construction fields.

With AIDS, scaled architectural drawings can be produced three to five times faster than by hand, and production

SOFTWARE SPOTLIGHT

CONVERSION SOFTWARE

Emphasizing compatibility rather than conversion, a procedure to migrate from IBM System/34 to HP 3000 computers has been developed. After the change, RPG programs will run in their native mode as fast as before the conversion, says the vendor.

The HP Transform/3000 product is a value-added software package for users of the vendor's HP 3000 computer. The software has three product elements: upgrade utilities to bring over procedure and data files, a process monitor to speed up execution of a set of commands that perform S/34 functions on the HP 3000; and on-site consultation for the transformation process.

Key to the ability of this system to run S/34 software in its native mode is the process monitor, PROCMON. It gives the HP 3000 the features that are familiar to S/34 users, but not with a performance-impair-

ing emulator, the vendor says. While some S/34 statements translate one-for-one to the HP 3000's operating system, those that do not are translated by PROCMON.

Transform/3000 will run on any HP 3000 system equipped with the current version of its MPE operating system; HP's RPG compiler, version 6.0 or later, is also required. Full documentation is included in the purchase price. License to copy is offered, and users who wish to do future S/34 to HP 3000 upgrades on their own need not purchase factory systems engineer support, which is required on the initial installation.

The vendor expects the package will appeal mainly to medium-sized and large organizations with in-house programming expertise and to software suppliers. Transform/3000 costs \$15,000. HEWLETT-PACKARD, Palo Alto, Calif.

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SOFTWARE & SERVICES

speed of nonscale drawings is increased 40 to 50 times, the vendor says.

The system allows for overlays of all types of architectural and engineering drawings, space planning, interior design, component costing, and graphic presentation displays. Designers are able to create a three-dimensional model of a building starting with a sketch and ending with all required drawings.

A self-teaching program assists users in becoming conversant with the programming within 40 hours, according to the vendor. A library of 2,000 standard symbols and details allows users to begin drafting immediately. It can be modified or expanded to suit the users' needs. A single computer terminal workstation is licensed for \$7,000, and two or more workstations can be licensed for \$14,000. ARCAD, Los Angeles, Calif.

FOR DATA CIRCLE 334 ON READER CARD

PC-MAINFRAME CONNECTION

PCMainframe is a software package that links the IBM PC to mainframe systems with CICS. It provides a generalized facility to transfer data between personal computers and a central host system without special programming.

Features of this software package include upload and download file transfer; data selection and summarization; automatic formatting for spreadsheets, databases, text, and binary data; six levels of security; centralized control; and hardcopy and on-line audit trails.

PCMainframe directly downloads selected records and fields from mainframe files to a PC. This data is available for use in most of the popular spreadsheet packages. Many applications on the PC can share the information contained in a central database.

Versions of PCMainframe operate under DOS/VSE, OS/VS1, and MVS (operating systems that support CICS). PCMainframe costs \$4,500 per mainframe, and includes three PC packages. Each additional PC package costs \$200. CFSOFTWARE INC., Chicago, Ill.

FOR DATA CIRCLE 335 ON READER CARD

MOUSE MENU

The Designer Pop-up software allows personal computer users to design or personalize pop-up menus for most IBM Personal Computers and PC-compatible software. Pop-up menus eliminate the need to memorize and type complex commands. Users select a command from the pop-up menu by pointing at it with the Mouse Systems' PC Mouse and pressing one of its three buttons.

The product requires no modifications to existing software. Users can design or personalize their own pop-up menus with any word processor that creates ASCII text files and a compiler provided by the vendor. Pop-up menus used with the PC

Mouse appear on the screen only when needed, and disappear when the desired command is selected. The menus are completely transparent to the underlying program and take up no screen space except when they are actually being used. Designer Pop-up menu software sells for \$100. MOUSE SYSTEMS CORP., Santa Clara, Calif.

FOR DATA CIRCLE 336 ON READER CARD

SYNTAX-DIRECTED EDITOR

The Syntax-Directed Editor (SDE) is a productivity tool that provides an interactive programming environment for writing, editing, and executing COBOL source programs. Its shorthand method reduces the amount of code that a programmer must enter and immediately checks for format and syntax errors.

SDE supports the creation of COBOL 74 programs in the General Comprehensive Operating Supervisor (GCOS) 8 environment for Honeywell large-scale computer systems. According to the vendor, its objective is to provide application building tools that can be incorporated into a user development center.

The vendor says SDE understands the rules of COBOL. Instead of the programmer typing complete statement structures, SDE is used by selecting a series of templates, one per COBOL verb type. All fixed aspects of the statement grammar are then automatically generated and displayed on the screen. Using the cursor and tab controls, the user fills in the blanks with variable information. The Syntax-Directed Editor for COBOL is available for \$225 per month, with a 12 month minimum. HONEYWELL INC., Phoenix, Ariz.

FOR DATA CIRCLE 337 ON READER CARD

CROSS REFERENCING SYSTEM

Probe is an interactive analysis and cross-referencing system for the IBM System/38. It uses object source code level analysis to provide cross-referencing information. The analysis is performed in a batch subsystem; the information is provided on-line.

The product is menu-driven and will display job-stream explosions. It will show all control transfers from one program to another, including CALL, TFRCTL, DFU, and SBMJOB. All RPG, COBOL, and CL programs will be included. Flowcharts will be provided by the vendor.

On-line database information includes record layouts for externally described files and RPG- and COBOL-program described files. It does field analysis and can display program usage of field information for internally and externally described files.

Reference field analysis and physical and logical file dependencies are able to be displayed. Also included are where-used displays and explosions.

The software is both menu- and

command-driven. The command processor provides access for frequently used functions and the menu provides a structured interface to all of its features. All displays are help-key capable, and the software includes a user manual. The system is completely compatible with ACS's Abstract/38 documentation system. Probe costs \$1,000. ADVANCED SYSTEMS CONCEPTS INC. Chicago, Ill.

FOR DATA CIRCLE 338 ON READER CARD

GATEWAY SOFTWARE

The Comtem Multiple Access Facility with Remote Host Option (MAF/RHO) is designed for the Comten 3600 communications processor system. SNA and BSC 3270 terminals in an IBM SNA or pre-SNA network can access non-IBM hosts and IBM hosts with this system. In addition, SNA 3270 and BSC 3270 terminals can access a gateway between IBM hosts located in separate networks.

According to the vendor, MAF/RHO increased the flexibility of the user's network by eliminating the restriction that 3270-type terminals be dedicated to either IBM or non-IBM hosts, or to any one network.

The software works without host modification, IBM MSNF, or any specialized gateway function. Polling and addressing of terminals for the host, error recovery, and control functions, and alternate routing for remote nodes are all provided by MAF/RHO. The license fee for the Comten MAF/RHO data communications software is \$6,400 per year. NCR COMTEN INC., St. Paul, Minn.

FOR DATA CIRCLE 339 ON READER CARD

BUSINESS GRAPHICS

APSGRAPH is a graphics package compatible with CPM-based personal computers. The software produces business graphs such as line graphs, pie charts, bar graphs, stick graphs, step graphs, and scatter plots. It also generates clustered and stacked graphs. The product is completely menu-driven and it allows users to graph new data or data already stored on a database or spreadsheet program. APSGRAPH is designed for the executive or professional who needs to produce graphs quickly and doesn't want to learn a command language, the vendor says. It also incorporates a help function.

To produce a graph, the program either displays a menu or asks a question. After selecting the type of graph to be generated, the user inputs the data for the graph or specific source. To generate very complex graphs, the product reads multiple data files. It then produces a single graph with overlaid images for each set of data. APSGRAPH costs \$300. AUTOMATED PROFESSIONAL SYSTEMS INC., New York, N.Y.

FOR DATA CIRCLE 340 ON READER CARD

—Robert J. Crutchfield

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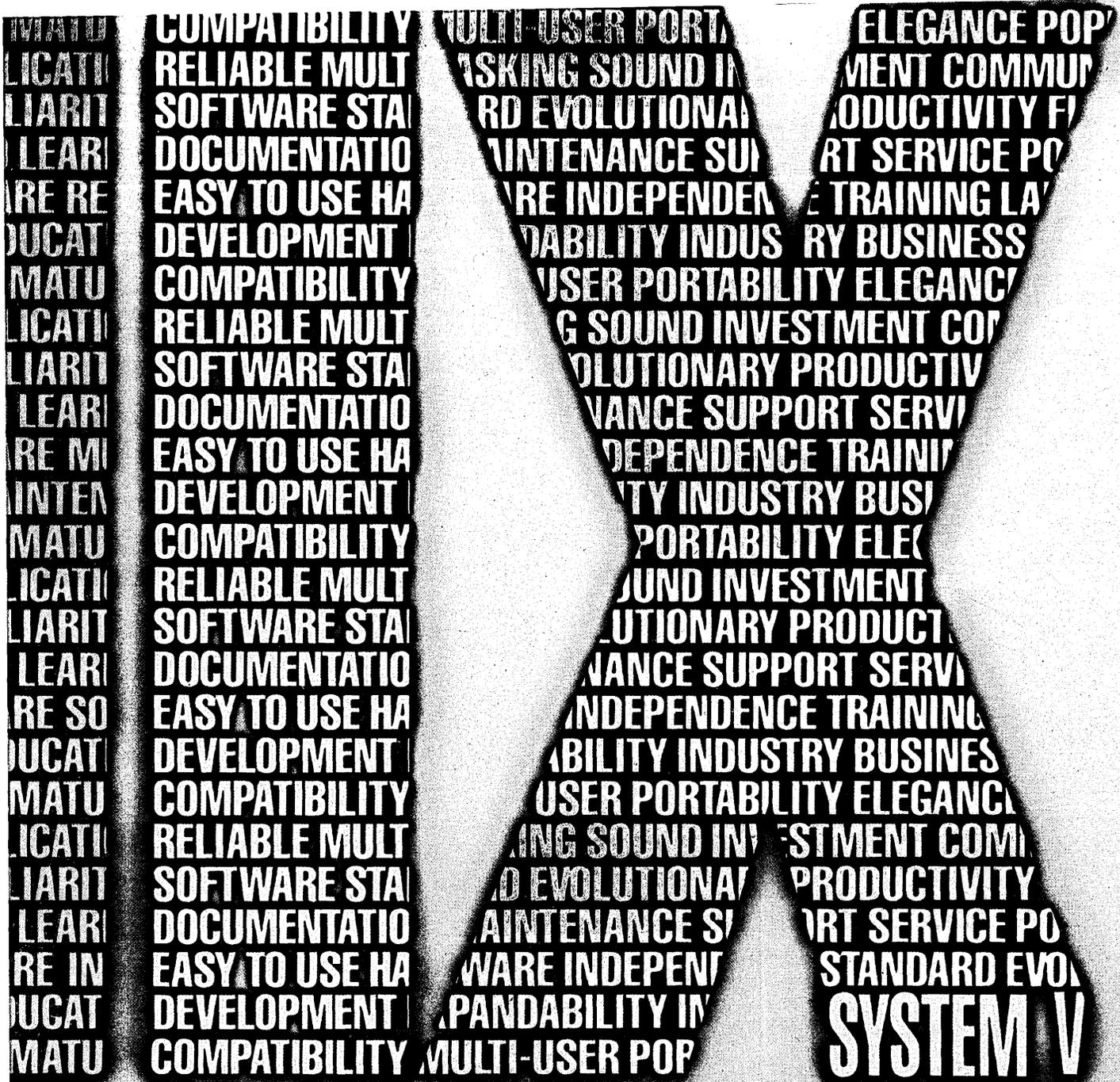
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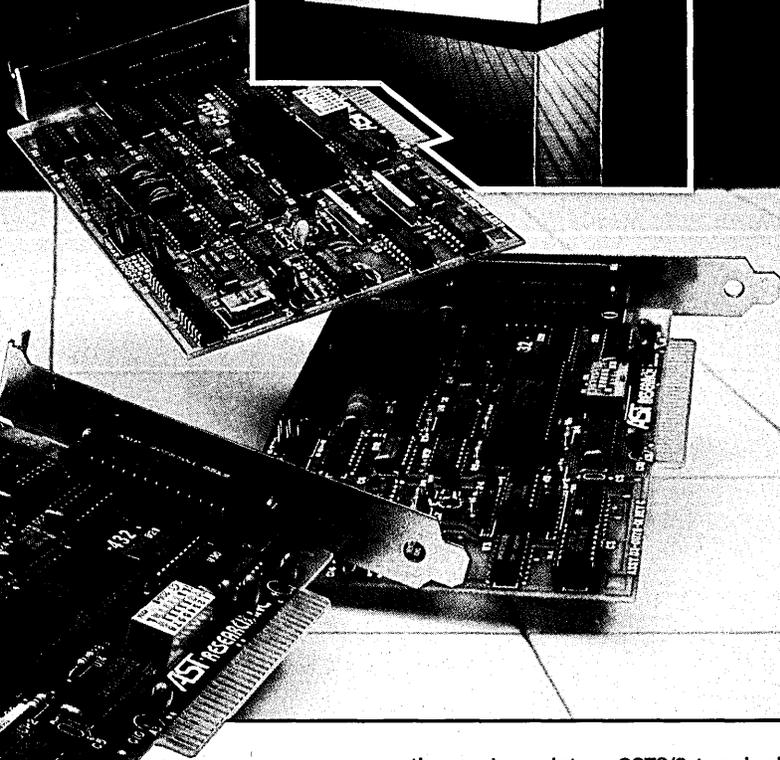
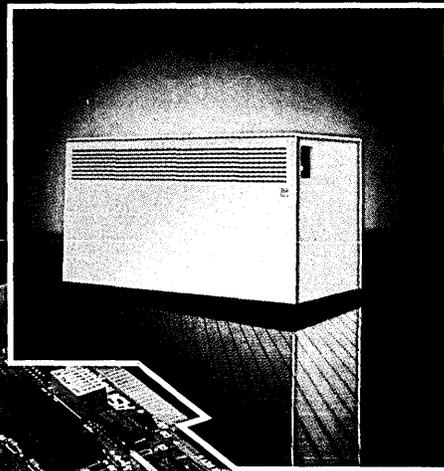
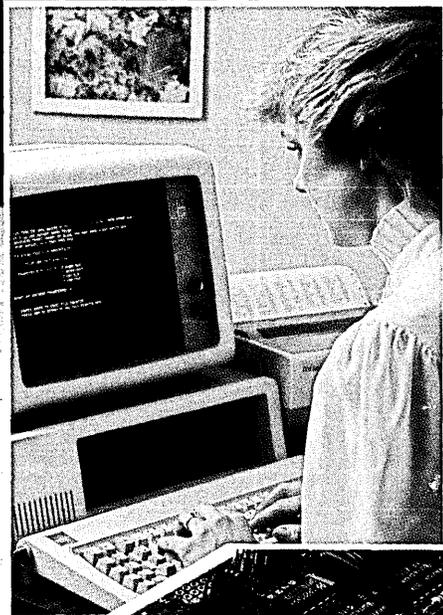
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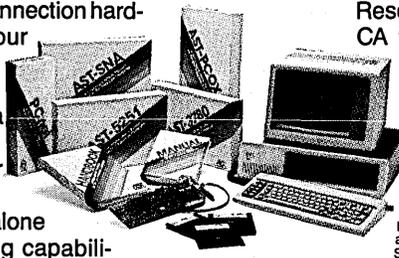
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SOURCE DATA

BOOKS

THE AMAZING RACE: WINNING THE TECHNORIVALRY WITH JAPAN

by William H. Davidson

THE JAPANESE CONSPIRACY: THE PLOT TO DOMINATE INDUSTRY WORLD WIDE— AND HOW TO DEAL WITH IT

by Marvin J. Wolf

In the last decade, Japan's economy has become the second most powerful in the world. Its manufacturing methods are as much envied as feared; its technology, once dismissed as shamelessly imitative, now serves up stunning innovations; its principles of corporate organization are studied with Talmudic fervor.

More arresting still, the fundamental business talent embodied by modern Japan may not be mass production or negotiations or even political brinkmanship—it may simply be conquest.

Students of Japanese history note that Japan's awesome postwar recovery should not be surprising: its roots are a millennium deep. Its swift rise to economic dominance of choice industries should not have caught the United States off guard—after all, the U.S. helped make Japan's resurgence possible, even charted its course. (Perhaps our greatest postwar talent was revitalizing rival economies.)

But decidedly, U.S. business has been vulnerable to the Japanese. And the results have been an uneven distribution of disasters, shocks, dislocations, and unmistakable benefits—chiefly consumer benefits. By now few Americans have not participated in Japan's rise to economic power. Buy-American sentiments to the contrary, it's a rare U.S. citizen who doesn't own a dozen Japanese products. We buy them because they're not only cheaper, they're better.

Take passenger cars. Unless you're inured to mediocre workmanship, clumsy handling, and premature deterioration you can't change, the car you own is designed, and probably built, as they say, offshore.

The Big Three are making money again, but find themselves in the embarrassing posture of imitating their betters, and far more slavishly than their new rivals once aped Detroit. So far the best these Motown geniuses can do is rip off foreign car styling. Meanwhile Mitsubishi has developed the ceramic diesel engine, Europeans are pushing suspension design ahead 10 years, and Honda is about to redefine commuting.

The auto business, as many have been saying, offers an instructive clinic for the information processing industry. Some would argue this clinic is not of much use; among them are William H. Davidson, author of *The Amazing Race: Winning The Technorivalry with Japan*. Davidson finds, peering westward from his perch as associate professor of the Colgate Darden School of the University of Virginia, that Detroit has not been the latter-day Rome of vanity, bureaucratic cowardice, and sloth we thought, but an able, useful organism suffering a spring cold. Others, including Marvin J. Wolf, author of *The Japanese Conspiracy*, see Detroit with its massive layoffs and enormous debt to the federal government as the first of many would-be Lazarus.

These two books in some ways define the spectrum of enlightened strategic thought about the Japanese threat. Both provide, for the nonspecialist at least, significant new information and sound, if not bell-ringing, insights. Both are unquestionably de rigueur for information processing managers.

Essentially, Wolf's methods are interpretive, Davidson's are mathematic. In that the vulnerability of U.S. markets to Japanese conquest has resulted more from cultural blindness than our inability to analyze financial data, Wolf's approach holds more promise. Of the two, in fact, *The Japanese Conspiracy* is more useful, once one gets beyond its initial (and, one suspects, sales-savvy) paranoia. It is merely regrettable that, given the shattering transformations underway in American-Japanese business relations, better books on such a topic could not have been written.

Since Commodore Matthew Calbraith Perry forcibly introduced Western culture to Japan in the 1850s, Japan has

been trying to beat Westerners at their own game. At the same time, the Japanese have been remarkably successful in preserving longstanding social structures and values.

The modern Japanese corporation, Wolf shows is very much an ersatz feudal village, built around the noblemen of contemporary Japan, corporate executives. There is a serf class—the two thirds or more of all Japanese workers who do not have lifetime employment with one of Japan's diversified high-tech giants. They live in tiny, poorly heated, nearly identical flats in fiercely overcrowded neighborhoods. They work long hours, and are expected to—they have no Western-style labor unions to protect them. Even lifetime employees are exploited by Western standards. Their favored status doesn't provide affordable housing—comparatively few Japanese acquire suitable dwellings, consumer credit being many times higher in interest and more difficult to obtain than we're accustomed to, and land within reasonable commuting distance is prohibitively expensive anyway. Those who manage to buy a tiny flat or house often acquire loans from their companies, cementing the loyalty to their employer.

Nor do lifetime workers have real job security: most are forced to retire at 55, whereupon they must find low-paying service jobs to supplement what savings they've scraped together over the years. (Japanese workers are compulsive savers, salting away 20% of income in postal or corporate accounts; this supply of cheap capital helps drive business expansion.) Unmarried workers appear hardly different from labor-camp detainees—if they work for a large corporation, they're housed together in company dormitories governed as strictly as disciplinary military schools.

There is a hidden hand in all this: with little to look forward to in private life, the Japanese worker devotes his energies to the company. There, and throughout Japanese society, conformity is the rule. Imagine an American manufacturing company where workers report early to take part in voluntary calisthenics, file quietly to the company cafeteria for lunch, return to their stations with five minutes to spare, and stay late to attend, without pay, a quality circle

SOURCE DATA

dedicated to improving not their own lot but company profits.

All of this may sound like a dream to American managers—the perfect humanoid work force. Especially to those confronted with Kafkaesque union contracts. In this country, the typical worker thinks first of himself and his family; his union comes second; the company, if its management is not too adversarial, is at best a distant third. But American managers cannot expect workers to exhibit the binding loyalty to company that Japanese workers apparently feel. The two cultures are radically different. Nor, given the tenets of democratic capitalism, is such loyalty desirable. The fact that American workers have, in general, more disposable income than their Japanese counterparts means that the U.S. is the best market for consumer goods in the world. Until recently, the principle beneficiaries of this market have been American companies.

In Wolf's view, the advantages of worker loyalty and (in key industries) productivity that Japanese companies enjoy are significant, but far from overwhelming. The real edge Japan holds in the world marketplace derives from two other factors: unsavory business practices, and national policies that amount to economic totalitarianism. Dumping, theft of industrial secrets, violation of patents, and then lying about such practices summarizes the first factor; the pervasive influence of Japan's government throughout private economic activity, especially that of the Ministry of International Trade and Industry (MITI), describes the latter.

In the current view, much of Japan's economic success is attributable to MITI's foresight, its bullying insistence on specific long-term economic goals, and its sway over elected Japanese officials. MITI, according to some, is a kind of national board of directors that oversees the voracious conglomerate—James Abegglen coined the phrase "Japan Inc."—that is modern Japan. This perception is at the heart of Wolf's book, as its title suggests; and while Wolf qualifies it now and then, he strains to substantiate it. Unfortunately, such a ready explanation is far too pat. MITI does help fund research and development in Japan for projects it deems critical to the furtherance of Japanese business. Its fifth generation project is the most prominent ongoing example. But Wolf fails to spell out U.S. government subsidies of industrial research in the same detail, from lavish Defense Department grants to small-scale funding from the National Institutes of Health, which amount to a far greater sum than MITI's handouts and arranged tax breaks.

MITI's ability to direct the use of resources within Japan, however, has no parallel in this country. Japanese antitrust laws are more relaxed than ours, and they are

rarely enforced, allowing business leaders from competing companies to form temporary alliances. Behind such alliances one can often find MITI machinations. But rather than a conspiracy, such high-level cooperation is more likely yet another example of the Japanese cultural tendency toward consensus. Such cooperation may be no more menacing than the joint ventures that U.S. computer companies are currently engaged in. To term such alliances conspiracy simply furthers Western ignorance of Japanese conventions.

Wolf does make a compelling point about discriminatory pricing. Prices for Japanese consumer goods have rigid national controls; at the same time Japan continues, by myriad means, to effectively prevent imports. This arrangement provides Japanese manufacturers with a captive market in which to achieve sufficient profits to subsidize underpriced exports. As Wolf sees it, this practice explains Japan's immensely successful triumphs in U.S. markets with products from televisions to automobiles. It incorporates, but goes beyond, Davidson's insight: "Japanese firms are willing to forego profits, period."

But not all products Japan sells in the U.S. are priced in a discriminatory fashion. Perhaps the central reason for low Japanese profit margins is that the Japanese almost invariably sacrifice short-term gain for longevity in order to survive in the marketplace. Far-sightedness is, in fact, deeply infused throughout Japanese society, from the loyalty workers and managers show their companies (and the support, from housing to loans, companies dispense in return) to the much greater suasion bankers, rather than stockholders, have in Japanese corporations. Beneficial results of such a perspective range from heavy commitments to research and development to sizable investments in the technology of production. Compare this focus to, for instance, the orientation of U.S. steel companies.

Unfortunately for the U.S. and other Western countries, the factors in favor of the Japanese do not end with a culture uniquely suited to business success. The Japanese also happen to be extraordinarily canny businessmen. Wolf describes a long litany of Japanese business triumphs in considerable (and bloodcurdling) detail. The most interesting is Houdaille Industries' fight to survive a Japanese attack on its basic product—perhaps the most fundamental building block of industry—machine tools. As Houdaille found out, the Japanese acted with methodical, amoral inevitability. Wolf offers the method, including its "ugly underside," as common Japanese business strategy:

- Protect Japanese manufacturers from foreign competition at home with tariffs and quotas. When trade barriers are challenged, reduce the formal impediments but institute

informal barriers such as incentives to buy Japanese.

- Rationalize Japanese industry by encouraging mergers of small, less effective firms and forcing others into different pursuits.
- Organize the remaining companies into a virtual (often an *actual*) cartel, empowered to act as one through a convenient loophole in Japan's antimonopoly law.
- Direct the new cartel to concentrate on products that MITI has targeted—in this case, numerically controlled machine tools, so-called steel collar workers.
- Fund the necessary research and eventually the accumulation of inventory, in preparation for flooding the market with low-priced products—and do so secretly.

At first MITI licensed machine tool companies to import sugar at prevailing world prices and then sell it at controlled, artificially high prices to Japanese consumers. When Japan's trading partners discovered the scam, MITI sanctioned betting on bicycle and motorcycle races, funneling the profits into machine tool company coffers.

In addition, by reverse engineering or other means (possibly outright theft), the Japanese acquire the essential technology. Houdaille allowed Yamazaki Machine Works Ltd. to build its machines and sell them in Far East markets for a fee per each machine sold. Five years later Yamazaki machines appeared in the U.S., identical to Houdaille's right down to design flaws, and they were priced to walk. In 1976, the Japanese share of the U.S. machine tool market was 3.7%; now they own 30% of the market and 60% of numerically controlled machine tool stakes. Wolf's lengthy description of government inaction during this period is too painful to relate here.

What, if anything, does this all mean for the information processing industry? According to both books, it means plenty. The Japanese presence in semiconductors is already considerable. Their explosive entrance into the RAM market burned virtually every American RAM maker, and the damage is far from over. Wolf also points to microprocessors—the next logical development—and to office automation. Other targets include 150-seat commercial aircraft (remember the Zero), biotechnology products from genetically engineered cells to discount drugs, the entire field of robotics, heavy construction machinery, solar and nuclear energy technology, telecommunications, and new markets spawned by fifth generation products including artificial intelligence.

Given the Japanese record, MITI's confident public announcement of some of these targets should be enough to make American managers swear off weekends. The Japanese play hardball (they even dominate Little League baseball). The question is, to what extent do previous Japanese business successes pertain to the mar-



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SOURCE DATA

kets of the late 1980s and 1990s?

Wolf, as one might figure, expects the worst. He sees the Japanese talents for production, distribution, market penetration, and organization extended by a newly found capacity for original research. Such creativity is already in evidence in the office automation field, at least within Japan (rule one is secure the home market). Wolf mentions Toshiba's optical disk storage, voice recognition, and facsimile transmission head starts; Fujitsu's data encryption and modem innovations; and computer automated engineering advances in use at Toshiba, Nissan, and Hitachi. These companies, he points out, are not working in a vacuum: linked through MITI and cooperative agreements, they may well be headed toward compatible product lines of Japan Inc. officeware.

Davidson is slightly more optimistic—or so he seems at first. "Japanese strategy will be most effective," he says coolly, "where unit volume is high, price sensitivity is great, product standardization is high, and gross margins are relatively low." The Japanese have been weak in services, though the high reliability of their products makes an elaborate service organization unnecessary. They have been weak in precedent-setting technology, but are no longer. Distinct weaknesses for Japanese companies in this country remain the almost complete lack of their own sales force or buyer-support mechanism, little software, and some lack of credibility.

Davidson is committed to the assumption that Japanese business, while extremely capable and aggressive, is predictable. He thinks the Japanese will pursue what they're good at and leave the rest. Such information processing markets include personal and small business computers, low-cost peripherals, subsegments of the telecommunications market such as telephones, and mass-produced components for all markets.

Component makers, especially semiconductor makers, have already felt the effects of Japanese industrial genius. Most U.S. semiconductor companies are chip specialists, integrated neither vertically nor horizontally; Japanese semiconductor makers are, by contrast, huge companies with strong vertical integration and are thus capable of suffering initial losses to gain market share. Once this tactic succeeds, as it did with memory chips, the Japanese can begin supplying integrated components through the same channels. Next, Davidson says, comes hardware. By such steadily increasing pressure—a method Davidson calls the termite strategy—the Japanese will gradually displace U.S. manufacturers, consuming their American elder brothers from within.

This strategy lends itself to the personal computer market, an opportunity

many have noted resembles the television market. And a resounding victory in personal computers will lead, naturally, to penetration of the minicomputer, mainframe, and office equipment markets, where the Japanese presence has so far been negligible. But once the Japanese have established a customer base, one that will need to trade up, the marketing edge U.S. mini and mainframe makers have in service, support, and vendor loyalty will become Japanese advantages.

The next Japanese thrust, which Davidson figures will occur in the next five years, will be into the emerging office equipment arena. It is here that the Japanese will first display their mastery of advanced technology, especially highly sophisticated word processing systems. Computers and other devices developed in the course of fifth generation research will reach market about the same time, further decorating the Japanese as technological innovators. Finally, by the end of the decade, these various pursuits will begin to merge and coalesce. As Davidson notes, "each of the six leading [Japanese] suppliers possesses the computer, communications, and office equipment technologies needed to compete on a system basis."

If this scenario seems like a blitzkrieg, the image is apt. Wolf points out that Japanese business talk is saturated with military argot; he also thinks the Japanese consider business "the moral equivalent of war." Is there cause for hope? Or should we all take up handicrafts?

Wolf's response, in tenor with his rousing initial chapter, calls for the disbanding of MITI, strict international supervision of Japanese trade practices, and a far more helpful, sympathetic, and alert U.S. government. In short, howls of righteous indignation followed by a nasty political backlash. Davidson's suggestions are more reasoned, and perhaps more naive. He points to a handful of U.S. industries that have turned back the Japanese tsunami—outboard engines, radial tires, consumer power tools, lawn and garden equipment, chain saws, tractors, and low-priced cameras. But he fails to mention that no significant Japanese home market for these products exists, nor is one likely to emerge.

He also points, of course, to IBM. When IBM realized in the early 1970s that its golden future could readily belong to the Japanese, it reacted with brutal efficiency; today its strength seems assured for years, if not decades, to come. In particular, Davidson mentions the introduction of the IBM 4300 series machines, which replaced existing IBM and IBM plug-compatible computers by offering the same performance at much lower rental fees. Intel, which leased Hitachi computers, collapsed almost overnight. IBM had turned the tables on the Japanese, giving up short-term profits, and the

affection of investors, for long-term market position. Unquestionably, IBM employed predatory pricing, and with impunity—the Departments of Commerce and Justice shut their eyes. The signal thus sent to the Japanese was twofold: IBM was no pansy, and U.S. inaction would not always work in their favor.

But most people see little difference between the Japanese and such monoliths as IBM and AT&T. In the struggle to come, Davidson offers us scant hope: "There will be niches in which smaller or slower companies can survive, but not many." Elsewhere, he says, "global firms will dominate virtually every market segment." Maybe one can cling to that "virtually."

In sum, Wolf, despairing that U.S. managers and their government will never wake up, all but concedes the future of information processing to Japan. It will happen soon, he feels—a direct result of the fifth generation project. Davidson *wants* to believe the contrary. "This time out," he says, "the Japanese will be competing against a far tougher field on a far tougher course. The competition is bigger, quicker, and smarter." He sees in the U.S. several cheering developments: improved labor relations, the shift of U.S. capital from housing to money markets, and a growing spirit of protectionism. But his conclusion reveals his secret convictions—a new order with one winner:

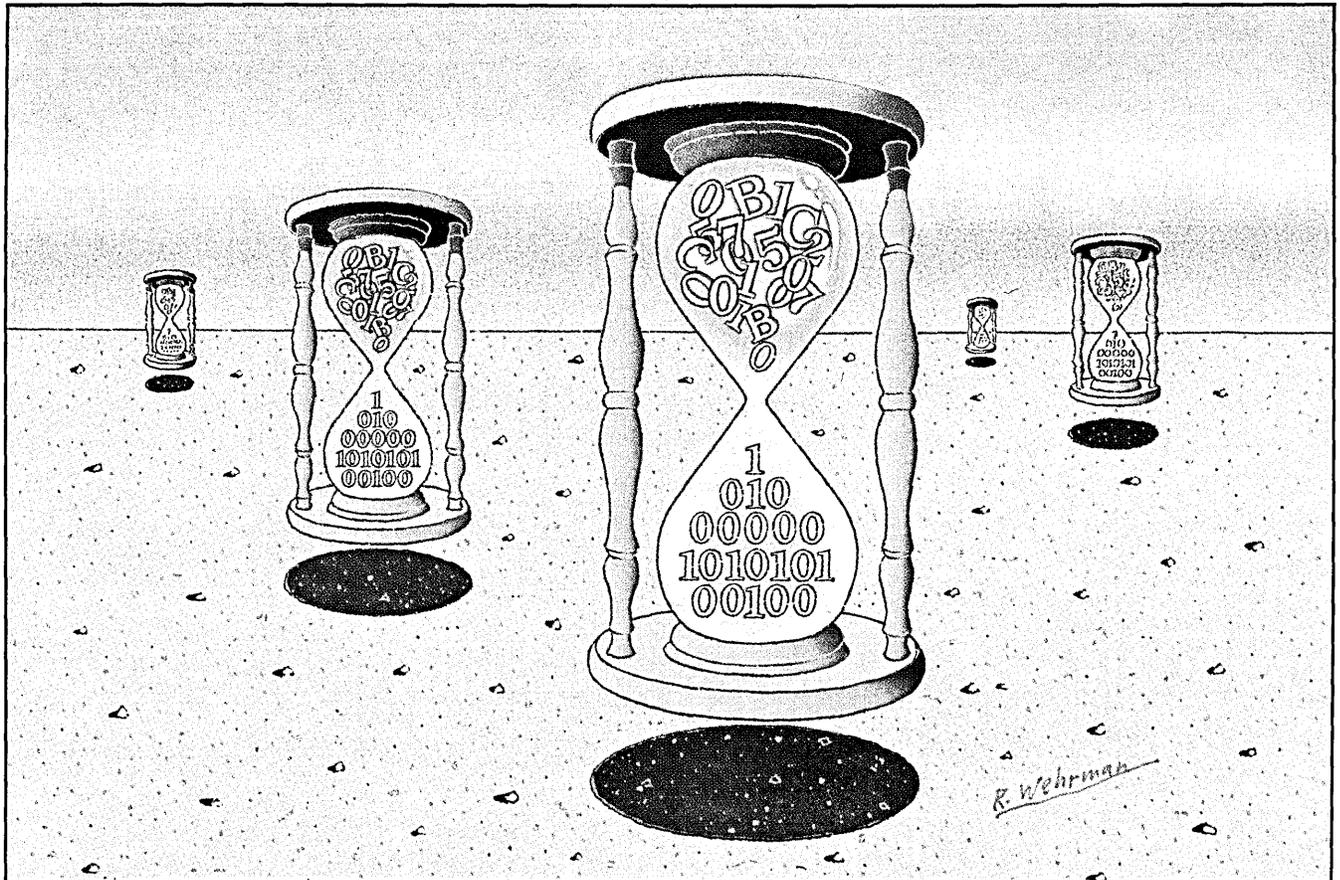
"The information technology sector is today what North America was 200 years ago—a large undeveloped area with limitless potential. Many nations attempted to secure all or part of [it]. . . . Only one participant had the vision to view the development of the bulk of the continent as its manifest destiny."

It is useful to remember that only a few years ago, similar gloomy pronouncements were offered in France and Great Britain with an eye to the economic menace that was the United States. Perhaps Wolf and Davidson accurately foresee the gradual erosion of American economic might. But there is in these books a telling lack of admiration for genuine Japanese accomplishments.

Since World War II we've been riding high, confining our disasters to the political sphere. Much of American business has grown self-satisfied. The Japanese offer the first serious economic challenge this country has faced in decades. It is a gift—of humility, and of renewal. Let's not brood about it in this mode too long. *The Amazing Race: Winning the Technorivalry with Japan*, John Wiley & Sons Inc., New York (1983, 270 pp., \$17.95). *The Japanese Conspiracy: The Plot to Dominate Industry World Wide—And How to Deal With it*, Empire Books, New York (1983, 336 pp., \$13.95).

—Tom Parrett

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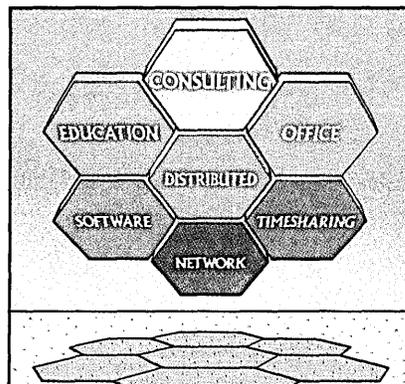


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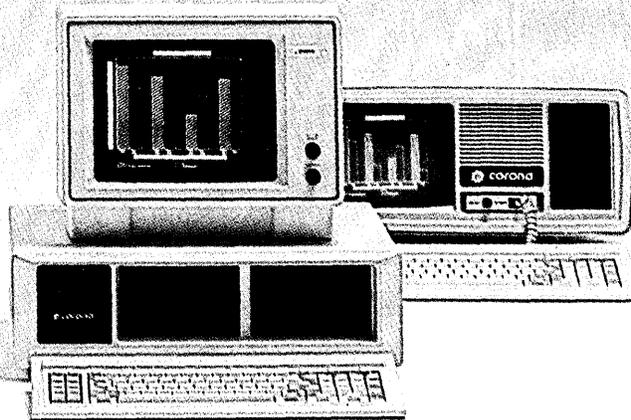
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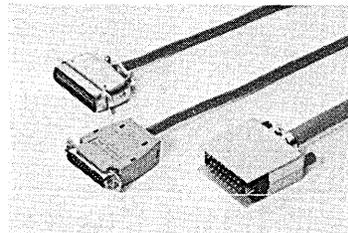
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ON THE JOB

THE TIDE IS HIGH

A recent survey of 424 companies indicated that the second quarter of 1984 should prove to be a good one for dp employment.

The survey, conducted by Compu-Search (the dp division of Management Recruiters International Inc., Cleveland, Ohio), showed that over 200 of the companies queried will be increasing staff size.

According to the report, 50% of the firms will be hiring in 1984, 45% will maintain current employee levels, and 5% will decrease current staff size.

Projections for the first quarter of 1984 showed 55% of the companies will be hiring additional personnel.

A closer look at the survey shows that the New England and Middle Atlantic states are in the eye of the hiring storm.

For the complete survey, contact Management Recruiters International Inc., 1015 Euclid Ave., Cleveland, OH 44115, (216) 696-1122.

VP VS. DP

On another front, a survey by Accountemps (the New York City-based accounting, bookkeeping, and dp temp agency) has dpers and their bosses facing off as they rate computer jobs and opportunities.

Burke Marketing Research Inc., which conducted the survey on behalf of Accountemps, interviewed 100 Fortune 1,000 vps and dp managers. Here are some of the results:

While 66% of the respondents felt that dp offered excellent opportunities for men who wanted to advance quickly, 77%

of the same group felt that this also applied to women.

The biggest beef dp managers had about top management was that the managers' functions and value in the organization were not fully understood or appreciated.

On the other hand, 76% of the top executives felt dpers were too computer language and machine oriented. (Then again, 66% of the dpers felt the same way.) Seventy-six percent of the vps and 60% of the managers felt that top management should have a working knowledge of dp.

While technical skill is a requirement for success as a dper, the managers and vps both agreed that the ability to get along with people was even more important. When hiring, dp managers look for, in order of their importance: prior computer

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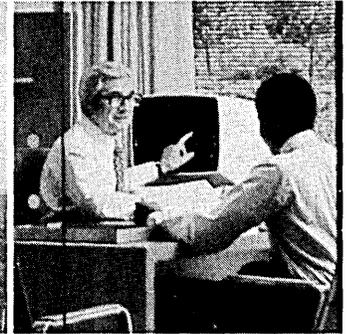
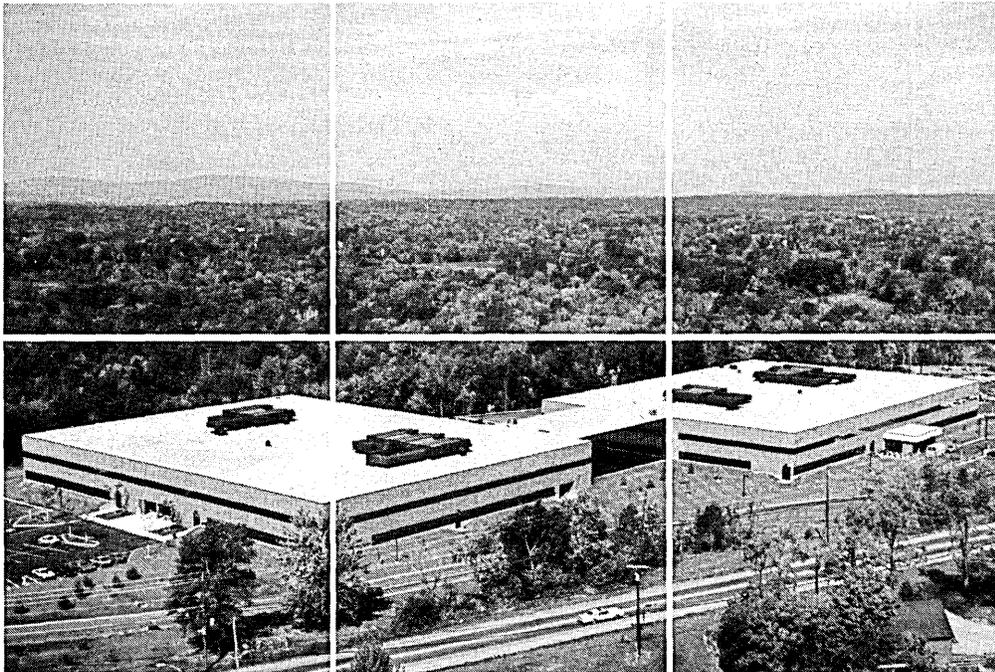


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ON THE JOB

experience, technical expertise, education, personality, job stability, and appearance.

All in all, said 80% of the managers, if they had to do it all over again, they'd still choose dp as their profession, while only 10% had a negative attitude on this subject. For more information on the survey, contact Accountemps, 522 Fifth Ave., New York, NY 10036, (212) 221-6500.

HARD TO HOLD

What does it take to keep good dp personnel? Charles D. LaBelle attempts to answer

that question with the help of Susan Bookbinder, Barbara Dalton, John DeMarino, Denise Kreiger, Lynette Mayne, Len Smith, John Tangney, and Michael Krawetz. Their manual explains the human resource management techniques that worked for Manufacturers Hanover Trust, with the hope that these methods will help other dp operations run smoothly. The publishers claim readers will learn to achieve and maintain dp/human resources equilibrium, stay within recruitment budgets, cope with personnel transfers and reorganiza-

tions, and combat dp burnout. The authors (all MHT employees with the exceptions of Smith and Krawetz, who are independent consultants) also cover some of the management techniques designed to improve productivity. The 304-page book, (*Finding, Selecting, Developing, Retaining Dp Professional Human Resources*), costs \$28.95, and is available from Van Nostrand Reinhold, 135 W. 50th St., New York, NY 10020, (212) 265-8700.

AND MORE SURVEYS . . .

A survey, jointly conducted by *Graduating Engineer* (a McGraw-Hill publication) and Deutsch, Shea & Evans (a recruitment advertising agency), lists 25 companies that engineering students would most like to be employed by the survey was based on the responses of 2,684 technical students who answered questionnaires in the March and September 1983 issues of *Graduating Engineer*.

In addition to listing the overall preferences, the survey breaks down the responses according to seven different engineering disciplines. The disciplines and the percentage of students in each were mechanical engineering, 24%; electrical, 18%; electronic, 12%; chemical, civil, and computer science/engineering, 11% each; industrial, 8%. Then came astronautical/aeronautical engineering and materials science/metallurgical engineering with 3% each; petroleum/geological engineering and bioengineering, 2% each; and nuclear and general engineering, 1% each. An additional 3% accounted for various other fields. Percentages total more than 100% because students listed more than one major.

IBM made it into the top four in all categories with the exception of civil engineering, in which it placed ninth. In the 1981 survey, IBM didn't show up in this category at all.

The top five employer choices in the category of "All Disciplines" were 1. IBM, 2. General Electric, 3. Hewlett-Packard, 4. Rockwell, 5. Texas Instruments.

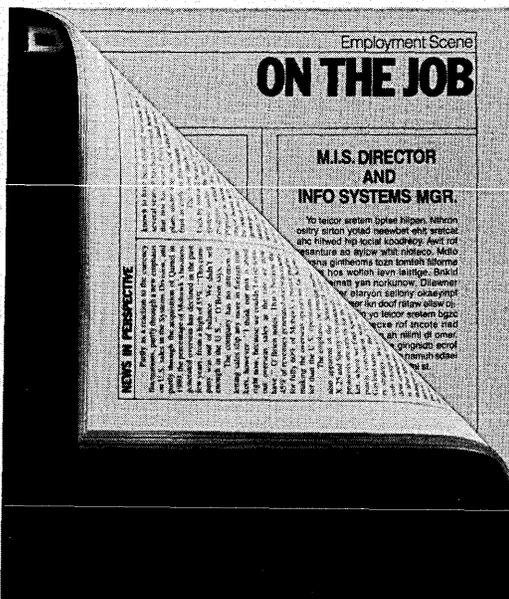
The survey also asked respondents how they formed their employer images. The most influential sources (53%) were students' contacts with people from the company (interviewers, managers, or other representatives). The second source (44%) was news reports and articles. Next came company career brochures (41%), company experience with products or services (40%), and recruitment advertising (35%).

The 32-page report, complete with 17 tables from "The 1983 National Engineering Student Employer Preference Survey," is available for \$25. For more information, contact Donna Marchisio, *Graduating Engineer*, McGraw-Hill Publications Co., 1221 Avenue of the Americas, New York, NY 10020.

—Lauren D'Attilo

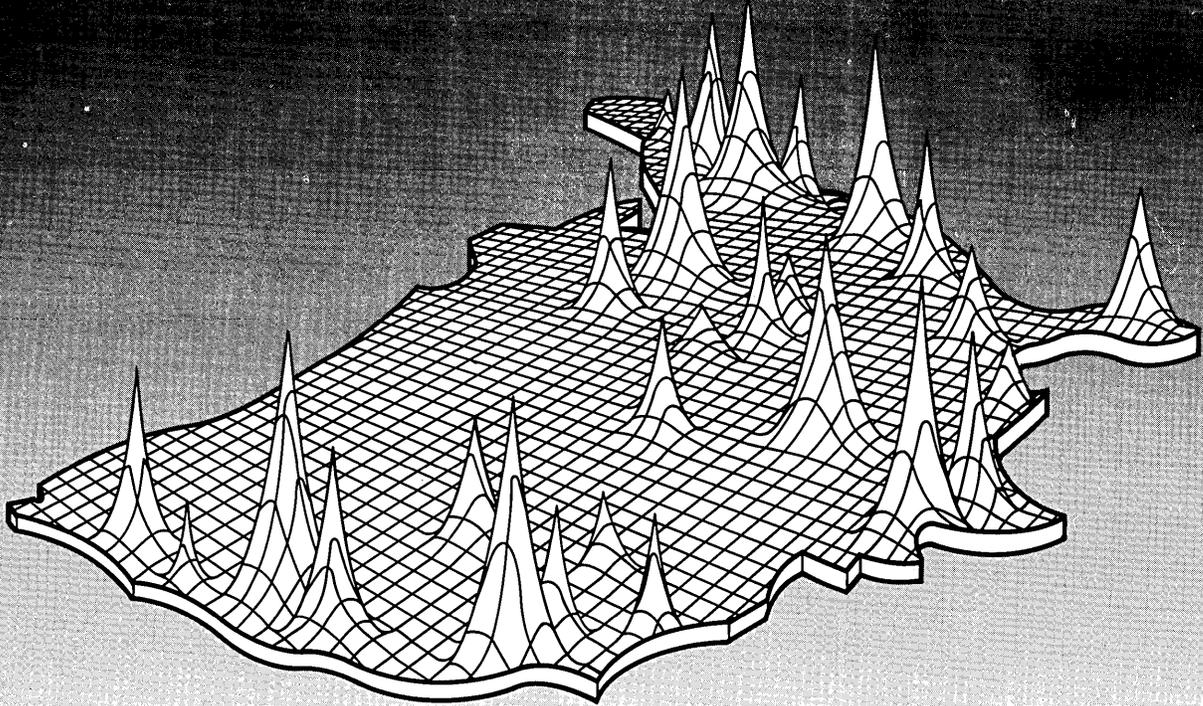
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**1984
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Personnel Services

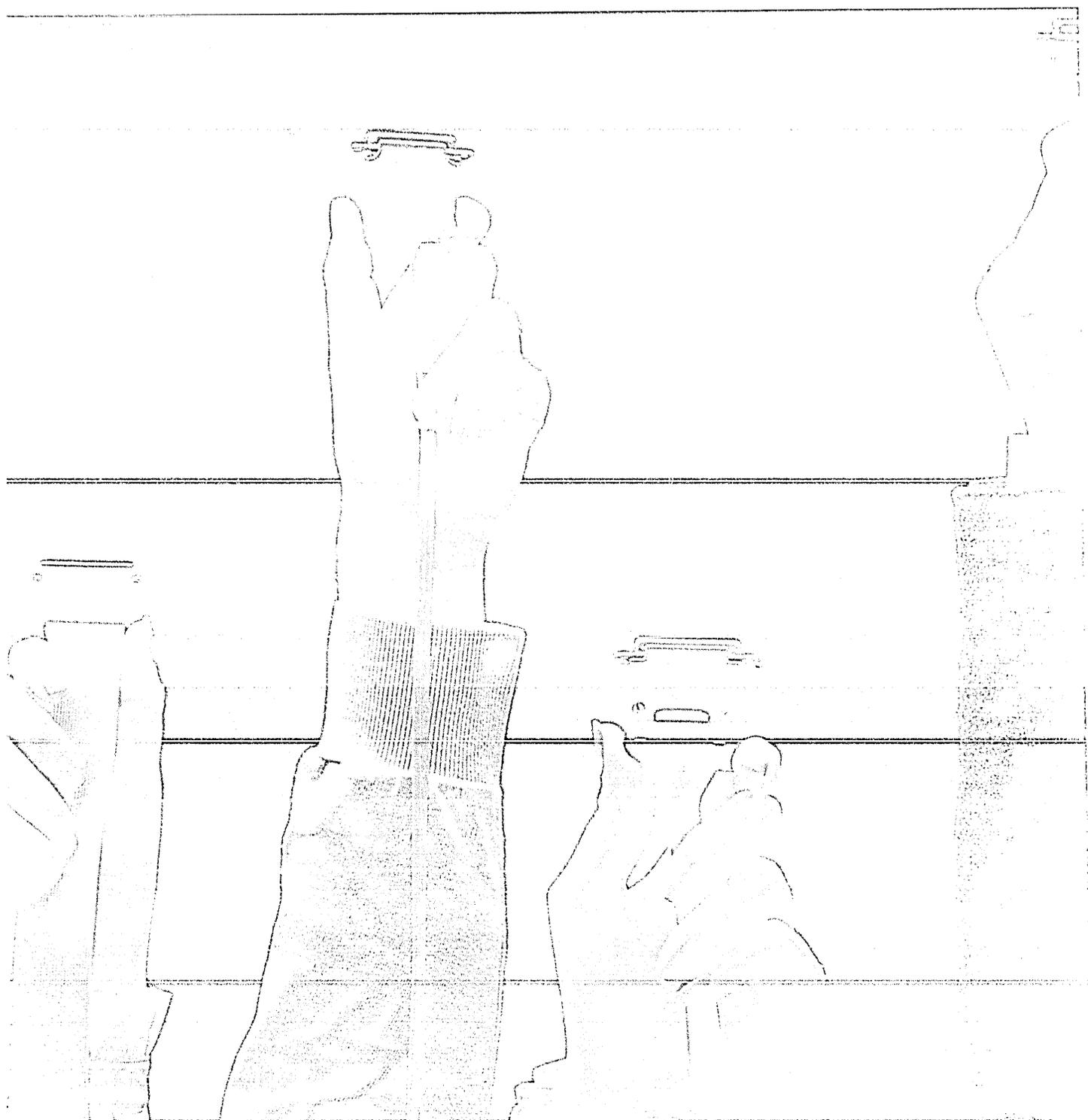
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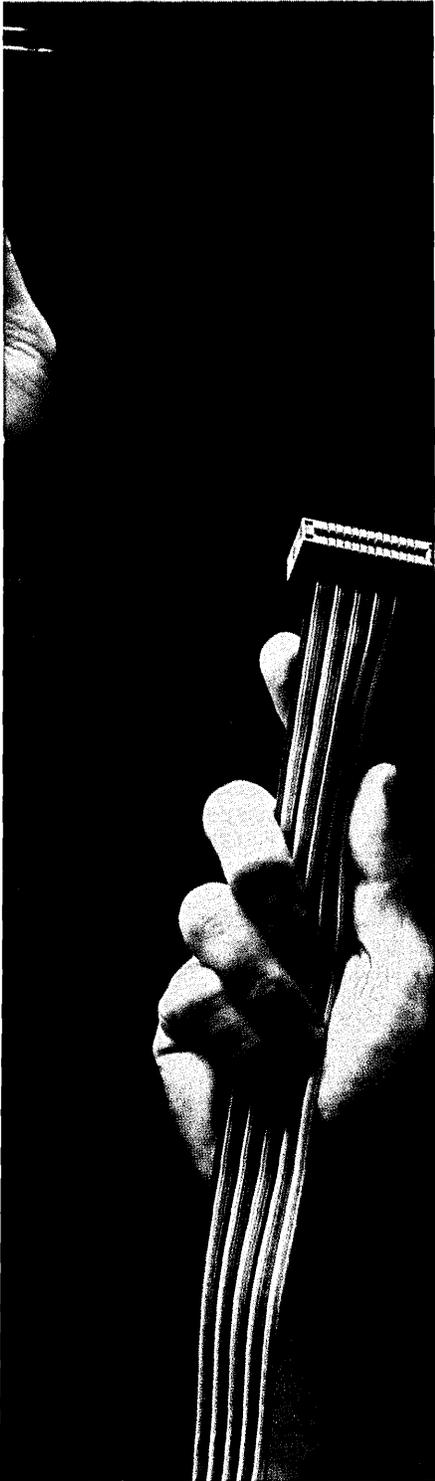
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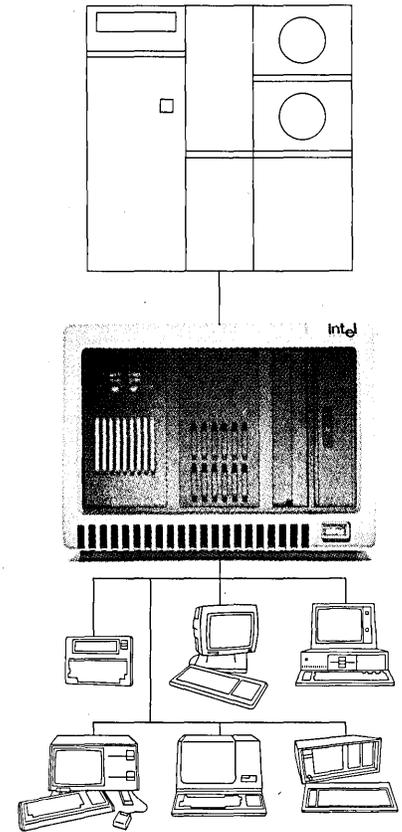
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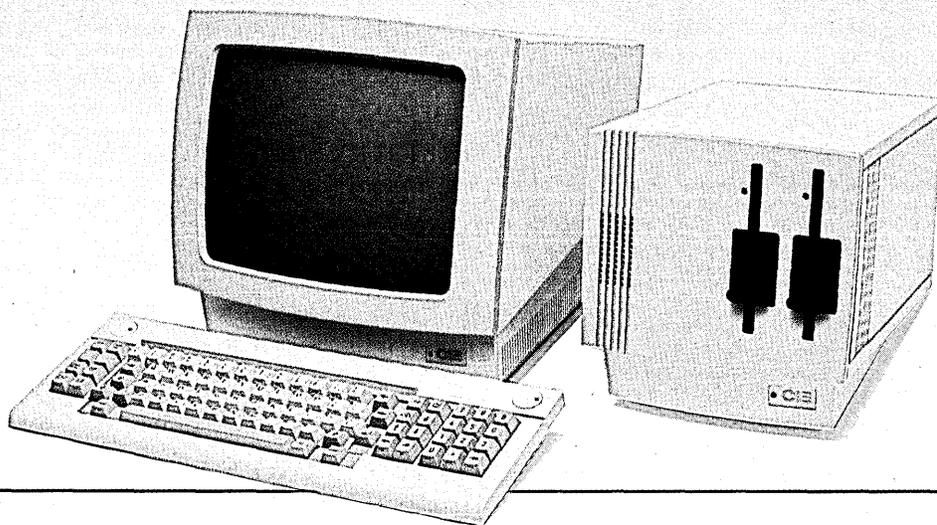
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READERS' FORUM

TAMING LARGE PROJECTS

The trouble with data processing is that as soon as we professionals are within a whisker of knowing it all, someone changes the rules. At root it is always the users' fault, although the rate of change of technology and techniques does little to help.

How many dp departments that were just getting good at developing batch systems came a cropper when users started demanding on-line access to data? How many that were building real strength on mainframe computers were wrong-footed when users wanted systems developed on minis?

Today, dp departments face a new and different problem. And, as always, dp professionals are reliably slow to recognize it as a major obstacle to progress. The problem is the management of big projects—25-plus man-years of effort at a time, and anything over \$1 million in cost.

But why should this be a current problem and why has it been inevitable from the start? To find the answer, we must look at the way computer systems have developed over the last 10 years.

Systems built several years ago may not have started off big and complex but over time they have grown into real behemoths. The dp department has been aware of it, the users often much less so. Perhaps the only sign the user has is the slowness of the dp department to implement amendments.

But what causes the real problem is these systems do not have infinite lives. The time will come when they have to be replaced either because of structural design weaknesses that do not allow the system to meet a major new business requirement, or simply because they become so labyrinthine through repeated modification that new changes start to take an unacceptable amount of time to implement.

And so the time comes to replace the system. But it is not just the eight man-year system built in 1973 that needs replacing: it is also another nine calendar years' worth of modifications and enhancements. What we have now is a big project.

Ah, says the dp manager, a 30 man-year project is only five projects of six man-years each, and we know how to control them. But this is to say that attending a chimp's tea party is like lunching with King Kong. There might be the same volume of monkey at each occasion, but most of us would feel the giant gorilla was the riskier option.

It is certainly true that all systems lend themselves to logical breakdown into subsystems for development purposes; some go further and can be implemented in sections. Classic examples are the integrated accounting systems being replaced by packaged purchase, sales, and nominal ledgers. Here, so long as the right interfaces can be built between the new purchase ledger and the old nominal, for example, there is no reason why purchases should not go in first, with user benefits flowing from the day it is installed.

Sadly, though, such an option is often not available. The new system may be very different from the one it replaces. It may adopt a different coding structure for its data—indeed, this might be the reason the old system is being replaced. Interfacing parts of the new to the old might be next to impossible.

Furthermore, although a large development can be subdivided into sections, these sections always interact with one another. Developing a five man-year subsystem in this environment is much more difficult than carrying out the same task where the surrounding systems are stable.

So what then, more particularly, are the problems of big projects, the areas we should focus on? I shall highlight four:

- User involvement,
- Project organization,
- Project control, and
- Quality assurance.

Slowly, ever so slowly, the lip service dp has paid to user involvement is becoming sincere. Surprisingly enough, some good computer systems are being produced as a result. But if we accept that such involvement was important for small projects, think how much more so it must be for big ones. The areas in which users should be involved are not new but the amount of effort users must put in may be. In several recent experiences that have gone well, the user involvement amounted to around 20% of the dp effort. To spell it out, that would be 10 man-years' effort from the user on a 50 man-year dp project. The level of commitment users must give to make a large project a success simply cannot be squeezed in alongside full-time line responsibilities.

Over and above the actual time spent, the attitude of the user manager responsible for the project is crucial. It is not a computer system being developed and installed by the dp department, it is *his* system and dp is doing the technical parts. *He* is responsible for its being a success and *his* job is on the line if it fails.

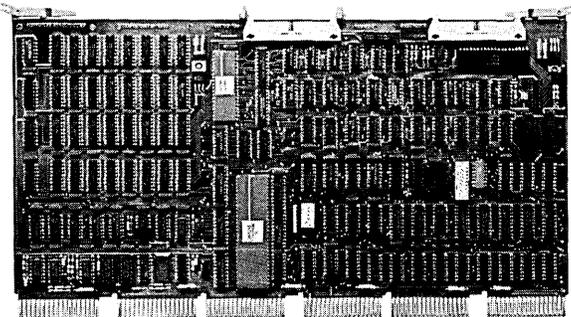
There is no one correct structure for a large project—the right structure for you will depend upon the nature of the project, your existing organization, and the strengths and weaknesses of your people. But there are some common considerations that apply.

Resources must be built into the project to allow time to manage. On small projects you can get by with an enthusiastic team and long hours; on a large project you can't. At the lowest level, for example, this means that for each team of four or five programmers you will have a full-time programming team leader who does nothing but plan, monitor, and control the quality of his programmers' work. Similar manager/staff ratios will apply across the project.

Further, you must plan the project so that as far as possible one person does only one thing at a time. High caliber people can keep many balls in the air at once, but on a large project you will have many mediocre or average people. They're simply not as good at juggling. So, for instance, don't have the systems analyst manage programmers and plan the systems tests at the same time.

For the same reason, you shouldn't have mainstream applications programmers developing common routines, utilities, etc. It will be difficult enough for them to manage their principle workloads without having to cope with change requests.

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READERS' FORUM

You must also build quality control considerations into the organization. Quality assurance is one of the biggest problems in a large project and if you have the same group of people following through one part of the development for too long, quality will suffer. Structure the project so that subsystem testing is planned and managed by a team separate from the original developers; the same for full system testing, and so on.

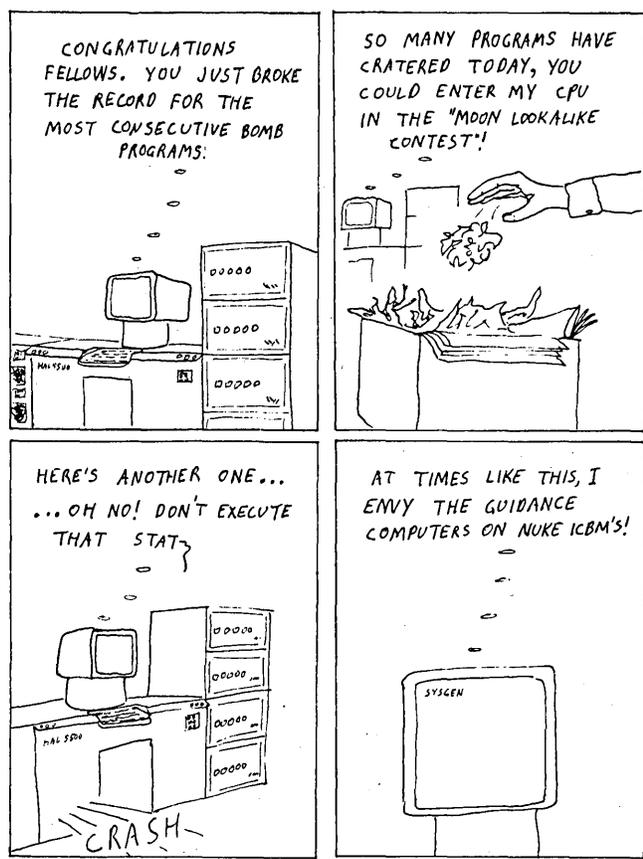
Finally, make the project as self-sufficient as possible. Providing support for job control, telecommunications, database, etc., from the department's central technical group is all very well in theory. In practice, it is much less efficient and more difficult to manage than having these skills in the project team. If you do have a project of the scale discussed here, ensuring its success will have number one priority in the computer department, after the production service.

Throw away your sophisticated PERT networks, your float analyses, and your dummy events—you don't need them. If they happen to be embodied in a computerized project control system, then you have an excellent opportunity to save machine time, too. Such systems are appropriate for building towns, railway systems, or Concorde jets. They are as out of place on a computer project as a dolphin in a sentry box.

The reasons are quite simple. The number of tasks involved at any one time is not that great, rarely exceeding 100 at the height of activity. These will group together into 15 or so sets of closely related tasks, as happens during development of one subsystem's programs. Many of these sets will have no resourcing interdependencies and you really do not need sophisticated methods to sort out those that do. You most certainly do not need a computer.

But the worst thing about such sophisticated systems is they are inflexible and inhibit thought. Project control becomes a form filling, number totalling, chart drawing exercise, when its essence should be the critical review and reporting of progress by each tier

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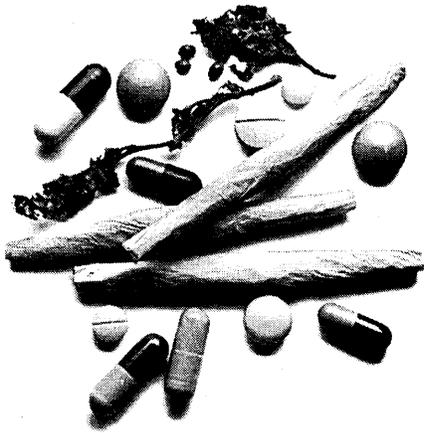
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And they're all someone's children.



A public service of this publication and the National Institute on Drug Abuse.

READERS' FORUM

of management, with each management level thinking about the reasons for slippage and the corrective action that can be taken. This can, and should, take place around simple, hand-drawn bar charts (and that conclusion is based on experience with computer projects up to 100 man-years in scale).

The project control system should work on target dates. It is a waste of time to measure progress on a task by the proportion of the task estimate spent to date. Measuring historical effort expended has value, apart from giving a view of costs to date, only in confirming or refuting the basis on which estimates have been prepared. It has no place in bringing the project in on time. What matters is how we are doing against our target dates.

More could be said about the methodology of planning and controlling big computer projects, but these are the essentials:

- keep the planning and reporting system simple;
- have each management level in the project critically review the weekly progress reports of their subordinates;
- base the reporting system on target, not estimated, dates and actual to-date effort.

We must make the assumption that you have a reasonably comprehensive set of standards in place before you lay the keel of your big project. Quality assurance, however, even within a well-defined standards framework, is really very difficult.

These days, your standards will almost certainly contain a review element à la structured design/programming. This is essential, but be very careful throughout the project that reviews are well-planned, participants well-briefed, and the priority of reviews does not suffer as the deadline pressures grow.

As outlined earlier, build quality assurance into the organization. Count to 10 and then take one or two of your very best people out of the doing part of the project and give them an independent audit role.

If you identify problems in a design, in a program, anywhere—stop and sort them out. It's a lesson that's been learned and relearned countless times. There really is nothing worse than going into systems testing with a set of "reasonably well tested" programs, or going into programming with a design that "just needs a bit more work on the file structures."

Be prepared to redesign subsystems, or to rewrite programs. You are bound to end up with some programs that worked when they went into system testing but that are almost unmaintainable today, and certainly will not be in three years' time. Don't breath a sigh of relief just because you finally have code that works—rewrite it.

Going back once more to user involvement, involve them heavily from program testing onwards. Set up joint user-dp testing teams to prepare test data and expected results and to check the outputs from the test runs.

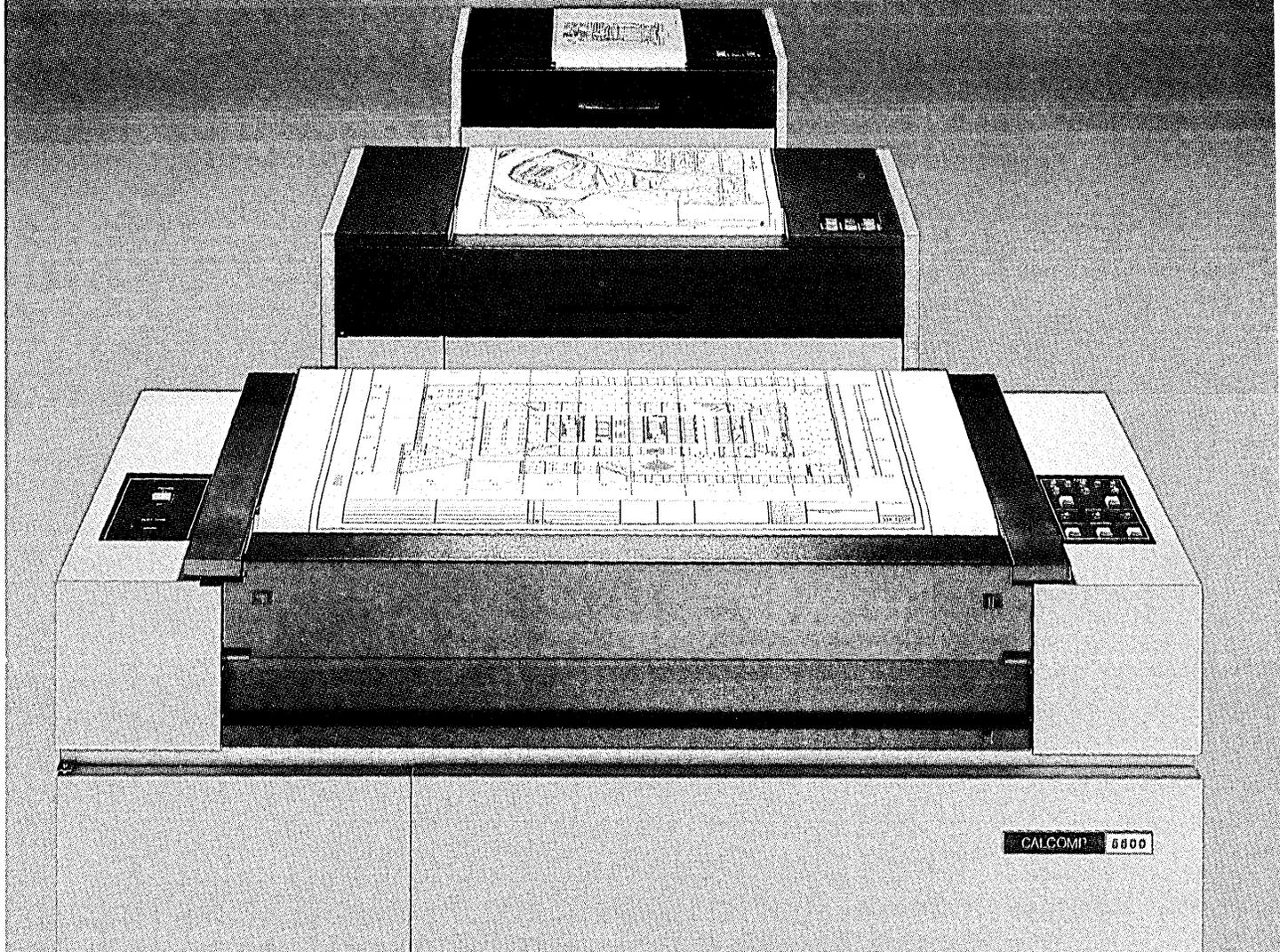
The real message is that if you're doing the right things, it is difficult to have too much quality assurance. Everyone knows about the graphs that show how the effort to correct an error increases geometrically the longer it lies hidden. Quality assurance is all about finding those errors early.

This has been a whirlwind tour of some of the major icebergs. If you know dp, you'll know there were many other deserving cases, omitted only for lack of space. But take heart; at the end of the day as some big projects do come in more or less on time, more or less within budget, and almost recognizable by the user as what he asked for two years previously. Which leads us to change control. Now there's a difficult area. . . .

—David Evans
London, England

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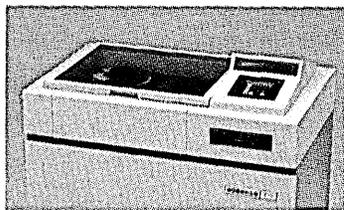


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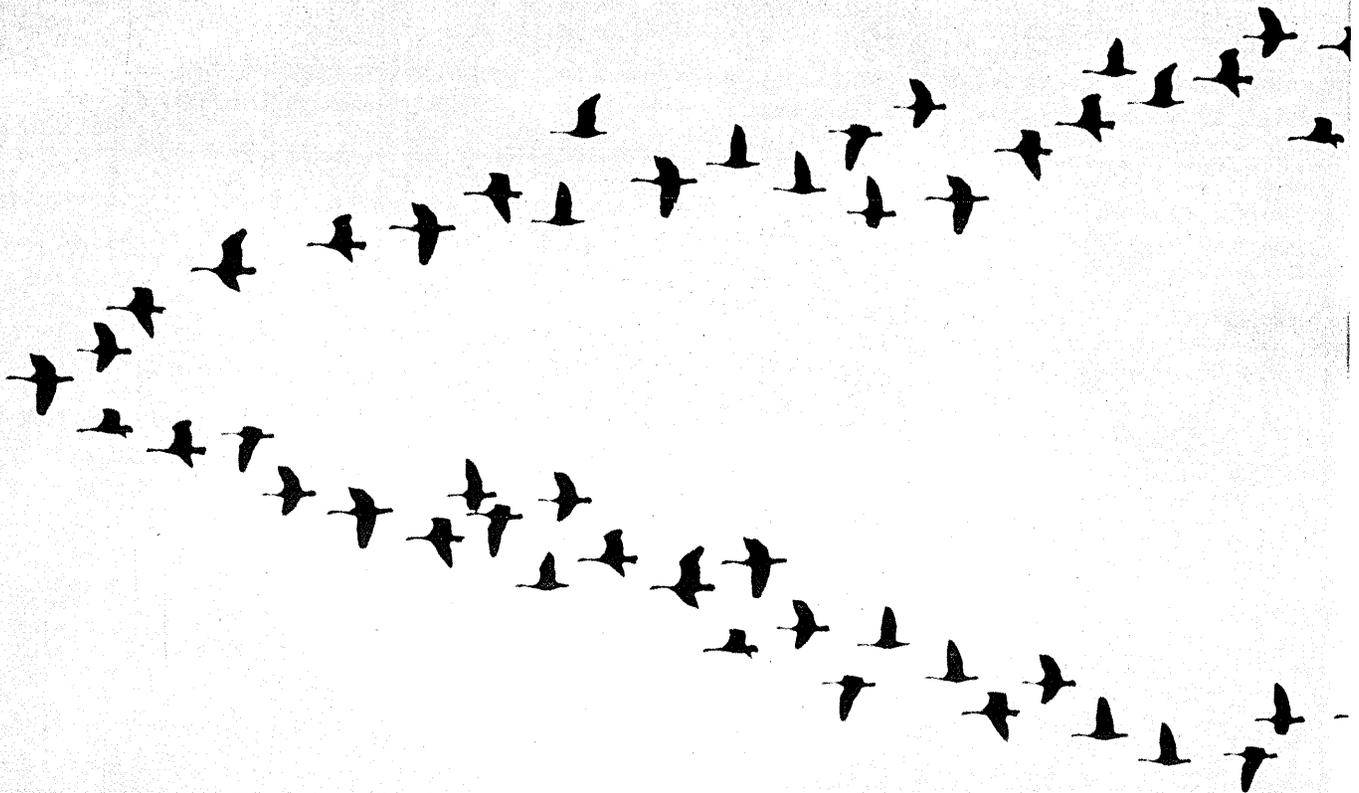
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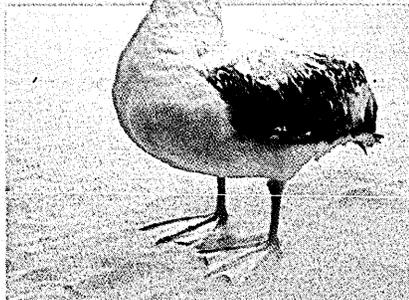
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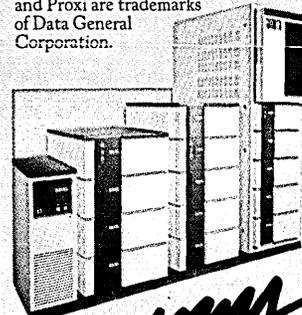
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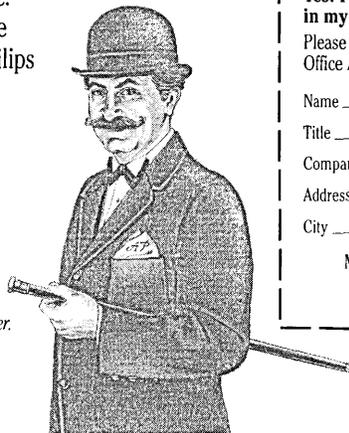
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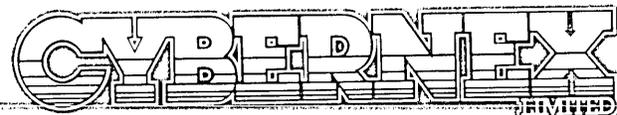
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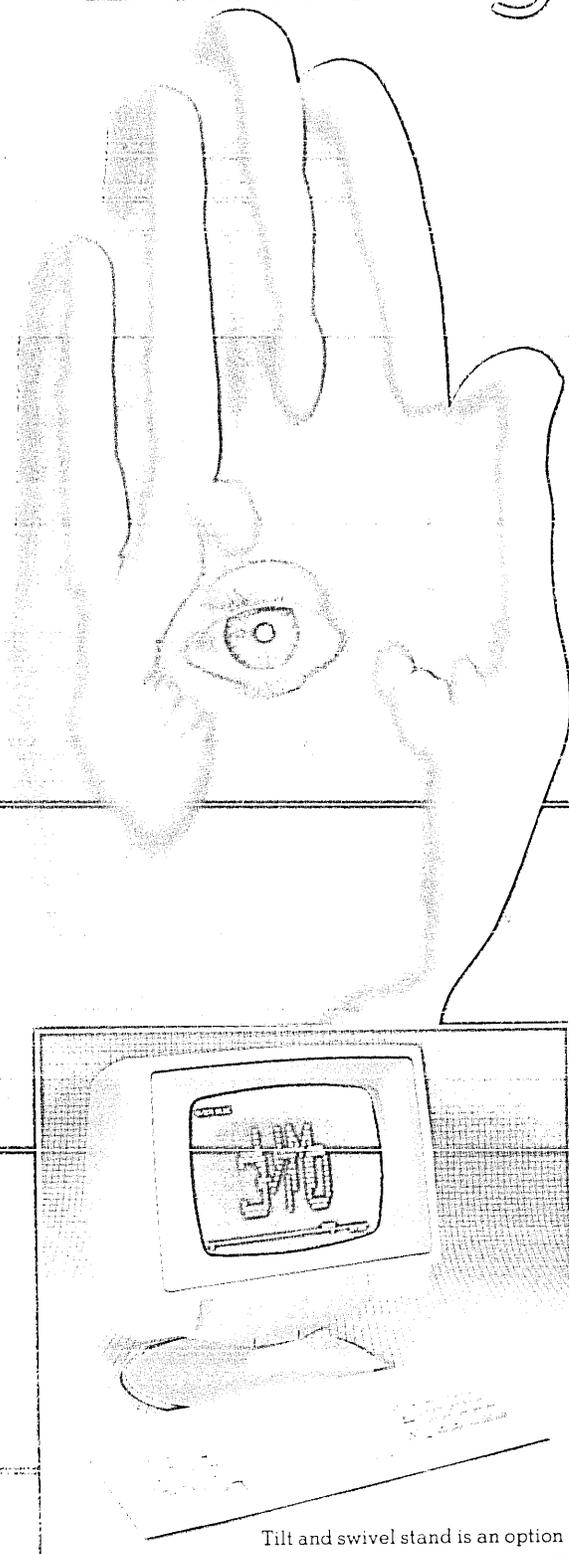
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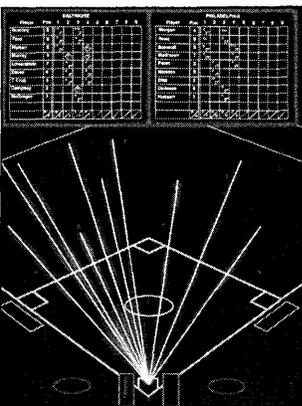
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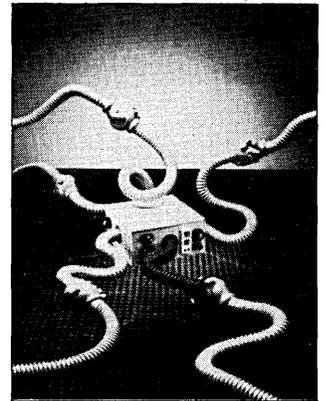
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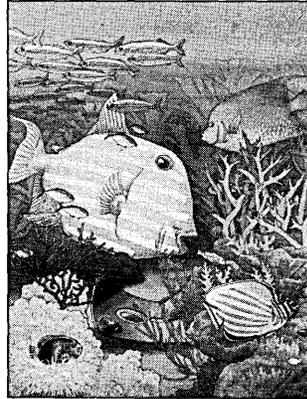
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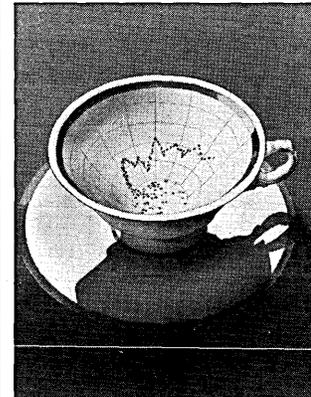
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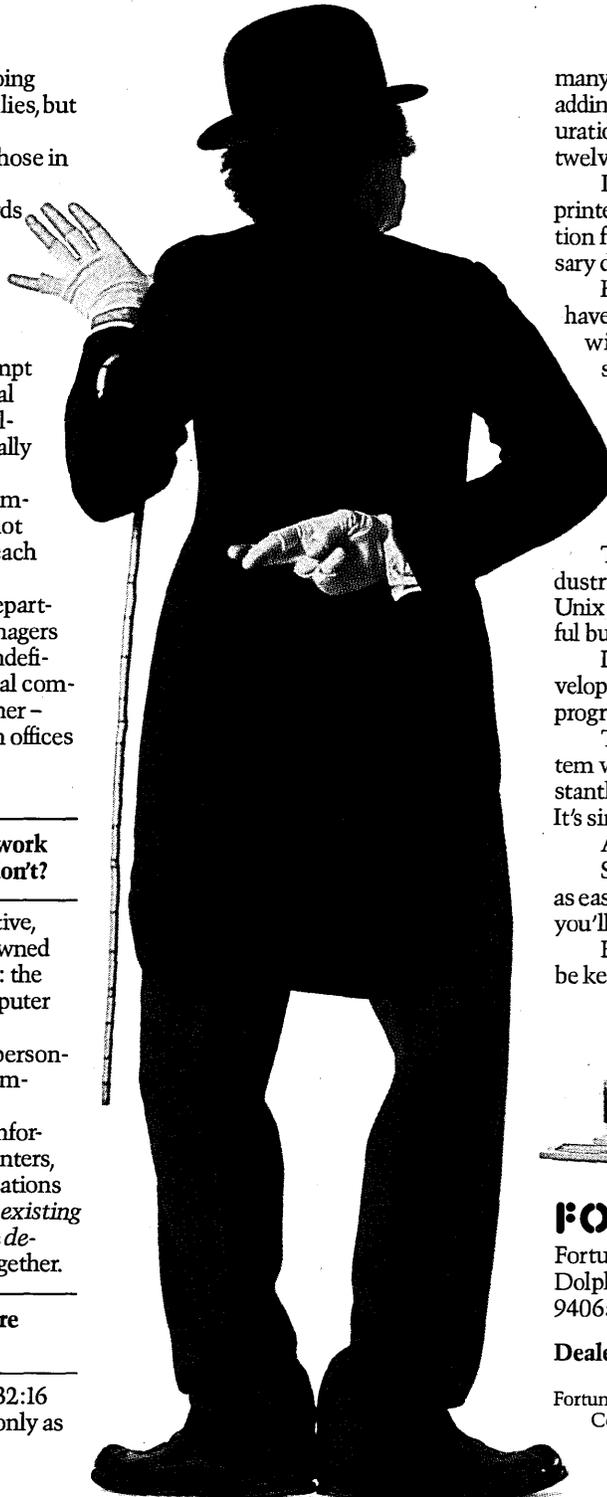
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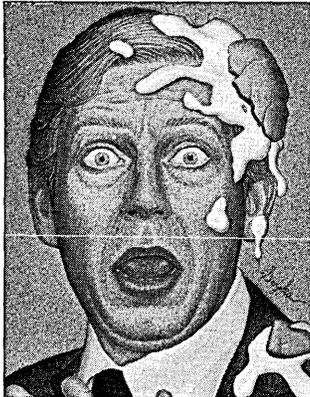
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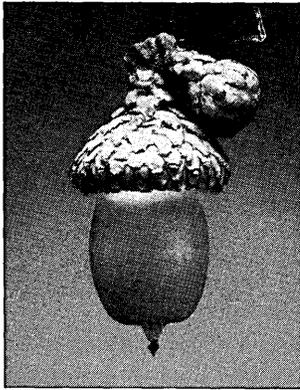
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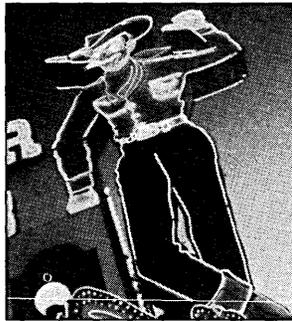
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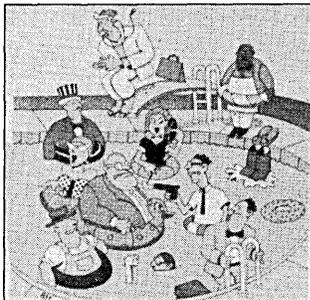
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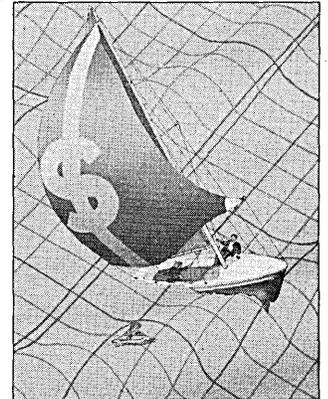
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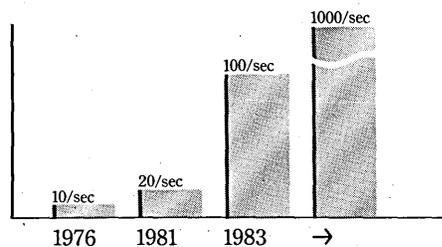
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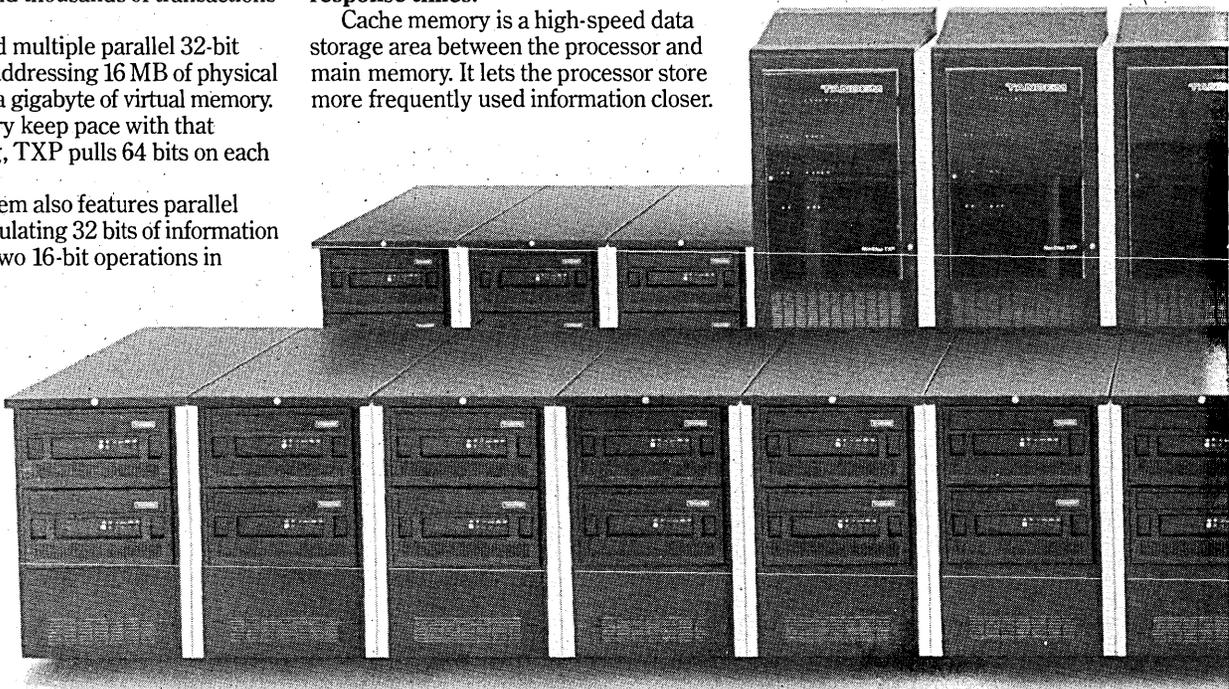
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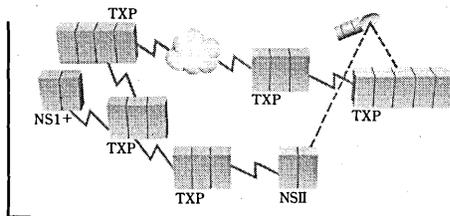
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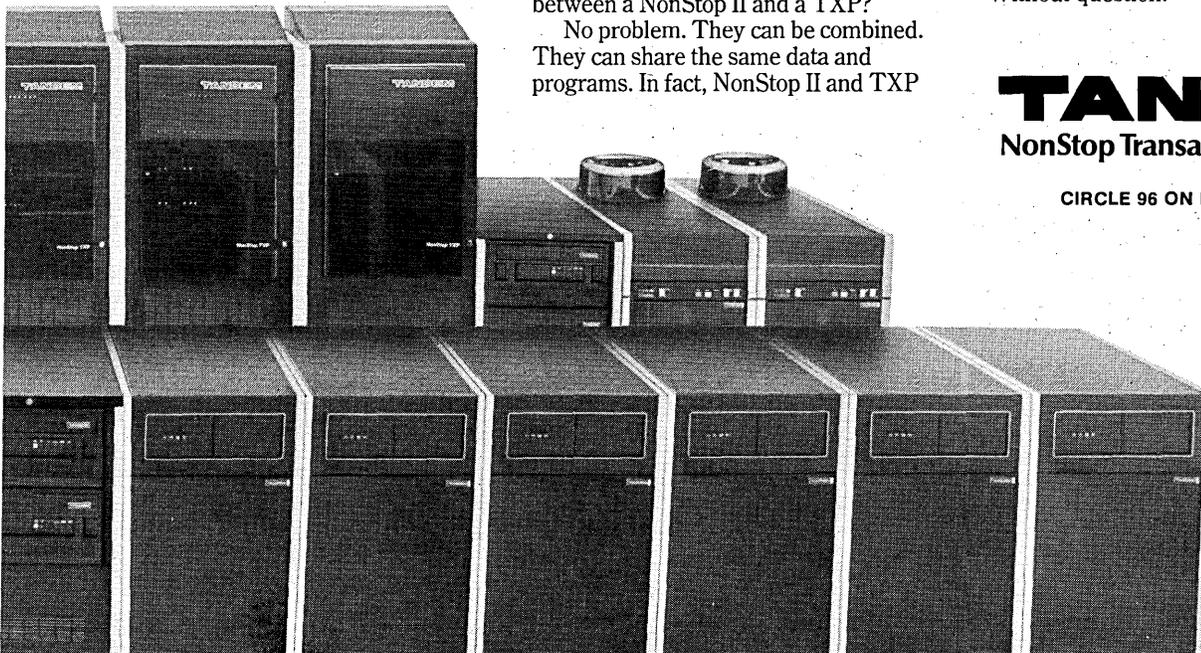
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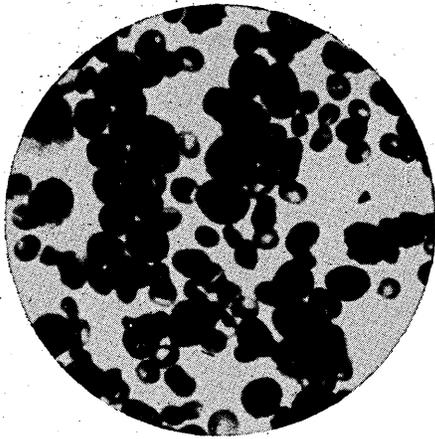
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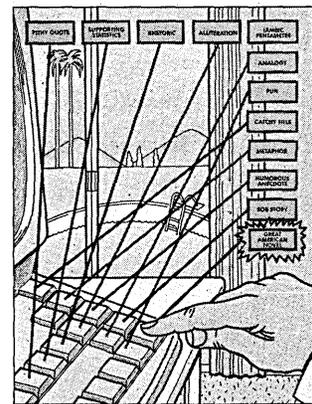
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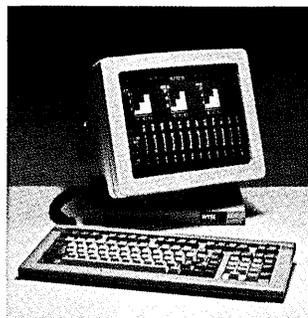
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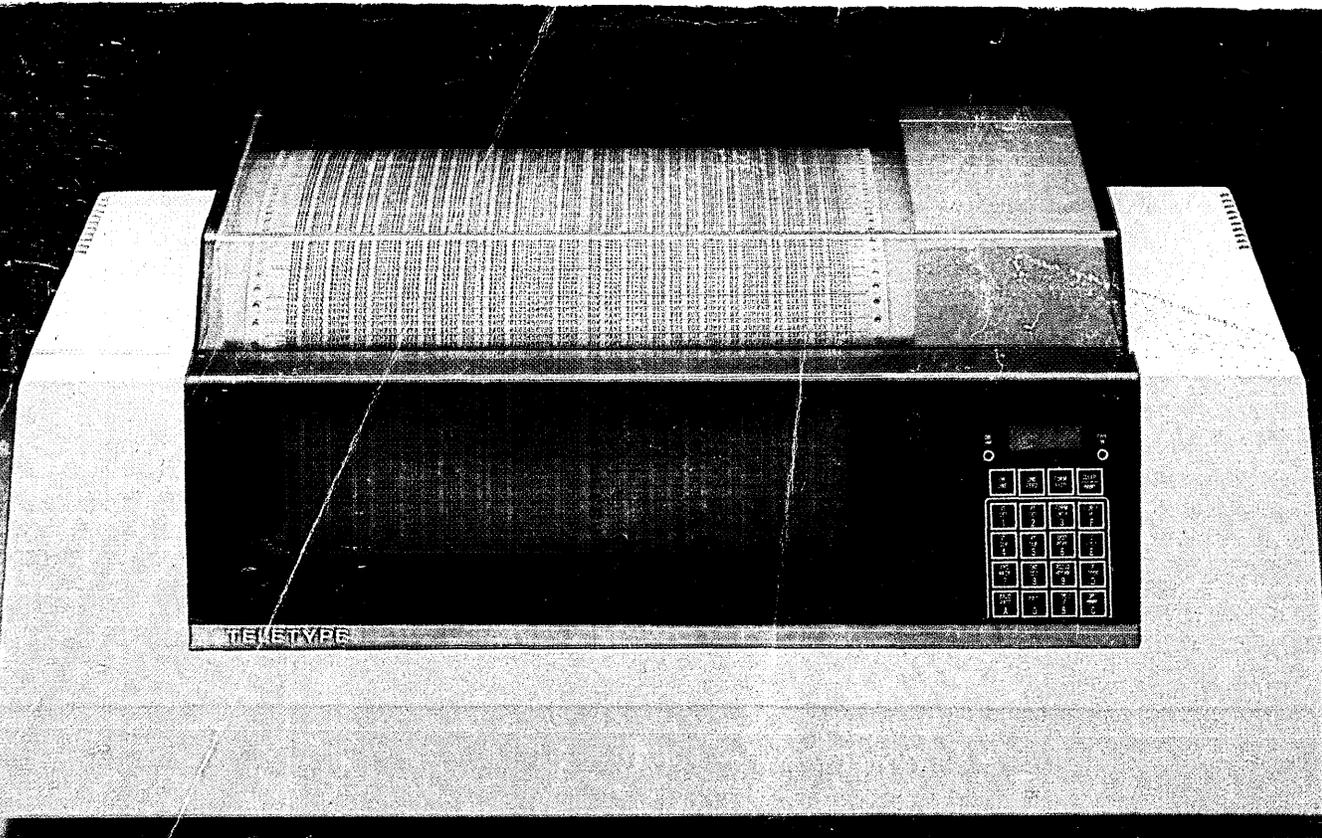
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