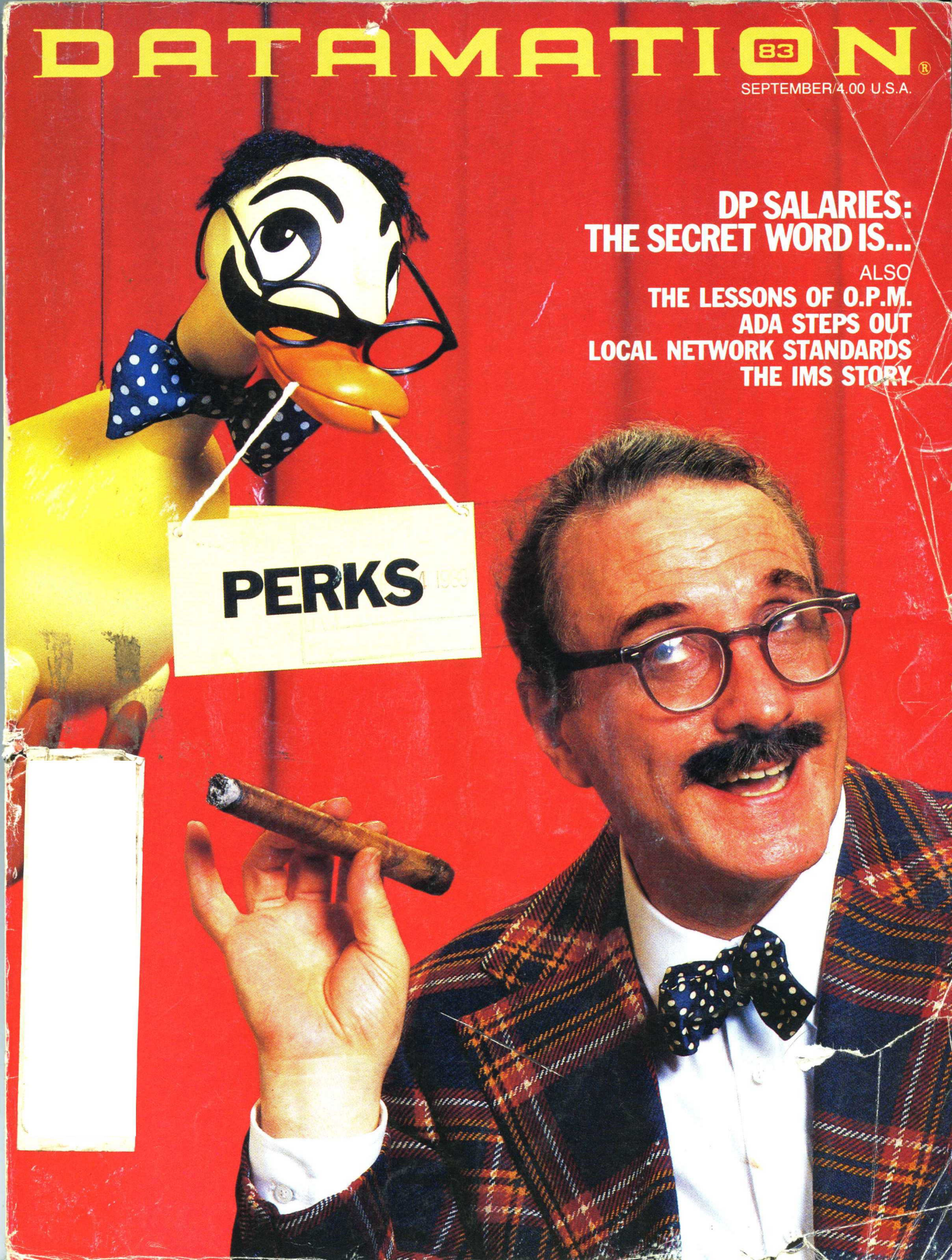
DATAMATION 83®
SEPTEMBER/4.00 U.S.A.

DP SALARIES: THE SECRET WORD IS...

ALSO

THE LESSONS OF O.P.M.
ADA STEPS OUT
LOCAL NETWORK STANDARDS
THE IMS STORY



Model 6455 Cartridge Tape System

Loaded with Features — Loaded with Benefits.

Kennedy products have always provided innovative new features. And these features have always provided significant benefits and convenience for the user. For instance, our Model 6455 offers these features and benefits:

Feature: Start/Stop Operation

Benefit: Drive can emulate a ½" tape drive, providing the ability to perform selective file restore, file restructuring, journaling and software updates.
The drive is effectively a ½" tape drive in a smaller package.

Feature: Hard Read Error Spec of [illegible]

Benefit: Best data reliability of any [illegible]. Gives the user confidence in the backup medium.

Feature: Onboard Diagnostics

Benefit: Drive can be tested without [illegible]. Equipment requirements [illegible]. Minimizes

Feature: Cartridge Jam Protection

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

Feature: [illegible] High Density Recording

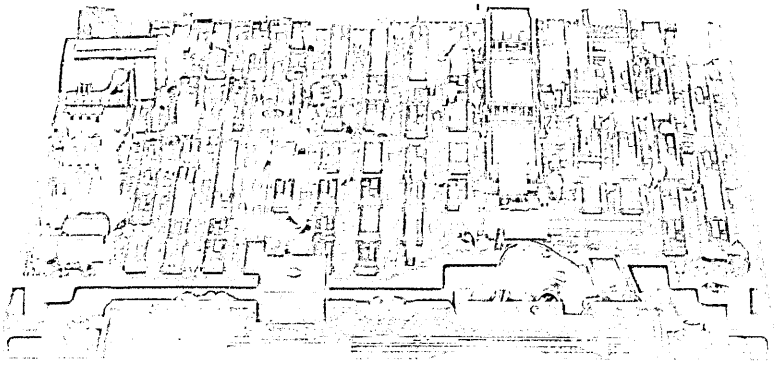
Benefit: Storage capacity of 28 MB on a single cartridge.

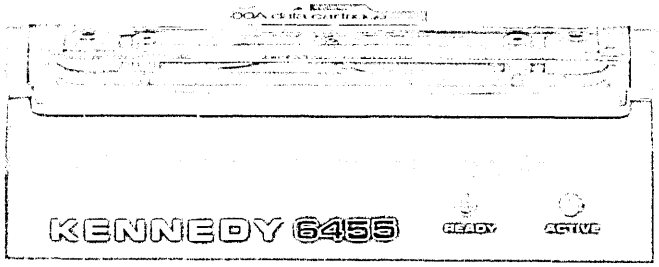
Feature: [illegible] Industry standard ½" tape interface.

Benefit: Operates with existing tape couplers and software. The drive operates as though it were a ½" tape drive without having to modify existing [illegible] software.

[illegible] drive at Model 6455 [illegible] benefits for you. For the [illegible]

KENNEDY
[illegible] Company
[illegible] CA 91016
[illegible] KENNEDY
[illegible]





KE [illegible] NT

You can have a local data network running this afternoon!

In fact, you already have most of it installed.

Whether you're adding only a few more terminals or personal computers, or implementing a more efficient minicomputer access method for hundreds of terminals at a time, you probably don't even have to pull new cables, much less install a complicated new network.

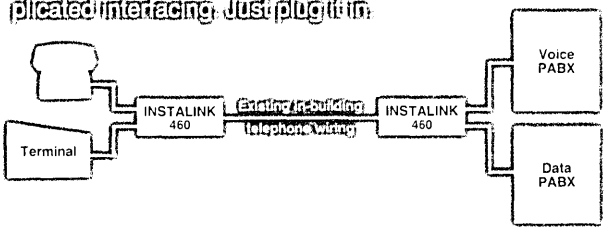
Your in-plant telephone network is already wired into almost every office and potential terminal site in your building. And fortunately for your data communications needs, its wires can carry voice conversations and data *at the same time*—with a little help.

All you really need is a way to connect a terminal and the telephone to the same set of wires, and that's where MICOM's INSTALINK Voice/Data Multiplexor comes in.

A component of MICOM's INSTANET™ Local Network—the "instant" remedy to local area communications headaches—INSTALINK plugs into your existing telephone jack and allows you to use your terminal and your phone independently—without interference of any kind.

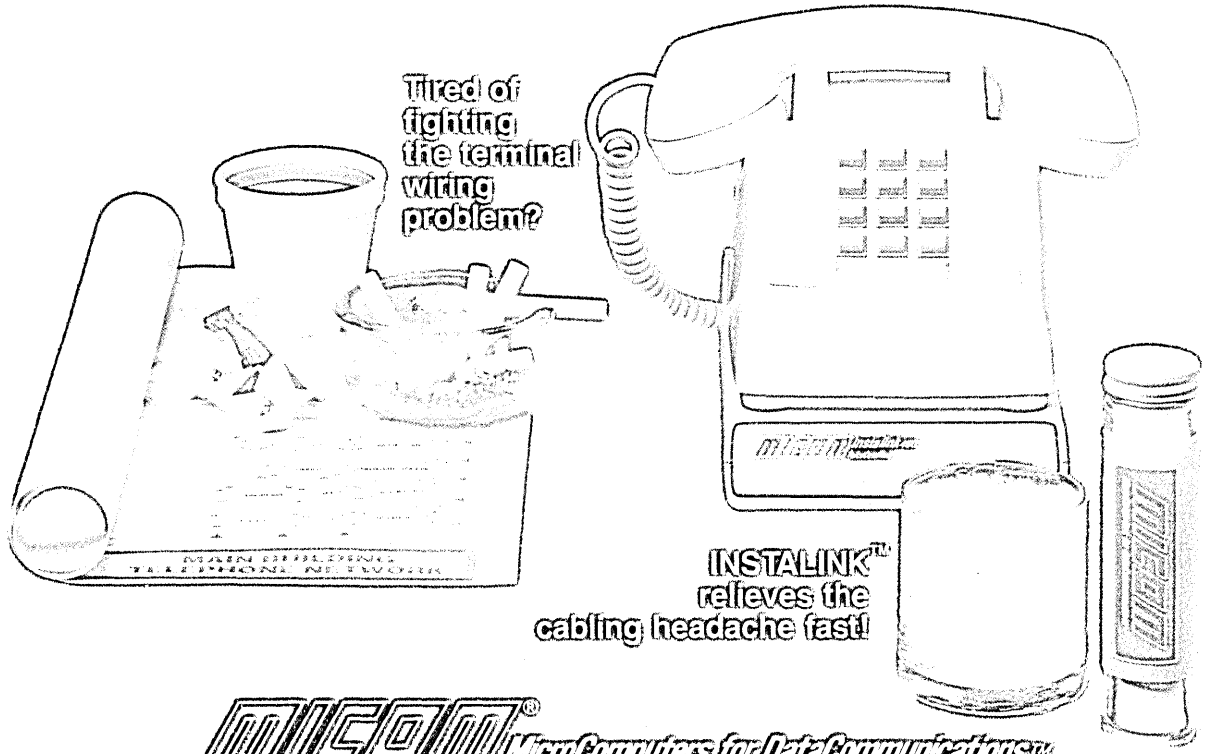
It supports asynchronous transmissions of up to 19,200 bps, full-duplex, for over a mile—plenty for almost any local networking application.

And it provides something else that many other in-house networks don't or can't complete portability. A terminal can be moved to a new site and connected to any telephone line already in place. No rerouting of cables. No complicated interfacing. Just plug it in.



Best of all, INSTALINK provides all this without requiring any long-term commitment, without major investment, without disrupting normal business operations, and without fuss—*"instantly."*

Call or send for a brochure which explains how.



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CIRCLE 4 ON READER CARD

Candle's Performance Seminars
MVS IMS CICS

Candle Corporation, developer of OMEGAMON®, announces a series of comprehensive two-day technical seminars on performance analysis and tuning for MVS, IMS, and CICS. These in-depth presentations are designed for intermediate or advanced level systems programmers and technically oriented managers. Sessions cover both introductory concepts as well as more detailed analysis of typical performance problems.

San Francisco	Oct. 13-14	**New York City**	Oct. 20-21	**Los Angeles**	Nov. 7-8
New York City	Oct. 17-18	**Dallas**	Nov. 3-4	**Chicago**	Nov. 14-15

Day 1

8:00 – 9:00 A.M. Registration
9:00 – 10:30 A.M.

G01: GENERAL SESSION
- Introduction to Performance Tuning Methodologies for MVS, IMS, and CICS Using Candle's Products
- Degradation Analysis
- Future Directions in Performance Analysis and Tuning

11:00 – 12:15 P.M.

G02: IBM's Directions for the Large System Environment
- IBM's Directions and their Impact on Users
- Effects on Performance Analysis and Tuning
- The Evolution of MVS, VM, IMS, and CICS
- Extended Architecture and Beyond

MVS
1:30-4:45 P.M.

M01: SRM ANALYSIS AND TUNING
- SRM Functions
- Adjusting SRM Parameters
- Monitoring the SRM Using RMF, OMEGAMON, DEXAN,™ and EPILOG™
- MVS/XA Considerations

IMS
1:30-4:45 P.M.

I01: IMS COMMUNICATIONS
- General Communications Flow
- IMS Communications Pools
- Communications Queueing Considerations

CICS
1:30-4:45 P.M.

C01: CICS INTERNALS
- CICS Task Control Internals and Performance
- CICS Transaction Flow
- CICS Task Dispatcher Internals and Performance

Day 2

9:00-12:15 P.M.

M02: I/O CONFIGURATION ANALYSIS AND TUNING
- Detailed Analysis of How MVS Performs I/Os
- Optimizing I/O Configurations for Performance
- Shared DASD Considerations
- Differences in MVS/XA

1:30-4:45 P.M.

M03: PAGING/SWAPPING
- ASM Algorithms
- How to Configure the I/O Subsystem for Paging/Swapping
- How to Measure the Impact of Paging/Swapping
- MVS/XA Considerations

9:00-12:15 P.M.

I02: IMS SCHEDULING
- General Scheduling Flow
- Scheduling Options
- Scheduling Pools

1:30-4:45 P.M.

I03: IMS APPLICATION EXECUTION
- Introduction to Execution Phases
- Application Phases
- Database I/O
- Data Communications Activity
- SYNC-POINT
- Database Pools Tuning
- Futures

9:00-12:15 P.M.

C02: CICS PERFORMANCE TIPS AND HINTS
- Establishing Performance Objectives
- A Practical Approach to CICS Performance
- Performance Methodology and Detailed Solutions
- Operating Systems

1:30-4:45 P.M.

C03: CICS VSAM PERFORMANCE AND CICS STORAGE ANALYSIS
- File Control Functions
- VSAM Performance and its Effects on CICS
- CICS Storage Control

The cost for the two-day seminars, including all reference materials and lunches, is $340 per person. Early registration is recommended as attendance will be limited. For further details and registration, call Candle's Educational Services Department.

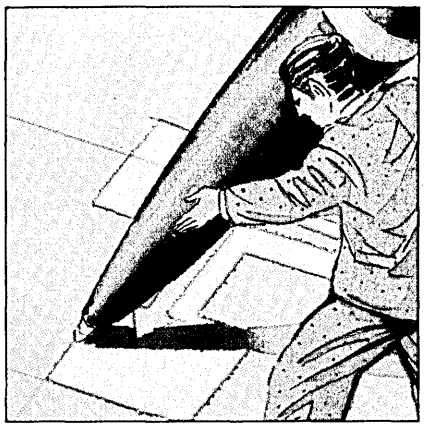
!Candle® 10880 Wilshire Boulevard, Suite 2404, Los Angeles, California 90024 (213) 207-1400

CIRCLE 5 ON READER CARD

DATAMATION®

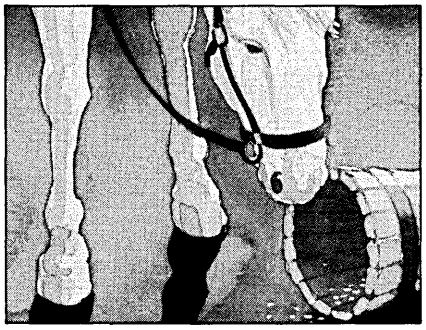
SEPTEMBER 1983/$4.00 U.S.A.
VOLUME 29 NUMBER 9
This issue, 163,647 copies

FEATURES



NEWS IN PERSPECTIVE

DEPARTMENTS



OEM SUPPLEMENT 192-1

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CIRCULATION
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Technical Publishing

BPA Circulation audited by Business Publications Audit

ABP Member American Business Press, Inc.

DATAMATION (ISSN 0011-6963) Magazine is issued monthly on or about the first day of every month. 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 $42, Canada $60, Japan, Australia, New Zealand $100, Europe $90 air freight, $190 air mail. All other countries $90 surface, $190 air mail. Reduced rate for qualified U.S. students, public and school libraries $30. Single copy $4 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. 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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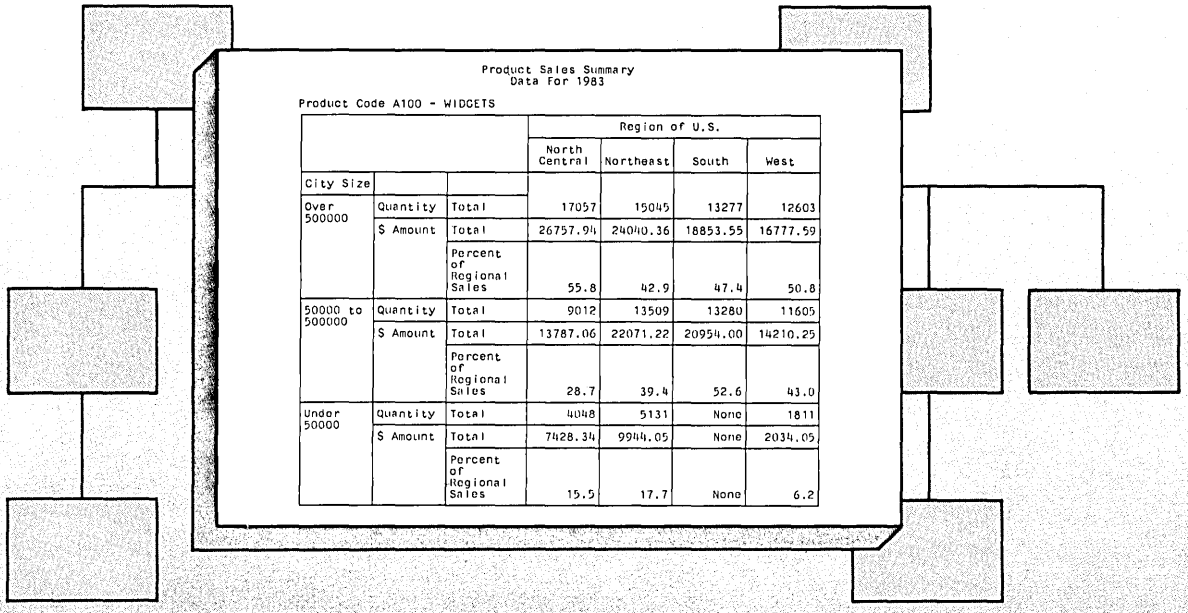
IMS-DL/I programmers
SAS users

SAS/IMS-DL/I saves you time



Product Sales Summary
Data For 1983

Product Code A100 - WIDGETS

			Region of U.S.			
			North Central	Northeast	South	West
City Size						
Over 500000	Quantity	Total	17057	15045	13277	12603
	$ Amount	Total	26757.94	24040.36	18853.55	16777.59
		Percent of Regional Sales	55.8	42.9	47.4	50.8
50000 to 500000	Quantity	Total	9012	13509	13280	11605
	$ Amount	Total	13787.06	22071.22	20954.00	14210.25
		Percent of Regional Sales	28.7	39.4	52.6	43.0
Under 50000	Quantity	Total	4048	5131	None	1811
	$ Amount	Total	7428.34	9944.05	None	2034.05
		Percent of Regional Sales	15.5	17.7	None	6.2

Replace your lengthy COBOL, PL/I or assembler programs with SAS/IMS-DL/I,™ a high-level programming language for accessing and maintaining DL/I data bases.

Data base administrators: With SAS/IMS-DL/I you can test many structures as you design or modify data bases. Use SAS/IMS-DL/I to build test data bases, convert data bases from one structure to another, rearrange fields within segments, verify DL/I call sequences in program specifications and correct data in existing data bases.

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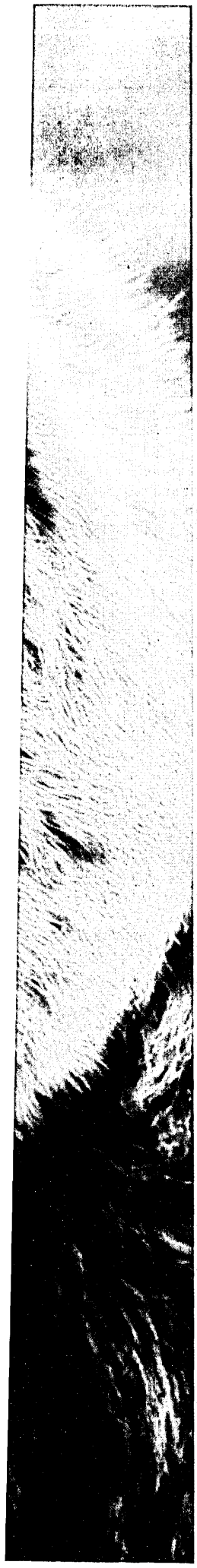
SAS® saves time



Alaska.
A Natural place for a Network.

NET-WORK
Distributed Data Processing System

Alaska has always been famous for its natural environment.

Now it has a Natural Network as well.

The combination of Software AG's NATURAL, NET-WORK, and ADABAS has given Alaska's statewide MIS Department the tools it needs to keep information flowing throughout the biggest state in the U.S.

NATURAL is Software AG's fourth–generation online application development system—a tool that provides the productivity needed in a place where people are the most priceless resource of all. One NATURAL programmer can typically do the work of 10 to 20 COBOL programmers.

NET-WORK is the distributed processing software that allows Alaska's officials to manipulate data from multiple systems hundreds of miles apart—without having to worry about which location has what data.

And ADABAS is the data base management system that lets it all happen in a convenient, friendly, and relational way.

No wonder Software AG's products are such a Natural for the state of Alaska.

Which leaves us with just one question:

What's the state of *your* system?

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SOFTWARE AG
OF NORTH AMERICA, INC
Powerful Software Solutions

CIRCLE 7 ON READER CARD

Twenty Years Ago/Ten Years Ago

LOOKING BACK

CODE BLUE

September 1963: After its final effort to scuttle ASCII, IBM completely about-faced, and, in a special issue of *The Data Processor*, its magazine for customer management, the company said, "We as a corporation are determined to move ahead with ASCII at the most rapid pace possible so that our customers can gain the benefits of standardization across the industry."

The article also pointed out that ASCII could ultimately make intercommunications and interchangeability between all manufacturers' equipment a reality.

Supposedly, IBM was pushing for the implied collating sequence of ASCII, calling for letters higher than digits, the direct opposite of the IBM code. This would mean a $15 million to $30 million tab for the reconversion of existing IBM customer files, and that new IBM gear would undoubtedly incorporate the new code.

SHARE AND SHARE ALIKE

While it was still pretty much of a blue sky idea, timesharing was getting a lot of attention and a lot of funding through a handful of universities and research organizations.

The best-known of the studies was MIT's Project MAC (Machine-Aided Cognition/Multiple-Access Computer), which was an 18-month study funded by the Office of Naval Research on behalf of DoD's ARPA (Advanced Research Projects Agency). The initial segment of the study involved some 60 people and was scheduled to swing into high gear with the installation of a 7090 that would have 20 to 25 remote inquiry stations initially, and 100 at the final count. ARPA was also sponsoring timesharing work through its Behavioral Sciences and Info Processing group—headed by J.C.R. Licklider—under the direction of Jules Schwartz at SDC, where a PDP-1 had recently been joined with a Q-32. Licklider's two-man operation said there was no way of telling the value of its current timesharing research, but a list of contracts from the office noted the following grants: SDC, $4,352,000; University of California, $797,000; UCLA, $675,000; Stanford, $420,000; SRI, $195,000; Carnegie Tech (for limited research), $397,000. Excluding MAC, Licklider's computer research contracts added up to $6,836,000.

SECURE IN THEIR JUDGMENT

September 1973: In early 1972, then-Secretary of Health, Education, and Welfare Elliot Richardson created a special advisory committee to analyze the consequences resulting from the abuse of automated personal data systems. The group was to recommend strategies to protect individuals against abuse and afford them redress for any harm.

Willis Ware, then a senior computer scientist on the corporate research staff of the Rand Corp., studied the results of the committee's work and commented on selected segments of its report.

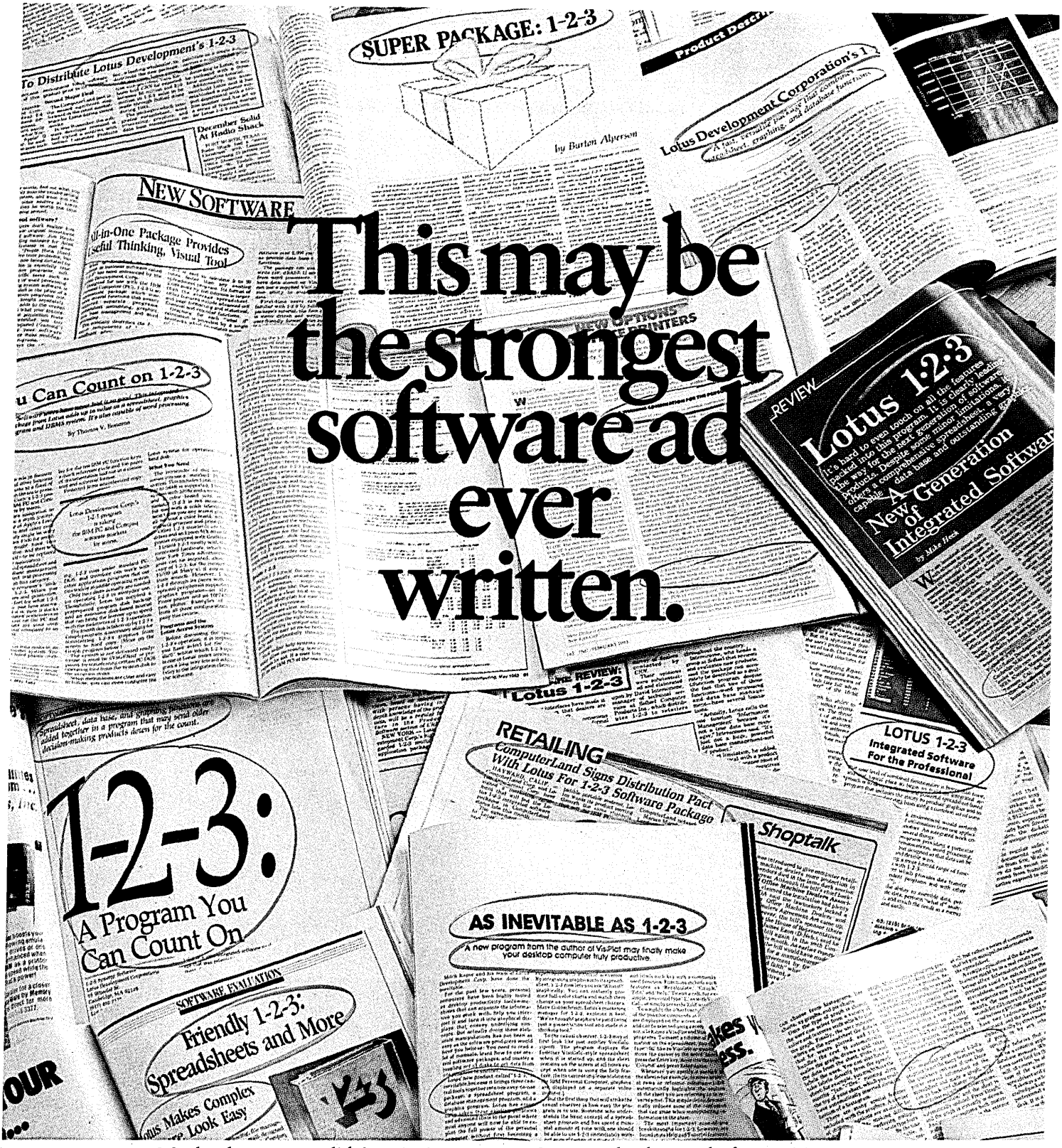
Ware said the study's main concerns were the record-keeping practices of government and private agencies in dealing with the public's personal information. While at that time all such records were not maintained by computer, those that were became of special interest because so much information was concentrated in computer files at one location. The availability of such files through remote access terminals magnified the opportunities for misuse of personal information.

A number of recommendations were made with regard to the use of Social Security numbers that would restrict their use to those purposes mandated by federal law. The committee also felt that the Social Security Administration should not assign numbers to children below ninth grade level, and that it should give the SSN the status of a confidential item of information.

Ware wrote that the committee was convinced that adequate deterrents against the abuse of personal information could be provided through the mechanism of a code for fair information practice. A regulatory approach was deemed unnecessary and undesirable.

As for the role that social security numbers played in the dissemination of personal information, the committee felt that the American public had not yet adequately considered the implication of a standard universal life time identifier. The committee's position was that until social and legal safeguards against missues of personal information were established, the use of social security numbers should be constrained.

—Lauren D'Attilo



This may be the strongest software ad ever written.

Maybe, because we didn't write it.

In fact, it was written by some of the most respected business and computer analysts in the country. And some of the most critical.

So when we tell you that 1-2-3™ from Lotus™ is the most powerful productivity software ever developed for PC's, you don't have to take our word for it.

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And after you read their comments about the attributes of 1-2-3, we think you'll understand what's causing all the excitement.

If you'd like to see what 1-2-3 can do for you and your business, just visit your nearest computer dealer. Or call us at 1-800-343-5414 (In Mass. call 617-492-7171).

Lotus

The hardest working software in the world.

CIRCLE 9 ON READER CARD

At last, help for companies wrestling with the problems created by personal computers.

"Overrun."
"Invaded."
"Swamped."

DP managers use a variety of terms to describe the arrival of so many different personal computers on the business scene. But the *feeling* is always the same.

After all, most managers have spent *years* developing well-controlled information systems. Now, almost overnight, they are losing control.

And while there's no arguing that PCs are valuable tools for individual productivity, everyone would prefer a more integrated approach for the company.

What's needed is a system that combines corporate data base capability with the personal computer capabilities employees now insist upon. A system with the capacity to extend the functionality of the corporate network to the individual local level. This is exactly what Honeywell has built.

The microSystem 6/10.

The cost-efficient microSystem 6/10 is a multi-personality workstation that provides an impressive range of functions – including networking.

Besides personal computing, the system handles data processing and word processing. It can function as a network end-point and a terminal emulator. What's more, power and flexibility make the microSystem 6/10 perfect for adaptation to industry-specific applications.

The microSystem 6/10 helps ensure organizational unity through excellent communications – it talks to IBM mainframes as readily as to our own.

It also offers expandable hardware and our time-proven GCOS operating system, which is compatible across the entire range of Honeywell minicomputer products, including even the most powerful 32-bit systems. This compatibility assures easy progress along your growth path by eliminating the need to re-create applications and retrain personnel.

Fight fire with fire.

Best of all, perhaps, the microSystem 6/10 will be an immediate hit with employees wed to their PCs. Because it accepts popular software packages based on CP/M-86® and MS-DOS,® chances are your people won't have to give up their favorite programs.

The microSystem 6/10.

Here's the way to win the battle against "PC Pandemonium."

And the war for control.

For more information, call **800-343-6665** (within the 617 area, call 392-5246) or write to the Honeywell Inquiry Center, 200 Smith Street (MS 440), Waltham, Massachusetts 02154.

Together, we can find the answers.

Honeywell

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CIRCLE 10 ON READER CARD

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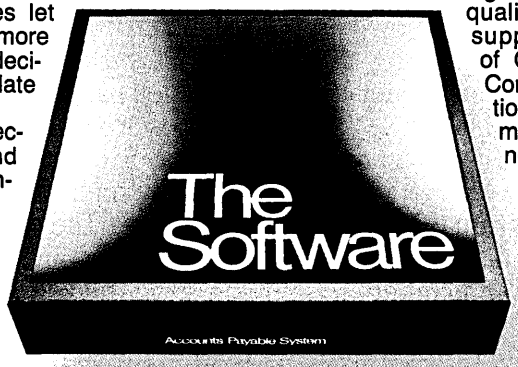

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SOFTWARE INTERNATIONAL

CIRCLE 11 ON READER CARD

LOOK AHEAD

AT&T'S A-COURTIN'

Look for AT&T soon to disclose further joint venture arrangements in Europe and other foreign lands. The telephone giant already has a formal deal with N.V. Philips of The Netherlands, but that covers only central switching systems, so far. AT&T is said by European sources to be highly interested in selling office workstations and even whole computer systems and would therefore be likely to link up with Italy's Olivetti, among others. That link would give AT&T a strong entree into IBM-dominated markets, like Italy itself, where Olivetti already sells computers.

IBM TAKES P.C. TO OEM MARKET

In a major move into the oem components business, IBM has entered the board-level computer market with a stripped-down version of its popular Personal Computer. Building on its efforts to sell raw disk drives to oems, the industry leader has begun bidding the guts of the P.C. to others who will embed the hardware into their products. One of the first customers for such business may be Romox Corp., a Campbell, Calif., startup that plans to distribute electronic game software through retail terminals. Romox's planned terminal would reprogram a customer's ROM cartridge in a minute or two, loading a new game package for home use. IBM has been bidding its P.C. innards to Romox, which like other potential buyers could take advantage of the many software tools available for the P.C. architecture. Meanwhile, IBM would further the penetration of its machine into new markets and take advantage of higher production volumes. IBM has offered hard and floppy disk drives in the past apparently without much success. Its propietary floppy drive, however, may get a boost in the near future if it is incorporated in one of the new personal systems expected from IBM.

DUTCH NET ON THE WAY

N.V. Philips will finally introduce its delayed wide-area network (Look Ahead, March) Sept. 23 in Brussels. Dubbed Sopho-Net, the product is designed to connect virtually any supplier's computers, terminals, word processors, and printers and will handle data, text, and images. The network will tie into other nets, local or transcontinental, and is understood to have protocol conversion facilities. Joining the Sopho-Net will be the firm's Sopho-LAN, a local area network. The Dutch firm is aiming high with the new products, targeting the world's top thousand companies, state agencies, and telephone author-

LOOK AHEAD

ities. Indeed, Philips may get help in world marketing from its new international partner, AT&T.

NAS FINDS SILVER LINING

There's a dark cloud hanging over IBM Denmark these days since diesel engine maker B&W threw out a freshly installed 3083 mainframe in favor of a National Advanced Systems/Hitachi AS/9050 cpu. It seems the purchased 3083 didn't meet performance expectations and IBM has had to make an undisclosed penalty payment. Meanwhile, NAS claims it has sold the 3083 to a broker for a premium price.

BUT CAN IT PRINT RED INK?

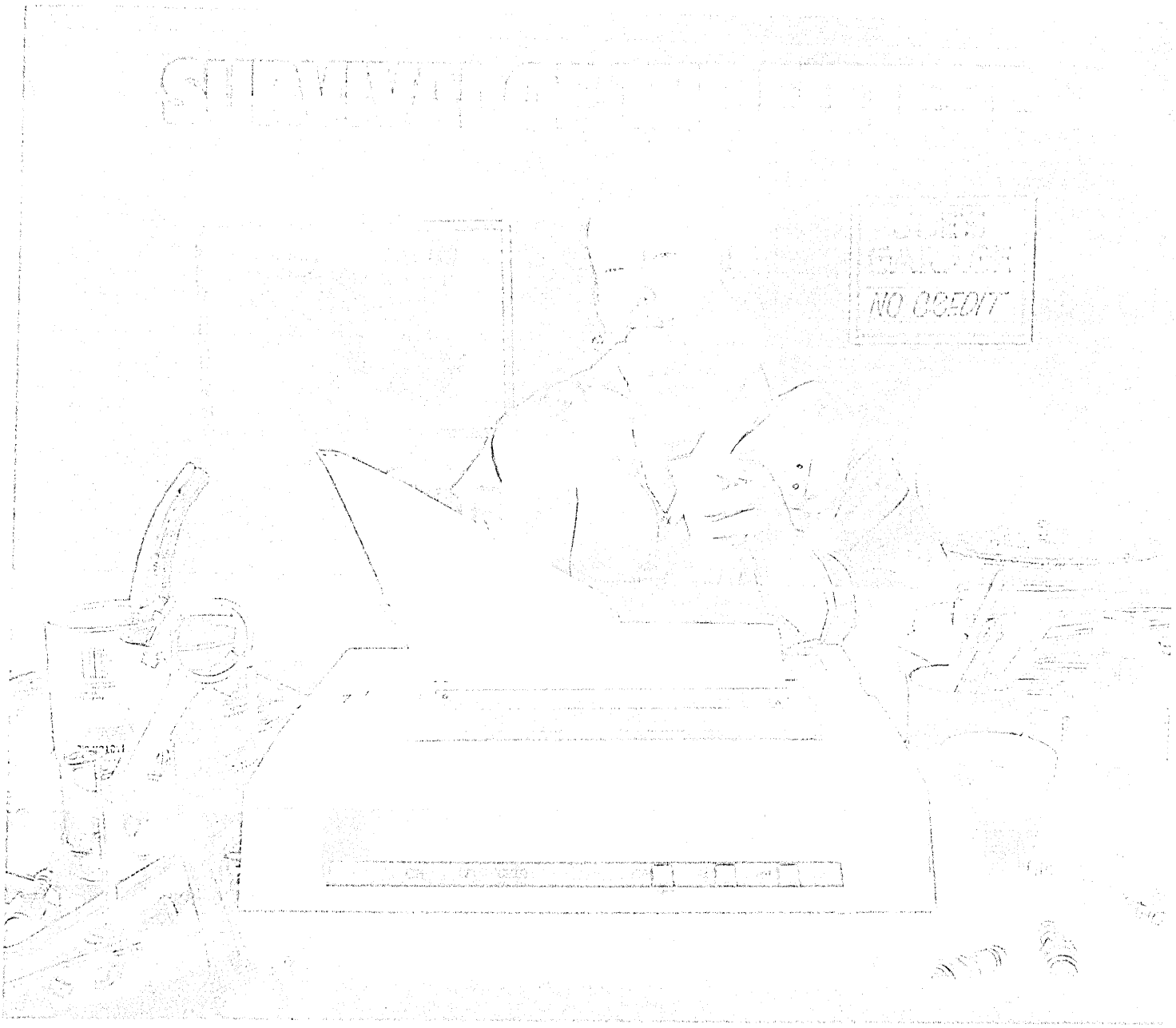
Texas Instruments late this month is to introduce a desktop matrix printer offering 150 cps in draft mode and 35 cps of letter quality. Seven character fonts (English only) will be available in ROM capsules, any three of which can be in use simultaneously. Key to the success of the new device, scheduled to sell for about $1,000, will be its printing quality.

CDC MAKES CYBER DEAL

"I am in shock," was Cray Research president John Rollwagen's initial reaction to arch-competitor Control Data's disclosure in Los Alamos, N.M., that it was getting out of the supercomputer development business. "John, do you want to buy in?" someone else yelled from the crowd as CDC chief William C. Norris made the surprise announcement. CDC of course isn't leaving the business entirely. It will invest $25 million to $30 million a year in spin-off ETA Systems Inc., headed by Lloyd Thorndike and Neil Lincoln, which has taken over the design and development of CDC's planned 2XX machine. With funding of about $100 million, ETA will deliver a specific number of the planned 10-gigaflop machines to CDC, which in turn will remarket the systems and use them in its Cybernet services. Meanwhile, CDC plans upgrades and refinements of its Cyber 205 machine, of which 18 systems have been installed.

RUMORS AND RAW RANDOM DATA

Sperry Corp. was spotted recently at AT&T's Basking Ridge, N.J., facilities, talking joint venture. No details are available, but some think it may involve AT&T's public networking services.... Digital Equipment has abandoned efforts to produce an 8½ x 11 inch crt terminal....Meanwhile, DEC is understood to be entering its second year in the personal computer market, having sold a total of 50,000 units, only a tenth of what IBM sold in the same period....General Electric has been eyeing Prime Computer as a potential takeover candidate. Such a deal would help GE in the CAD/CAM market, where its Calma subsidiary already competes with Computervision, which just chose IBM mainframes.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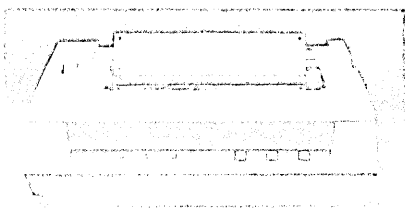


HELLO.
THE
COMPUTER
OF
TOMORROW

WHAT GOOD IS A PRODUCT OF THE FUTURE FROM A COMPANY WITHOUT ONE?

Dealing with a company you've never heard of can often lead to an experience you'll never forget.

A missed delivery here. Some critical down-time there. And all of a sudden, that breakthrough product you were so high on at last year's trade show is breaking your back when it comes down to actual application.

At ITT Courier, we can get as excited about new technology as anyone. In fact, last year alone, ITT spent over $1 billion on R&D. And millions more preparing each new product for the real world.

What's more, because the real world is filled with uncertainty, we back up every product with 150 ITT Service Centers in North America alone.

That's how you build a company that's installed over 325,000 terminals worldwide.

And that's why instead of gambling on the company that makes a new product first, you're a lot better off waiting for the company that knows how to make it last.

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ITT COURIER

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CIRCLE 13 ON READER CARD

CALENDAR

SEPTEMBER

IFIP Ninth World Computer Congress.
Sept. 18-23, Paris, France, contact: AFIPS, 1815 N. Lynn St., Arlington, VA 22209, (703) 558-3600.

Sixth International Conference on Digital Satellite Communications.
Sept. 19-23, Phoenix, Ariz., contact: Conference Administrator, c/o COMSAT, 950 L'Enfant Plaza S.W., Washington, DC 20024, (202) 863-6248.

SICOB '83.
Sept. 21-30, Paris, France, contact: International Trade Exhibition, France, 8 West 40 St., New York, NY 10018, (212) 869-1720.

COMPCON Fall '83.
Sept. 26-30, Arlington, Va., contact: IEEE, P.O. Box 639, Silver Spring, MD 20901, (301) 589-8142.

Telecommunications Association Conference (TCA '83).
Sept. 27-29, San Diego, Calif., contact: TCA Conference Office, P.O. Box 208, West Covina, CA 91793, (213) 960-1838.

OCTOBER

Eighth Data Communications Symposium —1983.
Oct. 3-6, Cape Cod, Mass., contact: Datacomm, P.O. Box 639, Silver Spring, MD 20901, (301) 589-8142.

INFO '83.
Oct. 10-13, New York, N.Y., contact: INFO '83, 708 Third Ave., New York, NY 10017, (212) 661-8410.

Seventh International Fiber Optics and Communications Expo and Second International Expo on Local Area Networks (FOC/LAN '83).
Oct. 10-14, Atlantic City, N.J., contact: Michael A. O'Bryant, General Manager, Information Gatekeepers Inc., 167 Corey Rd., Brookline, MA 02146, (617) 739-2022.

EduTech/East '83.
Oct. 13-15, Philadelphia, Pa., contact: Carol Houts, Judco Computer Expos, Inc., 2629 N. Scottsdale Rd., Scottsdale, AZ 85257, (800) 528-2355.

SYSTEMS '83.
Oct. 17-21, Munich, Germany, contact: Kallman Associates, 5 Maple Ct., Ridgewood, NJ 07450, (201) 652-7070.

The National Software Show.
Oct. 19-21, San Francisco, Calif., contact: Raging Bear Productions, Inc., 21 Tamal Vista Dr., Corte Madera, CA 94925, (415) 924-1194.

ACM '83.
Oct. 24-26, New York, N.Y., contact: Assoc. for Computing Machinery, 11 W. 42 St., New York, NY 10036, (212) 869-7440.

TELECOM 83.
Oct. 26 - Nov. 1, Geneva, Switzerland, contact: Madame Rison, International Communications Union, Place des Nations 1211, Geneva 20, Switzerland, tel. Geneva 99 5111.

Ninth International Conference on Very Large Data Bases.
Oct. 31 - Nov. 2, Florence, Italy, contact: Mario Schkolnick, K55-281, IBM Research Labs, 5600 Cottle Rd., San Jose, CA 95193, (408) 256-1648.

NOVEMBER

Federal Office Automation Conference.
Nov. 1-3, Washington, D.C., contact: Federal Office Institute, P.O. Box E, Wayland, MA 01778, (800) 343-6944.

Integrated Office Technology Conference and Exposition (INTECH '83).
Nov. 1-3, Chicago, Ill., contact: National Trade Productions Inc., 9418 Anapolis Rd., Lanham, MD 20706, (301) 459-8383.

Fifth Annual Northeast Computer Show and Software Exposition.
Nov. 10-12, Boston, Mass., contact: Northeast Expositions, 822 Boylston St., Chestnut Hill, MA 02167, (800) 841-7000.

International Information Management Congress (IMC '83).
Nov. 14-17, San Francisco, Calif., contact: IMC '83, P.O. Box 34404, Bethesda, MD 20817, (301) 983-0604.

AUTOFACT 5.
Nov. 15-17, Detroit, Mich., contact: Gregg Balko, CASA/SME Sr. Administrator at the Society of Manufacturing Engineers, One SME Dr., P.O. Box 930, Dearborn, MI 48121, (313) 271-1080.

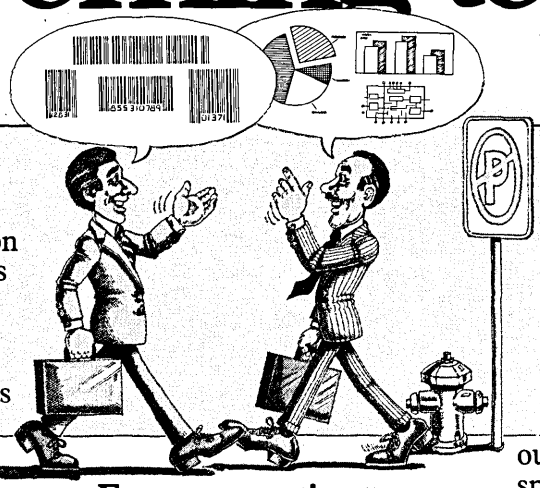
Global Telecommunication Conference (GLOBECOM '83).
Nov. 29 - Dec. 1, San Diego, Calif., contact: GLOBECOM '83, P.O. Box 81466, San Diego, CA 92138, (619) 457-2340.

DECEMBER

CMG XIV, International Conference on Computer Performance Evaluation.
Dec. 6-9, Crystal City, Va., contact: Computer Measurement Group, P.O. Box 26063, Phoenix, AZ 85068, (602) 995-0905.

Conference on Personal and Small Computers.
Dec. 8-9, San Diego, Calif., contact: Billy G. Claybrook, Publicity Chairman, The MITRE Corp., MS B332, P.O. Box 208, Bedford, MA 01730, (617) 271-2439.

The printer for what the world is coming to.



The more a business relies on charts, graphs, forms, diagrams and specialized characters, the more it needs a flexible and reliable computer printer.

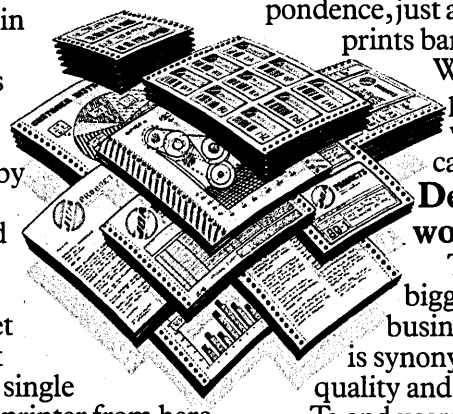
And if that business also uses bar codes and labels, it needs a printer with a brain.

The brain is built in.

Instructing the printer how to make codes can take a lot of input time from the host computer–time that it can't be used for other jobs.

Dataproducts' M-100L matrix printer has its own label-printing control board built in. It's pre-programmed to produce bar codes, block letters and other label graphics in a variety of configurations and sizes.

The board was designed by Dataproducts and is installed at the Dataproducts factory. So you get this intelligent printer from a single supplier, not a printer from here and a control board from there.



From accounting to shipping, everyone's in on this printer's act.

After the day's labels are printed, the M-100L is just getting started.

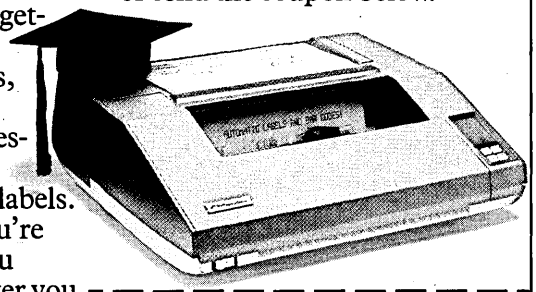
It prints reports, invoices, checks, sales charts, forms and even a lot of office correspondence, just as well as it prints bar codes and labels.

Whatever you're printing, you want a printer you can depend on.

Depend on the world leader.

To some of the biggest OEMs in the business, Dataproducts is synonymous with quality and reliability.

To end users, Dataproducts means high productivity, low cost of ownership. We're the world's largest independent manufacturer of computer printers. We build the M-100L to the same stringent standards we set for all our printers, including our most sophisticated high-speed printers. And we warrant it to OEMs a full two years—the printhead itself for one. To learn more, phone (213) 887-3924 or send the coupon below.



Dataproducts Corporation
6200 Canoga Ave., Woodland Hills, CA 91365
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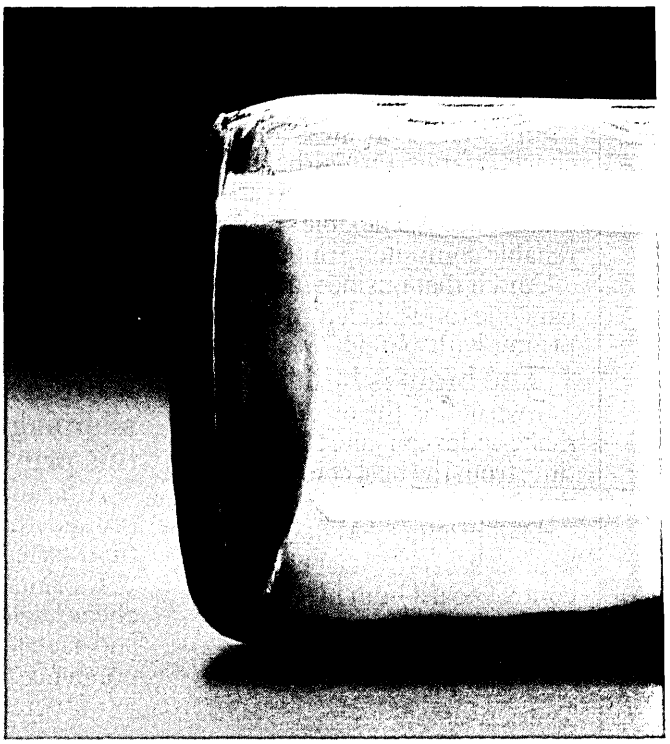
DATAPRODUCTS

The Printer Company

Dataproducts

CIRCLE 14 ON READER CARD

How to get a computer company to help unclog your applications bottleneck.



Consider this scenario.

Suddenly, all your management users become able to develop their own special applications. On-line, using their own desktop terminals.

They have immediate access to updated information within their authorized data bases, regardless of where it's entered. They're able to reformat reports and even redefine parameters. Themselves.

You're still very much in control of things, but not burdened by detail. You're free to manage the on-going workload. And the major applications.

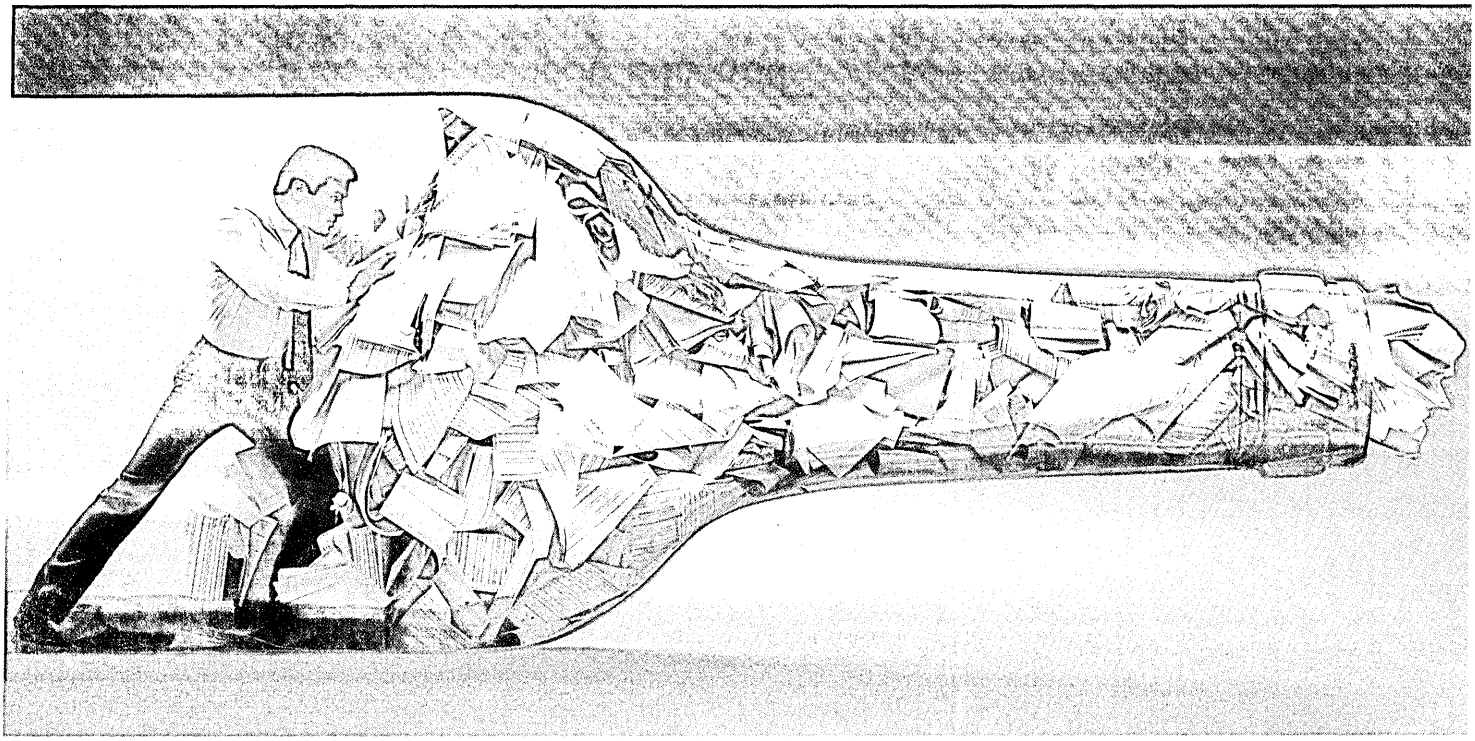
It could all happen with the Sperry MAPPER™ System. Not quite "suddenly," but in very short order.

MAPPER is that powerful. Simply stated, it's the most advanced information management tool yet developed.

A tall claim, to be sure. But we're prepared to back it up, conclusively. We'll put MAPPER to work on a real and specific application development problem that a user has given you.

SOMETHING FOR EVERYONE.

MAPPER's simple English-



MAPPER™ CHALLENGE

language commands and non-procedural flexibility make it easy for the most computer-shy user to gain proficiency in a day or two. The fact is, MAPPER can be used in all departments of your company and at various levels within the organization. And the MAPPER concept of "user friendly" far transcends anything you've seen.

HERE'S THE OFFER.

Accept our MAPPER Challenge. Bring us an application development project. Bring along the user. We'll show you—without any obligation or cost—how quickly and easily MAPPER gets the job done. It will be an awesome experience for the user. And maybe astonishing even for you.

800-547-8362

But first things first. Have us send you a copy of our brochure, "How to Take the MAPPER Challenge." Call toll-free: 800-547-8362 (9 a.m. to 5 p.m. E.D.T.). Or send us the coupon.

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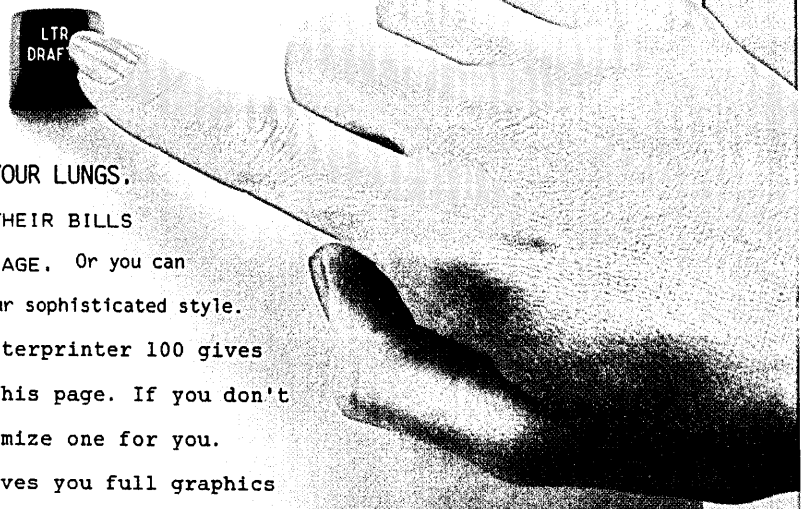
We understand how important it is to listen.

SPERRY

CIRCLE 15 ON READER CARD

Change your face with one finger.

Now there's a printer that lets you express yourself.
It's the Letterprinter 100, from Digital.
When you're feeling very professional and business-like,
then it looks just like this.
In fact, this is an actual printout. It's great for word processing.
You can send a nice polite letter to your most important client.
But there may be times when you want to put on a different face.
You can program your host computer to do it for you.
Or you can do it yourself.
Simply by pushing a button.



YOU CAN SHOUT AT THE TOP OF YOUR LUNGS.
TELL THEM THEY'D BETTER PAY THEIR BILLS
OR ELSE. THEY'LL GET THE MESSAGE. Or you can
be elegant. Impress people with your sophisticated style.
But back to business. The Letterprinter 100 gives
you all of the typefaces on this page. If you don't
see one you like, we'll customize one for you.
The Letterprinter 100 also gives you full graphics
capabilities. Plus three printing settings: one for
letter quality, one for graphics, and a high speed one that
gives you draft-quality documents in only 10 seconds.
So face it. Why buy an ordinary printer when you can express
yourself just by lifting a finger?
See the Letterprinter 100. It's just one of the family of
printers Digital offers,including a daisy wheel printer, the
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1-800-DIGITAL, extension 700, for the distributor nearest you.
Or write Digital Equipment Corporation, Terminals Product Group,
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digital

LETTERS

SET THE RECORD STRAIGHT!

Either time or transcription has confused the facts about the development of the PLS compiler at The Rand Corp., as discussed in the article "Plugging the Mole Holes" (News in Perspective, May, p. 56). Rod Frederickson, who is quoted in the article, was neither a systems programmer at Rand ("gifted," "enterprising," or otherwise) nor the author of the PLS compiler and manuals developed there. Mr. Frederickson was the director of The Rand Computation Center when the compiler was written and should be credited with the foresight to recognize the need for the compiler and the courage to provide the resources for its development.

The PLS (or RLS, as we called the language) compiler was the result of the efforts of many people on the staff of The Rand Computation Center in the mid-'70s. The principal authors of both the compiler and language manuals were R. Lawrence Clark, James S. Reiley, and myself as project leader. Using what was then state-of-the-art compiler generation techniques, this team developed a product that so sufficiently duplicated IBM's internal compilers as to make IBM feel compelled to restrict its distribution.

At the time we thought IBM's reaction to our accomplishments was excessive. Since the construction of the compiler had required relatively few resources, we reasoned that IBM's statements concerning the competitive advantage provided by PLS were either self-delusion or were motivated by a desire not to establish any precedence of not defending its trade secrets. It was clear that any company seriously intending to compete against IBM would have the resources necessary to duplicate our efforts. What we misread, of course, was IBM's desire to standardize the operating environment of its user community by making it more difficult for anyone to modify its operating systems. The strategic importance of a PLS compiler was not in the value of the language itself, but in the ability it provided to control one's operating environment independently of IBM.

DAVID J. SMITH
Director, National Systems
Main Herdman
Certified Public Accountants
New York, New York

TOTALLY AWESOME

The article "The Other Half of the Computer Revolution" (May, p. 260) is the most thought-provoking article I have seen in DATAMATION in approximately 15 years of readership. While applauding the growing commonality of thought and language in the computer and biological fields, I am chilled at the awesome implications of the predicted biotechnology. Hazards to society posed by industrial activity are nothing compared to the threat posed by engineered life forms which have no established niche in nature.

Now that you have given us this introduction to the subject, I hope you will try to provide follow-on articles on the risks and benefits of the new biotechnology.

E.M. GREENWALT
Sunnyvale, California

I applaud your efforts to provide articles that go beyond the usual dp fare, as demonstrated by "The Other Half of the Computer Revolution." While I usually enjoy Mr. Rifkin's work, I feel compelled to challenge his basic assumptions in *Algeny*.

In this article, Mr. Rifkin appears to confuse having the skills necessary to develop the tools of an advanced technology with having the wisdom to utilize those tools to achieve the desired results. In making reference to humankind conquering nature, or separating itself from its surroundings, Mr. Rifkin calls to mind the tactics of a cancerous cell. It too seeks to overcome its environment by imposing its own imprint, thereby finding itself in a Catch 22 situation; its success is also its destruction.

This seems not unlike the double crisis that Mr. Rifkin identifies in the third paragraph of the article ("The earth is running low on its stock of burnable energy and on the stock of living resources at the same time"), which is the result of humankind's attempts so far at reorganizing its relationship to the globe.

I would think that we will first have to recognize that we are an integral *part* of nature, before we can find the wisdom to use our new tools effectively.

ROBERT D. KANTOR
Project Manager
Allied Stores Corp.
New York, New York

NONSTOP NONSENSE

In your article entitled "Queue and Count" (News In Perspective, May, p. 83), the term "Nonstop" was used in several instances to describe a particular class of computers, which are more commonly and accurately referred to as fault-tolerant computers.

Nonstop is a registered trademark of Tandem Computers Inc. and should be used only to denote the products or services provided by Tandem. Tandem, of course, is a leader in the fault-tolerant computer industry and has used the trademark Nonstop with its products since 1976.

PATRICIA A. BECKER
Director, Public Relations
Tandem Computers Inc.
Cupertino, California

First, we did not employ nonstop usage of your trademarked term; the word was used once in the entire article. Second, the word

was not employed to designate a particular class of computers, but rather a particular class of computing. And third, perhaps the term first entered your vocabulary in 1976, but it's been in ours—and in our dictionaries'—for much, much longer.—Ed.

METHOD TO THE MADNESS

In his article on "System Development Mythology" (Readers' Forum, June, p. 272), Ian Gilhooley emits a very mixed signal. He delivers one of the more persuasive arguments I've seen for systems development methodologies, yet then goes on to predict that the advent of prototyping will bring about their demise; he even speaks of methodologies in the past tense.

This is not the first article I've seen with this theme, and I doubt it will be the last. Perhaps what bothers me is that these articles give extra ammunition to those who have always resisted methodologies for no better reason than that they do not like being told what to do, and every one of these articles then makes life that much more difficult for people like me who earn their living making methodologies work.

What bothers me even more is that this prediction is so obviously wrong, for a variety of reasons. First, although prototyping will be a great help in developing decision support systems, much of data processing work consists of systems whose primary purpose is not decision support but rather the everyday operations of the business. While prototyping may also be of value here, the pressure will still remain to develop precise project specifications, spelling out such things as each needed calculation.

Also, in the case of operations systems, providing the computer system that prototyping might aid in developing is just the tip of the iceberg. What about controls, noncomputerized procedures, backup and recovery procedures, user manuals, training, documentation, testing, etc.? One of the main reasons we do have methodologies, of course, is to get people to provide all these things and to do them at the right point in the project.

Even with systems that are the best candidates for prototyping, do we simply want to arm data processing personnel and users with the appropriate software and then unleash them with some sort of vague mandate to "play around" until they find something they like? I have to believe that in order to avoid the same kind of disasters we've encountered with traditional development methods, we'll still need controls and some sort of standard development cycle that would allow for a number of iterations of the prototype. And we'll still need the standard project management musthaves of budgets, costs and benefits, schedules, etc. In other words, we'll need a methodology for prototyping. So in the end, what we are talking about is not less methodology, but more.

Mr. Gilhooley's contention that "system development is an art" is just wishful thinking. I'm sure we'd all like to think of ourselves as artists, but business has found that it cannot subsidize artistic expression in an area as vital to the life of the organization as data processing. That's why we have methodologies, and that's why they're not going to go away.

JERRY SCHULZ
Project Requirements Coordinator
Northwestern National Insurance Co.
Milwaukee, Wisconsin

IRRATIONAL RATIONALE

In your article entitled "Is Market Research Rational?" (In Focus, June, p.32), Ulric Weil seems to set himself up as the industry overseer, keeper of the ethical standard, and judge of what kind of market research information is useful (or useless) to his clients and to ours.

The author claims that "in the end, industry gossip at trade shows, seminars, or cocktail parties in Westchester, Greenwich, Silicon Valley, or suburban Boston may be the most common but least reliable . . ." sources of industry information. Perhaps he is the best qualified to make that judgment, as Mr. Weil frequently travels across the United States, attending such shows and cocktail parties, and often uses this information in his own research reports.

The writer goes on to stress that "More often than not, what the subscriber to market research receives is tenuous projections . . . and speculative assessments regarding a particular company's future product plans or market and pricing strategies." As a principal in Morgan Stanley, and as one who uses this material for his own analysis and projections, Mr. Weil is understandably frustrated with the quality. But perhaps Morgan Stanley is subscribing to the wrong services; I suggest that he consider subscribing to our research studies and newsletter, *Infoperspectives*, which accurately predicted a number of significant IBM developments over the past 12 to 18 months. Examples include: 1. IBM's System 36 price/performance and month of announcement; 2. IBM's recent System 38 model 8 enhancements; 3. IBM 8130-B VLSI; 4. IBM 3725 communications controller—although we were six months early on the date of introduction; 5. IBM H series price/performance and date of introduction; 6. the significance of IBM XA; and 7. various IBM purchase price reductions.

Allow me also to correct a few factual errors in this article: 1. Enterprise Information Systems Inc. is considerably larger than a "one- or two-man shop." In fact, we have doubled in size each year since 1981; 2. IBM's annual R&D spending does *not* "average about $2 billion." It averages about 6% of revenues per year; 3. None of our annual subscription fees "range from $15,000 to $25,000." They are considerably less, and our renewal rate exceeds 80%; and 4. Reports from Wall Street brokerage firms (such as Morgan Stanley) are *never* free—such firms get huge "soft dollar" (commissions on trades) business from the institutions and other clients who read their research studies. And please be so kind as to give examples of where "*the record shows* [emphasis added] that the pricey market research houses tend merely to extrapolate prevailing trends." Whose record is that?

I fully agree that certain research firms, which you have cited, have the *potential* for a conflict of interest because of their close relationship with various Wall Street firms and their dual roles as investment advisors and company consultants; this is a real issue. EIS Inc. currently has no such relationship with Wall Street and we clearly recognize that objectivity and confidentiality are the keys to professional consulting.

In closing, I wonder how Ulric Weil performs his research at Morgan Stanley—in a vacuum without any input from "sources"? If he obtained an exclusive or inside information or intelligence, would he not use it? Can any analyst or researcher afford to discount all rumors and forecast data (which, by definition, are not factual) as pure speculation? Has this Wall Street analyst never extrapolated prevailing trends?

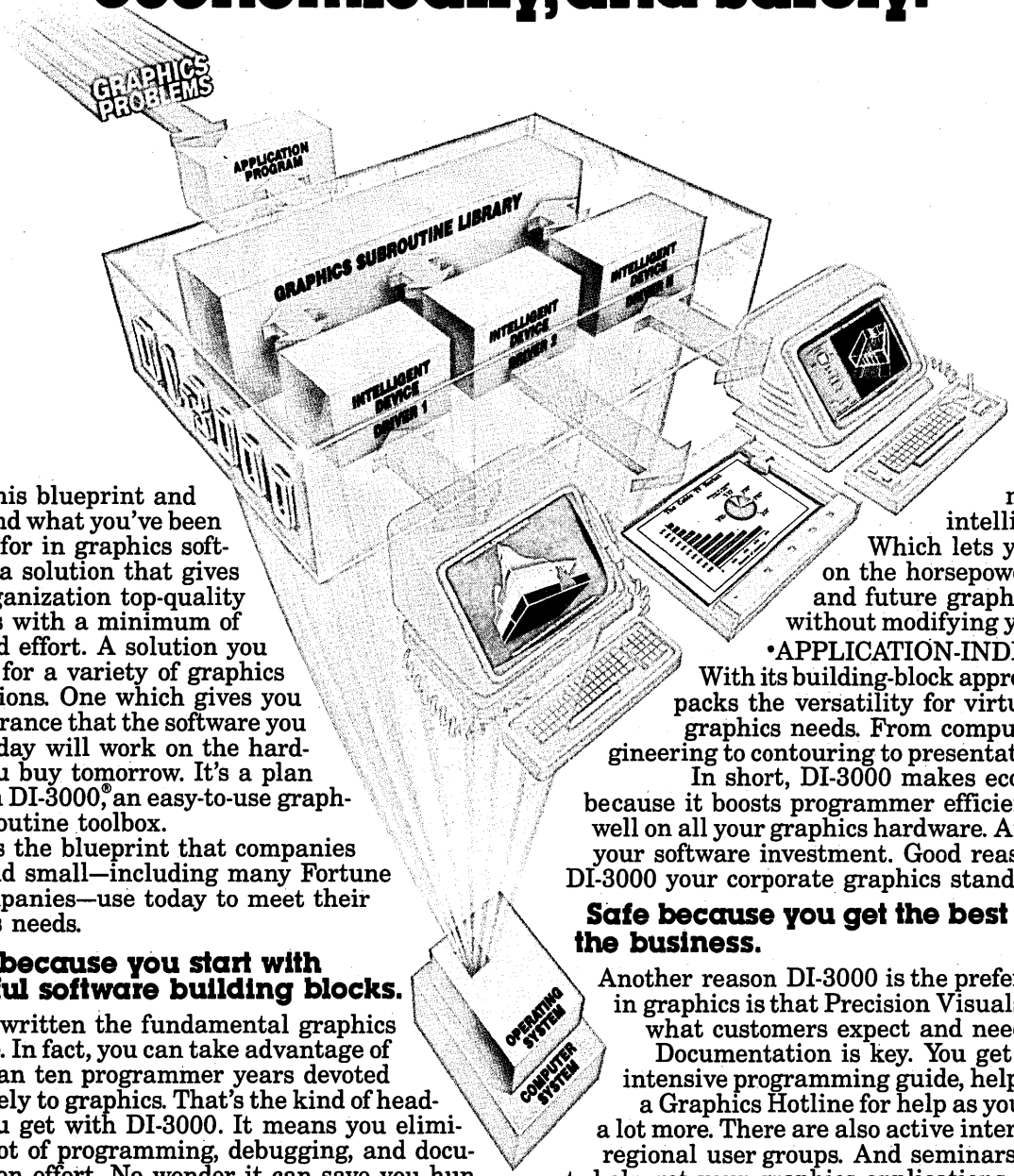
If research were based simply on our analysis of currently available facts, our job would be easier; but then, many companies would have less need for our services. Research implies to search, to study, to investigate, and most importantly, to interpret.

ROBERT T. FERTIG
President
Enterprise Information Systems
Greenwich, Connecticut

MR. WEIL RESPONDS:

In response to Mr. Fertig's letter, as well as a number of others I have received, I would say my article has evoked predictable reactions: several of the leading lights from the market research industry state that I am right on target but that some of the key conclusions do not apply to them, e.g., their prophesies have been on the mark, they do not extrapolate trends . . . but indeed their competitors do. A number object to my observations of a possible conflict of interest because of their Wall Street affiliation, claiming that security analysts also have a dual and sometimes conflicting function. My point remains that security analysts employed by member firms of the exchanges are subject to day-to-day surveillance and must adhere to compliance standards enforced by the exchanges. Those who do not, place themselves at risk. No such legal compliance procedure and exchange-administered surveillance applies to

Here's your blueprint for getting into graphics...quickly, economically, and safely.



Study this blueprint and you'll find what you've been looking for in graphics software...a solution that gives your organization top-quality graphics with a minimum of time and effort. A solution you can use for a variety of graphics applications. One which gives you the assurance that the software you build today will work on the hardware you buy tomorrow. It's a plan based on DI-3000,® an easy-to-use graphics subroutine toolbox.

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Quick because you start with powerful software building blocks.

We've written the fundamental graphics software. In fact, you can take advantage of more than ten programmer years devoted exclusively to graphics. That's the kind of head-start you get with DI-3000. It means you eliminate a lot of programming, debugging, and documentation effort. No wonder it can save you hundreds of hours. And speed you to the graphics solution you've been looking for.

Economical because a little programming effort delivers a lot of software life.

DI-3000 will save you significant software development dollars. Because DI-3000 is:

• MACHINE-INDEPENDENT. Its modular structure works as well on a microcomputer as it does on a super-mini or mainframe. That means freedom from software obsolescence.

• DEVICE-INDEPENDENT. You're not locked into specific graphics devices either. You can choose from more than 50 intelligent drivers. Which lets you capitalize on the horsepower in current and future graphics hardware without modifying your software.

• APPLICATION-INDEPENDENT. With its building-block approach, DI-3000 packs the versatility for virtually all your graphics needs. From computer-aided engineering to contouring to presentation graphics.

In short, DI-3000 makes economic sense because it boosts programmer efficiency. It works well on all your graphics hardware. And it protects your software investment. Good reasons to make DI-3000 your corporate graphics standard.

Safe because you get the best support in the business.

Another reason DI-3000 is the preferred solution in graphics is that Precision Visuals has learned what customers expect and need in support. Documentation is key. You get an example-intensive programming guide, helpful tutorials, a Graphics Hotline for help as you need it, and a lot more. There are also active international and regional user groups. And seminars and courses to help get your graphics applications operating on time and within budget.

This is the blueprint you can trust. It's been proven by companies both large and small who need top-quality graphics solutions...quickly, economically, and safely.

Call or write Precision Visuals for complete details.

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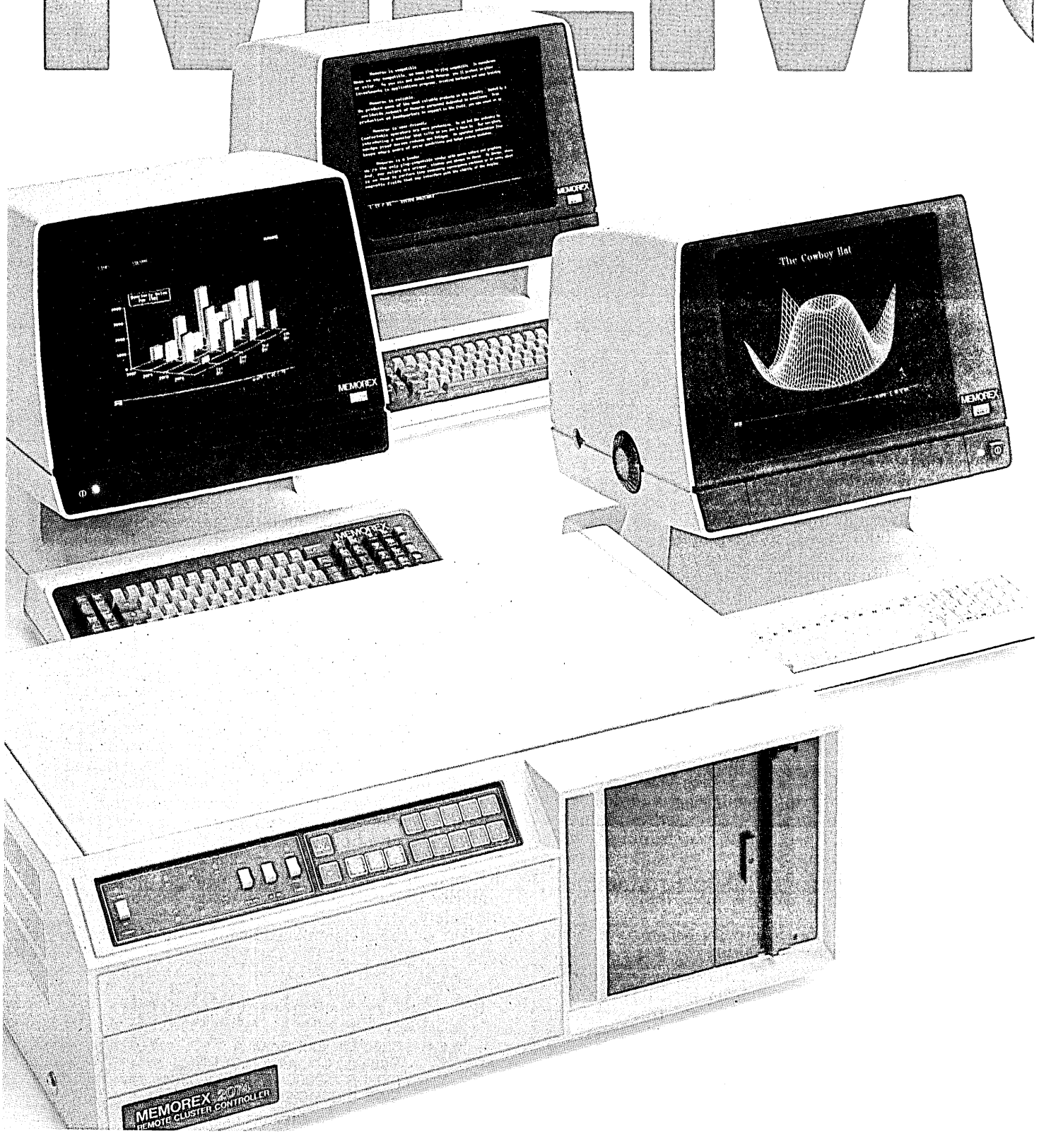
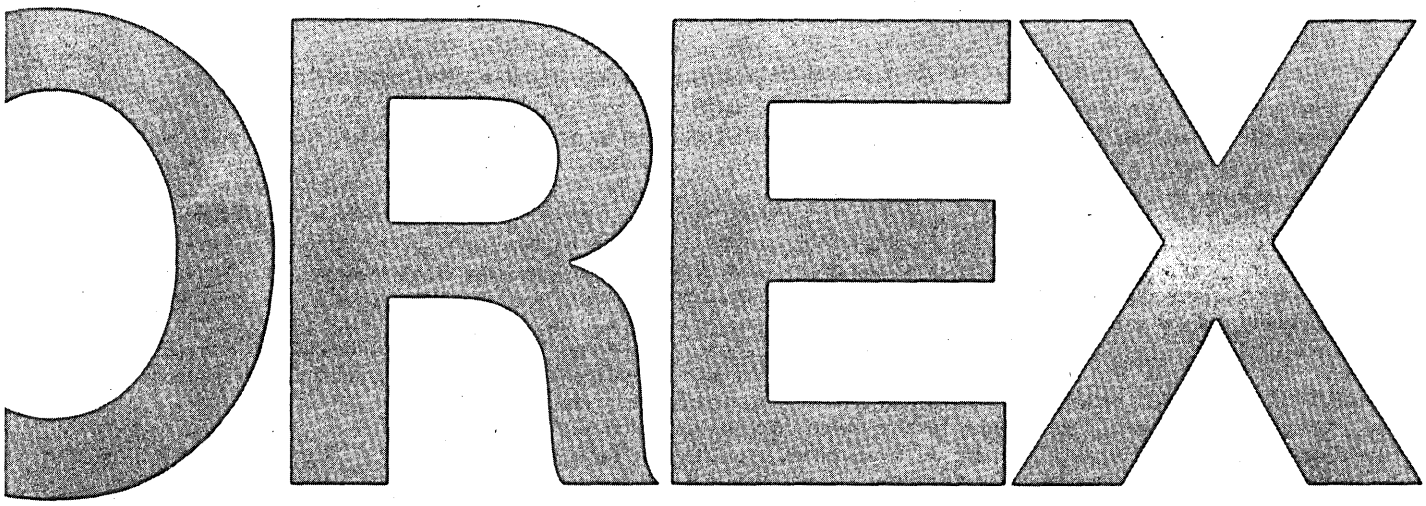
CIRCLE 16 ON READER CARD

MEMO


MEMOREX
The Cowboy Hat
MEMOREX 2074
REMOTE CLUSTER CONTROLLER



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When you're good, you don't have to shout. Our 3270 family of controllers, printers and display stations is the best you can buy. So, to prove our high opinion, a few quiet facts:

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Call today for more information. Our toll free number is (800) 538-9303; in California (408) 996-9000, Ext. 616. Or write to Memorex Marketing, 18922 Forge Drive, Cupertino, CA 95014. Once you've got all the facts, we're confident of your decision.

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CIRCLE 17 ON READER CARD

LETTERS

the analysts employed by the market research houses.

In writing the article I was careful not to be "ad hominem," i.e., while for illustrative purposes I identified some of the "players," I made no judgments as to the relative quality of any one of them vis-á-vis their peers. The fact that quite a few appear to be personally affronted may indicate that they feel guilty and wish I had not opened "Pandora's box."

THOUGHTS ON THE THINKER

In his article "Technology for the Executive Thinker" (June, p. 206), Mr. Denise quite correctly points out that modeling is a major component of a decision support system. Our experience in assisting organizations to plan for decision support systems indicates modeling is not only a major component, but it is the component data processing departments are least prepared to deal with. The root of the difficulty is that few systems analysts have the training and experience required to develop the types of complex models needed to effectively support upper-level management decision making.

The experience of most systems analysts has been limited to the development of computer-based systems that have supplanted manual procedures or that merely provide status information. What most upper-level managers are interested in by way of decision support is "impact analysis." For example, what will be the impact on the organization as a whole of introducing a new product line? Or what will be the impact of changing our pricing structure? Finding reliable answers to questions of this sort requires not only good understanding of how various organizational processes interrelate, but also the ability to accurately describe those relationships in terms of mathematical and simulation models. And few systems analysts have backgrounds that enable them to develop such models.

Furthermore, although there are many tools available that facilitate model building, such as software for performing regression analysis or input-output analysis for linear programming, many analysts are unable to take advantage of them because they do not understand when and how to use these tools.

If our experience is any indication, it will be the lack of skilled model builders that will impose the greatest limitation on the development of effective and comprehensive decision support systems and not any limitation of data processing technology.

JOSEPH C. NAPOLI
Executive Vice President
P-Cube Corp.
Brea, California

RIGHT, WE'RE WRONG!

I was reading your DATAMATION 100 issue (June, p.86) and noticed you reversed the Hewlett-Packard and Honeywell spreads in the Company Profiles section. HP is correctly listed on p. 96 as the number 7 company, with Honeywell number 8, but on p. 106, we're reversed. Actually, the charts on p. 106 are correctly placed—HP to the left, Honeywell to the right—but the commentary beneath the charts is reversed.

Congratulations on an otherwise excellent issue.

ROY E. VERLEY
Corporate Press Relations
Hewlett-Packard Company
Palo Alto, California

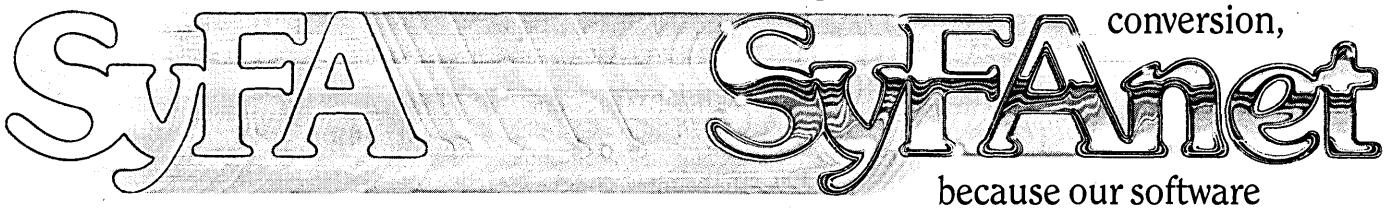
We had planned to announce that error ourselves, but you explained it so well that we decided to run your letter instead. Our apologies to both Hewlett-Packard and Honeywell.

And while we're making our apologies, we'd like to point out an error in the chart on p. 92 of that same article. The three subheadings under "The Year of the Bull" are, quite obviously, out of order. If you examine the column "% Change" we think you'll be able to separate "The Wall Street Winners" from "Those Who Lost the Most." We apologize to those companies as well.—Ed.

NETWORKING VS. NOTWORKING:

ANNOUNCING THE NET RESULTS.

Linking micros to mainframes is one of the most pressing problems facing DP managers today. How do you bring all the computers in your company together so they can share information, resources, programs, and access the corporate data base without any loss of security?



Networking is a nice concept but it won't work unless you have a system that works.

SyFAnet™ (System For Access network) is the network that works. The only complete solution on the market, ready to meet all your networking needs now.

SyFAnet gives you everything you ever wanted in a network: the ability to link PCs together, multi-function workstations, industry-standard software, global information access and unlimited expansion capabilities. All fully-integrated, and built upon a foundation of proven hardware and software.

Picture a powerful processor for every purpose—one for applications, another for sharing resources. This special architecture makes SyFAnet a more reliable network, with no single point of failure. Every time you add a terminal, you gain more power instead of losing it.

Our broadband bus offers more flexibility. So you can add more users whenever and wherever you want.

By adding microprocessor-based workstations and CP/M-86, SyFAnet gives you more functionality, too. You can upgrade easily without costly conversion, because our software remains the same at all levels.

And while *you* might get confused by the flurry of message traffic in the office, SyFAnet never does. Its unique version of collision avoidance means data doesn't get lost in the shuffle.

Because business doesn't stop at borders anymore, SyFAnet was designed with the whole world in mind. SNA and X.25 capabilities connect you to mainframes and networks around the world.

SyFAnet. Ready to solve your networking problems today and tomorrow. It's the network that works.

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CIRCLE 19 ON READER CARD

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With all the clamor about personal computers, a fundamental fact is often overlooked: some simply *work* better than others.

Consider the COMPAQ Portable.

A computer will make you more productive. A computer will make you more efficient. You hear it everywhere. But you don't hear about which computer actually *works* best.

A computer isn't magic. It's a tool. And just like other tools, some computers work better than others.

The COMPAQ™ Portable is a combination of 20th-century electronics and 19th-century pragmatism. It simply does personal computing better. Here's why.

Works in more places

You don't do all your thinking in one place. Why have a computer that stays in one place?

The COMPAQ Portable has all the capabilities of a large desktop computer. But now those capabilities can go where you go.

You can move it from office to office to share its resources. You can move it into the conference room to answer questions when and where they come up.

With the COMPAQ Portable, you can be as productive in your hotel room or your lake house as in your own office. It's a reliable companion on a business trip. It's a powerful sales aid in your customer's office.

What's more productive than a computer? A computer that works for you in more places.

Works with the greatest number of programs

The most important consideration when you choose a computer is "what programs will it run?" And that's one more reason for choosing the COMPAQ Portable.

The COMPAQ Portable runs more programs than any other portable. In fact, it runs more than most non-portables. That's because it runs all the popular programs written for the IBM® Personal Computer. There are hundreds of them. They are available in computer stores all over the country, and they run without any modification, right off the shelf.

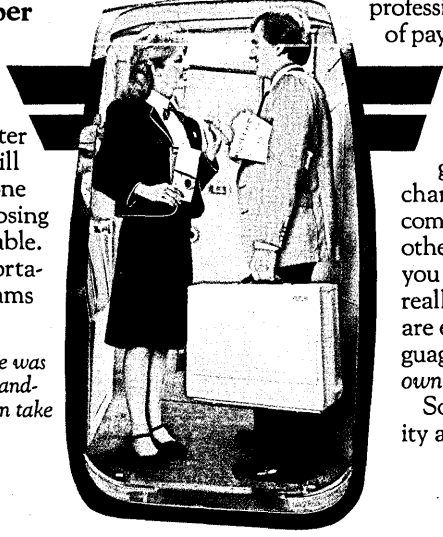
Imagine the power of a *portable* word processor. There are dozens of different word processing programs available for the COMPAQ Portable.

Planning, problem-solving, and "what-ifs" are a cinch with a variety of popular electronic spreadsheet programs. The COMPAQ Portable runs them all.

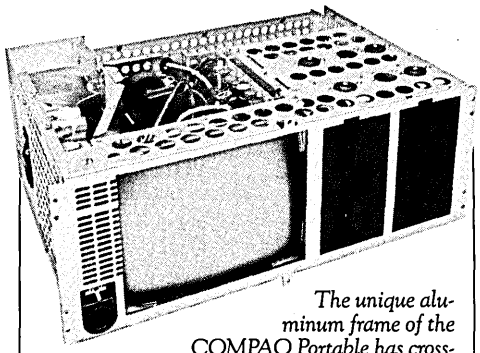
There are accounting programs for anything from computerizing your family budget to full-scale professional management of payables, receivables, inventory, and payroll for your company.

There are programs for making charts and programs for communicating with other computers. Or if you want something really specialized, there are even program languages for writing your *own* programs.

So, you get portability and you don't give up problem-solving power. The combination adds up to the most useful personal computer on the market today.



The COMPAQ Portable was designed to fit under a standard airline seat so you can take it on business trips.



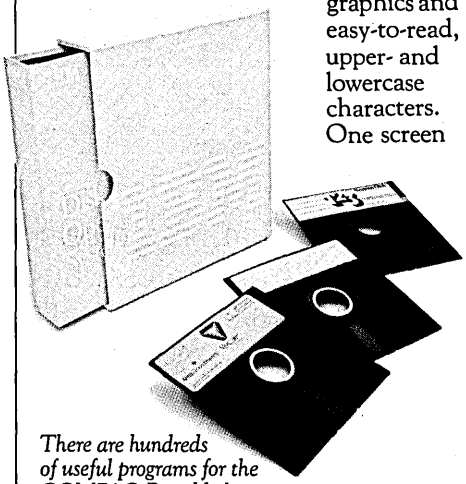
The unique aluminum frame of the COMPAQ Portable has cross-members that strengthen it front-to-back, side-to-side, and top-to-bottom. It's a design practice commonly used in race cars.

Works better because it's easy to read

The display screen of the COMPAQ Portable measures nine inches diagonally. It shows a full "page width" of 80 characters on a line so tasks like word processing are easier. And those characters are big enough to read even if you're leaning back in your chair.

The display shows both high-resolution graphics and easy-to-read, upper- and lowercase characters. One screen for all the information. With some personal computers, including the IBM, you can have either the graphics or the legible characters, but you can't have both unless you buy two different displays.

Incidentally, computer prices are often quoted without a display. The display of the COMPAQ Portable is built in, of course.



There are hundreds of useful programs for the COMPAQ Portable because it runs all the popular programs written for the IBM.

Add-on options make it work the way you work

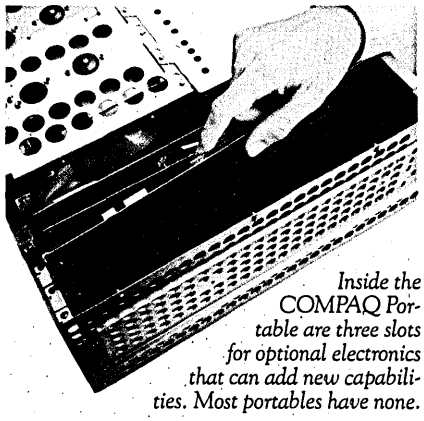
Inside the COMPAQ Portable are three open slots. Electronic devices called expansion boards fit those slots and give the COMPAQ Portable new powers.

Just like the programs, expansion boards designed for the IBM work with the COMPAQ Portable, so there are dozens available right now. With them, you can make your personal computer more personal.

Want to check a stock price? Or look up something in The New York Times Information Service? One expansion board enables the COMPAQ Portable to handle those communications over ordinary phone lines.

Want to use your company's central computer files while you're on a trip? There are boards that allow the COMPAQ Portable to communicate with a variety of large mainframe computers.

Other boards let you hook up controllers for computer games or increase memory capacity. Still others let you connect personal computers in a network so several people in your office can share the same information.



Inside the COMPAQ Portable are three slots for optional electronics that can add new capabilities. Most portables have none.

Works better because it's tough enough for the road

Portable doesn't just mean smaller. Portable means tough, too.

The COMPAQ Portable was built to withstand the hard knocks of constant travel. An aluminum frame within the case completely surrounds the computer's working components. Each disk drive is mounted in rubber shock absorbers instead of being bolted directly to the frame.

To test internal components, the COMPAQ Portable was subjected to impacts of 40 G's *while running a program.* After impacts on each side, there was no internal damage and the program was still running. Without error.

Computers are for getting rid of worries, not giving you new ones.

Designed to help you work better, too

The COMPAQ Portable was designed to *feel* good.

Specifications

Software
- ☐ Runs all the popular programs written for the IBM PC

Memory
- ☐ 128K bytes RAM
- ☐ Expandable to 640K bytes

Storage
- ☐ One 320K-byte minifloppy disk drive, second drive optional

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

Expansion board slots
- ☐ Three IBM PC-compatible slots

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

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

The keyboard is detached so it can fit into your most comfortable working position.

The keyboard cable remains connected at all times. So you don't have to unpack it and hook it up every time you use your computer.

Because the display is built in, the COMPAQ Portable makes a neat, small package on your desk, instead of a big obstacle you have to talk around. The built-in display also avoids the usual cable clutter because there's no need for separate cables for the display.

The COMPAQ Portable even has an electronically synthesized sound to create the familiar keyclick of a typewriter. With a simple keyboard command you can adjust the volume to suit the level of background noise in your office.

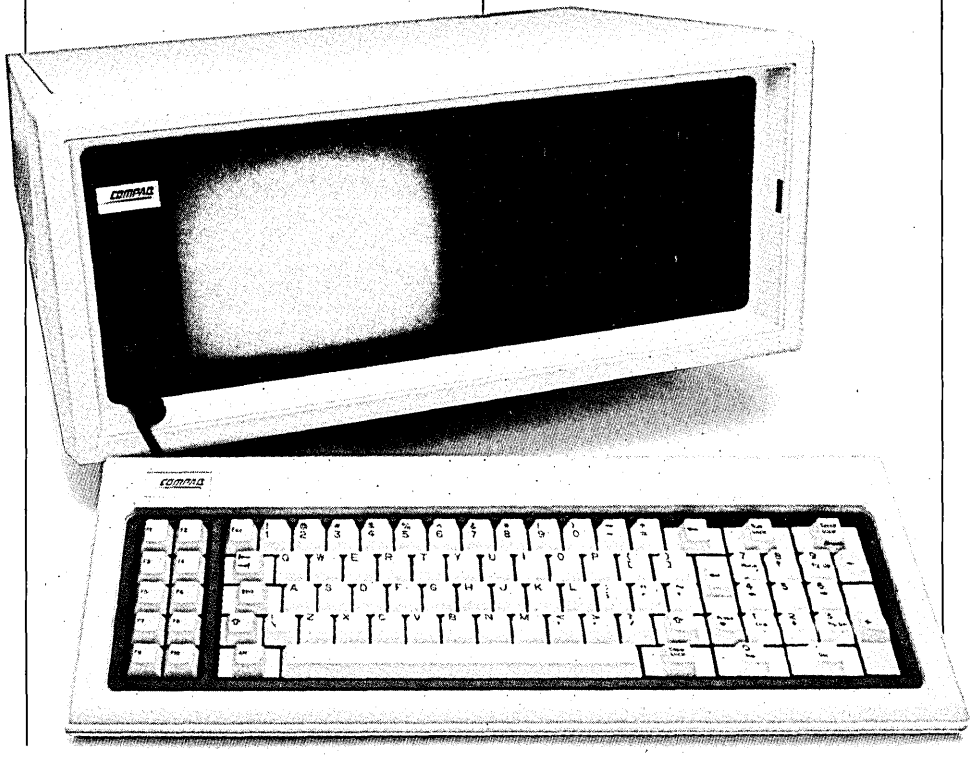
The added usefulness is free

The COMPAQ Portable can do what desktop computers do and do it in more places. But it doesn't cost any more than an ordinary desktop.

In fact, it costs hundreds less than a comparably equipped IBM or Apple® III. The COMPAQ Portable comes standard with one disk drive and 128K bytes of memory, both of which are usually extra-cost options. A second disk drive and additional memory are available to make your COMPAQ Portable even more powerful.

The bottom line is this—you just can't buy a more practical, useful, productive computer. Before you decide on a computer, you owe it to yourself to compare the COMPAQ Portable.

For the location of the Authorized Dealer nearest you, call 1-800-231-9966.



COMPAQ™

Common sense and uncommon design

John L. Kirkley, Editor

EDITORIAL

ARE YOU UNDERPAID AND OVERWORKED?

The dp manager's dilemma: not enough hours in the day, not enough money in the paycheck.

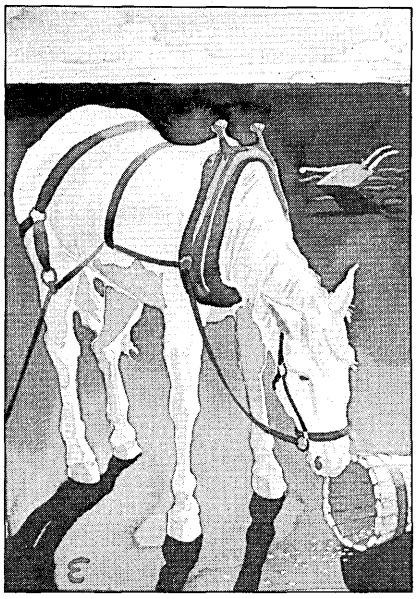


ILLUSTRATION BY DORIS ETTLINGER

There are a couple of questions we never ask when we conduct our annual salary survey. One is "Are you being paid enough, given the responsibilities of your job?"; the other is "Are you being paid too much?"

To the first question we'd probably hear a chorus of hearty "nos," but we doubt we'd find anyone who admits to being overpaid; that's not the way the world works.

As you can see by this year's survey (p. 82), how much the dp professional is paid depends on a variety of factors, including geography, specific industry, bonus structures, perks, and the like. Vice presidents of dp had an average base salary of just over $50,000; as you might expect, those in large shops in big urban areas like New York command considerably more.

Now, $50 thousand to $70 thousand a year is nothing to sneeze at, but there are valid reasons why today's top dp managers and directors of MIS may feel themselves underpaid and overworked.

As we all know, most corporate raises tend to be proffered in stair-step progression—an annual percentage jump in the teens when inflation is high and the economy is hot, or, as was the case last year, more modest percentages when times are tough. But, generally speaking, unless you make a very fortuitous job change, the upward salary progression remains fairly steady and not too exciting.

The trouble is, many of you are suddenly experiencing a change in the nature of your work that is not only exciting but highly demanding as well.

For the first time since the beginning of business data processing in the late '50s, your role has made a major shift. With the advent of micros, the merging of computers and communications, increasing computer literacy coupled with a growing demand for access to information processing capabilities by every user department, the growth of information centers, and a continuing technological explosion, the demands of your job have changed and increased dramatically.

The old technical skills are no longer at a premium (although you still have to have them). No longer are you the elite high priest working with strange machines and speaking some arcane language, totally in control of your glass-enclosed electronic showcase.

Now you are being asked to be the creator of a corporate information environment, a complex mixture of computing and communications where the applications are being transferred out of the dp shop to the end users. You are being called upon to exhibit a great variety of people skills and to be a part of the corporate business environment. You are now a part of top management and you must look and act the part.

Are you being paid enough? You might ask what the top financial officer or the top strategic planning executive is being paid in your company. You might compare your compensation with that of the top marketing or human resources executives. If indeed your department is being used as it should—as a key contributor to your company's business strategy—your paycheck and perks should reflect that contribution.

A great deal depends upon you—how you structure your job in the face of these demands. If you see your role as strictly the keeper of the corporate database and a cruncher of numbers—if your chosen lot in life is to be down in the basement shoveling coal into a 360—then our second question, are you overpaid, is not so ridiculous. You probably are.

But if you are an enthusiastic and key part of the information revolution, we have a suggestion. It's September and budget time again. We recommend that you pencil in a sizable raise for yourself. After all, you deserve it. ❋

IN FOCUS

THE OPM SCANDAL UNMASKED

Investigators sifting through the computer leasing scandal have advice for dp managers.

by Hesh Wiener

A salesman calls on the telephone, offering the computer lease of the century and citing references from American Express, American Telephone & Telegraph, and half a dozen other blue chip companies. For the first three years of the lease on a 4341 from IBM, he says, the monthly payments will be less than your mortgage. If you decide to keep the machine for the full nine years of the contract, he adds, the payments will modestly increase. If you don't like the machine, the deal, or the color of his shirt after a few years, he promises, "there won't be a problem. We'll take out the computer and you'll owe nothing for the remainder of the lease term because we have others who would sublease the machine."

Before grabbing your fountain pen to sign the deal, remember the sad fate of dozens of data processing managers who were badly burned from similar arrangements when O.P.M. Leasing Services Inc. went bankrupt in March 1981 (April 1981, Benchmarks, p. 112). After two years of sifting through documents, some with signatures forged over a glass coffee table with the aid of a flashlight, investigators and others familiar with the case now offer advice on what to look for to avoid fraud or the myriad mistakes that cost companies like American Express more than $50 million.

While the publicity, lawsuits, and judgments surrounding the O.P.M. collapse did a lot to sharpen hindsight, data processing department managers may need more help to improve their foresight. "I'll bet there are lots of users signing subleases right now that are just plain nutty deals," claims Tom Martin, president of Computer Financial Inc. of Hackensack, N.J., a computer leasing company.

Overall, the investigators say that dp managers should keep four things in mind to avoid falling into the trap that O.P.M. set for the cream of American corporations. First, use common sense when dealing with a computer leasing company—recognize that just because something is cheap does not mean that it is a bargain. Second, insist on reviewing the audited and certified financial statements of the leasing company. Third, contact a credit ratings service, or have the corporate credit department do a thorough investigation. And fourth, if a sublease is arranged to take a capacity-limited system off your hands, file the appropriate documents to retain your rights to the new lessee's payments and the old machine.

To understand what not to do, some background on O.P.M. and its major players is required. Mordecai Weissman and his brother-in-law Myron Goodman started O.P.M. in 1970 to lease equipment as diverse as photocopiers and chicken fryers in the New York City area. Clients might have been forewarned by the name of the company, if they'd known the initials stood for the phrase "other people's money." But by 1974 the Brooklyn pair appeared widely successful and decided to diversify—to lease mainframes, minis, and peripherals. American Express, AT&T, Merrill Lynch, Rockwell International, and dozens of other respected corporations were customers drawn into the O.P.M. web.

O.P.M. wrote leases that permitted users to return their computers earlier than at the end of what was typically a seven- to nine-year lease term; these leases are called "walks" because the user was said to be able to walk away from a deal. O.P.M. promised clients that it would find another user for any computer that was returned, and that the second user's payments would fulfill the obligations of the initial user.

O.P.M.'s collapse began when the second lessee paid a lower rate than Goodman and Weissman expected, because of declining market conditions. Under the terms of the original lease, O.P.M. was responsible for making up the difference in payments owed to the banks or other creditors, but after the March 11, 1981, bankruptcy, the original lessee was presented with the bill. Users who had expected to "walk away" from a lease for returned equipment learned that they couldn't, and some users who had walked in the past could not walk fast enough or far enough to avoid paying for machines no longer on their premises.

Some users couldn't walk fast enough or far enough to avoid paying for machines no longer on the premises.

Indeed, there were few second lessees for the hundreds of computers leased by O.P.M., which paid enough rent to cover the original lease payments over the seven years it was in business. According to James P. Hassett, the court appointed bankruptcy trustee responsible for unraveling the financial transactions that led to bankruptcy and lawsuits, O.P.M. was never solvent. O.P.M.'s cash flow was maintained through a combination of a rising tide of clients and bank loans, obtained with forged computer leases as O.P.M.'s collateral. Essentially, O.P.M. organized and carried off a pyramid scheme using computers as

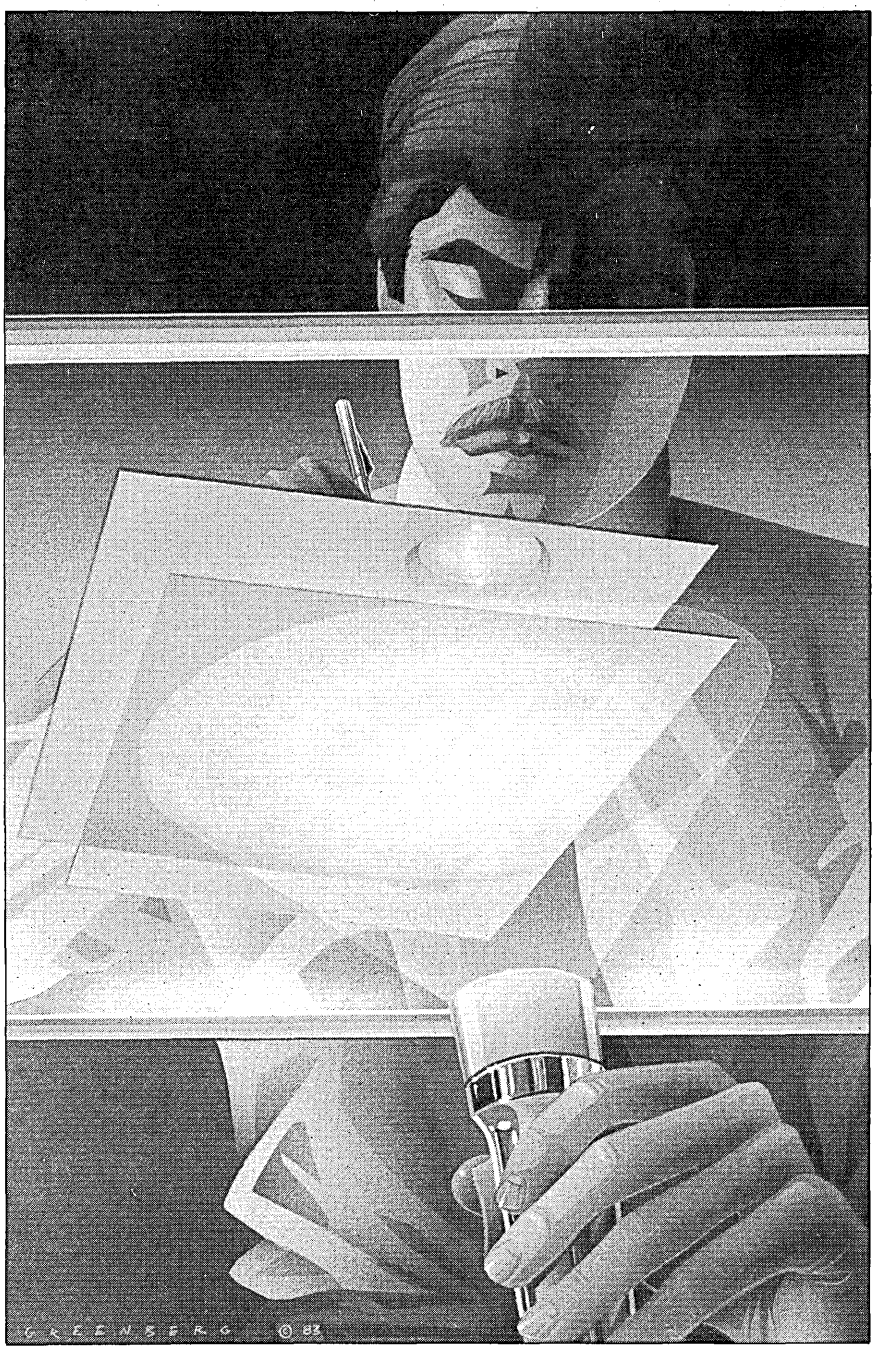


ILLUSTRATION BY SHELDON J. GREENBERG

the commodity and big companies, not innocent investors, as its victims.

How did the O.P.M. scam work? One way was by forging a signed computer lease in the name of a major company and selling the agreements or forgeries in the financial markets like a bond or debt instrument; a bank, insurance company, or other investor expected a good return on the investment from the monthly payments.

Other, equally fraudulent, means were used to bilk financiers out of $200 million or so, some of which was paid back before O.P.M. collapsed. The O.P.M. frauds succeeded because not one investor checked the authenticity of the leases. Instead, each relied on the assumed diligence of others and the simple fact that billions of dollars in similar paper, nearly all of it good, is brokered in the financial system every year without anyone getting hurt.

The finances and reputations of dozens of people and institutions such as Lehman Bros. Kuhn Loeb Inc. were hurt by O.P.M. Now the banks seem to be a lot more careful, but dp managers are still taking chances. That, at least, is the view of James Hassett, the O.P.M. trustee and veteran of other computer company liquidations. Hassett is considered an expert on the leasing business—his appointment as O.P.M. trustee was recommended by the Computer Dealers and Leasors Association.

"The banks learned to check with the lessee to confirm that equipment described in a lease exists," Hassett says. "When O.P.M. was rolling, they had just been taking the papers and issuing checks on it. Now, many banks actually go out and see that the physical product leased is there. A bank officer visits the users and checks the serial numbers on equipment to ascertain whether it matches those on a lease.

"That protects the banks," Hassett continues. "They are basically interested in protecting themselves. You might say that the user is protected because the banks would catch the kind of fraud that hurt Rockwell International, whose name appeared on forged leases, and which, for a variety of reasons, sustained considerable costs as a result."

There are quite a few lessons for users, and according to Hassett, those users who were hurt by the O.P.M. collapse did learn them. At least they say they did. As for others, that remains to be seen.

Before signing a lease that appears to be a bargain, a corporate dp manager

It looks like a free lunch, but the bill comes two years later.

ought to think about the way it looks from the lessor's position. If the deal might cost the lessor a bundle, Joe Mainframe should assume the lessor is making similar deals with other dp departments and will soon be insolvent. If the lessor's insolvency won't affect the user, it may not be the user's problem. But when lessors have bombed out in recent years, this has not been the case.

"If a deal comes in," says Hassett, "that is so good it is unbelieveable—and O.P.M.'s deals were like this—maybe it *is* unbelievable. The user has to ask himself how the leasing company can make that kind of offer. Then, if it does make economic sense, the user has to take the necessary steps to investigate whether the leasing company is capable of delivering what it promises."

Many users have changed their attitudes, according to Kenneth N. Pontikes, chief executive of Comdisco Inc., the Chicago company that has grown to be the biggest factor in computer leasing and remarketing, with 1982 revenues of $447 million. "Quite a few customers have learned to look critically at a deal. They have found that a user can be offered a free lunch, only to be presented with a bill for it two years later."

By this, Pontikes means that time bombs are ticking away—problems in computer financing may take some time to materialize. The problems may stem from the practices of the leasing company or from unforeseen circumstances, but they may also be the result of an unrealistic attitude on the part of the user.

A number of data processing managers are "simply trying to sign the cheapest lease as measured by the monthly pay-

ments and without regard to the total impact the lease can have on budgets under different circumstances," says Martin of Computer Financial. "A leasing company that makes too many unprofitable deals will eventually fail, and this can hurt a lot of users."

It's one thing to seek a low bidder, and another thing to grab a complex arrangement that may turn out to be based on fanciful representations. Some of the schemes that backfired in recent years involved a combination of a user's agreeing to a big payment spread over seven or nine years and a leasing company's promise to cover part of the user's future payments. The two obligations are, from a legal standpoint, unrelated, and each may be separately enforceable.

"Here's an example of what can go wrong," Jim Hassett says, recalling the horrors in the O.P.M. file. "American Express signed a number of leases in which the full term was anywhere from 72 to 108 months. Amex was on the hook to the bank under the terms of the lease no matter what O.P.M. did—it had to pay for the equipment whether it was using it or not. O.P.M. was supposed to pay the banks for American Express's rent if it took back a leased computer, but when O.P.M. went under, American Express found itself exposed to the tune of millions and millions of dollars. While O.P.M. had an obligation to American Express, it had nothing to do with the obligation of American Express to the banks that were assigned the lease payment stream.

"I imagine many users are not cautious about this."

The banks loaned money on American Express's credit and, in a sense, didn't care if O.P.M. went away because American Express had to pay no matter what.

"None of the many users caught in such circumstances had ever gotten financial statements from O.P.M., with the exception of Rockwell International," says Hassett. "And the statements Rockwell got turned out to be forged."

In any event, obtaining a lessor's financials should be standard operating procedure. "A user must be extremely careful in looking at a lessor's financial statement," warns Pontikes of Comdisco. "He has to find out the real net worth of the company, after taking things out of the balance sheet assets like good will and anticipated residual equipment values." As a publicly held company, Comdisco includes assets and liabilities in its annual report. Other lessors, private as well as public, also produce financial statements for their customers to examine. While the reports are not comparable—leasing companies do not have identical report formats—it is possible to examine a lessor's representations to assess the ability of the lessor to make good on promises.

Further complicating a data processing department manager's life is the sublease concept. If a user buys a new computer to replace a leased 4341 that is at the limits of its capacity, the leasing company could try to sublease the old unit. Dp managers should remember that subleased equipment is technically the original lessee's property that is out on loan. Therefore, the sublease agreement must be treated as if it were a loan, and the borrower must be credit worthy. To protect the "owner," the sublease should include repossession provisions—if that asset is not paid for, and if the initial user has to make good on a loan used to finance it in the first place, the default of the new lessee will not affect the initial lessee's promise.

"If a user is allowing its credit to be used to the extent of tens of millions of dollars—as O.P.M.'s big customers did when they accepted a sublease from O.P.M. while their primary lease was running and enforceable—that user has to know whether the leasing company can meet its obligations," explains trustee Hassett. "Because when the user is bought out of a lease he is extending credit to the buyer unless he gets a lump sum payment. If you're extending credit, act like it. Go to your credit people. Find out if the sublessee is good for the money.

"Users who got hit by O.P.M. are now very careful about this. I don't have any way of knowing whether others have become equally cautious. I imagine that some have, and that many have not."

In real life, computer leasing arrangements can be as convoluted as the résumés of certain professional sports team managers. A computer may have two or three subleases layered on top of its title. The actual user, and everyone who used the machine in the past, have to be aware of the liabilities if any one part of the chain is broken. The first lessee will be responsible for repaying the loans used to purchase the machine, not the folks actually using the machine.

"To minimize risks," Hassett suggests, "the user who is subleasing a com-

"Thank you, sir, and here's your decal."

CARTOON BY ELI STEIN

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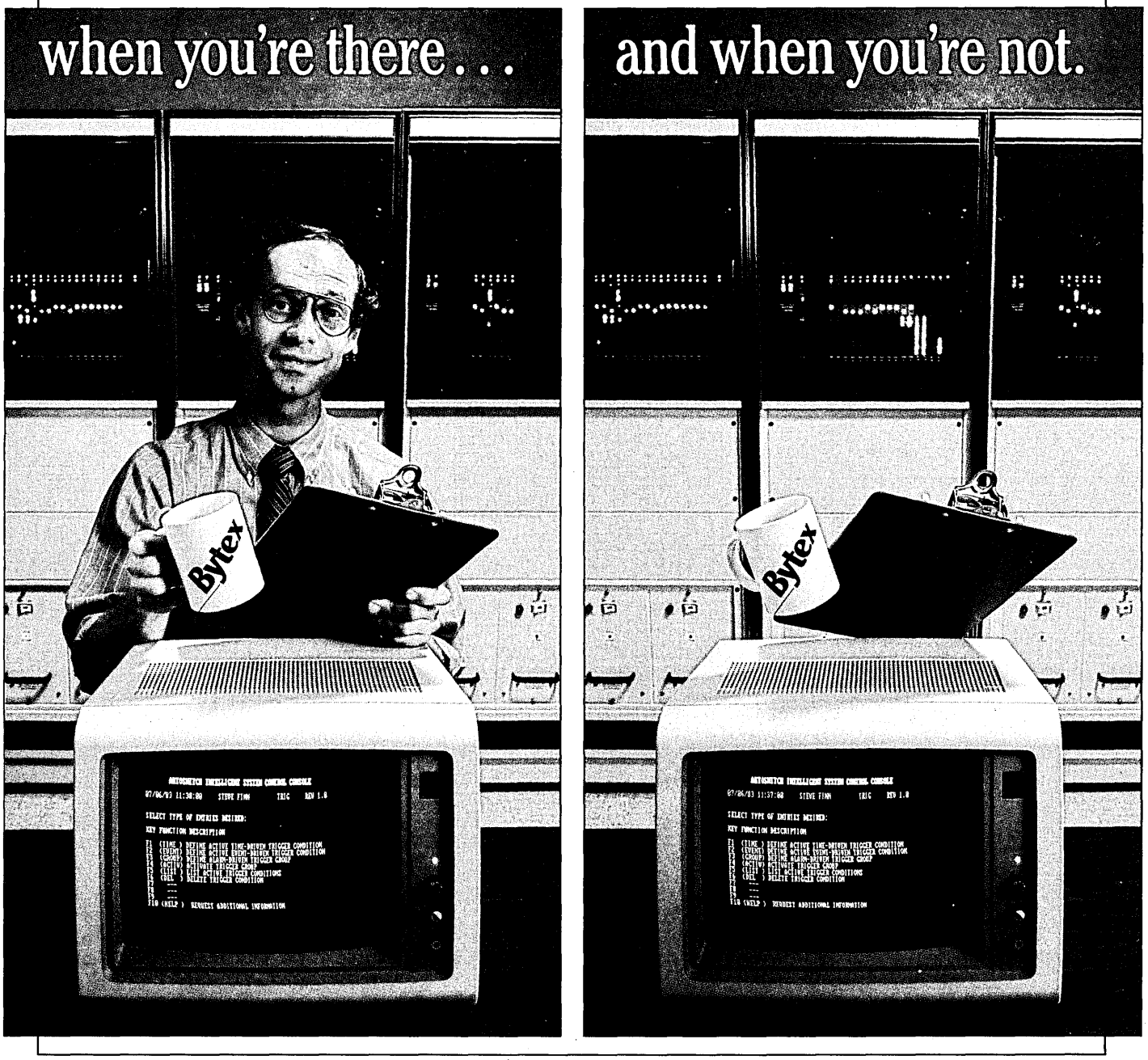

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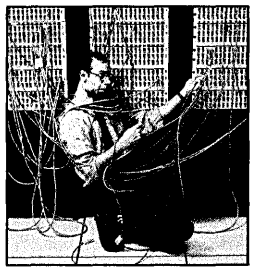

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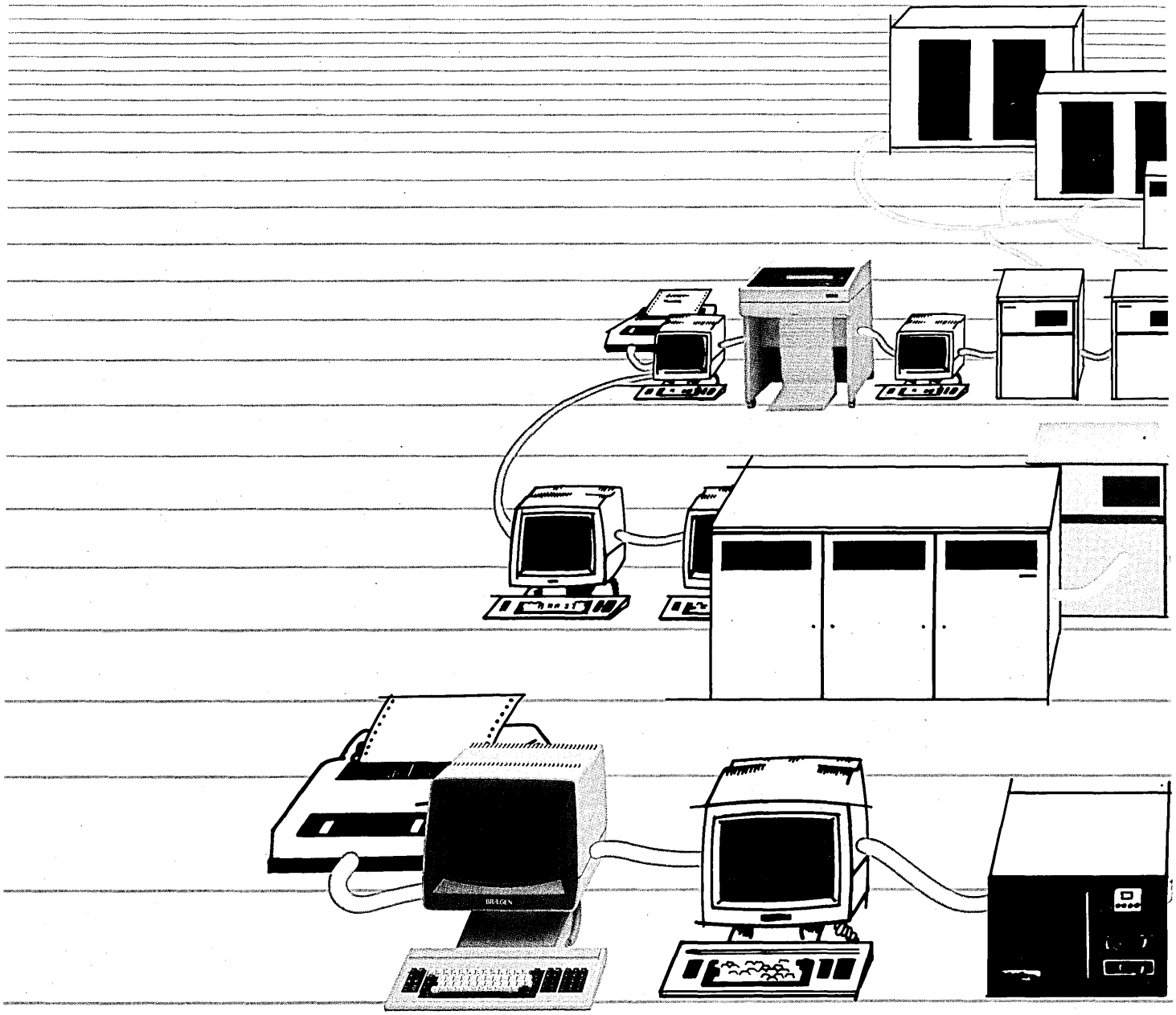

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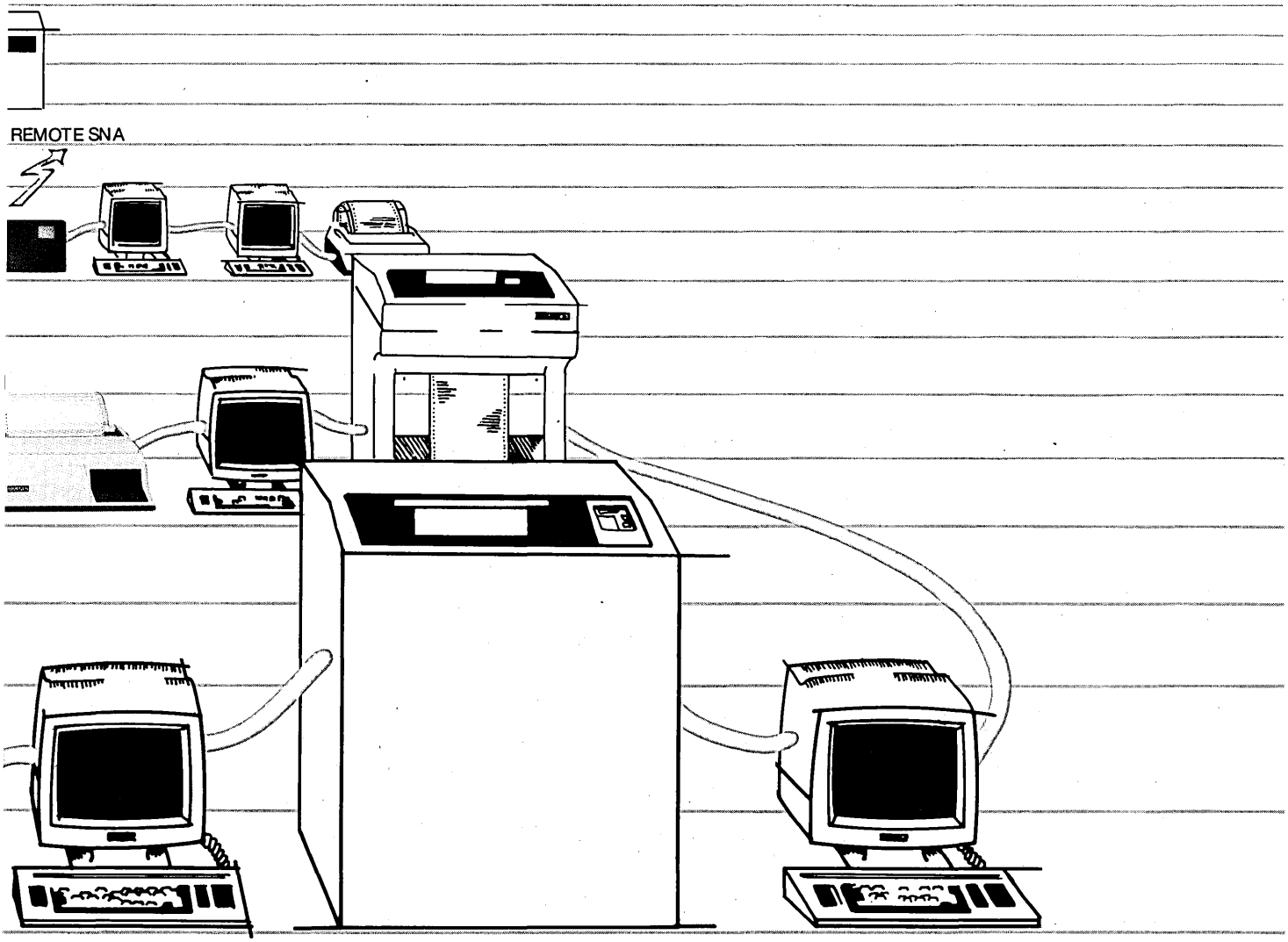

four distinct controllers—and multiple coaxial links of up to 10,000 feet each—to any of those LANs.

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IN FOCUS

puter—who has, in effect, become a lessor—must get access to the payment stream coming from the ultimate lessee. Alternatively, the user may decide that a big leasing company that arranged the sublease is good for the money—some are very strong—and that it is prudent to extend credit. But it is better to get the right payments, determine where the subleased machine is going, and file a Uniform Commercial Code statement that secures an interest in the computer." Basically, this protects the first lessor the same way a mechanic's lien protects a plumber from deadbeat customers.

"If a leasing company is in the middle, the user has to get financial statements," Hassett continues, "and make sure they are certified. Then, if something goes bad and the financial statements turn out to be no good, the user has recourse to the accounting firm."

Things ought not get to that point. Lessors can arrange transactions that do not put their ability to pay in the middle of a transaction, whether a primary lease or a sublease. According to Tom Martin, of Computer Financial, "A user who bases a deal on the lessor's ability to pay, knowing little or nothing about the other transactions the lessor is involved in at the same time, is making a big mistake. It's just as easy to reach an agreement that puts the lessee in a secure position. If a machine is the user's asset; and a lease obligation the user's debt, the user has to treat them both that way."

There is one way a user can get an upgrade before his lease is concluded that works in some circumstances, according to Pontikes of Comdisco. "The user may arrange to get his next machine's lease written as an offset," he says. "That is, the user pays only the difference between what would be the separate rental on the machine coming and the payment on the one going out. This can't always be done, but in many circumstances a leasing company can work it out."

Users should check such a deal carefully to ascertain what happens if the leasing company cannot pay for the sublease on a machine that has been removed. "A user can ask for, and get, a letter of credit that covers the obligation of the leasing company," according to Pontikes. And lump sum payments on the takeout can be gotten, too, under certain circumstances.

Despite the possiblity of some risks, there are times when the user will do best subletting a machine to a lessor. It's important to look at the risks before signing a contract, however. And to make sure to see if the same results could be obtained without taking chances. ✻

Hesh Wiener is president of Technology News of America Co., a computer newsletter and news service publisher in New York City.

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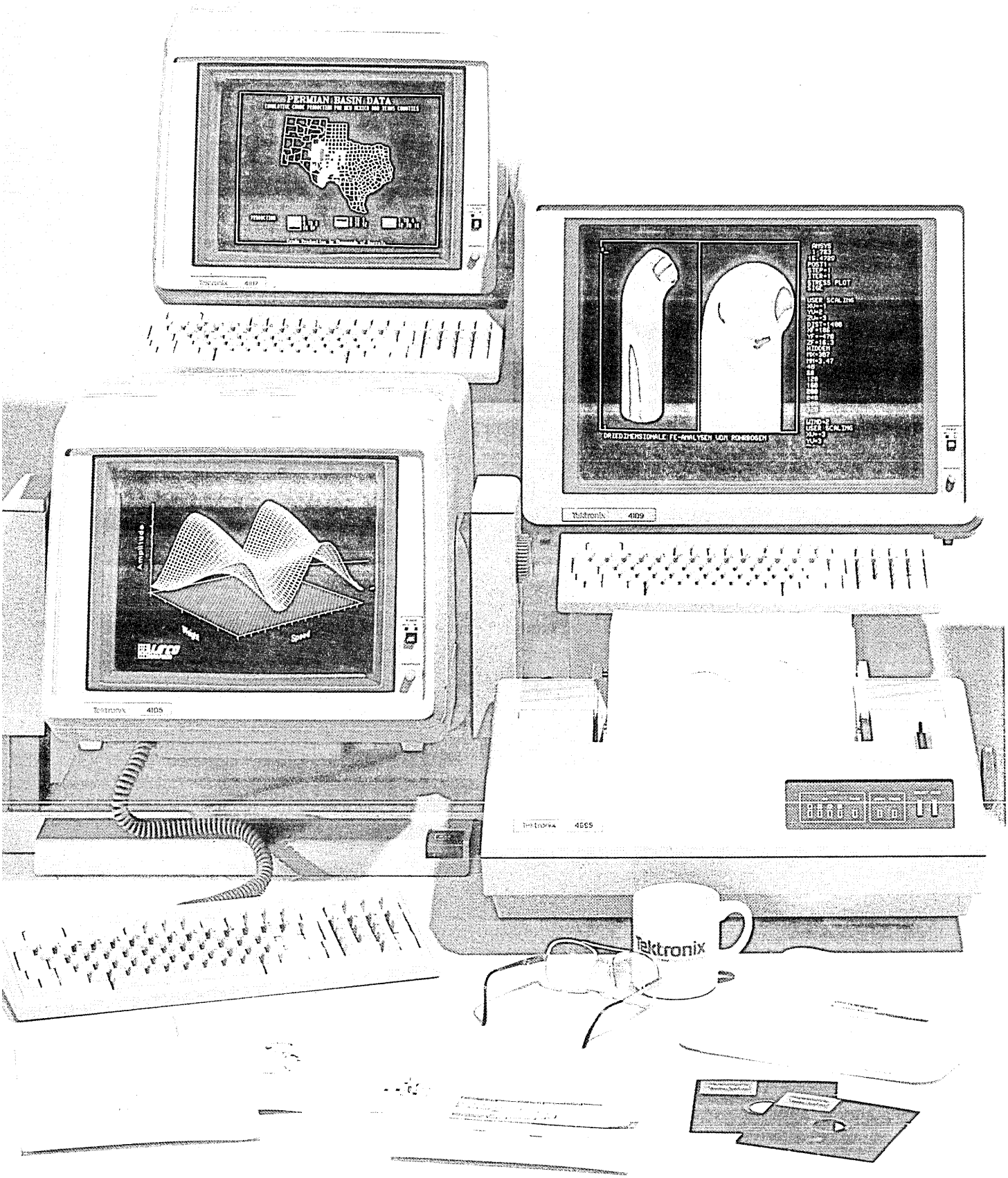
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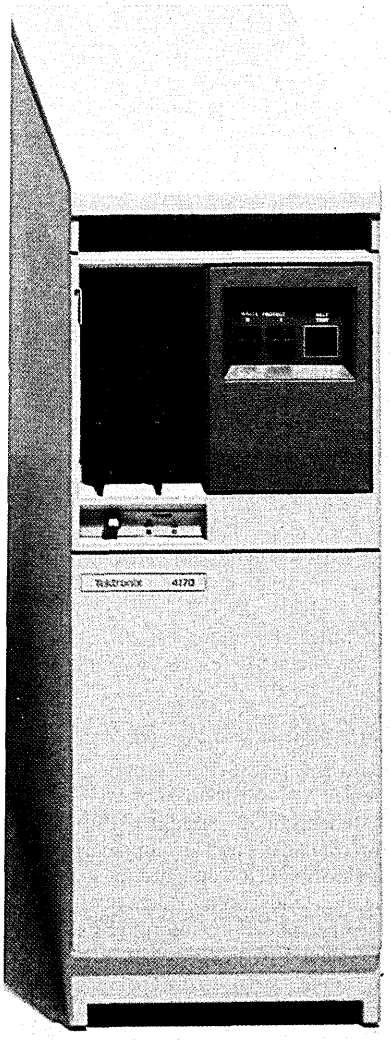
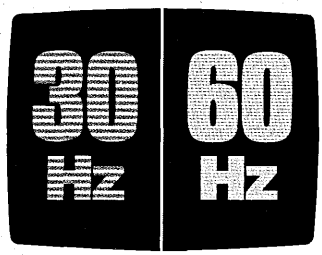


VT100 text editing and PLOT 10 color graphics are now packaged as basic desktop units and priced from $3995 complete.

Tek's new 4100 Series desktop terminals answer a range of resolution, screen size, color palette and local intelligence needs. All three feature outstanding 60 Hz non-interlaced displays and rapid 16-bit graphic processing speeds.



As simulated, Tek's 60 Hz refresh rate and bright phosphors result in a flicker-free image with perceivably better definition than that provided by 30 Hz terminals quoting greater pixel densities.

Standard capabilities include 38.4K baud communications; easy color selection from the keyboard; 4096 x 4096 addressable display space; a separate display surface for alphanumerics or communications dialog; and compatibility with ANSI X3.64 screen editors, including DEC VT100 extensions.

Each offers an unconditional, one-year on-site warranty. Tek Warranty-Plus extends this coverage two additional years at minimal cost.

	4105	4107	4109
Display Size	330mm (13")	330mm (13")	483mm (19")
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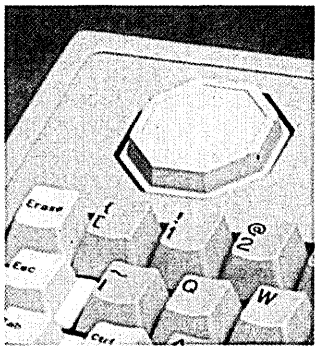
Graphics	8	16	16
Alphanumeric	8	8	8
Palette	64	64	4.096
Resolution	480x360	640x480	640x480
Segment Memory		128K Bytes	256K Bytes
Price	$3,995	$6,950	$9,950
Warranty-Plus	$195	$295	$395

For less than $1,600, you can add Tek's compact, plug-compatible 4695 Color Graphics Copier. With a palette of up to 125 shades, the 4695 lets you reproduce graphic and alphanumeric displays on report-size paper or transparency film at the push of a button.



All 4100 Series terminals feature programmable keyboards with innovative Joydisk for convenient graphics input.

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NEWS IN PERSPECTIVE

TRAINING

MICRO LEARNING CURVES

Companies are beginning to demand in-place computer literacy now for their middle managers and top executives.

by Edith Myers

The invasion of corporate America by microcomputers is spawning a new business that, if it ever defines itself, promises to become extremely lucrative.

It is the business of training business's top and middle managers to use their new toys. A three-year-old company in the field, Micro Courseware Corp. of San Francisco, is projecting sales of $5 million in 1984 and $100 million by 1989. Another, two-year-old American Training International Inc., Manhattan Beach, Calif., has been profitable each month since it opened its doors, according to its owners.

Deltak Inc., Naperville, Ill., which claims to be the largest organization in the dp training arena with $75 million in annual revenues, liked the looks of the micro training area so much that last February it started a separate facility to address the market.

Educators approaching the computer literacy problem at levels from elementary school through college predict that computer training will someday be a job requirement for most responsible positions. From executive suites comes the cry, "But what about now?" There seems to be a swelling need for almost instant computer proficiency and big business is seeking it any way it can.

National Training Systems, a Santa Monica, Calif., company that has been offering business training since 1974 and for the last two years has been conducting executive computer workshops, last month offered a one-day personal computer awareness seminar it calls Micro Ease concurrent with the IBM Personal Computer Fair in San Francisco. "When the sign-ups came in," said Lisa Gilmour, an executive assistant at National, "they all came with company checks."

Joel Rakow, executive vice president of American Training International said, "You never know who's buying." His company accepts mail orders for its line of interactive computer-based training products for micros, among other avenues of distribution. Through the mail, in fact, ATI received an open purchase order for 5,000 training systems from General Motors.

ATI in June assigned to Advanced Systems Inc. of Chicago exclusive rights to market its training software to Fortune 1,000 companies and the government.

Rakow said ATI's programs cover virtually every best-selling micro software package on the market and operate on virtually every microcomputer using the IBM P.C./DOS, Apple DOS, CP/M-80, CP/M-86, or MS/DOS operating systems.

He said large end users utilizing ATI products to train employees in various hardware and software packages include Xerox, Northrop, Hughes Aircraft, Transamerica Corp., United Technologies Corp., Procter & Gamble, Security Pacific National Bank, Coopers and Lybrand, Boeing Computer Services Co., and Harvard University Business School.

Rakow, whose background is in training rather than computers, founded ATI with its president, Francis Gaskins III. The two met four years ago when both were working with Toshiba, Rakow developing sales training and Gaskins evaluating software packages. Rakow believes firmly that a knowledge of instructional technology is essential to the development of all training tools. "A person with this knowledge then works with a subject matter expert.

"When the sign-ups came in, they all came with company checks."

"An intelligent professional doesn't want to know anything about a computer. We teach him what it and the software does and what to look for when it's doing it," he said.

Of the interactive tutorials ATI has for specific software packages, Rakow said the most popular are for MicroPro International's Wordstar and Ashton Tate's dBase II, followed by "all the Calcs."

Harvard Business School professor Jim Cash selected ATI's VisiCalc interactive tutorial for students in the school's PMD (Program for Management Development) next spring. He surveyed PMD participants to determine the kinds of pressures they were under to become fully informed on information systems, particularly personal computers.

"They told me they had had role models, senior executives who were adverse to technology and management science methods. Now they're seeing new people coming into their companies who are competent in both. They feel pressured to get their [own] learning curves up." The PMD program runs 13 weeks for managers with 10 to 15 years of experience. Cash has written a book he will introduce into the program in the spring which covers both management science methods and personal computer technology. Each copy will come with a floppy disk containing ATI's VisiCalc training program.

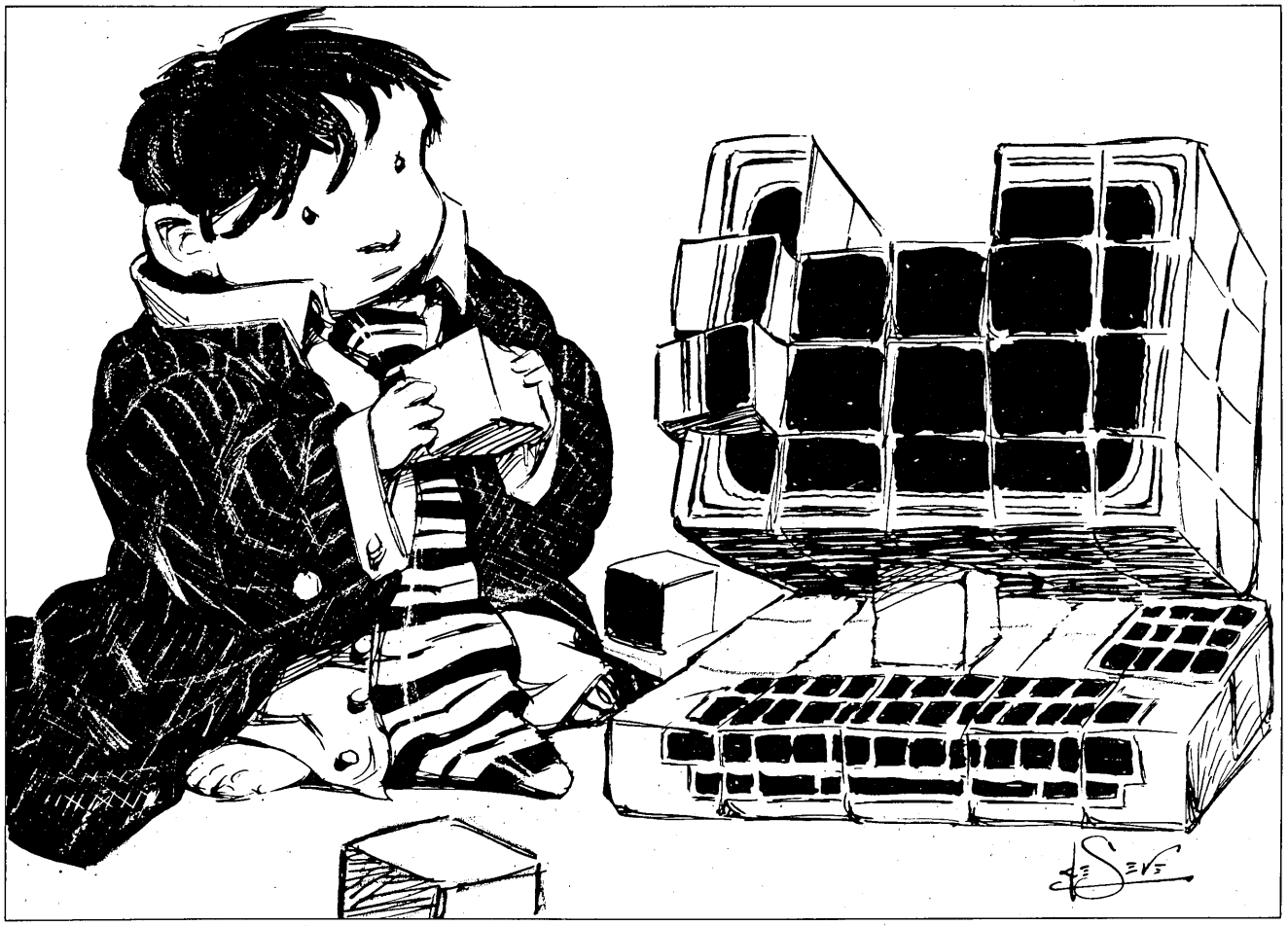

ILLUSTRATION BY PETER DE SEVE

He emphasized that PMD participants have been using personal computers for a year now in the areas of finance and accounting. They have had one IBM P.C. for every two students but next year that ratio will be one to one.

Another HBS program, AMP (Advanced Management Program), has had an information science study as an elective. Cash anticipates doing for this program what he is doing for PMD within a year.

Cash said he determined through his survey that his students wanted interactive tutorials to get their learning curves up as opposed to audio or video cassettes. In his case, he combined these with a book.

Books in the area of microcomputer education abound. Arthur Leuhrman, founder of Computer Literacy, Berkeley, Calif., is in the process of preparing a series of self-study books on "computer literacy for managers," which he expects to have complete within nine months. Their use presumes access to a computer, as they are assigned for a hands-on approach. Leuhrman said his initial materials will be geared to the IBM P.C. and possibly Osborne machines.

He's looking at integrated packages, particularly Lotus 1-2-3 and the VisiCorp family. He contemplates bringing in outsiders to rework his materials for other computers.

A variety of combinations of material are available for seekers of microcomputer literacy (see box). Deltak Microsystems offers its most basic courses as a combination of videotape (both three quarter inch and half inch) and floppy disks. One of these, "How to Get Started with the IBM P.C.," covers such elementary aspects as "how to take it out of the box and plug it in," a spokeswoman said. The second basic course is "How to Use Software with Your IBM P.C."

All Deltak's courses are geared for the IBM P.C./XT and Compaq computers. The basic courses use videotapes, while courses in two other categories, productivity software and operating systems and languages, are strictly floppy disks and text. In the productivity software category, in which 25 packages are to be available by year-end, programs are called "Teach Yourself" and cover such topics as VisiCalc, Lotus 1-2-3, MultiPlan, and dBase II.

"They told me they had had role models, senior executives who were adverse to technology and management science methods."

When Deltak Inc. spun off Deltak Microsystems, it had several PC courses under development. These remain in the parent company's rental catalogue. For the future, the company sees itself turning all microcomputer course development over to the new subsidiary that will handle purchases only. "We've learned that the marketplace is asking for courses that can be purchased," the spokeswoman said.

She added that the PC courses in the parent firm's catalog will continue to be available for rent and are more in depth than those of the spin-off firm.

Bob Rutan, marketing director for MicroCourseware Corp., which has been doing custom training packages for three years, said the company's "Blue Chip 1: An Introduction to Micro Applications" will be ready for product distribution Oct. 15. Introduced at PC '83 in June in San Francisco, it is geared at developing computer literacy for the professional first-time user.

"It is being offered in a market so new it is hard to define," said Rutan. "Our goal is to achieve in five years a 3% market share of an estimated 50 million executives, middle managers, business owners, and new white collar workers. That's a pretty substantial market, ranging from $3 billion to $35 billion."

He said industry figures for 1980 showed external data processing training capturing nearly $2 billion. "Figures for 1990 are estimated at $25 billion—just in

NEWS IN PERSPECTIVE

TRAINING AT EQUITABLE

Bob McKenty believes in in-house training for managers, professionals, and executives using microcomputers.

"You can tailor the training to your environment and control the curriculum when you're doing it yourself. You can set standards and show your people that you have the capability in your own organization. Too many consultants coming in from the outside is bad for local morale."

McKenty is a training specialist with the distributed computing technology group of The Equitable Life Assurance Society in New York. He has been in data processing and with Equitable for 26 years, a dozen of which have been spent in training activities.

Besides the in-house aspects, he believes in the personal touch. "My instincts are that technology should not be used to introduce technology to people. Tutoring is the most effective technique of all, working with people on the parts they're most interested in."

A year ago, McKenty started developing materials for in-house courses for managers and professionals using Apple computers. Then last December came a mandate from Equitable president John B. Carter that all senior executives be made acquainted with basic microcomputer use.

"He [Carter] thinks technology is a major factor in the future of the company. We have a mandate from the top," says McKenty. When the mandate came down, he had to shift gears. "We refocused in two ways. The development had been geared toward classroom training for Apples. Top executives are never available at the same time so we had to shift to tutorials in a packaged form and to IBM P.C.s, which were what the executives were getting."

He developed a lesson on videotape covering "VisiCalc and a little bit on operating systems." McKenty himself was featured on the tapes. "This was new to me. I'm used to being a live, stand-up trainer."

He learned that pacing the video instruction too slow could turn off quick learners so he struck a medium pace. "Slower learners could always stop and replay," he notes.

The tapes were accompanied by diskettes for hands-on experience at the keyboard while the tapes were being viewed. McKenty says, "All the returns aren't really in and all I can say is if there was a problem it was in the perceived relevency of the software. Not all people find spreadsheets pertinent to what they do."

The video/diskette packages were distributed to 18 senior executives and later to others in the company who expressed interest. "One guy who is a quick study went through it in one morning and was able to use a spreadsheet to do a budget."

With the package for executives completed, McKenty picked up again on the live course program targeted to managers and professionals. It became a two-day workshop using a mix of Apples and IBM P.C.s with two or three instructors for a maximum of 10 people. By early August, 35 people had been trained. The program has been moved from McKenty's domain to Equitable's Employment Development Center, where it is offered as an elective training course.

McKenty said there has been high interest in the course and he anticipates some 1,000 people will eventually complete it.

He sees both the packaged training and the classroom training as evolving to three stages. The first would be the spreadsheet with, perhaps, a course called "The Computer as a File Cabinet" as an alternative entry point. After that would come linking to outside databases such as The Source or Dow Jones, and, finally, linking to the company's own mainframe computers and databases.

With the day-to-day responsibility for the training out of his hands, McKenty currently is looking into training for new software packages, specifically for Lotus 1-2-3. But he's still tied into the training in an advisory capacity.

"It's exciting and I love it," he says of his training experience. He tells of one neophyte who became a computer zealot as a result of the two-day course. "She left looking for the nearest computer."

—E.M.

the data processing field, not counting those in general management or accounting positions who will be using the micro as a tool to solve their general business problems."

Gilmour of National Training Systems, which offers combinations of training materials and personal instruction, said her firm will be completing its biggest executive training program to date, the training of some 1,100 managers at United Technologies Corp., by the first of next year. The program began in mid-1982 with managers trained for three days each at a rate of no more than 16 at a time.

The UTC workshops were for users of IBM P.C.s and Context MBA software. National is completing development of a two-day, hands-on workshop for Lotus 1-2-3. "We respond to the demands that come in over the phone and the IBM P.C. and Lotus 1-2-3 are what it's all about right now," said Gilmour, adding, "but this could change overnight if someone came out with something better."

All Deltak's courses are geared for the IBM P.C./XT and Compaq computers.

National, which recently merged with Safeguard Business Systems, has ambitious expansion plans that include opening offices and training centers in Boston, Chicago, Dallas, and San Francisco for starters.

Gilmour extolls the use of an "A-B" switch in training novices. In a group, a participant can elect to be tied into the instructor's computer or go it alone simply by changing a switch. "It allows an instructor to work with a small group of people experiencing problems while the rest go ahead at their own pace."

Another National touch she says is popular is the use of a simulation game in which students become movie producers bidding on movie stars. This technique is incorporated in both the three-day and the two-day offering.

She said the one-day Micro Ease workshop that debuted last month is strictly an awareness seminar. "There's no way a novice can become proficient in one day."

Peddling microcomputer literacy is a growing market in which new entrants and new approaches are proliferating.

Last month a small Irvine, Calif., training firm, Learning Source Inc., hired Ernie Sobel away from Woodbury College, a Los Angeles business college, to attack this market. In early August, Sobel said his program was still "in the embryonic stage," but he's expecting to have an offering ready "in a couple of months" that will incorporate live instruction and will be available on customer sites or at Learning Source's Irvine facility.

MICRO MEETS VIDEO

Users can become computer literates after five hours of videotape instruction.

by Edward K. Yasaki

In the learning center at the Computerland store in La Mesa, Calif., near San Diego, customers are gaining hands-on training and learning to use the Apple II and IBM Personal Computer while watching a videotaped presentation.

"People are demanding training, and with our limited resources we don't have to hire a full-time trainer," says the store's John Ray. "We can use videotape and the sales force on the floor to answer any questions."

At a large California bank, too, computer support personnel view tapes, which are said to provide "a convenient, quick solution for people within the support

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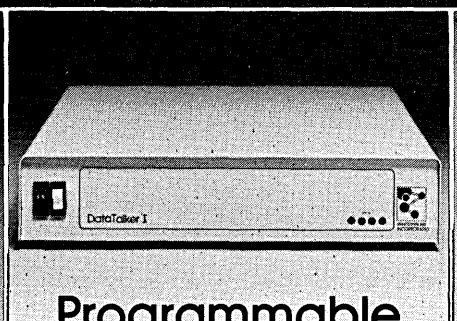

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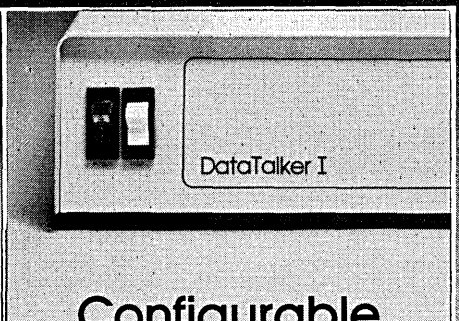

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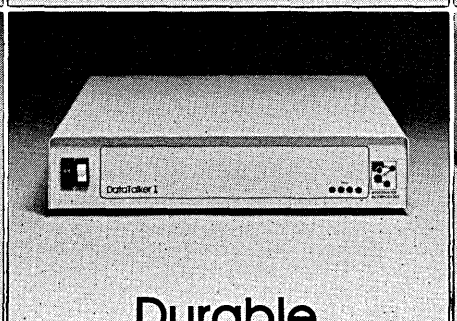

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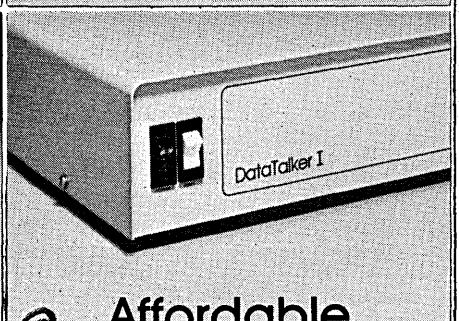

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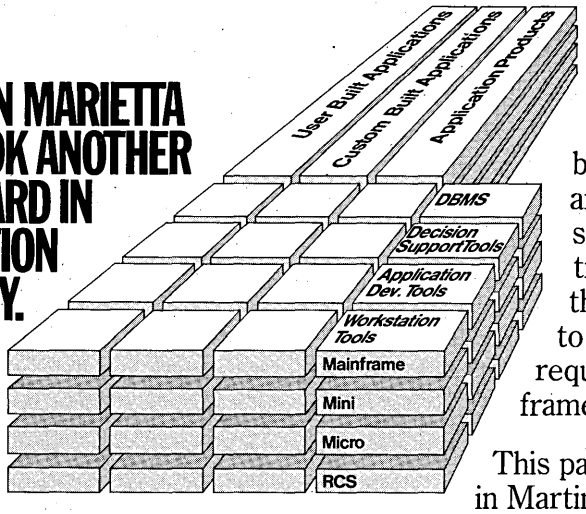

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group who have had no exposure whatsoever to microcomputers."

The tapes are the product of what formerly was a small television production house in Mill Valley, Calif., now called Kennen Publishing. Since the company's first tapes on the Apple II were shipped in September 1982, others on the Apple III, the IBM P.C., and the Apple IIe have been completed, the latter yet to be shipped. But in the first 10 months, upwards of 3,500 instructional videotapes have been sold.

Also in wide usage is training software packaged on three floppy disks by Cdex Corp., Los Angeles, Calif. Its instructional program on the IBM P.C., for example, covers on the first diskette key terms and concepts, first contact with the machine, and system components. Disk 2 gets into the use of DOS and BASIC and further details of the system, and disk 3 covers additional DOS features, other operating systems, programming languages, and applications programs. It typically takes about three hours to complete a course, says the firm's Gary Niedermier.

He figures about half of the company's sales have been to large corporations and the other half to small- and medium-sized firms, through a network of dealers. Niedermier won't say how many of his firm's programs have been sold since the first program on VisiCalc was shipped in October '82, but he figures on becoming a $50 million to $60 million company within five years. In addition to offering how-tos on the Apple II and IBM P.C., the firm is scheduled to begin porting its product over to the DEC Rainbow and the TI Professional.

"Basically, the first script, which was the Apple II Plus, evolved out of our frustration with trying to learn how to use the computer from reading the manuals," says Ed Dudkowski, one of the two principals at Kennen Publishing. "I was angry that this machine consumed so much of my time to learn how to use it." Dudkowski, who has been in electronics for most of his life, felt there had to be a more efficient way, perhaps through the use of video techniques, which was his business. "Good, solid instructional television techniques are adaptable to any field," he adds.

Dudkowski and coprincipal Marijane Lynch undertook the scriptwriting. Rewrites were performed by writing experts and technical consultants, and suggestions were solicited from training personnel employed at computer stores. When the script was completed, shooting required upwards of 15 days, followed by two to three weeks of tape editing. Only when this was completed was the product tested on 30 people who had never used a computer before. They were expected to learn the use and operation of the computer after five hours of viewing the tape, without assistance from anyone to answer questions. This same technique, including additional reviewing by instructors in personal computers at a local junior college, is still being followed in the production of new tapes.

Dudkowski explains that with the Apple II and IIe, every buyer must open up the cabinet and physically install a disk controller board. This forces the buyer to look inside and see what makes up a computer.

"Early on in the tape, having them open up and physically install the card and the disk drive causes their feeling of intimidation to go way down," he says. "And so the machine begins to become friendly, even before they've turned it on." He wishes that was also required with the IBM P.C.

"In terms of an initial exposure," says the bank consultant, "the tape assumes that you've just received the personal computer and it's still in the box, which, of course, is not the situation we have. But it still gives someone who has had no exposure whatsoever to a computer a very good overview, including how it all fits together. And, indeed, some of our people [in the support group] will be responsible for that kind of installation."

He adds that "it teaches some general concepts about the operating system, some of the capabilities such as copying a disk, a bit about what programming is, and

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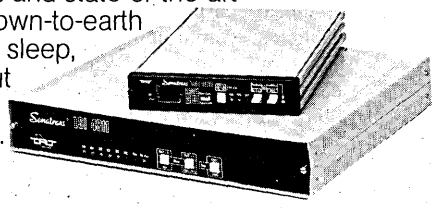

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just enough to give someone a sense of what it is and to do a few practices."

The Kennen tapes, all priced at $69.50, $10 more than the Cdex software, range in length from 105 minutes to 145 minutes, not counting time spent by the student when the tape suggests a pause for hands-on practice. At the northern California bank, the videotape recorder and color tv are set up next to the computer "so that what [the students] see on the tape is exactly what they see in front of them," says a spokesman. Students there are said to spend a maximum of two and a half hours viewing the tape, including all interaction with it.

In terms of the relative efficiency of audio- and videotapes for training purposes, Kennen's Lynch, who has a background in instructional tv, says that it depends on what you're teaching and on the individual. "People learn in all different ways," she says. "Some people can sit down with a technical manual and be just as happy as a lark. Other people can listen [to an audiotape] and imagine pictures in their head and be O.K. Most people have a problem with that, though." She thinks illustrative material, even flip charts with words, work better than mere audiotapes.

"I don't say that videotape is the end-all, by any means," Lynch adds. "But with the videotape, when you've finished that tape, you'll be using the computer." That's not true of all introductory material now available. "You won't be using the computer, I guarantee you, after reading the manual."

Users of these instructional packages tend to be, but are not restricted to, business organizations. In a number of cases, the Cdex sets have been purchased by MIS or dp departments and supplied to end-user departments, says Niedermier.

HEALTH AND SAFETY

VDTS O.K. BUT...

The National Research Council says the machines' placement in offices is more troublesome than the crts themselves.

by Willie Schatz

The National Research Council has given the controversial video display terminal (vdt) a clean bill of health, determining that the ubiquitous office device itself does not give off harmful radiation, as some critics have complained.

But the manner in which many vdts are installed in offices leaves much to be desired, according to "Video Displays, Work and Vision," a 236-page report recently released by the NRC, an operating arm of the National Academies of Science and Engineering and the Institute of Medicine. The report states that while there is "no scientifically valid evidence" that use of vdts will increase the risk of ocular diseases or abnormalities or cause harm to the visual system, workers can suffer ill effects when using awkwardly placed screens.

The NRC also reviewed the existing scientific literature on the biological effects of vdt radiation and found that levels of radiation during normal operation are "highly unlikely" to be hazardous.

The study was requested and funded by the National Institute for Occupational Safety and Health (NIOSH), which has previously investigated complaints and potential health hazards from the use of vdts. It took two years and $180,000 for the 12-member NRC panel to produce the report.

NRC's expert words are the latest. But some people don't think they are the greatest. Everyone knows they won't be the last in the continuing vdt debate.

"We find no scientifically valid evidence that occupational use of vdts is associated with increased risk of ocular diseases or abnormalities, including cataracts," the report's executive summary says. "Existing

knowledge makes such an association seem quite unlikely. We find no scientifically valid evidence that the use of vdts per se causes harm, in the sense of anatomical or physiological damage, to the visual system.

"The symptoms of ocular discomfort and difficulty with vision reported by some workers who use vdts appear to be similar to symptoms reported by people performing other near-visual tasks. Temporary changes in measure of visual function reported to occur following vdt work appear to be similar to those observed after performance of near-visual tasks in non-vdt jobs. Most features of vdt work tasks that may contribute to discomfort of visual difficulty are also found in various jobs not involving vdts; however, poorly designed vdts, workstations, and work tasks often produce a particularly problematic concatenation of adverse features."

On the touchy subject of radiation emissions, the executive summary was equally emphatic. "A number of competent studies have found that the levels of radiation emitted by vdts are far below current U.S. occupational radiation exposure standards and are generally much lower than the ambient radiation emitted by natural and human-made sources to which people are continuously exposed. We have not attempted to evaluate the adequacy of existing standards, but our review of the scientific literature on biological effects of radiation emitted by vdts under conditions of normal operation and under conditions of malfunction or aging of the vdt are highly unlikely to be hazardous."

Though the panel's expertise lay in visual issues, it touched briefly on the question of whether vdt radiation adversely affects pregnancy, as many workers have alleged. The panel referred to two formal studies as having determined that "vdt work was judged unlikely to be a causal factor," while acknowledging, however, that the reports "have not been publicly disseminated."

The panel's verdict was not unanimous. Lawrence Stark, a professor of physiological optics and engineering science at the University of California, Berkeley, and a professor of neuroopthalmology at Cal's Medical Center in San Francisco, wrote a dissent in which he criticized the majority for not seeing it as he saw it.

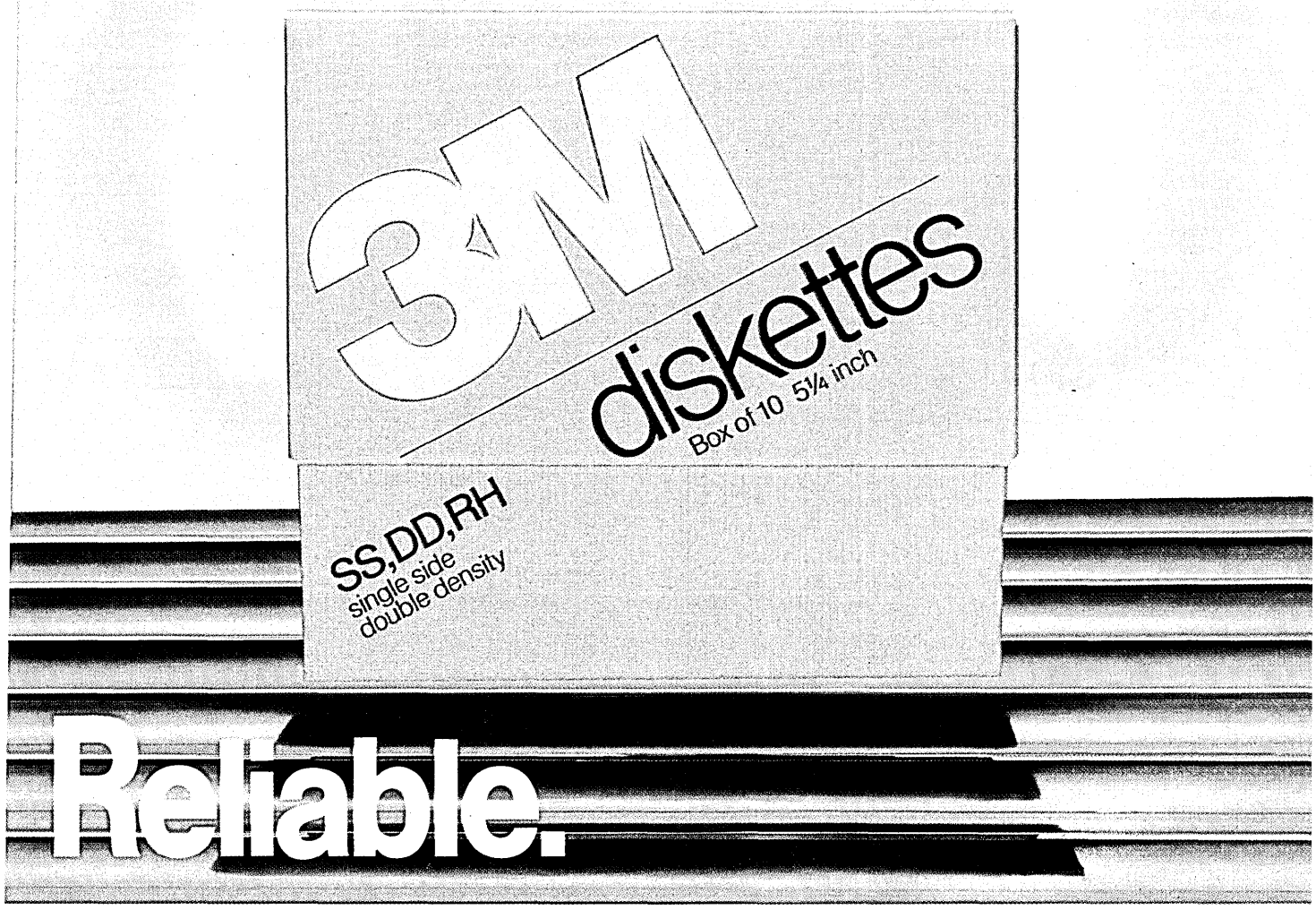
"The report does not provide adequate guidance to a vdt user or his or her physician regarding complaints of ocular discomfort and visual fatigue," Stark said in the back of the book. "I believe that many highly motivated vdt users suffer from ocular discomfort and visual fatigue beyond that appropriate to a normal work place.

"The report does not provide adequate guidance to a vdt user or his or her physician regarding complaints of ocular discomfort and visual fatigue," says one panel member.

"I do not, however, disagree with the body of the report or with the 'Executive Summary' in any of the detailed findings; in particular, I do not believe that radiation damage or serious diseases such as cataracts result from vdt use. My dissent rests on possible misinterpretation of the report with its detailed, balanced 'scientific' outlook and style, as supporting the status quo of no standards or guidelines for vdt work places and no clear concern with unacceptable levels of ocular discomfort and visual fatigue."

According to Stark, the committee met three times in the first year, then not at all in the second. He requested a meeting, first verbally, then in writing, before the release of the report. It never happened.

"I wanted us to get together and discuss some of the outstanding issues, the state of the findings, and how the report would be viewed by the public," Stark said. "It was 18 months between our final meeting and the issuance of the report. We traded voluminous correspondence, but



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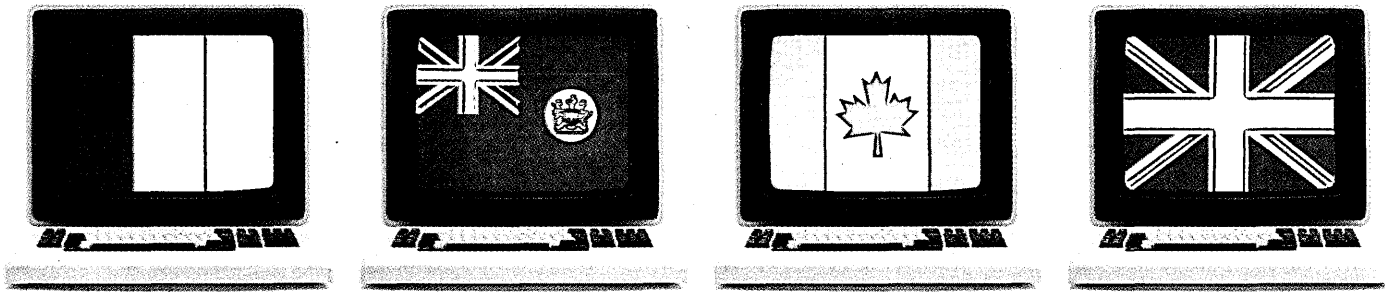

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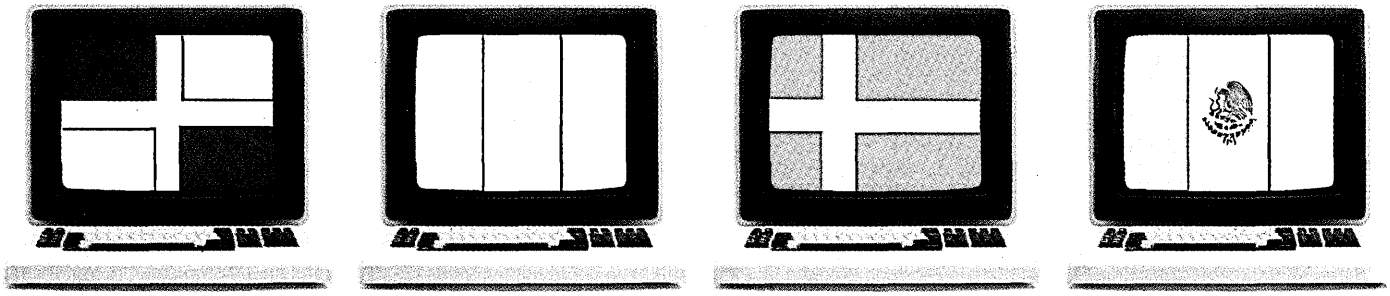

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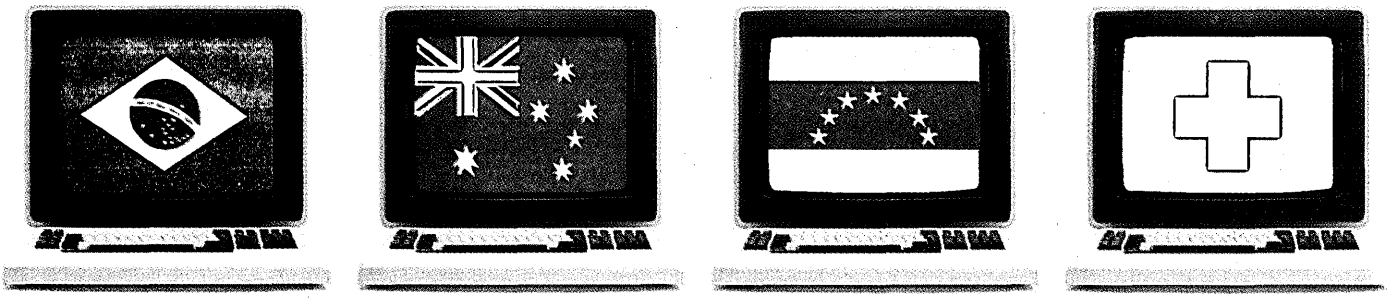

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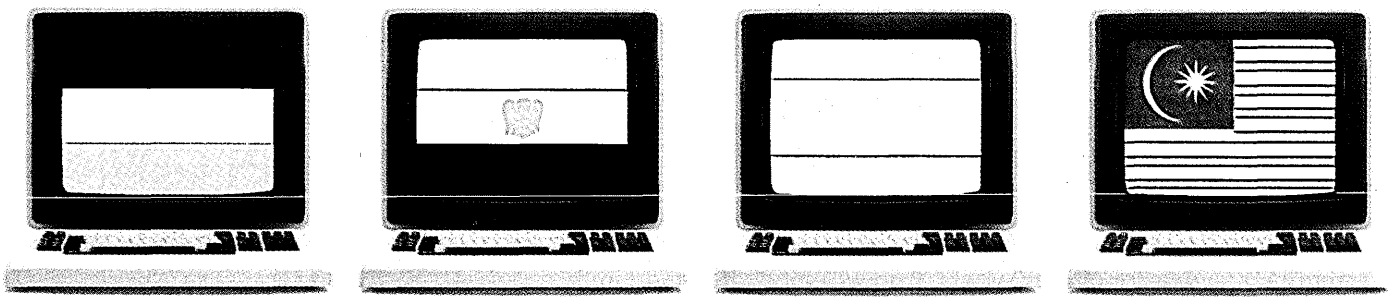

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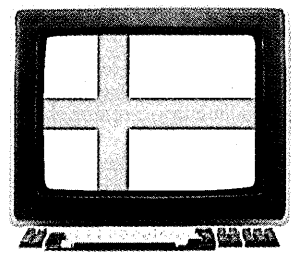
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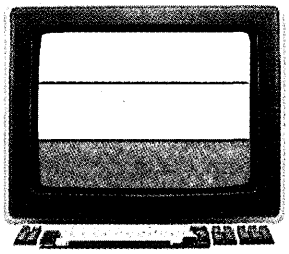
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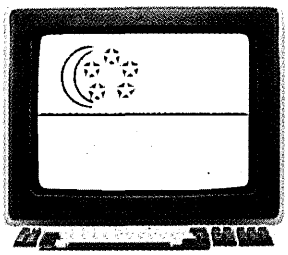
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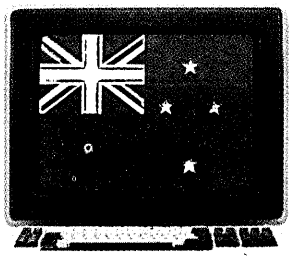
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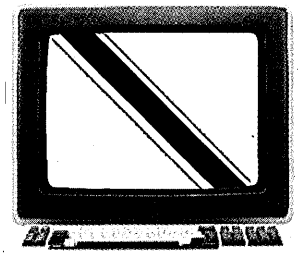
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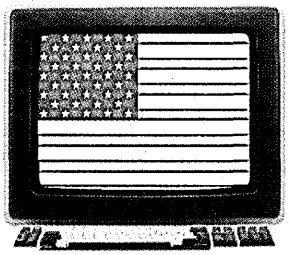
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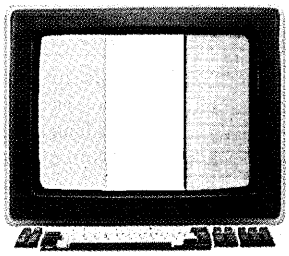
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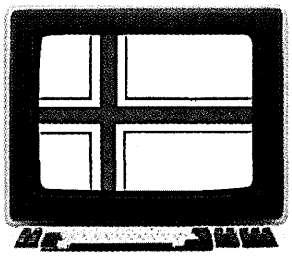
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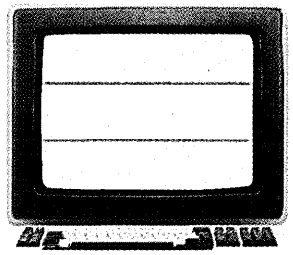
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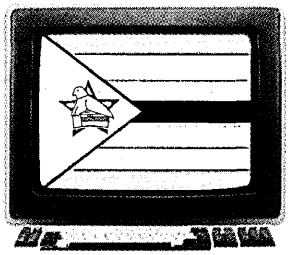
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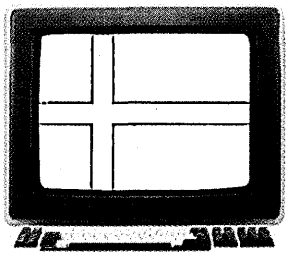
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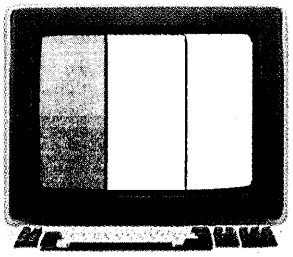
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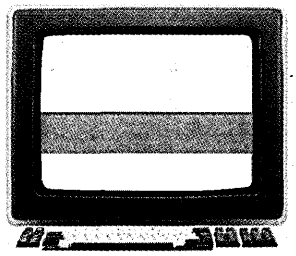
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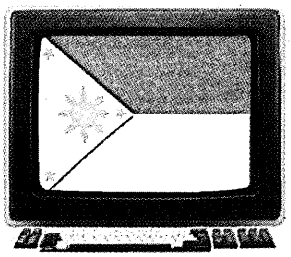
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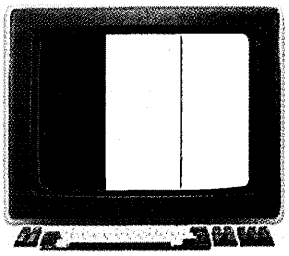
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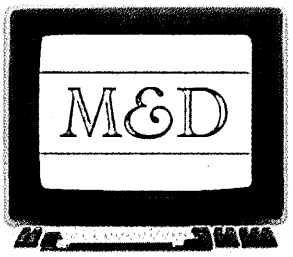

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CIRCLE 33 ON READER CARD

that's not the same thing as meeting face to face. I think the chairman [Edward Rinalducci, a professor of psychology at Georgia Tech] was being a very cautious scientist."

Too cautious, according to another critic.

"The Executive Summary is nothing short of misleading," contends a spokeswoman for 9 to 5, formally known as the National Association of Working Women, and one of the most vocal critics of alleged vdt hazards. The association says it has received 3,032 calls in the last eight weeks on its "vdt hot line." Leading the complaint standings with 17% are eye problems.

"The summary acts as though it's reasonable to say there are no problems," the spokeswoman says. "But the report reflects the lack of consensus on whether or not there are eye problems and what should be done about them. They say they're not going to deal with radiation, then they go to great lengths to advance the issue. That was totally inappropriate. It has the effect of setting policy. The real problem is that there's not enough research."

No argument there, even from the majority. "No study we have reviewed has been adequate in meeting the criteria for adequacies of research design, theory, measurement, and sampling," the panel said. "The relationship between the use of vdts and well-being has yet to be studied in a satisfactory, scientific manner."

That raises the question of whether this distinguished scientific panel filled that void. It did urge that the terms "visual fatigue" and "eyestrain" be described as "ocular discomfort, changes in visual performance, and changes in oculomotor functions." And it blamed eye problems (for lack of a better scientific term) on the placement of vdts in the office, rather than on the machines themselves. In short, the fault, dear operators, lies not in the manufacturers but in the bosses.

'IBM wouldn't be spending millions on electroluminescence if it thought vdts were really O.K."

"Evidence suggests that job design and task requirements can produce job-related physical symptoms and stress," the summary said. "Thus it is possible that differences in reported symptoms between vdt workers and non-vdt workers might be more directly related to characteristics of the work situation—i.e., the way in which vdts are used—than to characteristics inherent in vdts.

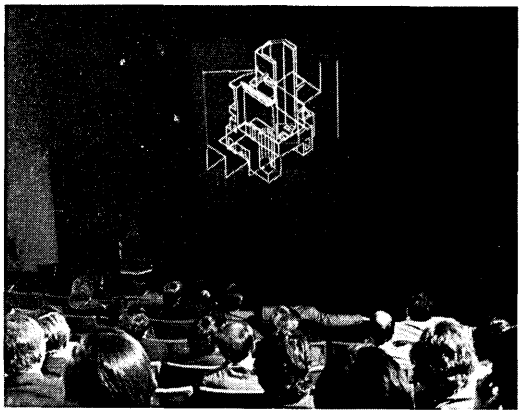
"The comfort, performance, levels of stress, and job satisfaction of workers who regularly use vdts have in many cases been adversely affected by failure to apply to jobs and equipment well-established principles of good design and practice. We strongly recommend that manufacturers and users of vdt equipment draw upon available scientific data in designing and selecting vdt equipment and in designing vdt-related work."

But until—or, more likely, if—that blessed day arrives, workers will continue to sit in front of their terminals. They will continue to complain about eye problems. Whether they will be heard remains to be seen.

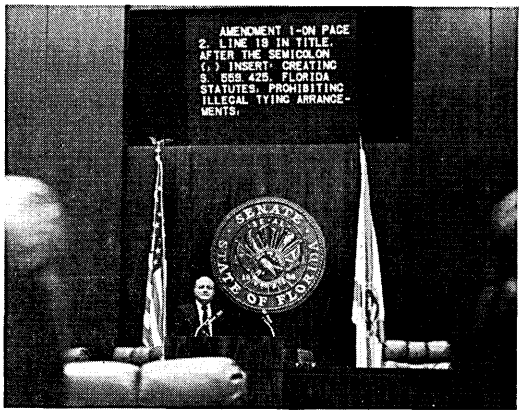
"We can't be getting all these complaints for nothing," the 9 to 5 spokeswoman says. "What are we supposed to do, think these people are imagining things? In the long run this report will mean nothing and be shown up for what it's worth."

"There's no doubt that vdt users suffer increased severity and prevalence of ocular discomfort beyond what is appropriate for non-vdt workers," Stark says. "The report says that, although you have to look in the fine print to find it. The summary certainly doesn't say that. That part is a whitewash for the status quo.

"The report should have said that vdts are difficult to look at for a nine-to-five day. Vdts just aren't good machines. IBM wouldn't be spending millions on electroluminescence if it thought vdts were really



COMPUTER-AIDED DESIGN displayed by General Electric projector is viewed by Engineering Society of Detroit.



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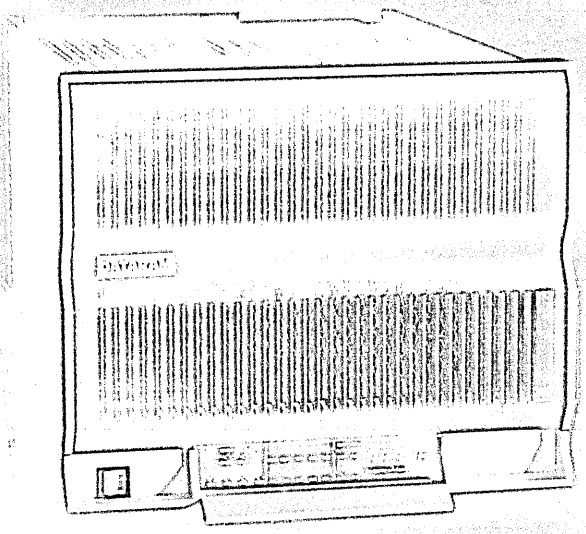

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O.K.,'' Stark added.

''This report undercuts the credibility of people who sit in front of vdts and then go home with their eyes bothering them. I'm not a raving radical, even if I live in Berkeley. Milton Friedman is my economist. But the people in 9 to 5 and the workers who complain about eye problems have a real, legitimate gripe.''

They'll continue to be heard. As will everyone else.

WASHINGTON

GOVT.: GETTING SMART?

Computers could save the federal government as much as $21.8 billion over three years, according to a privately funded study.

by Willie Schatz

On paper, the President's Private Sector Survey on Cost Controls (PPSSCC to its friends) Task Force on adp/OA doesn't figure to be more than another 214 pages on the scrap heap of reports detailing the woes of the government's dp and information resources management situation.

It's all been said before. Adp inventory is obsolete. Dp is mismanaged. OA is a total mess. Government can't get good help anymore. Things have gone from bad to worse and are going downhill from there. After millions of pages in hundreds of GAO reports, everything still remains the same.

But it may not after this epic. Why should this report be different from all other reports? For several reasons. First and foremost, it was written—and underwritten—by the private sector. It didn't cost the government a cent. Chairman of the group's executive committee, established after President Reagan brought the PPSSCC into being on June 30, 1982, is J. Peter Grace, one of the country's business heavyweights. The adp/OA task force, one of 36, was cochaired by William Agee of Bendix, Joseph Alibrandi of Whittaker Corp., and Donald Procknow of Western Electric, not exactly a trio of lightweights.

Second, the report talks about saving money, $21.8 billion over three years, to be exact—$11.2 billion is identified by this task force and $10.6 billion identified by other task forces. This windfall is contingent upon the government acting on PPSSCC's advice, of course. That wasn't part of the original deal.

Third, the task force makes numerous recommendations that seem bureaucratically feasible. They would surely create some order out of the current chaos. Making them was easy. Implementing them will be another story.

''By itself this report won't do anything,'' admits project manager John Kerr. At the time of the study, Kerr was President of Whittaker-Medicus, a unit of Whittaker Corp. Kerr is now president of Mediflex Systems Corp., a software supplier to hospitals.

''But I think this report will make a difference,'' Kerr says. ''The cumulative effect of the GAO reports, the Carter reorganization initiatives, and this administration's reorganization efforts have gotten us close to making something happen. And Peter Grace is very good at hitting people over the head. This report should help in getting these ideas implemented.''

''I think this report will make a difference. Peter Grace is very good at hitting people over the head.''

If those ideas come to fruition, there will be a Federal Information Resources Manager (FIRM) appointed by the President.

This individual, "together with the network of Information Resources Managers (IRMS) in the agencies, the Office of Management and Budget (OMB), and the General Services Administration (GSA), will be responsible for the critical task of upgrading and expanding the use of adp/OA systems," the task force suggests. (The group had no comment on the irony of suggesting an additional bureaucrat to an administration that makes a habit of unemploying federal workers.)

"The federal government is not effectively managing its information technology resources and, therefore, missing out on substantial potential cost savings," the task force writes. "The government has failed to develop a coherent system for adp planning and management. As a result, it has not capitalized on the substantial opportunities for cost savings and effectiveness improvement."

The task force puts the onus for this time warp on OMB. It accuses OMB of spending too much time worrying about how much information technology is going to cost and not enough worrying about how it's being managed. Rather than put its trust in OMB, the task force heartily recommends the FIRM.

He or she would be a major part of the proposed Office of Federal Management, as recommended by another task force. The FIRM would establish and chair a government-wide Information Technology Steering Committee (including the IRMS) that would be the primary forum for establishing federal goals and directives in adp. Better yet, the FIRM would control the purse strings. If this saviour saw a cost-effective adp scheme he or she liked, he or she could expedite its funding. If an agency were not following the Steering Committee's priorities and objectives, the FIRM could cut it off at the checkbook.

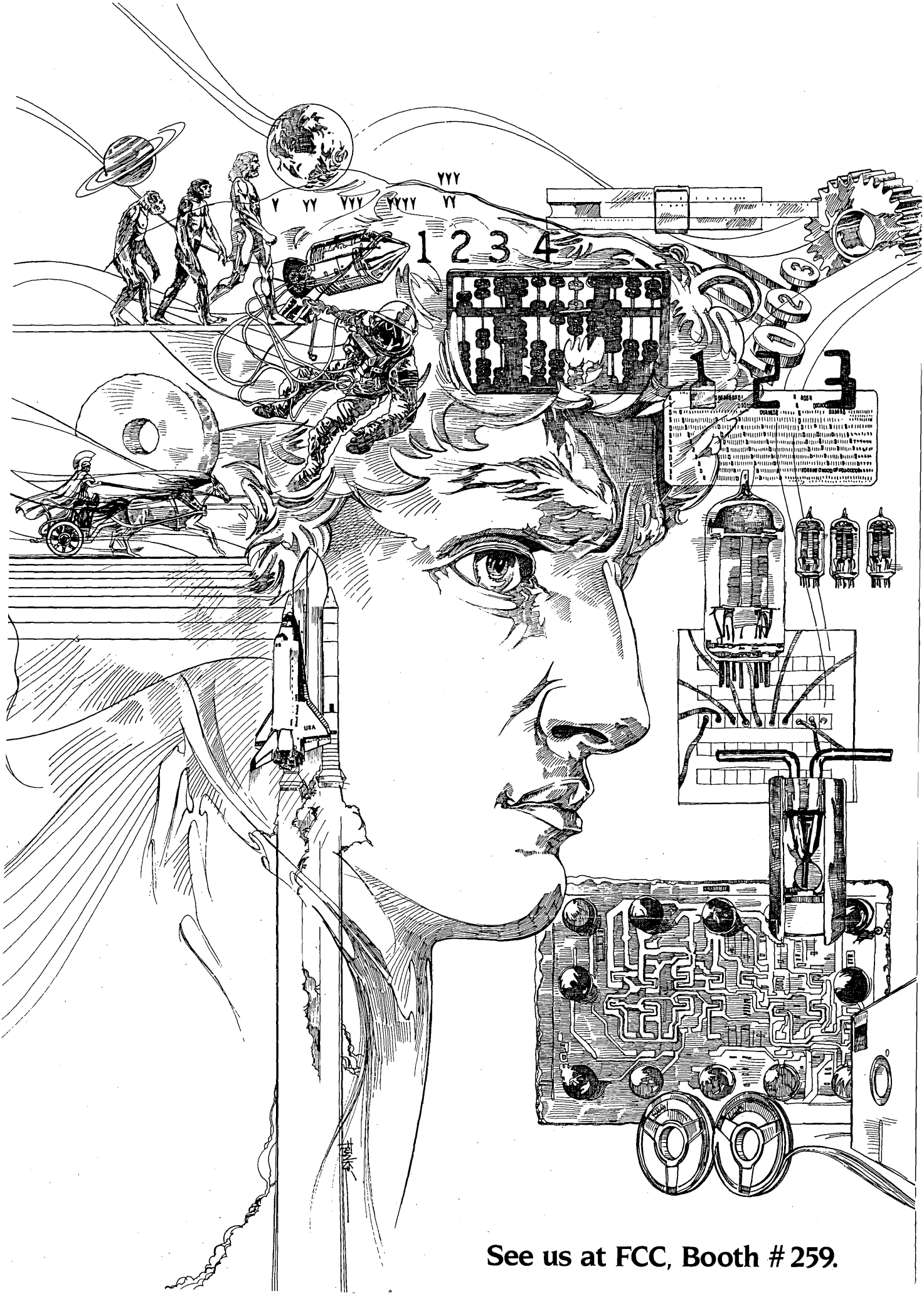
The task force also criticized current IRM management within the agencies. It objected to the standard practice of adding an IRM's responsibilities to those of an existing administrative position, usually the Assistant Secretary for Administration, rather than hiring a full-time professional, as contemplated by the Paperwork Reduction Act of 1980. The task force recommended that agencies be "directed to assign the IRM's function to an SES [Senior Executive Service, the crème de la crème of government bureaucracy] career professional with the appropriate training and experience."

Other recommendations followed the previous party line. GSA should grant agencies more procurement autonomy. Agencies should upgrade or replace uneconomic and obsolete adp/OA systems—about half of the government's inventory is so old that it is no longer supported by the manufacturer and must be maintained by specially trained federal personnel. Teleprocessing costs should be separately documented and teleprocessing networks should be shared. Government should improve management of OA and emphasize its use for managerial/professional personnel. Last, but hardly least, government should improve salaries and hiring procedures for adp personnel.

The report accuses OMB of spending too much time worrying about how much information technology is going to cost.

"Most of the recommendations of the Task Force can be implemented without legislation or Executive Order," the group contends. "However, Presidential initiative is required to establish the direction and momentum for necessary changes. With the appointment of a FIRM and the formation of the Office of Federal Information Resources Management, leadership and authority will exist for making the other necessary changes within the agencies and Government-wide."

"I know there are a lot of political obstacles to this," concedes Kerr, who as part of his preparation spent one weekend reading five years' worth of DATAMATION



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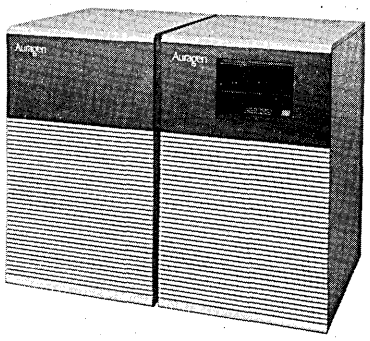

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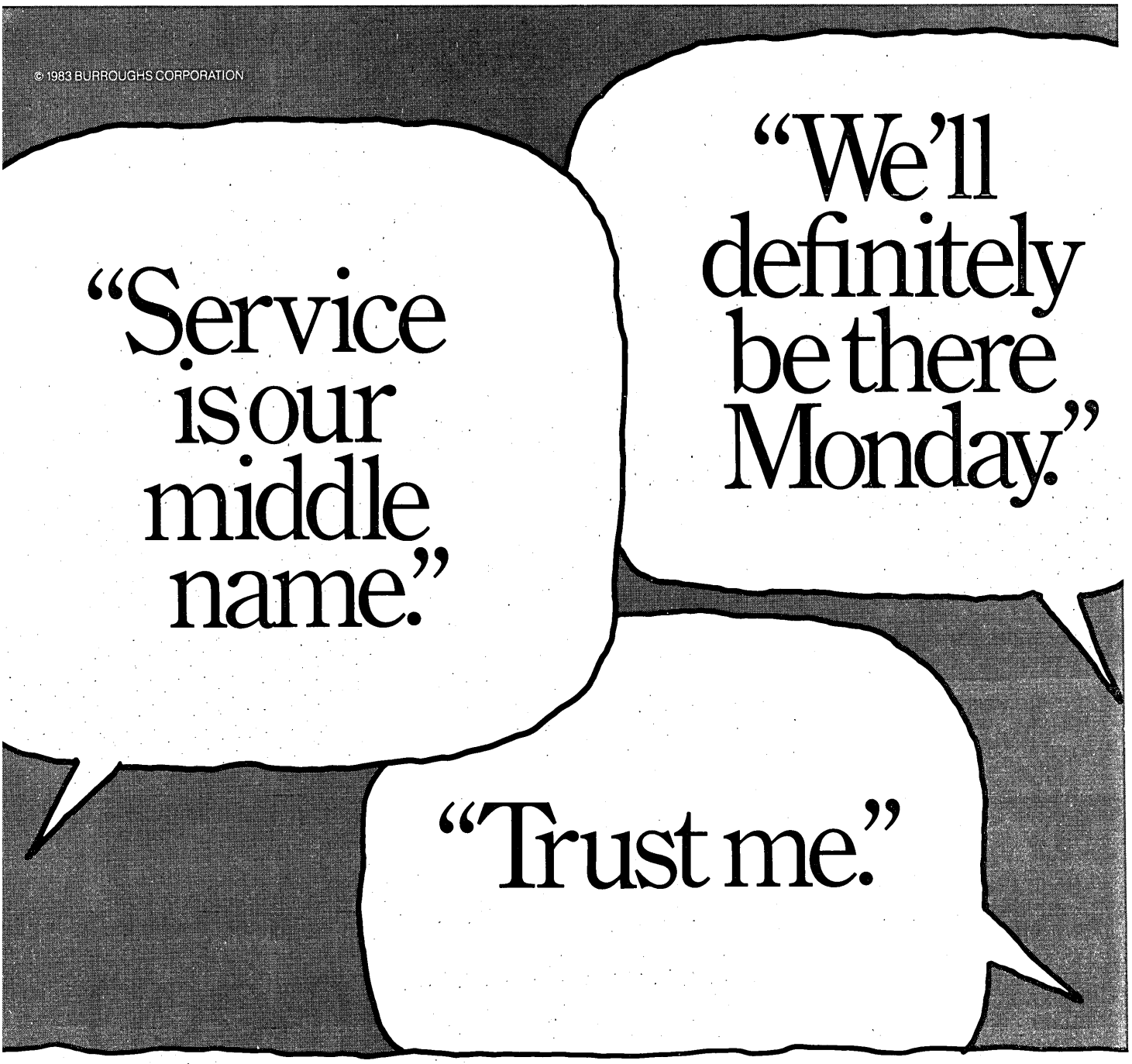

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THE QUESTION ISN'T WHO'S BIGGER.
IT'S WHO'S BETTER.

articles relating to government adp. "We tried like hell to avoid the political ramifications. None of us are politicians.

"I'd never spent much time in Washington. I saw some of the most atrocious and embarrassing things I've ever seen. But I also found a lot of good people. They've got the right spirit of entreprenurial life. They can do the job if they get the chance."

Until now, waiting for that chance has been like waiting for Godot. Finally, he may have arrived.

GSA GETS SOME RESPECT

Having gone from enemies to friends, neither GSA nor the vendors wants to return whence it came.

by Willie Schatz

'Twas barely a year ago that the computer industry couldn't find a kind word to say about the General Services Administration (GSA). Rest assured, the times, they are a-changin'. The industry doesn't have GSA to kick around any more.

Not very many folks saw this one coming. Last time anyone glanced at this soap opera, the players were across the bargaining table, each accusing the other of trying to steal his soul. Now all is well.

"We're not about to undermine GSA," says Jody Walsh, director of contracts administration for the Federal Systems Division of Honeywell Information Systems. "We're in a position now where we want to help them. They're doing a good job. They've definitely gotten new respect from us and I think most other companies. We all have to realize we can't continue to rely on GSA and try to thwart them at the same time.

"There's much more dialog between the representatives of industry and GSA," says an attorney for a leading computer company. "Each side is listening to the other and beginning to understand the other. I think they're moving in the right direction."

This is no one-way trip, either.

"Things are much better between us and industry," says Harry Fuchigami, director of GSA's Office of Information Resource Procurement. "We've changed our attitude. If industry has a legitimate concern we're willing to listen. Now we've got full disclosure and coordination with industry before major policy changes. We're more timely in our contract awards. And we're more professional in the manner in which we do business with business.

"Two years ago I would get three or four complaint letters a month. Now I get one every five months. We're trying to do the thing that's best for the entire community. We certainly weren't working like this a year ago."

No kidding. A year ago GSA came forth with its Multiple Awards Schedule (MAS). The industry immediately said "no MAS, no MAS." All GSA was asking was for the vendor to treat it like an oem. Industry members would sooner have given the agency the sun, moon, and stars.

"The government's goal when negotiating MAS contract pricing arrangements is to obtain a discount from a firm's established catalog or commercial price list that is equal to greater than the discount given to the firm's most favored customer," GSA said. "The most favored customer [MFC] discount is equal to the best actual discount given by a firm to any entity with which that firm conducts business, including original equipment manufacturers, dealers, distributors, and others.

"GSA will not award an MAS contract to a firm that does not give the government a price equal to the best price given to its large volume end-user customers with comparable terms and conditions except where the government's overall volume of purchases does not warrant the best price given to end-user customers."

Well, they tried. And tried. But GSA's idea never got off the paper. Industry groups closed ranks and wrought major changes in the MAS schedule. Now, as Fuchigama told a recent conference on procurement of computers and telecommunications equipment, GSA won't execute a contract unless the price and discount is equal to the "lowest end-user price." It doesn't even ask for the price a vendor

When GSA asked last year that the vendor treat it like an oem, another round of warfare commenced.

gives an oem, distributor, or dealer. The agency got the hint that though it may fancy itself the center of the vending universe, there are plenty of other stars in the galaxy.

"They went completely overboard on the first MAS policy," Walsh says. "It was too much too fast. There was no way they were going to get oem prices. But I have to give them high marks for at least attempting to achieve their goal of guaranteeing the integrity of a schedule on which the government can obtain small quantities at the most favored customer price.

"But ADTS [GSA's Automated Data and Teleprocessing Service] has its act to-

gether. It was the first to back off."

GSA's intent remains the same. It still wants that coveted oem price, even though it knows it can't have it. And it still wants to know the reason why.

"The process has gotten much harder now," Walsh says. "It's more burdensome because they're asking you to justify so much more of your prices to the commercial sector. But that doesn't mean it's unfair. Industry knows what GSA is trying to achieve. They have a right to know they're not getting ripped off. They should demand data as to why they can't get a discount equal to a commercial customer. I have to admit, though, that they are making it harder for the vendors to deny the agency its goal."

Despite the increased reams of paper, however, a good contracting officer can easily slip through the many cracks and crevices still dotting the GSA landscape. Offensive clauses disappear, never to return. But both sides expect that to happen. And the atmosphere is far more cordial than it once was. Procurement may not be peaceful, but these days it is hardly "warfare," as Mark Dombroff, director of the Torts Branch of the Justice Department's Civil Division, characterized it before his procurement conference audience. Dombroff, who said he and his cohorts once left a Wang word processing system on the sidewalk after failing to receive service on it, also warned his listeners "not to cooperate with the enemy."

The advice seems to have gone unheeded. Not only is the "enemy" getting friendlier, it's getting smarter. Where agency contracting officers were once two or three generations behind the business, they have rapidly been coming up to speed. Such increased acumen makes it easier for a good time to be had by all.

"A lot of our contracting officers just did it like it was done the previous year, even if it was wrong," Fuchigami admits. "That was costing everybody money. We've tried hard to upgrade them from [GS] 12s and 13s to 14s and 15s, and I think it's helped everyone."

Where GSA contracting officers were once two or three generations behind the business, they have rapidly been coming up to speed.

"That situation has definitely improved," Walsh agrees. "I remember the dingdongs we used to work with in the mid- and late '70s. They don't seem to be around any more."

This new-found euphoria does not mean that everything is cool, calm, and collected. There are some MAS issues, such as industry treating the government as a single market but not a single buyer, to be worked out. Fuchigama admits his contracting officers must exercise their authority more effectively. He willingly concedes that most of what GSA requires contractors to submit is "garbage" and essentially useless to anybody. He acknowledges the continuing difficulty with other agencies' autonomy to purchase dp equipment. He hopes to alleviate part of the problem by increasing the current maximums of $50,000 for a sole source contract and $500,000 for a competitive bid. Both floors may be raised tenfold.

But we speak of trivialities. The relationship is markedly improved from a year ago. Having gone from enemies to friends, neither side wants to return whence it came.

"Being litigious or starting a war makes no sense if you want to keep selling to GSA," says Digital Equipment Corp. senior attorney Andrew Stone. "A lot of problems start because industry doesn't understand the rules. It's important that everyone understand that there have to be rules and understand the rules themselves. That will make the situation even better."

"Three years ago we were awarded our contract on Christmas Eve," Walsh says. "Two years ago it was on New Year's Eve. Last year it was on Sept. 15. If GSA keeps that up and doesn't drown us in pa-

perwork, you have to respect that. We need some consistency, and GSA adds that. They set the ground rules, and we can play by them. It's better to go through the process once a year and know what to expect than go through it every time you want to make a sale to an agency."

"We're trying to do the thing that's good for the entire community," Fuchigami says. "We want to keep this relationship going the way it is now. Each side is doing as much as possible to be cooperative and still maintain a business relationship. I'll be the first to admit that's not easy, because doing business with the government stinks."

True. But it smells a lot less than it did 12 months ago.

STRATEGIES

RAMIS II GETS A BOOST

Martin Marietta's purchase of Mathematica Inc. is hoped to help both companies in the nonprocedural language arena.

by Willie Schatz

Aggressive aerospace conglomerate Martin Marietta had the brawn but not the brains. Mathematica Inc., the Princeton vendor of Ramis II, was "like a brain with short arms and legs," recalls one insider. Putting their talents together in a $30.8 million deal finished in late July, the two hope to muscle in on the lucrative database management market in ways neither could have done alone.

Like so many mergers and acquisitions in the software market, this one promises to uphold that most ancient sports ideal, the deal that helps both sides.

"Mathematica was not a casual undertaking," says Rick Walters, president of Martin Marietta Data Systems, of which Mathematica will become a wholly owned subsidiary. "It's a fundamental piece of long-term strategy we've been pursuing for four years.

"We've been looking very hard at nonprocedural languages, fourth generation languages," Walters explains. "We've also been interested in programmer productivity for our applications business, so we need portability. The third thing we've wanted is reliability. When we started looking at these, Mathematica came through loud and clear."

Martin Marietta wasn't the only company that heard the message. At least two other companies were talking seriously

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to Mathematica about buying it. Martin Marietta itself had been talking turkey since July 1982, but the deal didn't go down then because "a company named Bendix came knocking at our door," Walters says whimsically.

"People had been after Mathematica for a while," says industry analyst Al Berkeley of Alex. Brown in Baltimore, which handled the sale. "The company came up on everybody's computer screen."

The pursuit was hot and heavy to the end. According to a well-placed source, Mathematica was in the final stages of negotiations with acquirer number two when Mathematica president Tibor Fabian got a call from Martin Marietta. "Don't do anything until you talk to us," said the voice from Martin Marietta. A corporate jet appeared shortly thereafter to transport Fabian from Mathematica's Princeton, N.J., headquarters to Martin Marietta's base in Bethesda, Md.

"It wasn't quite that dramatic," Berkeley says. "But other people were getting close. Six expressed interest and two or three got serious."

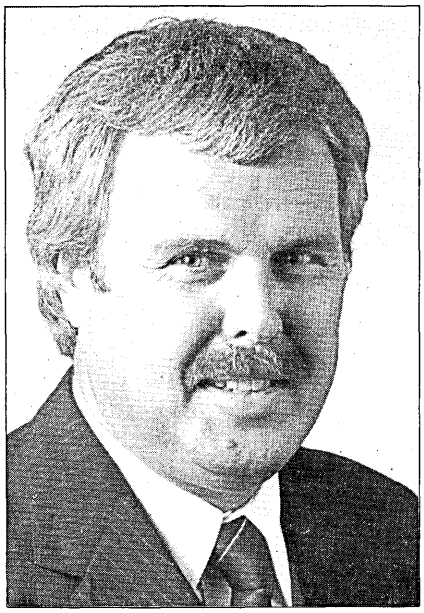
While not necessarily watching these courtships with bemusement, Mathematica was in no hurry to sell. The company had set records for operating revenues ($36 million), net income ($1.375 million), and earnings per share ($1.30) for its fiscal year ending June 30, 1982. Even a disastrous third quarter in the first three months of 1983—an income deficit of $186,000 and an earnings-per-share loss of $0.18—had not dimmed the company's enthusiasm for going it alone.

"I'm confident we would have survived either way," says Dick Cobb, president of Mathematica Products Group (MPG), Mathematica's major subsidiary. "We would have succeeded had we done it, and we would have succeeded had we not done it. But we decided we would have a higher probability of success if we did it.

Mathematica was determined to survive, takeover or not.

"We really did it for two reasons. The shareholders decided that Martin Marietta's offer was a very attractive opportunity for their own financial interests. From a business standpoint, MPG is going to get a substantial improvement in the availability of funds to do the things we want to do to be able to capture the software market."

A portion of that already belongs to Mathematica. The company's RAMIS II product is the industry's leading fourth generation language, having some 500 installations. It operates on IBM or compatible computers running with the MVS, VM/CMS, or DOS/VSE operating systems. MPG's other major line is ATLAS, a data communications monitor designed specifically for the DOS/VSE environment.



RICK WALTERS: "When we started looking, Mathematica came in loud and clear."

Mathematica Inc. also includes Mathtech, which is involved in the development of packaged software and the sale of software-enhanced micros, and Mathematica Policy Research, a market research and consulting group specializing in formulating state lottery systems.

All three pieces of Mathematica will become part of the whole of MMDS, which has ambitious plans to enhance its market position. MMDS has been the proverbial sleeping giant. It has been successfully going about its business, which began as facilities management and has since metamorphosed into integrated services, which Walters describes as "womb-to-tomb responsibility to do the job for our customers." Walters cites winning a $5.6 million contract from the Army to install an instructional support computer center at West Point, enabling cadets to learn computer science and engineering skills on a system that can be accessed at any time from classrooms, dorms, offices, and study areas. MMDS had exactly four months to put the system together from scratch.

"If it worked, we got the money," Walters says. "If it didn't, we would have been in a world of hurt."

It worked. They got the money. And nobody feels any pain. MMDS has been growing at an annual rate of 35% to 40% over the last few years, compared to the information system industry's overall rate of 21%. In fiscal 1982 sales were $122 million to the outside world, an increase of 24% over the previous year, and $122.7 million to the other divisions of Martin Marietta. That money isn't just handed to

MMDS, incidentally. It must compete with outside bidders for internal services. As a reward for its success on the outside, MMDS was accorded full company status within Martin Marietta. The growth is expected to continue in 1983, with outside sales projected at $175 million (including Mathematica) and inside sales of $140 million.

Now MMDS would like the world to know that Mathematica could be the start of something big.

"There's going to be a whole restructuring of U.S. manufacturing in the next 10 years," Walters contends. "It's going to be much more automated than in the past. And it's going to be run by software. We're positioning ourselves as the information supplier for that new marketplace. We need tools for that, and one of those is RAMIS II.

"We're going to try to accelerate the products, particularly RAMIS II. That's got a hell of a lot of capabilities that haven't really been exploited. It's got the best screen editing I've ever seen. With that available to our customers, our marketing potential should improve substantially."

This could be a great fight. No one's going to lie down and let MMDS walk over them in manufacturing, federal government, or MIS, the three areas of MMDS' expertise. It's now in 43% of the available information services industry market. Walters anticipates that it will eventually be in 58%. That means more head-on conflict with Cullinet, MSA, Software AG, Cincom, PRC, and EDS, MMDS' main adversaries.

"We're not a household name," Walters admits. "But we're not small folks out there. We've just kept our heads down doing what's right and what's making our customers happy.

"Some of the things we see hyped, we've done as normal business. Someone comes along and says he's got a micro-to-mainframe link and all of a sudden he's written up as 'a forerunner of the industry.'

The automated manufacturing market is Martin Marietta's main target as it looks into the future.

Then we think maybe we should have said something about ours. Take John Imlay [chairman of MSA] running around and talking about being [a] $100 million [company]. Cullinet's what, $64 million? Software AG is $25 million to $30 million? We do that in our sales. But [Software AG president John] Maguire gets all the publicity. So I think we'll talk more about the exciting things we're doing."

Many would say it's terribly exciting that Martin Marietta is around to do anything at all. After the Great Merger War of 1982, when Bendix, Martin Marietta, Allied, and United Technologies traded offers for each other by the minute, Martin Marietta seemed doomed to disappear off the business map. Allied swallowed Bendix whole and took a 39% bite of Martin Marietta. Last September Martin Marietta's debt-to-capital ratio was an astonishing 82%. The premerger level had been 23%.

Like a phoenix, the company has risen. Its debt-to-capital ratio is now in the mid-50% range. Allied's stake has been reduced to 20% through one stock offering. A second is planned to eliminate all Allied holdings in the company.

Still, Wall Street raised its collective eyebrow when Martin Marietta plunked down the $30.8 million for a small software company. That was more than 20 times Mathematica's trailing earnings, expensive by regular industry standards but considered de rigueur these days for a coming high-tech company. But paying three times equity did seem somewhat dear, especially following Mathematica's deficit in the first quarter of 1983.

"They bought the company on reasonably depressed earnings, so I think Martin Marietta got a very good deal," says Berkeley. "But I don't think they were trying to get a steal. The question for them was whether it would be easier to play catch-up against Cullinet and Software AG by going head to head or going out and getting someone as good as Mathematica and tucking them under MMDS' marketing power."

"I would have been happier if Tibor had stuck around," says Wolfgang Demisch, who watches over Martin Marietta for his First Boston clients. (Owning 8.8% of the firm's stock, former president Tibor Fabian left Mathematica $2.2 million richer after the acquisition, reportedly planning to write his memoirs and unofficially help his former employer for six months or so. His post has been taken over by Walters.)

"The software business is 90% people, and you have to be damn sure you want to take on a new company in the midst of a management change. Can they hold on to what they got in a way that will satisfy them and justify the price to investors? I'm optimistic, but we'll have to wait and see," says Demisch.

The financiers may be waiting, but the acquiree isn't. After significant apprehension that it would be swallowed whole by Martin Marietta, never to emerge again, Mathematica is putting its considerable brainpower to work for its new partner.

"If we can achieve our goals in the software area we will have done a fantastic amount for them because we will have given them a very large market position in an area where they have no market position now," MPG president Cobb says. "RAMIS II is by far the best product around. It ought to be dominating the whole computer software industry and the one system that ought to be

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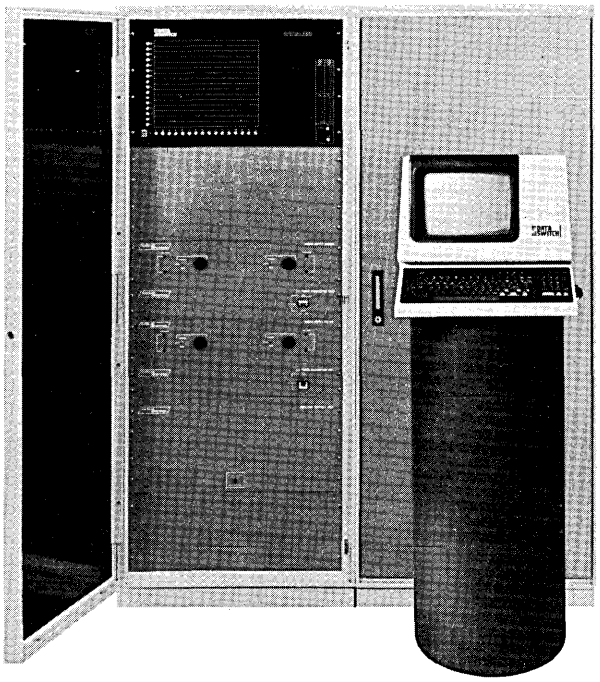

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MICROCOMPUTERS

WAITING FOR UNIX

IBM may have the current workstation business sewn up, but Bell has the operating system.

by Ralph Emmett

Now that IBM seems to have dispatched its 16-bit workstation challengers with a minimum of fuss, the company is looking for a repeat in the unfolding 32-bit division. Only here, the competition might prove to be a little less puny, for waiting in the wings is that other megaforce of the information processing world, AT&T.

While it's true that IBM's 16-bit PC/XT Personal Computers are becoming as common on users' desks as the company's Selectric typewriters, Bell too, has the beginnings of a ubiquitous presence in the workstation business. Its Unix operating system has become the popular choice among 32-bit workstation vendors. So much so, in fact, that Gnostic Concepts, Menlo Park, Calif., predicts a $5 billion-plus Unix-based business will materialize by 1985.

IBM's advantage is that the Unix-based systems are more or less forced to coexist and be compatible with its P.C. phenomenon. The negative side for IBM is that it is being pushed into supporting Unix by the efforts of other vendors to do so. Sources say IBM will not only support Unix for its PC/XT but will announce its own Unix-based 32-bit workstation next year.

In essence, IBM has the current workstation business sewn up. But Bell, observers point out, has *the* operating system. "In fact, a close look at Bell reveals that it has so much more," says one source related to a current Unix standards drive.

Adds the source: "Bell has an end-user population of telephone subscribers that makes IBM's P.C. base look tiny by comparison. Bell also has a three-step plan to bring Unix to these people.

"Bell realizes that it has this neat operating system," said the source. "The company's main question is, how do we get the most mileage out of it?"

Bell's first step, according to the source, was to get Unix as widely used as possible. "Companies like Microsoft [which helped popularize the IBM P.C. with its MS/DOS operating system] and Unisoft, with its ports for Unix to run on the Motorola 68000 micro, helped a great deal in this respect."

One source says Bell has a three-step plan to bring Unix to its huge base of telephone subscribers.

Bell's second (and current) step is to get leading vendors to implement Unix on their hardware. The telecommunications giant recently concluded a deal with three leading semiconductor outfits—Intel, Motorola, and Zilog—to develop Unix versions for their micros. "Add to that the efforts of such companies as DEC, Data General, HP, Prime, and soon, IBM to do the same, and pretty soon a river of applications software begins to flow in support—the very thing, it should be stressed, that Unix currently lacks," said the source.

It's when we get to stage three, however, that things get really interesting.

"This is when Bell bundles Unix into a new generation of its own 32-bit virtual machine chips and tells the industry that if it wants Unix it'll have to take the Bell hardware as well"—and pay hefty license fees based on dollar volume of number of terminals used.

Other sources explain that this is the logic underlying the recent Bell/Western Electric development (the Bell MAC project) of a new 32-bit chip from scratch, rather than using Intel, National Semiconductor, or Motorola equivalents. These observers add that pretty soon the Bell/Unix workstations will begin to appear in their stores all over the country as adjuncts to that most ubiquitous of all terminals, the telephone.

Said one observer: "Once an IBM P.C. leaves the factory, the computer giant has no idea where it is going or what it's being used for. Bell, on the other hand, can monitor its terminal base, offer credit, and all kinds of technology extensions."

Fears that Bell will bundle Unix into a new generation of its own 32-bit virtual machine chips is what prompted the formation of/User/Group.

It wouldn't be difficult to gauge IBM's reaction to such a three-step strategy by Bell. Understandably, the other Unix and Unix look-alike vendors aren't crazy about the scenario either. This is why a new conglomeration of commercially oriented Unix users, called the /User/Group, banded together early last year.

"The idea," says Jim Isaak, marketing director for one of the group members, the Boston-based Charles River Data Systems (CRDS), "is to come up with a portable Unix standard that reflects the efforts of everyone, not just Bell Labs."

/User/Group (which is attempting to change its unusual name to Uniform) is composed of such luminaries as DEC, HP, Microsoft, Fortune Systems, ITT, and, of course, Bell itself. Though its ranks are predominantly made up of Bell Unix licensees, some of the members, like CRDS, have come up with their own Unix-like operating systems.

Others, like HP, have developed their own operating system as the "kernel" and offer Unix utilities on the outside, thus preserving their own base environment and looking like Bell on the outside. The net result of this input, according to Isaak, is that the recommendation for a new portable Unix standard could be submitted to ANSI by year-end. "Though the standard is largely based on Bell's new System 3, there have been some significant changes to the draft, such as new file and record-locking mechanisms that Bell doesn't offer," Isaak revealed.

"The important thing," Isaak stressed, "is that you don't have to be a Bell/Unix licensee to implement our portable standard."

Against such a background, IBM's anticipated entrance into the Unix arena assumes even greater importance. Will the computer giant become just another Bell licensee, like so many on the standards committee? Or has the company followed the HP route with its own kernel on the inside and a passing resemblance to Bell on the outside? Will IBM use one of the alternatives developed by Microsoft or Pick Systems? Maybe IBM has its own alternative?

/User/Group hopes "to come up with a portable Unix standard that reflects the efforts of everyone, not just Bell Labs."

Sources point out that even at this late stage, IBM is juggling its options. The betting among insiders is that IBM's 32-bit Popcorn (tipped for second quarter 1984 announcement) will be Unix based and that the software was developed outside IBM.

At the same time, IBM is known to have had a constant input to the /User/Group meetings via "a committee member" and may be prepared to go along with its findings if a consensus can be reached.

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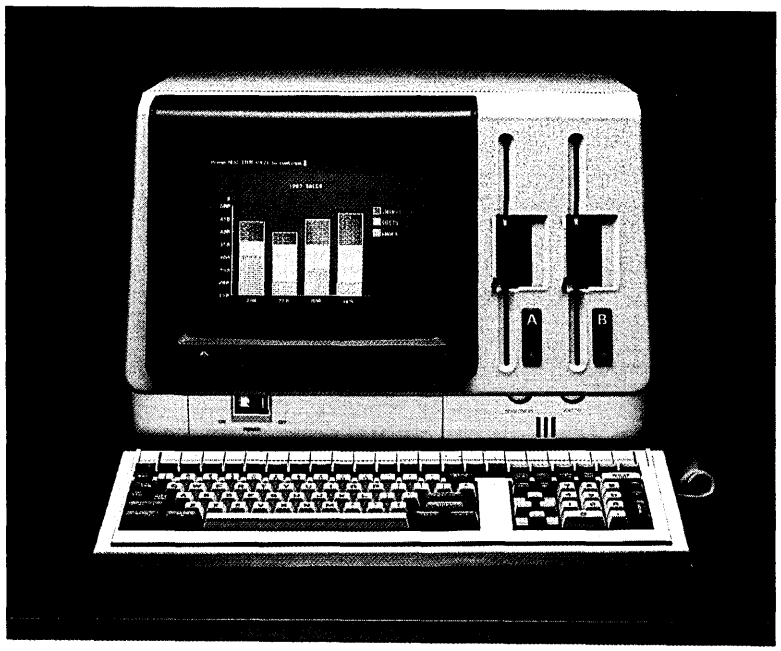

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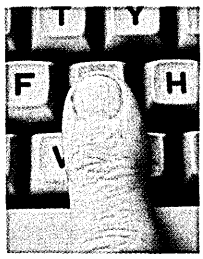

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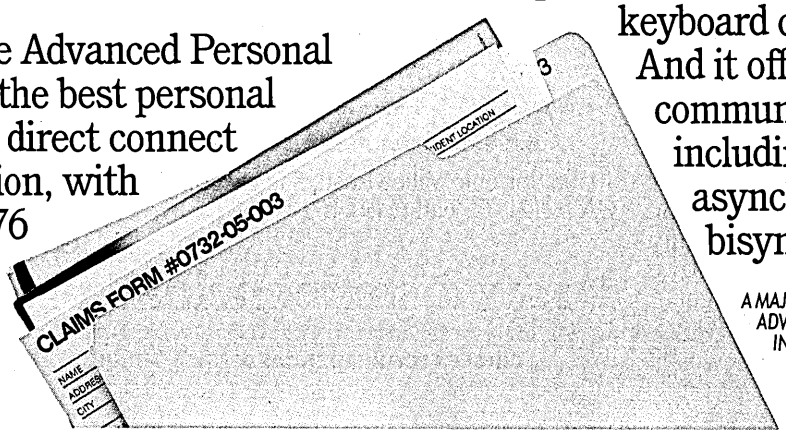

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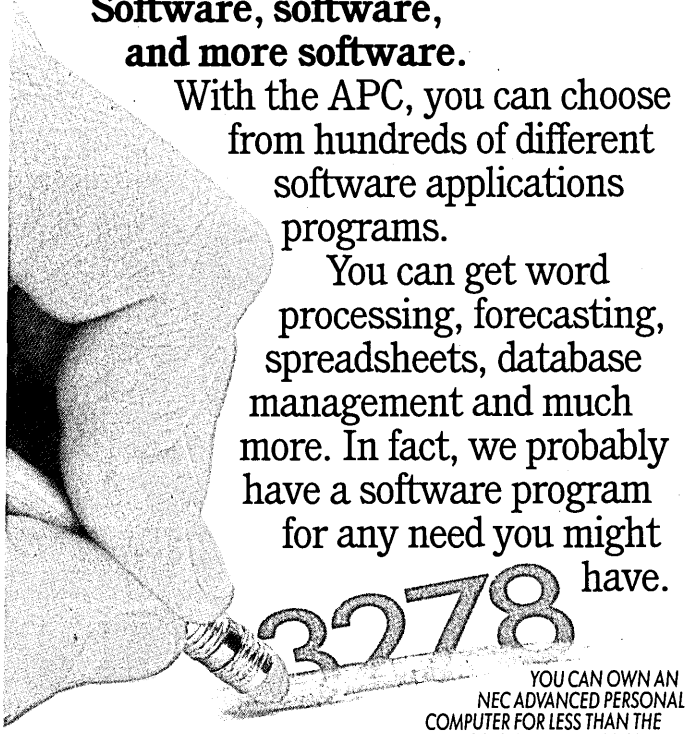

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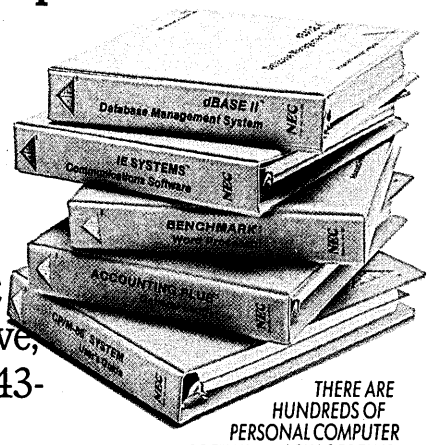

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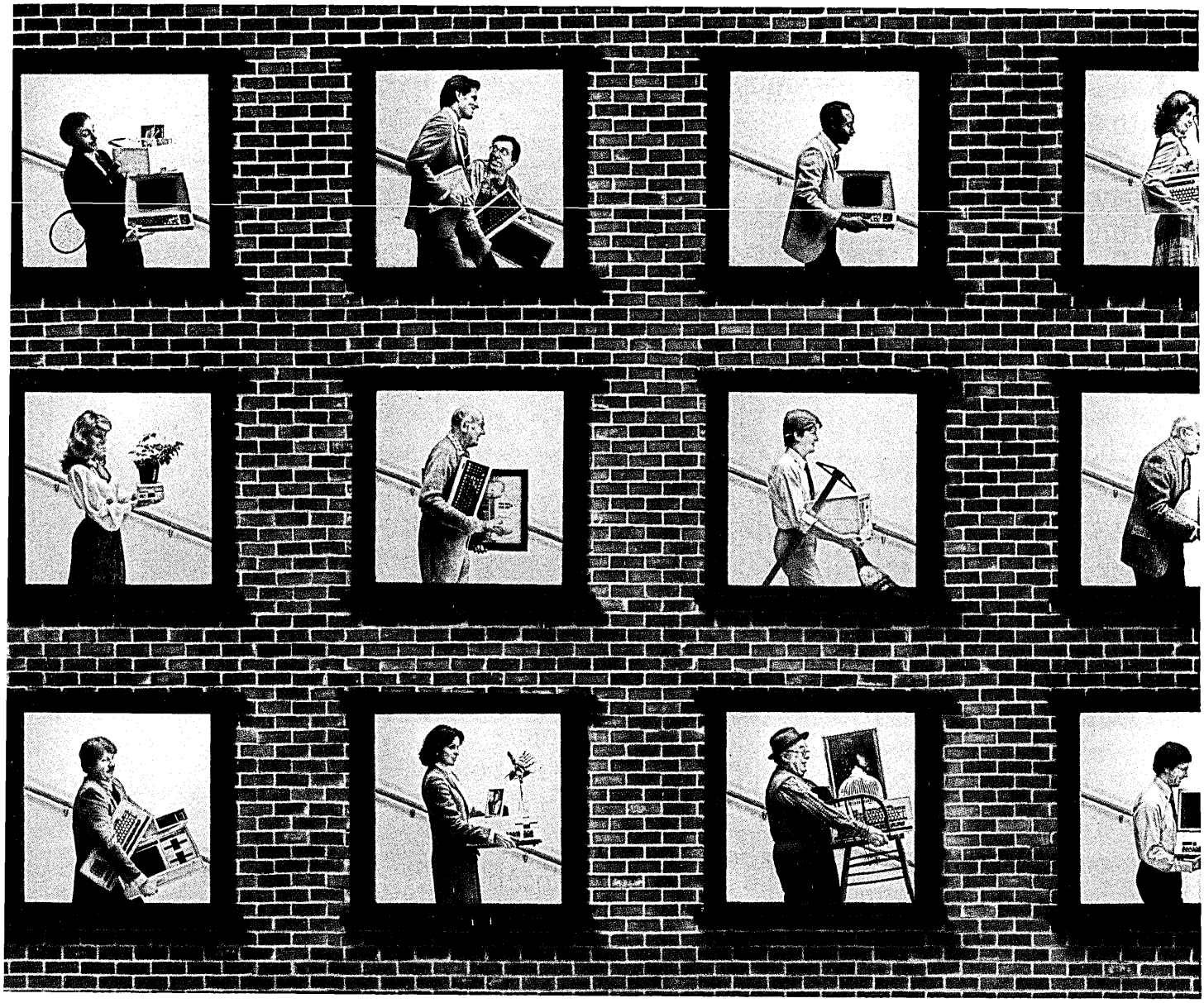

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SECURITY

TALES OF DECRYPT

A Bay Area startup is peddling a new data encryption device for use with all sorts of terminals.

by Edward K. Yasaki

Spending for data processing in the U.S. is fast approaching the $100 billion-a-year mark, and critical applications such as funds transfer, distributed CAD/CAM, and electronic mail are highly dependent on data communications channels. Yet, it has been estimated that users spent as little as $200 million last year on security for their computer systems.

Although that figure is expected to grow to $600 million in 1985 and as much as $1.5 billion in 1990, it is no surprise that current estimates put the cost to U.S. businesses of data theft and computer damage as high as $3 billion a year.

In recent months, a technology that represents but a small component of that spending has begun showing up in the marketplace—cryptography. A number of vendors have announced protocol-transparent devices that encrypt and decrypt data signals to provide protection in communications environments. It's a technology understandably favored by the financial community—banks, insurance companies, and securities firms—and by the military. But few others.

One of the problems with encryption has been its high price. What's required is a cryptographic device at each end of a transmission line, one near the terminal, and one near the computer, and that comes to at least $2,000 per line. A second problem is management of cryptographic keys, not a whole lot different from password management except that physical keys must be distributed to authorized users. That might require the use of special mail or courier services to reach distant users. But someone must still keep track of who has which key.

"You buy a $2,000 device, and then you hire a $24,000 guy to manage the thing," says Shig Tokubo, president of newly formed Securnet Corp., Oakland, Calif. What with that individual's overhead and operating expenses, the company is now paying $50,000 for key management, and the device cost only $2,000.

Securnet is the latest entry into this late-blooming market. The company is a spin-off of a computer security consultancy called EDP Audit Controls that performs computer penetration projects, develops risk analysis studies and contingency plans, and advises companies on ways to improve their computer integrity. From such experience has come a so-called data line security device (DLSD).

"You can have the most unsecure operating system in the world," says Tokubo, a principal in the consultancy. "But if you control the access to that machine, you'd be pretty secure." That, in essence, is the objective of the DLSD, a passive device that is transparent to user traffic. It scrambles data leaving the terminal and unscrambles them before they reach the computer, and vice versa on the return trip.

Securnet does not use the DES algorithm proposed by IBM and accepted as a standard by the federal government.

What sets the DLSD apart from similar devices is the absence of the DES (data encryption standard) chip which, based on an IBM algorithm, is available off-the-shelf from several semiconductor makers. In-

stead, DLSD uses an algorithm devised by Tokubo and implemented in a custom chip at a lower cost than the DES. As a result, Securnet figures it will be able to supply a pair of black boxes for half the price others cost, or about $1,000 a pair.

Keys are inserted in the device each time the user wants to use his terminal.

Additionally, because Securnet performs the key management task for its clients, keys can be distributed to users by a client's security officer, the dp manager, or the person responsible for supplying new employees with a key to the office.

"And any time a key is lost by a user," says Tokubo, "the matching key at the computer end is removed and is considered invalid for the system." There's no need to modify a password file.

The DLSD, a microprocessor-based device about the size of a business envelope and measuring less than 2 inches thick, has the key hardwired inside in its current configuration, which means each box has a unique encryption key. Under development, however, is a DLSD with a separate key fob about the size of a book of matches that the user will carry around. Each user's password will be inside that fob, which must be inserted into the box before communications can take place. "No one can stand over your shoulder, watch you type, and steal your password without your knowing it," explains Tokubo. Not only is the user responsible for reporting any loss or theft of a key, but the thought is that a user should be required to use his key at least every other day. Failure to do so will be interpreted as a lost or stolen key by the system, which automatically erases that key. Any key or pair of keys removed from the system is returned to Securnet, which supplies new keys at no cost.

An unfortunate side effect of the use of keys is that the system is able to monitor where the user is each time he or she logs in, following a peripatetic user around the facility and the equipment being used. The security inherent in such a system also provides an element of Big Brother that some may not find attractive.

There are a number of factors, however, that favor the use of cryptography. One is a decrease in price as demand increases, for the device consists essentially of only a few IC chips. A number of terminals makers are interested in integrating the black box into their devices, the external appearance changed only by a receptacle for the user key, Tokubo says. That would eliminate the separate cryptographic box, which ideally would be reduced to one chip. For the oem, of course, incorporation of that chip would represent another value added by the equipment maker.

What sets the DLSD apart from similar devices is the absence of the DES chip. Instead, DLSD uses an algorithm devised by Tokubo and implemented in a custom chip at a lower cost.

"In my opinion, everything that goes over the satellite ought to be encrypted," says Martin Hellman, Stanford University's leading cryptologist. The reason, he adds, is that transmitting a signal by satellite "is like broadcasting it to the world." Even data sent over phone lines create concern, especially when handled by microwave transmission. "But I also think things like local area networks are going to create a big demand" for encryption, Hellman says.

Hellman, who consults in cryptography, says people ask him about automated spying techniques, such as monitoring a transmission line and looking for key words. But the professor points out that a local area network constantly scans the cable, looking for an individual's address to appear. When a packet destined for that individual's terminal is found, that packet is

picked off. "It's constantly spying for legitimate purposes," Hellman says. And if one wanted to convert that into a spying device, one only has to have it look, for example, for a particular company's address.

BUSINESS

OLD BOYS GO LEGIT IN L.A.

A new Southern California network has attracted 110 top executives from local technology companies.

by Edith Myers

The "old boy" network has gone formal in Southern California where a group of 110 chief executives, 97% of whom are in the computer industry, have banded together to help each other out.

Instigated by Steven Panzer, a Los Angeles management consultant, the Southern California Technology Executives Network (SoCalNET) hopes to foster growth and development of its members and help the Los Angeles area maintain itself as a stronghold of technology-related companies. Technology is thought to bring economic salvation and has therefore become the subject of intense efforts by local civic and commercial groups to lure investments to their communities.

Southern California has long been a center of computer industry activity, although its image as a leader in that area has partly given way to Silicon Valley up north.

"Together we represent 2,000 years of computer experience," says executive director Panzer, half jokingly. He says the group was founded after he was called in to help a struggling software company. "They seemed to be doing the right things but there were pieces of the puzzle missing. We began to wonder too why companies like Texas Instruments and Atari were making strategic mistakes and why so many companies failed to go beyond their first successful product."

He began discussing the matter with many ceos in the area, he says, and found nearly unanimous desire for greater interaction with peers to share problems and solutions. The group held its first meeting in midsummer.

"There is an informal network like this in Silicon Valley," Panzer notes, "and it works."

SoCalNET's initial activities include personal networking, information exchange, and image enhancement—making the world perceive Southern California as a high-technology growth center.

"In the wake of IBM's investment in Rolm and Intel," Panzer points out, "cooperative ventures will proliferate."

Says one ceo who admittedly was on the lookout for potential joint venture partners, "With the climate what it is now in Washington [for joint ventures], it looks like anything goes, short of collusion."

Panzer initiated the plans for the network last May 26 with a round table meeting of some 50 ceos. At that meeting, Walter Bauer, chairman and ceo of Informatics General Corp., Woodland Hills, Calif., was named chairman. A core meeting followed at Informatics on June 10 and, at a subsequent meeting on July 8, two vice chairmen and a 10-man executive council were elected.

"With the climate what it is now in Washington, it looks like anything goes, short of collusion."

Ricardo G. Brutocao, president and ceo, LDM Inc., and C. Paul Davis, president of Perfect Data Corp., are the vice chair-

men. The council is composed of Martin Albert, president, Cambrian Systems Inc.; Richard Barrett, president, Adaptive Data and Energy Systems; J. David Callan, president, Callan Data Systems; George M. Crandell Jr., partner, Brentwood Associates; Harold M. Gordy, president, Teledyne National; Alexander D. Jacobson, ceo, Inference Corp.; Arthur Lacerte, president, Basic Computer Systems Inc.; Charan S. Lohara, chairman and president, Intelligent Communications Networks Inc.; Thomas L. Ringer, president and ceo, Fujitsu Systems of America Inc.; and Thomas Roberts, chairman, Transducer Technologies Inc.

"There is an informal network like this in Silicon Valley and it works."

The first official meeting of the network was held July 29, when the membership was divided into round table groups of 12 ceos, which will meet monthly for half a day. Network-wide conferences and workshops are to be held quarterly.

Panzer predicted that the network initially will give a lot of attention to marketing. "Among the ceos we interviewed, almost all ranked marketing high as a success factor. They ranked themselves low."

At the initial meeting, David Cole, ceo of Ashton-Tate, pointed to the tendency toward "killing the messenger who brings bad news. You've got to seek out information. Expect bad news and appreciate good news, but get the information quickly." He said Ashton-Tate has identified all the channels in the organization through which a customer can talk.

David Saykally, president of Context Management Systems, said, "Focus on the parameters of the marketplace, not on channels of distribution. Determine who has responsibility for strategies."

In addition to its regular members, all high-tech ceos, SoCalNET has a panel of venture capitalists, lawyers, and consultants who can be called on by the round table groups.

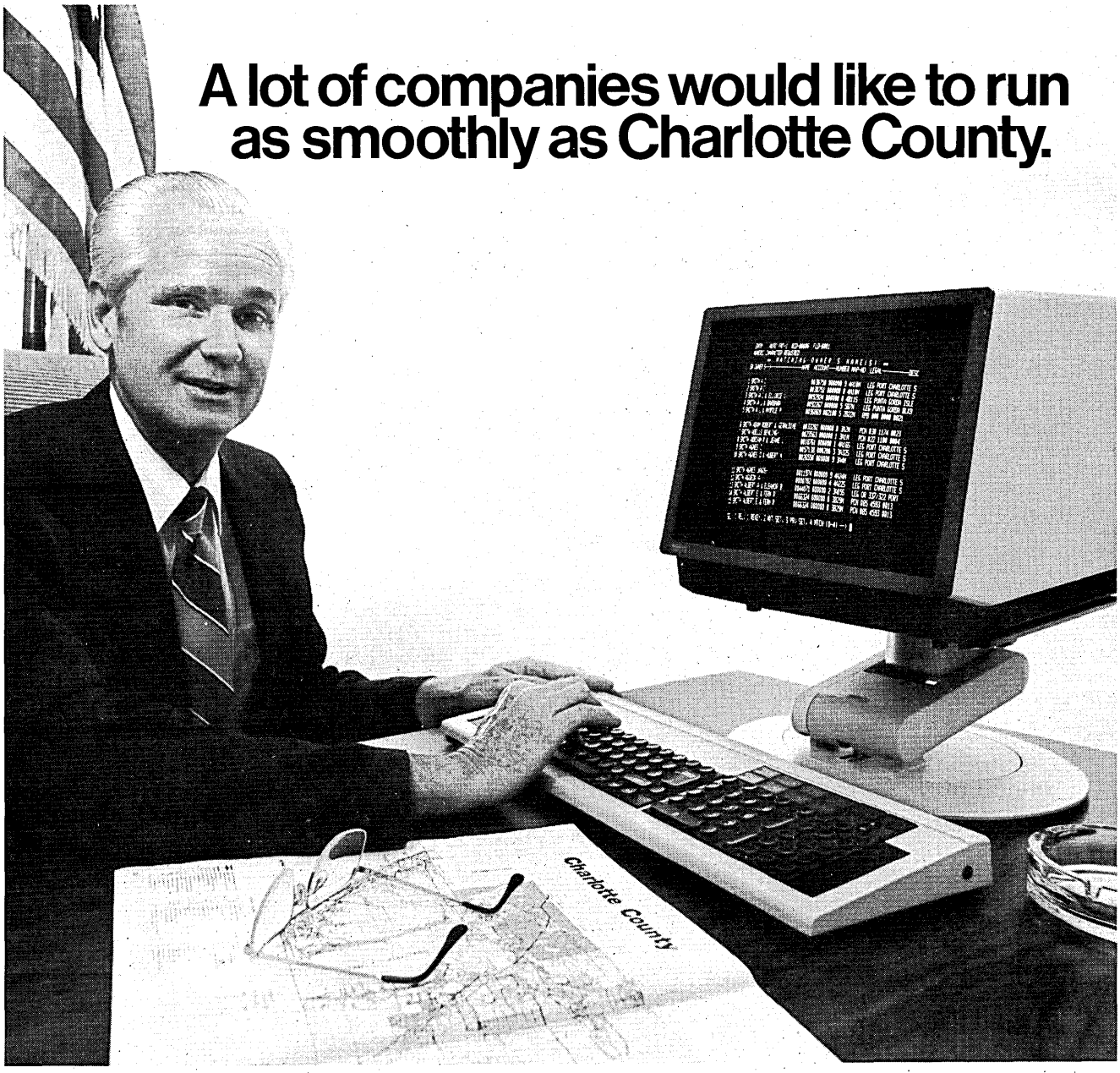
Panzer believes the network will grow. "I've compiled a list of some 250 emerging high-tech companies in this area. This is an exciting time in Los Angeles."

BENCHMARKS

REENTRY: Data General once again has attacked the microcomputer market, introducing a family of desktop machines it hopes will appeal to corporate and small business users. The firm's new Desktop Generation line uses the microEclipse microprocessor and Intel's 8086, offering the ability to run previously written Data General minicomputer software as well as industry-generic packages. The company had unsuccessfully tried to enter the micro market in 1980 but "missed the mark," as one executive put it, by choosing a proprietary operating system that limited the amount of applications software available. The low-end model of the new family is a single-user machine selling for $3,165 with 128K bytes of main memory, a 368K byte diskette drive, monitor, and keyboard. The upper two models, which can handle up to four concurrent users, will sell in the $10,000 to $17,000 range, depending on options. Deliveries were set to begin this month.

BUYS IN: Frustrated in its delayed attempts to enter the office systems business, Harris Corp. has agreed in principle to buy established word processing vendor Lanier Business Products Inc. of Atlanta. In a stock deal valued at about $415 million, Lanier would become a subsidiary of Harris. The deal is expected to be completed by October or November, giving Melbourne, Fla.-based Harris a solid entrée into a market it has eyed for several years. Harris last spring finally came out with its own word processing system after several years of development and scrapped plans. The company is understood to have a relatively strong standing in the distributed processing marketplace but is now determined to

A lot of companies would like to run as smoothly as Charlotte County.



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As Oliver Lowe, Charlotte County's Property Appraiser, and the driving force behind the implementation of the Nixdorf 600/55 computer system, puts it, "One of the primary obligations of any government agency, regardless of size, is the elimination of unnecessary expense and duplication of effort. With the Nixdorf system, we are able to meet the data and information processing needs of all county departments, and at the same time, make the information used by one organization available to any other department that might need it. We're comparable with private enterprise when it comes to efficient management."

The Nixdorf system handles the complete range of the county's administrative functions from property appraisal, tax collecting, license and registration renewals, payroll, and mosquito control to a number of law enforcement requirements.

Another reason for the selection of the Nixdorf system, according to Mr. Lowe, was its ease of use. The system is being run by people who had never operated a data processing system before. No computer specialists had to be hired. And that's a major factor in Charlotte County's ability to save hundreds of thousands of dollars.

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establish a position in the office arena. Lanier sells the EZ-1 series of standalone word processors which are manufactured for it by Montreal-based AES data Inc. (in which Lanier has a 37% interest), while Harris offers a clustered system, the Series 9000. The latter recently made the bold move of divesting itself of its well-established printing business to become entirely an electronics company. Lanier brings to the situation a payroll of approximately 5,000 employees, some 2,000 of whom are in sales.

SPLITS: After less than a year and a half of its Industry Systems group structure, Burroughs Corp. formed a three-group arrangement at its head offices in Detroit. Replacing Industry Systems will be the Large Accounts Development, Business Information Systems, and Financial Systems groups, the first of which is to be headed by corporate senior vice president William P. Conlin, who had been in charge of Industry Systems. All three of the new groups will report to Burroughs president and chief operating officer Paul G. Stern. Business Information will include office automation and small business computer operations and is to be headed by Edwin F. Carlson, a corporate vice president who joined Burroughs last spring from Victor-Kidde's computer operations. Heading Financial Systems will be Martin A. Belsky, a corporate vice president. When formed in May last year, Industry Systems had encompassed product planning; market planning; engineering and manufacturing for financial, commercial, and manufacturing systems; as well as office and small business machines.

DELAY: Amdahl Corp. has been forced to slip the first customer ship date of its dual-processor 5860 mainframe by at least three months due to a shortage of engineering staff within the company. Instead of being available in the second half of this year, the machine will be delivered early next year, Amdahl told customers. The slippage is understood to be the result of management's decision to concentrate engineering efforts on other areas, most notably the development of products to handle the Extended Architecture (XA) IBM has started to deliver in its high-end mainframes. While industry observers don't expect the pcm's revenues or earnings to be affected by the delay, it will make Amdahl's largest machine enter the market a few months after IBM's largest, the quad-processor 3084. That machine is scheduled for first shipment in the last quarter of this year.

TAIL WAGS DOG: Acknowledging that its product's name is better known than its company title, Three Rivers Computer Corp. has changed its name to Perq Systems Corp. The Pittsburgh maker of high-performance scientific PCs also has snuggled closer to British computer vendor ICL, which has for two years marketed and manufactured Perq systems abroad. Under a new five-year agreement, the two companies will more closely coordinate their manufacturing efforts, dividing the Perq product line between Pittsburgh and the United Kingdom. Three Rivers hired a new top management team in March to help reverse what was understood to be a declining order rate. Company sources indicated that new financing, aimed to help development of an expected lower-cost Perq 3 system, would be publicly disclosed this month, perhaps involving ICL. Meanwhile, the British firm is gearing up to introduce the Perq 2 workstation in the U.K. on Sept. 21.

SPREE: Management Science America Inc., the Atlanta software company, has entered the educational market through the acquisition of Edu-Ware Services Inc., Agoura Mills, Calif., for about $1.5 million in cash and stock. This move is expected to bring the company more sales in the microcomputer market and give it a boost in competing with IBM whose Science Research Associates subsidiary is expected soon to be a major force in the educational software market. Edu-Ware had fiscal 1983 revenues of $1.6 million. Meanwhile, MSA earlier had acquired Computeristics Inc., a builder of order processing and accounts receivable software, for about $4.5 million. MSA has disclosed plans for further acquisitions in the hospital and banking arenas, among others, as it tries to target specific industries. The company reported second quarter revenues of $36.9 million, up 63% over the comparable year-earlier period.

"CAVED IN": That's what AT&T admitted doing in reluctantly agreeing to drop the Bell name from its corporate title following the upcoming divestiture of its local operating companies. The agreement cleared the way of all legal obstacles for the breakup. Those 22 smaller units, which are joining together into seven regional holding companies, will be allowed to use the Bell moniker. Thus, AT&T's unregulated subsidiary, now American Bell, will become AT&T Information Systems and the long-lines subsidiary will be named AT&T Communications. Bell Laboratories will, however, retain its name intact. It is thought that the phone company will now have to spend millions of dollars to reestablish its market identity without the Bell logo, but the company agreed to change in order to avoid extended legal hassles as the Jan. 1 divestiture approaches. Meanwhile, AT&T has chosen red, blue, and black as its corporate colors, leaving the traditional blue, ocher, and white to local companies.

TIDBITS: Digital Equipment paid $26 million for a 9% interest in mainframe maker Trilogy Ltd., giving DEC an option to license Trilogy's wafer-scale semiconductor technology. It was also agreed that Trilogy, at DEC's option, could develop a new chip manufacturing facility in California, a portion of whose output would be used to supply DEC. No details were given as to DEC's intention to use the advanced chips in its product line. . . . Swedish manufacturer Ericsson Information Systems has cut two potentially lucrative deals with U.S. comptuer makers. The company has agreed to set up in the U.S. a join R&D company with Honeywell Inc. to develop voice and data communications products. The two firms also signed a long-term technical exchange agreement regarding Ericsson's MD110 private branch exchange (PBX) which Honeywell now is to market in North America. Meanwhile, Sperry Corp. said it has signed a marketing agreement giving it the right to market Ericsson's System 2100 bank branch automation system in most Europen countries outside the Nordic nations as well as in Canada, South Africa and Southeast Asia. . . . Lee Data acquired Wordtronix, a late-starting Minneapolis maker of word processing equipment. . . . Honeywell said it received an order for more than 1,000 DPS 6/40 minis for Metropolitan Life Insurance Co. sales offices in the U.S. and Canada. *

MRP AUTHORITY DIES: Oliver W. Wight, author, industrial educator, and a leading advocate of manufacturing resource planning techniques, died of cancer after a long illness. He was 53 years old. A founder of the American Production and Inventory Control Society, Wight was a well-known lecturer on automated manufacturing methods. Speaking with the enthusiasm of an evangelist, Wight inspired industrialists worldwide to use computers to improve factory productivity and gain better control over operations. He was born in Bridgeport, Conn., and graduated in 1951 from New England College, Henniker, N.H. Publication of his latest book, *We Can Beat Japan*, will bring to six the total number of titles he produced.

Making The Case For
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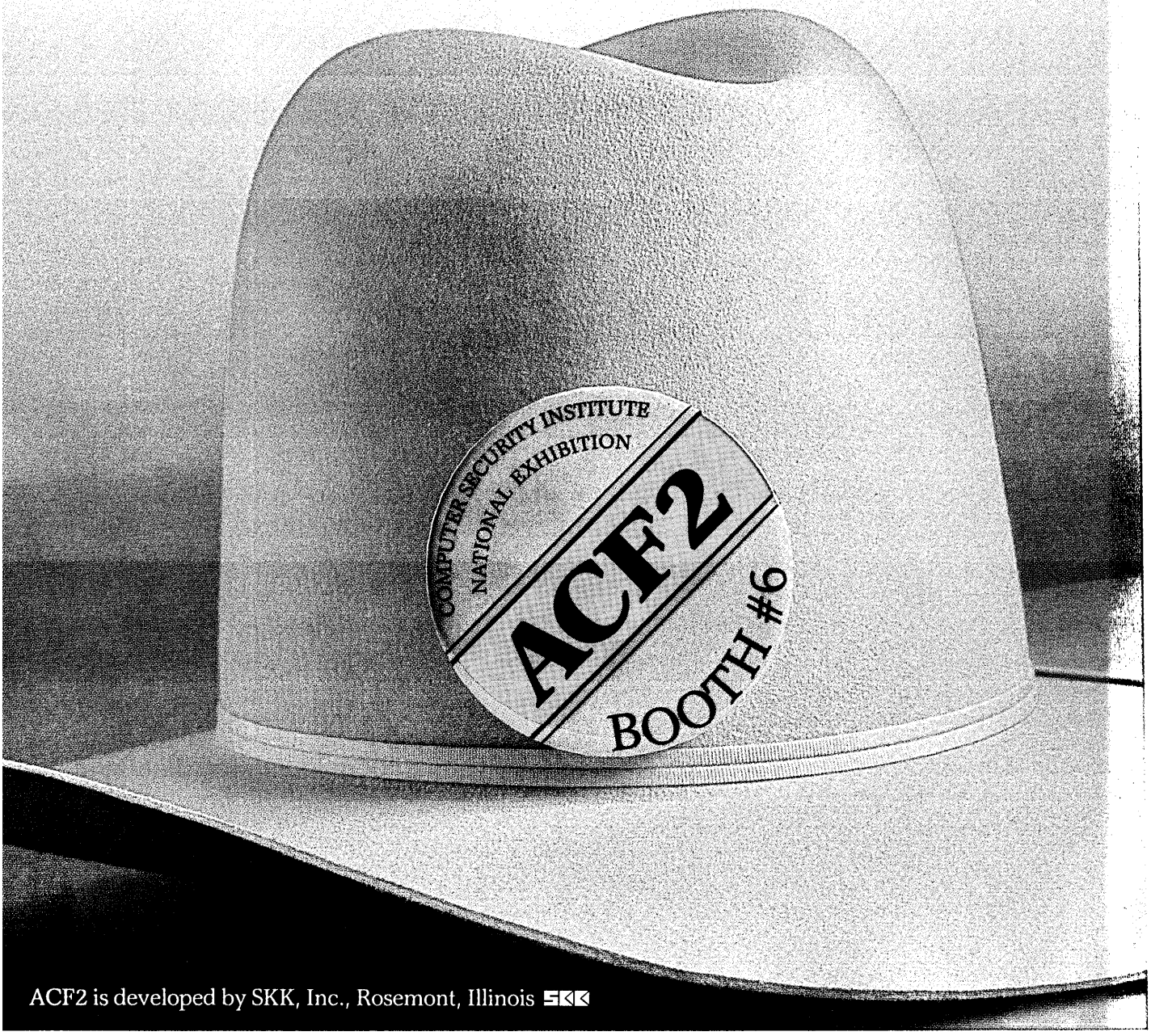

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THE CASE FOR COMPUTER SECURITY

by John C. O'Mara, Executive Director
Computer Security Institute
Northborough, Massachusetts

The hallmark of an effective manager is the ability to recognize what is important. Unfortunately, senior management has a long history of failing to recognize the critical importance of information, and what would happen if their data processing capabilites were damaged or destroyed. Yet information is the lifeblood of every organization. It is an asset as valuable as cash, accounts receivable, personnel, plant, and equipment. And at the organization's heart lies the computer, pumping the flow of information to every part of the enterprise. The loss of that information, or of management's ability to use it, would severely cripple the organization.

Computer Security Institute surveys show that the degree of dependence on computers varies considerably—but in almost all cases is increasing. For a typical manufacturing plant the additional out-of-pocket expense of computer downtime runs between $2,000 and $50,000 a day; for a large bank or insurance company it can be $500,000; for an airline it could be millions. Extended downtime would become even more costly, to say nothing of lost business and customer good will. Survey results also show that the primary reason for the absence of dp safeguards can be traced to top management's lack of awareness of the need to protect these critical assets.

Why this lack of awareness? For one thing, senior managers rose through the organizational ranks before the computer became a familiar business tool. Many CEOs are uncomfortable in a computer environment, never having had the opportunity to work with computers in school or on the job. Even when organizations began installing their own computers, there was often a management reluctance to get involved—and expose their lack of understanding to the "high priests" who ran the machines. An almost blind dependency evolved, which prevented senior management from asking the right questions, kept them from effectively applying to the dp function the same evaluations and standards they routinely used for manufacturing, finance, marketing, and other functions.

In addition, dp administration has done a poor job in educating senior management, leaving behind the mystique of the "black box." The net result is a real lack of awareness of the importance of the dp function to the organization, not only in terms of its cost-effectiveness but, more important, its critical role in the organization's overall operations.

Establishing a Computer Security Program—Here's a useful, if simplified, description of the major steps in establishing a program to secure information processing systems.

1. **Develop a Policy Statement and Assign Responsibility.** A necessary first step is to formalize in a policy statement the organization's commitment to protecting its information resources. This can be as short and simple as "Information is a valuable corporate asset and must be managed accordingly." This high-level commitment is necessary if any program is to have a chance of success and gain the cooperation of management and the user community. The next step is to choose an individual to serve full-time as dp security officer with overall responsibility for computer security. If your company is small or medium in size, you may have to live with something less than a full-time responsibility, but it is nonetheless essential that this role be assigned.

2. **Conduct a Cost/Benefit Analysis.** Before corrective action can be taken, make a thorough analysis of risk exposures. What effect would a disruption of dp services have on your company? What if vital records were lost or destroyed? What about the disclosure of trade secrets or other proprietary data? (To be most useful, these critical loss potentials should be described in dollar terms.) This information then ties directly into your evaluation of risk-reducing options. To determine whether a proposed security system or procedure is cost-effective, you compare its cost to the potential loss it is expected to reduce or eliminate. Rational decisions can now be made regarding the appropriateness of physical access control systems, backup power, fire protection, and other protective measures. When these systems and controls do not reduce the risk to an acceptable level, you may wish to transfer the residual risk to an insurance underwriter; or, you may choose to self-insure. In either case, you need to be aware of what is at risk.

3. **Establish a Disaster Recovery Plan.** Even after protective measures have been taken, breaches in your security screen are possible. You need a contingency plan to establish a state of preparedness, along with the capability to react immediately in a controlled and systematic way. Tasks should be clearly defined, prioritized, well-documented, and tested.

Managing the Program—Managing information security successfully requires an understanding of the organizational interfaces among data processing operations, systems development, audit, corporate security, user areas, and senior management. Of all these groups, however, it is perhaps most important that end user departments understand and believe in the goals of the security program as well as the measures used to implement it. Only with their acceptance will the program work effectively.

Monitoring the Safeguards—Once your program is in place, you should institute a mechanism for monitoring the program. It should verify that control procedures are operating, that the various security systems are performing properly. These systems, such as automatic fire protection systems and backup power, should be maintained and tested so you can be assured they are in working order if called upon.

In short—Keeping the "big picture" in focus requires a clear understanding of the role data processing plays in supporting the organization's day-to-day operations—and an understanding that its loss could be catastrophic. Prudent measures must be taken to assure smooth and uninterrupted operation of the dp function. When you're dealing with hundreds of thousands, or millions, of dollars worth of assets, a patchwork, piecemeal approach to computer security is simply not good enough. An effective program doesn't happen by chance; it requires detailed, time-consuming planning, funding, and a commitment from all levels of the organization. When created and managed conscientiously, and with the blessing of senior management, an effective computer security program will ensure the most efficient use of your resources, with a minimum of surprises. ✲

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Businesses today have become so computer dependent that there's only one word for complete computer shutdown: disaster. And your computer is vulnerable. To floods, fire, explosion, nature and sabotage. Your data processing manager probably has a disaster plan. And probably it won't work. It really isn't his or her fault, because business continuity, whether computer related or not, is a corporate/financial responsibility, not a data processing problem.

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COMPUTER SECURITY

THE MYTH-MANAGEMENT OF DISASTER RECOVERY PLANNING

by Martin E. Silverman
Coopers & Lybrand
Chicago, Illinois

It is dangerously bad management to assume that "a disaster won't happen to me"; but it's even worse to believe that somehow you'll be able to recreate your data files and computer resources without detailed, tested recovery plans. The prolonged unavailability of dp resources is not a viable option; neither is simple reliance on the best efforts of computer manufacturers to get you going again. Few managers realize the extreme importance of planning for such contingencies. Instead, they often think in terms of "myths."

Myth #1: Contingency planning is not senior management's problem; it's a technical thing the dp department should worry about.
Reality: Planning for disaster recovery is a business management responsibility involving the protection of a corporate asset as valuable as any of its "hard assets," or the decision-making capabilities of management. That asset is corporate data, the key to your business—customers, markets, operations, strategies for survival. Contingency planning is therefore a necessary cost of doing business.

Myth #2: A viable contingency plan means making backup copies of everything on the computer.
Reality: Will those backups be usable after a disaster? Do you keep them away from your dp site? What will you run them on? Do you copy your programs as well as your data? How old is the backup? What if something happens to your only backup? The sad truth is that backup of data and software is only one part of contingency planning.

Contingency plans are specifically designed actions, resources, and procedures that will be used to recover and maintain vital corporate functions if your dp facilities are rendered partially or totally inoperative for an extended time. They must serve your organization's *specific* survival needs. They must be designed with the involvement of your staff and tuned to your organizational objectives. They must support your critical systems and guide the actions needed to restore full and normal dp activities. Anything else will leave a gaping hole in your corporate security blanket.

Myth #3: Contingency planning means finding a "place to go" where dp activities can be resumed after a disaster.
Reality: While this is an important component of contingency planning, it can only be addressed *after* you know what your real requirements are—when you have determined which applications are critical to the organization's survival and what resources are needed to support them.

Critical applications and resources should be carefully defined. What is critical to one group may be incidental to another. When making contingency plans, a critical application is one which must be carried out with a specified regularity if the company is to survive, and which must resume regular operation as quickly as possible after a disaster.

When discussing the resources required to support critical applications, the first two that come to mind are the computers themselves and the operating software (both systems and application packages). But from a management perspective, there are several other important factors which must be figured into the contingency planning process.
Hardware—What equipment do you absolutely need to resume operations? What substitutions, what compatible equipment can be used to meet your needs? Where will you obtain the equipment, and how long will you be able to use it?
Software—What operating environment(s) will allow you to run your critical applications?
Personnel—Will the required number of support personnel be available? Are they trained in alternate systems (some may be manual) for data entry and processing?
Logistics—If you're moving to a different location—possibly more than one—for your recovery operations, how will you coordinate data, personnel, support materials (such as forms), transportation, and communications to achieve the necessary results? Sometimes the extra movement involved in relocation may introduce enough added risk to eliminate that alternative.
Security, Audit, Control—After a disaster, your normal operating procedures will be severely disrupted. Operating programs and personnel will be forced to work under extremely adverse conditions that would not otherwise be tolerated. Your usual control mechanisms may not be fully operational. Clearly there must be alternate (perhaps even more stringent) procedures to ensure adequate security and auditability during a highly pressured recovery period.
Recovery Time—There are two critical time dimensions to consider when planning for recovery—maximum allowable "downtime" for critical applications and the length of time it will take to recover normal processing at your normal dp location.

Myth #4: The final step in the contingency planning process is to formalize (document) the plan.
Reality: A well-conceived, well-documented plan does not assure that it will work in a disaster situation. For that assurance it must be *tested!* Because disaster recovery planning involves such a complex of events and circumstances, so many interrelated activities and procedures, the only way to tell whether it works is to put the plan into effect. Periodic testing will also alert you to the plan's weak points as well as reinforce for your personnel their specific tasks and responsibilities.

A Living Process—A contingency plan must be based on the organization's overall needs, not just the technical requirements of the computer center. It is not simply an "add-on"; it is a living process. That process begins when new applications are designed, and it should not end until the application is obsolete. It also requires modification of existing applications, procedures, and processes.

The final decisions rest with senior management, and the decisions must be made intelligently. When contingency planning is ignored, that's mismanagement; facing up to the misconceptions, that's myth-management. ✱

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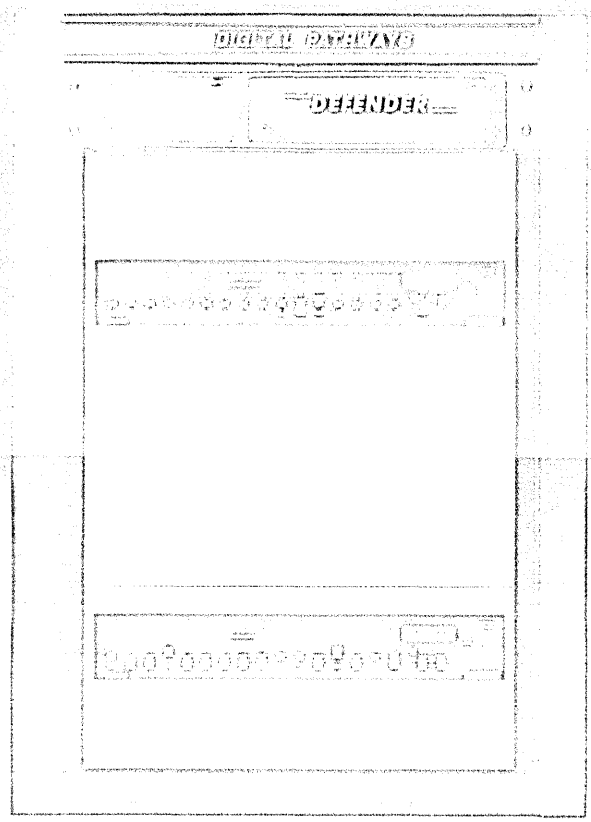

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MICROCOMPUTERS: THE ELECTRONIC OFFICE'S DR. JEKYLL/MR. HYDE

by Gerald I. Isaacson
Computer Security Institute

The widespread use of microcomputers offers one of our greatest opportunities for increased white collar productivity. But with every new concept or technology (as with Dr. Jekyll's formula), there are potentially damaging side-effects. In the case of micros, we face the very real risk that their use will proliferate out of control.

A major problem faced by data processing management is simply getting a handle on where the microcomputers are—who in the organization has them and who is buying them. Because of their low cost (commonly treated as operating rather than capital expenditures), dp often never learns of their purchase. And since many were purchased as electronic typewriters, word processors, and programmable calculators, organizations have no idea of *how many* micros they own!

Hardware service and software support problems multiply when a wide variety of products and brands are being used. And with this potpourri we lose the ability to develop usable documentation and the ability to recover from machine failures or localized "disasters." On the bright side, managers and staff can now use these machines for their individual processing needs, possibly reducing demands on the dp center.

Who's Responsible for Security?—With processing channeled to users, the protection of information and processing resources must also migrate to them. This is a two-edged sword. A security plus is that users will easily recognize strangers, since personnel with a need for particular information generally work in the area where that information is processed. This does not, of course, preclude unauthorized access via communications. On the other hand, there is usually a lack of recognition of the need for security, and a poor understanding of risks involved and solutions available. Years ago, when management assigned the responsibility for processing data to the dp department they also delegated the responsibility for protecting it. As microcomputers lead to the building of miniature dp centers throughout the organization, management and users must be ready and willing to accept the security responsibilities that go along with the processing power.

Protecting the Equipment—Microcomputers are tempting targets for theft, even greater than typewriters. The physical protection of each micro station should be evaluated in terms of the equipment and the information being processed. Simple precautions include lockable equipment enclosures, lockable power switches, and fasteners to secure the equipment.

Access to Stored Data—Securing information and software from unauthorized access or modification becomes increasingly important as sensitive information is relegated to the micro environment. It may be sufficient to lock up floppy disks overnight. As the trend to hard disks, resident files, and networking continues, greater protection may be required. In dealing with a sensitive application, it may often be more cost-effective to operate in a stand-alone mode than incur the costs of controlling access to shared systems.

Media Control—One floppy disk may contain hundreds of pages of information (with storage densities growing and physical disk sizes decreasing). Since this information can easily be duplicated without detection, we need to restrict access and guarantee data security. How does your organization handle floppies? Are they locked up when not in use? Are they left unattended in machines? Are they properly handled according to contents, classification level, department or company? Can they be taken off premises undetected and without permission?

Network and Communications Security—Microcomputer systems will not reach their full potential until they are networked, communicating with one another and with large mainframes and databases. Communications capability is required for electronic mail, teleconferencing, videotext, facsimile transmission, and other services that will be an integral part of the "office of tomorrow." The need for secure communications is obvious. The protective measures that will work here are the same ones used with traditional dp communications. The threats are essentially the same, the communications facilities are identical. We face the same vulnerabilities.

A notable difference, however, is the type of information being transmitted. Traditional data communications involves transaction-oriented data, which query or modify records, or batch transmissions, which provide input to or output from processing applications. With the increasing use of microcomputers, networks will be used for communicating sensitive management information between corporate executives. Drafts of confidential material will be "on the wire" as parties to decision-making processes communicate with their terminals. Confidential information once carried by hand will now be broadcast. The vulnerabilities are significantly greater, and yet individuals using these communications facilities are largely unaware of the dangers. Current network designs do not even address this threat. From the user's viewpoint, security probably won't be effective until it can be applied by the push of a single button on the keyboard.

Awareness: The Critical Step—To properly address microcomputer security problems, senior management must adopt a security policy which clearly defines the responsibility for information security. This is more significant than ever in the micro environment because of the distribution of sensitive data and processing resources throughout the organization. A strong policy is the first step to building awareness.

The key, of course, is for management and users alike to develop a "security mindset," recognizing that information is a critical resource of the organization. Once that awareness exists, micro users will begin identifying problem areas on their own and will welcome help in finding appropriate solutions. Many of these solutions are familiar to dp management. Applying them to micros may call for some modifications, and a new risk assessment may be needed to justify certain measures, but the traditional basics of computer security are still valid—and sufficient—for protecting microcomputer systems. ✻

Why This Special "Adver . . . . . torial"

For almost ten years, Computer Security Institute has been preaching that "Information is a critical resource and must be managed accordingly." Unfortunately, even today, there are literally thousands of managers (DP as well as non-DP) who run their organizations without appreciating that fact. Our aim in sponsoring this special "Advertorial" (advertising/editorial) section is to temper that mindset by first "making the case" for information protection in a very commonsense way, and then offering practical ideas on how to make it happen.

Easy to Use, Great to Pass Along — These articles have been written as stand-alone one-pagers to facilitate copying and routing to senior management, DP, and user personnel. They deliver concise, easy-to-understand information devoid of jargon... but with substance. For those of you who are "believers" in computer security, but have had a difficult time "making the case," these articles should be of great help in furthering your cause. ***If you'd like a reprint of this entire special section, send your request using the coupon on the opposite page. We will distribute our limited supply first come, first served.***

Next Year . . . Computer Security Institute will sponsor another "Advertorial," but significantly expanded. If you have something important to say about information security, we invite you to respond to our "Call for Articles." We're looking for short pieces (1,100 words) that deliver insightful, practical information that can be put to immediate use. If you're interested, write to our Russell Kay for details at Computer Security Institute, "Advertorial," 43 Boston Post Road, Northborough, MA 01532, or use the coupon.

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Each day, speakers will address key issues that have important long-term computer security implications. They will share their expertise and experiences, describe the latest developments and answer your questions.

Special Interest Sessions

These optional gatherings are purposely unstructured, offering a chance for people with similar concerns and problems to get together and discuss mutual interests and experiences.

Exhibition

The National Computer Security Conference's Exhibition is the only Exhibition of its kind presented specifically for the computer security professional. The wide variety of products and services being displayed include: security software, disaster recovery/backup facilities, physical access control systems, encryption hardware and software, dial-up security systems, microcomputer access controls, identification and authentication devices, records storage, fire protection, insurance, consulting services, films, publications, and many more.

Optional Seminars

Here's a chance to attend two of seven optional full-day seminars offered just before and after the Conference.

- Introduction to Computer Security
- How to Conduct a Security Review of the Data Processing Function
- Managing Microcomputer Security
- Evaluating and Implementing Security Software Packages
- EDP Disaster Recovery Planning
- Security and Control of On-Line Systems
- A Blueprint for Establishing Security Policies, Standards and Guidelines

Spouse's Program

While you're at the Conference, your spouse can enjoy a special program of sightseeing in historic lower New York, a seminar on "Communications Dynamics," tours of the Frick Mansion/Collection and the Museum of the City of New York, and a morning of "Fashion and Fitness" at Macy's.

The "Graduate Program"

For the first time, this year's Conference will include special 1½ day "Graduate Program" designed for the advanced computer security practitioner with at least four years experience in the field. This program, limited to 75 persons will have its own schedule of 6 workshops and will encourage very active give-and-take among participants.

60 Workshops

Take your choice of 6 of the 60 workshops being offered (up from 4 out of 48 last year). Each 1¼ hour session has been developed with one overriding objective in mind — to provide an environment where real learning takes place. Contrasted with the General Sessions, which are tutorial in nature, the workshops are less formal — designed for maximum interaction between leader and participants. Workshop topics have become more and more specific each year.

and you can bank on leaving with practical, cost-effective ideas that help you "put it all together." You receive handout materials for each workshop you attend. A partial listing of this year's workshop program includes:

Introduction to Data Security—For the New DSO
Basics of Operating System Security
Developing and Implementing a Data Security Policy
Risk Analysis: An Overview
An Encryption Primer/Its Practical Use
Computer Security for the Non-EDP Professional
Security & Audit in a Minicomputer Environment
Computer Security—State of the Art
The Human Aspects of Computer Security
Computer Security Awareness: Making it Happen
Personnel Security: Coping with Drug Abuse
Controlling the Systems Programmer
User Experiences with ACF2, GUARDIAN, RACF, SAC SECURE, TOP SECRET (workshops on each)
Security Controls for Sperry 1100 Computer Systems
Security Controls for Burroughs 4800 Computer Systems
Managing the EDP Audit Function
Auditing the Data Security Function
Auditing the EDP Audit Function
Phase I of Disaster Recovery Planning: Identification of Critical Applications
Long-Range Planning for Data Security
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Safeguarding Distributed Systems
Designing Security into a Large-Scale EDP Project
Security in Local Area Networks (LANs)
Why Computer Security Programs Fail

. . . plus an additional 30 workshops!

& Exhibition

Extras

While the prices of other conferences have been raised and the amenities cut back, Computer Security Institute provides a host of enjoyable "extras" — those little touches that increase enjoyment and stimulate personal interaction. There's a hospitality hour, the "Time to unwind" with added entertainment, a wine & cheese reception, luncheon and coffee breaks every day of the Conference. We also foster "personal networking" by: luncheon seating (one day by job function, another by industry, a third by special interest), coffee breaks with regional setups, and nametags color-coded by industry.

Economy

It's important to make the most of your travel and training dollars, so CSI has pushed hard to keep costs down. Hotel rates are exceptionally low for New York, and air travelers will receive discounts of 35% or more with Eastern Airlines.

But Don't Take Our Word For It

Here's what some of last year's attendees had to say about the 1982 Conference:

"An excellent opportunity to learn, share ideas, and gain valuable contacts for all levels of experience, from novice to expert. The one conference which is a must for EDP security practitioners." Howard Peace, Asst. Mgr., Manufacturers Hanover Trust

"A very excellent conference—as usual, a magnificent event. The best in the computer industry!" John T. Devall, Jr., Security Specialist, Gulf Oil Corporation

"A high quality conference in both structure and content. Probably the best single source of information pertinent to both philosophy and practical application of security measures." A. J. Stutler, Mgr. Data Admin. & Sec., Kelly-Springfield Tire Co.

"This was my 5th conference and it's a real credit to your organization that each one surpasses the previous one in content and organization. Keep up the good work." James E. Duffy, Assistant Vice President, Peoples Savings Bank

"In 1981 you sponsored an excellent conference; In 1982 you improved upon excellence." Allan T. Weatherwax, Sr., EDP Analyst, European American Bank

"Professionalism at its best. Guest speakers were of the highest caliber." G. A. Volpe, Staff Manager, New York Telephone Co.

"Great conference! Excellent speakers, good information, new acquaintances made and old ones renewed. Wealth of information." Mary Anne Todd, Systems Analyst, Supply Systems Security Group, Norfolk N.A.S.

"I came with doubt; left with awe. You done right good!" James H. Crawley III, Auditor, Computer Sciences Corp.

"Attending since 1977, this has been the best yet. I would recommend that anyone responsible for MIS security attend next year's conference—I know I'll be there." F. W. Barnett, Corporate Security Administrator, Sonat Inc.

"It was excellent—well coordinated, fast-paced, good variety of topics represented. Workbook was very helpful...Most productive trade conference I have attended!" Gay Goforth, Security/Aud. Officer, Texas Dept. of Human Resources

"Excellent. The conference dealt with the ever constant changes in computer security and presented the challenges as well as possible solutions. Very thought-provoking." Kenneth E. Rice, Vice President, First & Merchants National Bank

"The conference was extremely beneficial and provided examples, points, and methods that are immediately usable in my job." Ezra W. Brooks, Security Coordinator, Burlington Industries, Inc.

"This is an excellent opportunity for security people to meet & learn from each other—it really isn't optional." Zael E. Lutz, Corp. Information Security Admin., Upjohn Company

"Outstanding—acquired a storehouse of ideas." Steven Libertucci, EDP Auditor, The New York Bank for Savings

"Very professional, well organized. Conference is the meeting place of the experts. Very useful and motivating!" A. Ritche, Information Systems Security, Toronto-Dominion Bank

"The most informative and professional EDP security conference available to the industry to date. I look forward to next year." Gene Sweeney, VP Marketing, Mastiff Systems, U.S., Inc.

"Excellent—well organized, well run; where else can we get so much information in so short a time?" Rance R. Willis, Computer Specialist, U.S. Army Corps of Engineers

"Overall, I thought it was one of the most worthwhile conferences for data processing security I have attended—current, professional & state-of-the-art!" Mary Mulvey, EDP Audit Supervisor, American Broadcasting Co., Inc.

"Outstanding." Palmer B. Reeves, Mgr., I/S Admin., Pratt & Whitney Aircraft

"Conference is great. Scheduling is superb. Keeping a conference this size on schedule is a job 'well done'." Jeanette Mullen, DP Security Manager, Bank of Delaware

"Outstanding! CSI provides an excellent opportunity for security professionals to share knowledge & experiences." John Maunder, Security Coordinator, IBM Canada

"It provided an excellent opportunity to discuss issues with the cream of the crop in computer security." George W. Siegmann III, Sec. Admin., Lockheed Missiles & Space Co., Inc.

"Great to be surrounded by people who understand the issues & problems which confront me." Jack Musgrove, Vice President, First National Bank of Chicago

"I can hardly wait to get home to try some new ideas!" Nancy Lopez, EDP Risk Analyst, United Services Auto Assoc.

"The conference succeeded in gathering the best minds together in one location. This presented a rare opportunity for one to hear first-hand those individuals who have demonstrated professionalism in the computer security field." Chris McDonald, ADP Systems Security Mgr., White Sands Missle Range

"Well organized with an excellent choice of topics and work sessions. A rare opportunity for people concerned and involved in security issues." Richard H. Rogers, Sr. EDP Auditor, Twentieth Century Fox.

"Best of its kind." Charles M. Elliott, Director Quality Assurance, Martin Marietta Data Systems

About Computer Security Institute

CSI, established in 1974, is the first membership organization totally dedicated to helping organizations safeguard their EDP resources.

Membership Services

For their $85 yearly membership dues ($115 overseas), members receive a bimonthly newsletter, *Computer Security*, which provides news on security topics and developments, checklists, guidelines, case histories detailing real-world experiences, and other information useful to the computer security practitioner.

In addition, members receive the 520-page *Computer Security Manual*, an "instant reference library" on the fundamentals of computer security. The *Manual* is available *only* to CSI members.

CSI's staff is on call via the "Hot Line" to respond to member problems. Although we're not a consulting organization, we can often provide the information you need or refer you to the appropriate sources. We're the major clearinghouse for computer security information.

Finally, CSI members are given preferential rates on all CSI conferences, seminars, and publications.

Conferences & Seminars

CSI sponsors the Annual Computer Security Conference & Exhibition, widely known as the "Computer Security Event of the Year," and the annual IBM/Amdahl Users Computer Security Workshop program during the summer.

CSI also conducts a full schedule of regional seminars on a variety of currently important computer security topics throughout the United States and Canada. These seminars are also presented as in-house training programs (along with custom-designed courses).

CSI Publications

Computer Security Journal — This twice-yearly journal designed for the working practitioner, offers practical coverage on all aspects of computer security, including software comparisons, contingency planning and security management.

Computer Security Handbook — Over 500 loose-leaf pages of tips and techniques, policies and procedures, case histories and checklists. This comprehensive volume offers practical, how-to information about implementing and managing computer security programs.

Computer Security Compliance Test — This self-administered service allows you to find out how well your security program is doing — measured against the standards and priorities *you* set. The *Test* will document your progress and can lend extra weight to your internal recommendations.

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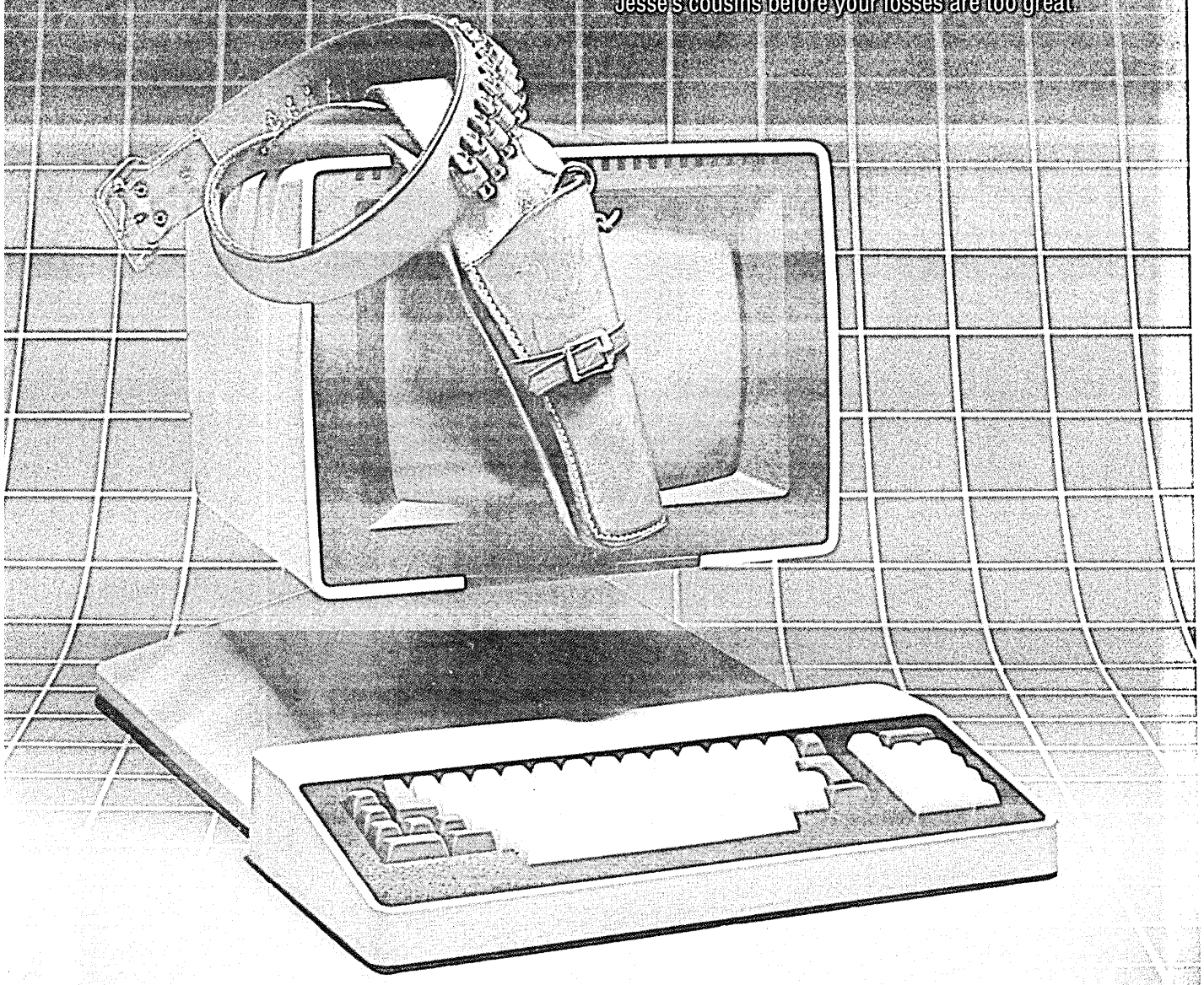

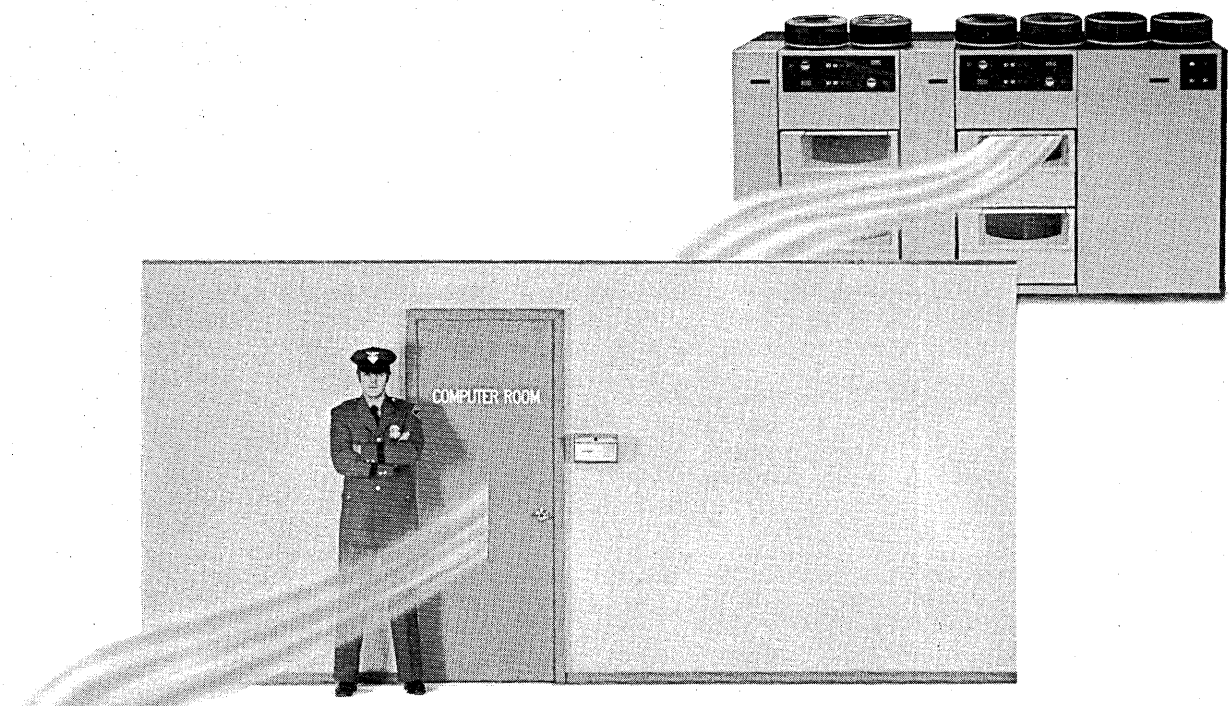

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A PRAGMATIC LOOK AT COMPUTER SECURITY

by Robert H. Courtney, Jr.
Robert Courtney, Inc.
Port Ewen, New York

First, and absolutely fundamental to the achievement of a rational, cost-effective security program, is that the mere existence of a computer-based system vulnerability does not provide sufficient justification for applying corrective measures. The world, including the data processing community, is full of problems that are better tolerated than fixed. We should fix those which cost less to fix than to tolerate, but we should live with the others until a cost-effective solution is available.

Avoid the "Step in the Right Direction" Syndrome—Doing something not really effective, but which offers a vague hope that we can build on it later, is often worse than doing nothing at all. Be very wary of those who counsel that a proposed action may not be the best solution, but "at least it's a step in the right direction." In any kind of endeavor, making motions in the apparent direction of the ultimate objective, but where the whole route to that goal is neither visible nor planned, seldom results in progress. The usual consequence of the intuitively-derived, hope-filled "step in the right direction" is the need to later reset to zero and start again—but with resources diminished by the cost of the false start.

The Security Problem Disassembled—Many things are better understood if we take them apart and examine at least the major components in isolation. So it is with computer security—but, like a watch, we must not expect it to work properly that way.

It is quite difficult to find the most cost-effective security measures if we take the problem apart and disperse responsibility for addressing the components throughout the organization. We often lose the ability to identify justifiable security measures because we cannot see their applicability to the many different aspects of the problem.

Individual security concerns are too interrelated to allow each to be addressed in isolation. For example, we cannot isolate our concern for errors and omissions from our concern for the depredations of dishonest employees, or isolate either from our concern for being attacked by technically sophisticated outsiders. It is almost a certainty that if none of these concerns influences our planning for backup and recovery, we will not get the most security for our money. Further, the probability will be high that we will be implementing security measures which are mutually incompatible or which result in an otherwise unnecessarily large negative effect on productivity.

Again, we can take the problem apart to look at it, but we must put it back together again to solve it properly. While it is often convenient to consider errors and omissions as a separate problem, we should realize that there is almost always a strong connection between errors and omissions and the dishonest employee problem. Further, some very important security measures have an applicability to both, and their cost--justification may lie in their ability to contain both problem categories. For example, take the need to hold people accountable for their actions. People are inclined to be both more careful and less likely to steal if they know that their actions are not only observable but that they are, in fact, observed. Identifying people with adequate (for the particular situation) rigor, recording individual activity, and processing those records to find undesirable behavior provides a powerful deterrent to both those who are not careful enough and those who might have their personal integrities unduly stressed. Unless both problems are considered concurrently, it is improbable that measures applicable to both will be implemented.

A necessary though obviously incomplete solution is a corporate policy statement fixing responsibility for data security on the managers of the user departments—the functional areas which are supported by the dp facility. Other areas—security, dp, audit, legal, personnel, real estate, buildings and grounds, insurance—must assist in identifying and solving problems, but the basic responsibility should be fixed with the users. There appears to be little hope that any other approach to the assignment of computer security responsibility will properly reflect the real needs of the whole organization and create the essential recognition that security is not an end in itself; we pursue it only to limit losses.

The Problem with Prioritizing Problems—We have saved until last one of the most difficult of all data security problems to overcome; that is, the very strong temptation for both data processing professionals and professional security people to want the computer security problem to be more technically challenging or more intellectually titillating than it is likely to be. This inclination leads to a prioritization of problems or concerns which is completely contrary to the actual experience of those same people.

It is common for dp directors to be concerned with the capability of a few well-paid systems programmers for causing damage, while giving little thought to the thousands of geographically dispersed clerks who have constant access to key organizational files. Only a small portion of computer-related crime can be attributed to technical people, either inside or outside the organization.

A Plea for Common Sense—The planning and implementation of security measures yields as well to careful, systematic, coherent system design as does any other aspect of data processing. In designing other systems, we try to accommodate all reasonably foreseeable problems and exception conditions, and we reject applying resources to solving problems we have never experienced and have no good reason to think that we will. If we apply the same professionalism, diligence, and insistence on cost-justification that we apply to other aspects of well-designed systems, we can have fully cost-effective security with minimum negative effect on system performance and function. ✱

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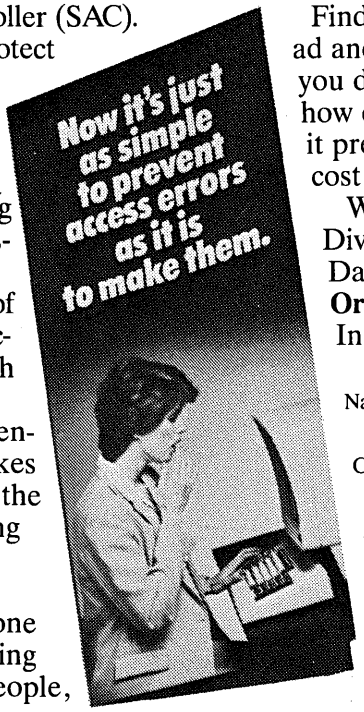

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MODERATE COST COMPUTER SECURITY CONTROLS

by Donn B. Parker
and Charles Cresson Wood
SRI International
Menlo Park, California

The preceding articles should provide the motivation for protecting data resources. Here are some examples of important controls which can be implemented at moderate cost to improve security.

A generally accepted set of basic controls for computer systems exists, even though it is small and subject to modification depending on data sensitivity, applications, technology, and other factors. Some controls are recognized as generally applicable to all systems and can be used as a starting point for a security plan. However, in addition to specifying a control, many related factors (not all covered in this short article, such as who is to be constrained by it) must also be considered.

Human Controls—Many computer security specialists overlook the importance of personnel-related controls, such as **background checks** for data processing positions of great trust. Systems programmers, as well as data entry clerks, can do great harm. Managers typically scrutinize the technical background of applicants but often neglect to check personal backgrounds. Of course, personal background checks are limited by regulations, laws, and ethics. Where allowed, a manager should check the education, past employment history, criminal convictions, and credit history of an applicant for a sensitive position.

Employees may often avoid or circumvent security controls to complete tasks more quickly, because productivity alone may be considered in their **job performance reviews**. An increasing number of employers are realizing that, without explicit inclusion of security awareness and compliance evaluation in job performance reviews, employees will continue to rationalize their noncompliant behavior.

Many data processing employees use their employers' computer resources for personal purposes without explicit authorization. This may be tolerated in some organizations but not in others. Professional associations such as the ACM (Association for Computing Machinery) have codes of ethics addressing such matters, but they seem to be rarely applied.

Twenty-one state computer crime statutes and two pending federal computer crime bills have been helpful in defining acceptable conduct, but these laws set only a lower bound. In one recent court case in a jurisdiction where no such statute exists, the judge released the defendant charged with criminal use of his employer's computer services, in part because his employer had failed to inform him that unauthorized personal use was not permitted. Unless employees are informed about prohibitions, they may rationalize their behavior, assuming that certain actions are permissible.

A **code of conduct** for all employees and contract workers is highly recommended to explicitly identify unacceptable actions. The code should describe penalties for violations; otherwise, it is only a guideline. Codes should be reviewed periodically with the people affected, and they should sign a statement agreeing to be bound by the rules. A code of conduct should, for example, cover: personal information confidentiality, customer and employer information confidentiality, rights to computer programs developed while on the job, use of employer's computer resources for personal purposes, compliance with computer controls, sanctions for policy violations, reporting of losses and data owner and custodian responsibilities.

Password Access Controls—Password controls are used primarily for gaining access to multiuser systems. The features generally agreed to be important for password control include: requiring a minimum number of characters for each password; termination of sessions activated by idle time; limiting the number of log-on attempts permitted before a user is disconnected; preventing the display or printing of passwords at the terminal; and one-way encryption of master password files. The U.S. National Bureau of Standards will soon release a Federal Information Processing Standard publication entitled "Standard for Password Usage" along with guidelines for its application.

Some systems now require a series of passwords for access to increasingly sensitive computer system areas, such as a communications network, a specific computer, an application on that computer, and privileged functions within the application.

Backup Copies of Data—Making backup copies of critical data is recognized as good business practice. A surprising number of organizations, however, do not store them in sufficiently safe places—specifically, away from the computer site. If a fire or other localized disaster were to occur, all copies of the data could be destroyed. In addition, one backup copy is often not sufficient; if an operator accidentally erased the only backup copy, recovery operations could be costly or even precluded. Thus, at least two backup copies should be made.

Baseline Controls—Organizations should assess their computer security posture vis-a-vis that of others with a similar computer operating environment and with security literature. This will enable organizations to reach decisions on accepted controls more easily and increase confidence that an adequate baseline is established relative to accepted practice. To complete a security program, it should be noted that every organization has unique characteristics and associated risks that should be dealt with separately from and subsequent to the consideration of generally accepted controls.

Two reports resulting from SRI studies provide further information on recommended security controls. The report on the landmark study "Systems Auditability and Control," obtainable from the Institute of Internal Auditors, contains a compendium of useful information on controls that are being widely used. The "Computer Security Techniques" report, recently prepared for the U.S. Department of Justice, Bureau of Justice Statistics, details controls that were found to be used in seven exemplary computer installations around the country. ✱

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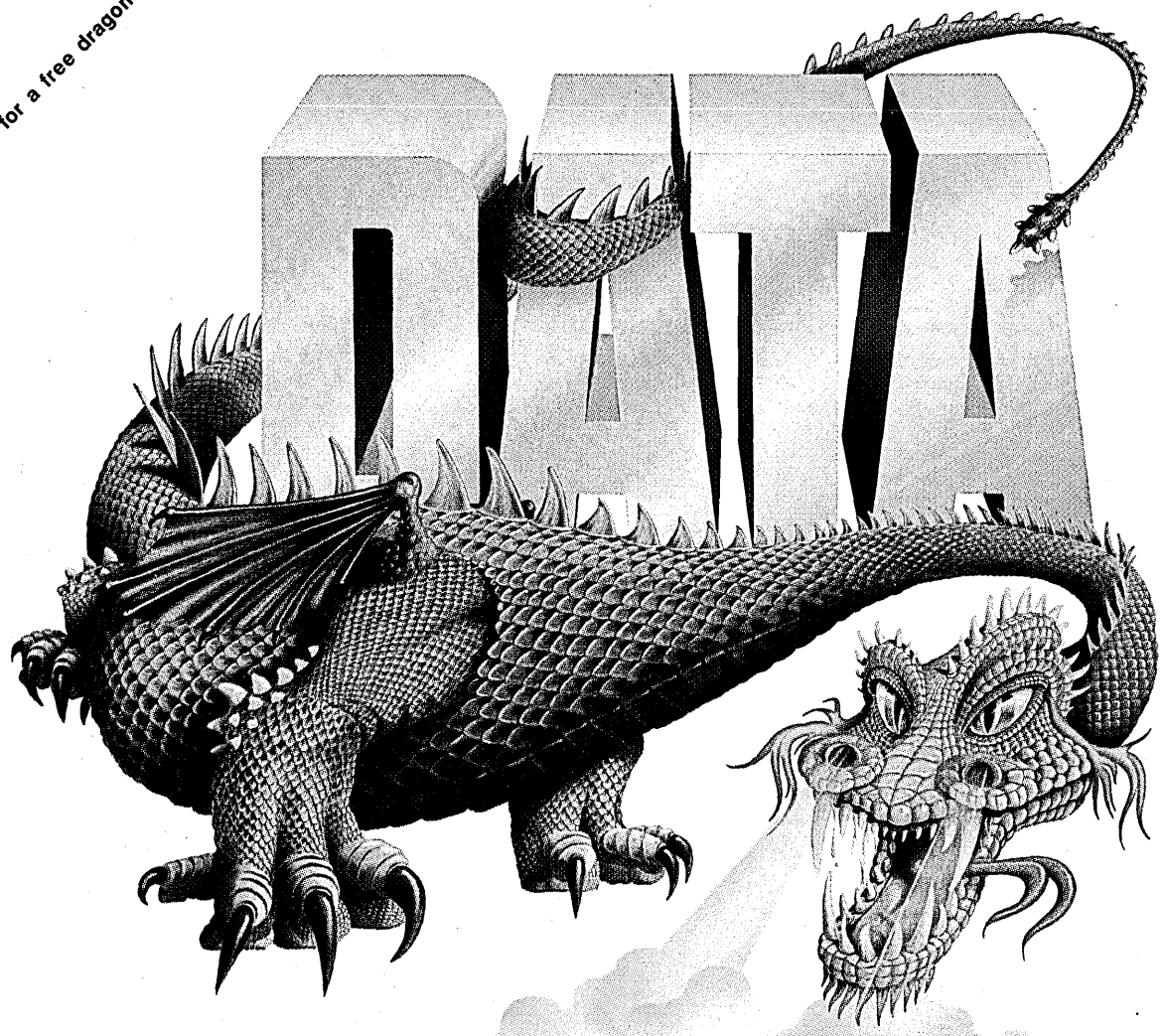

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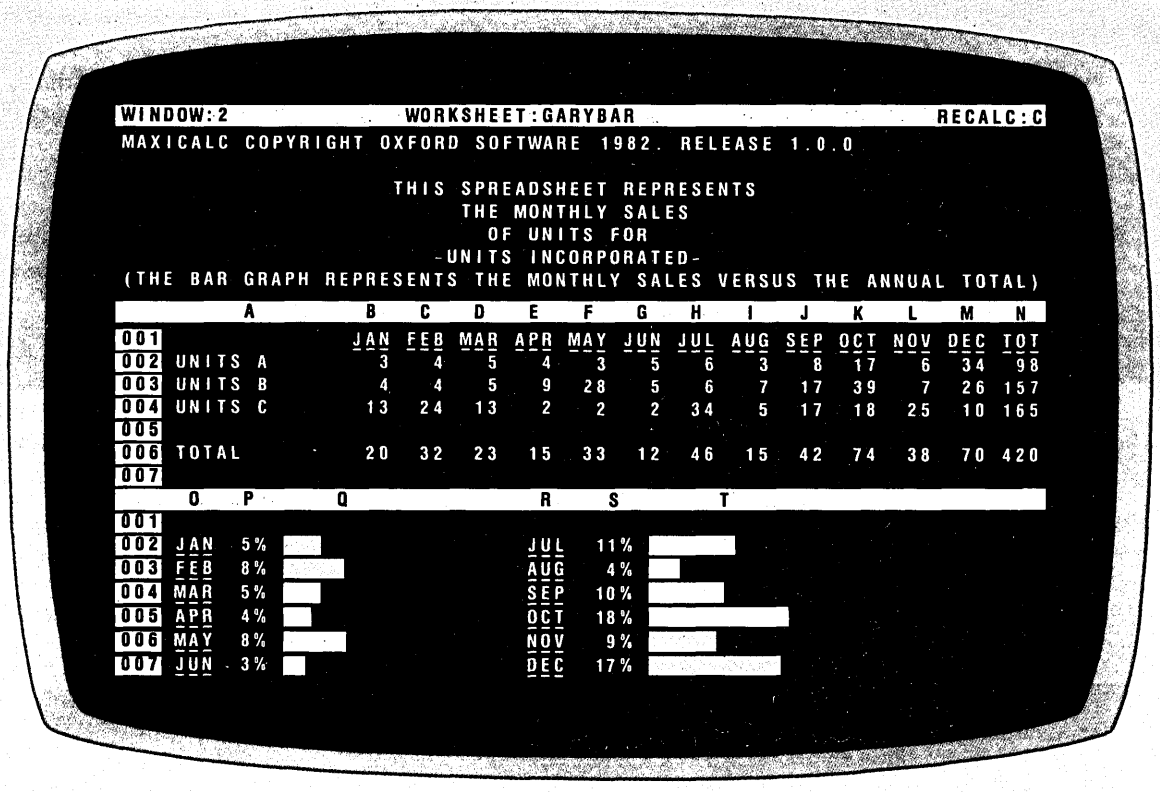

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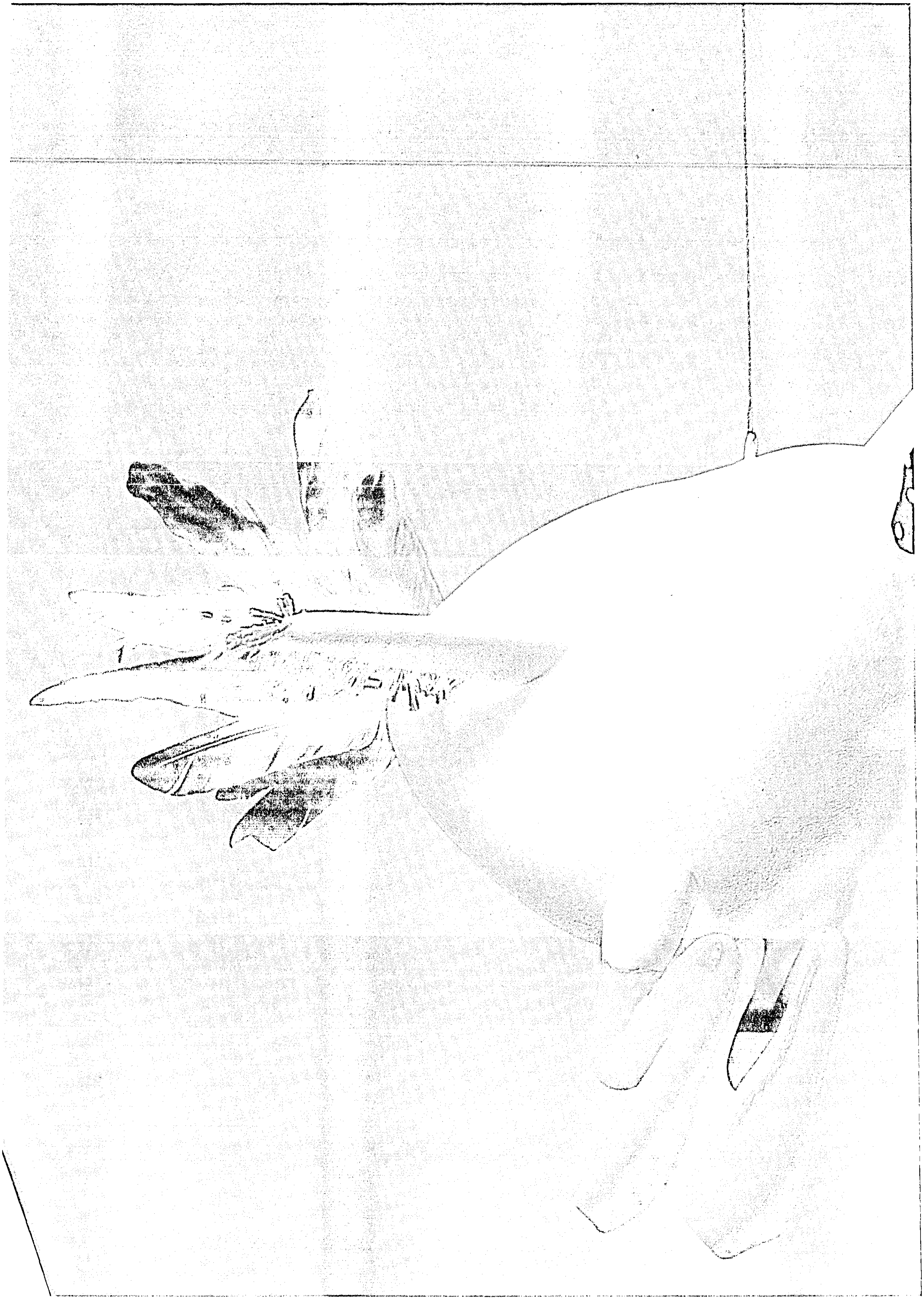
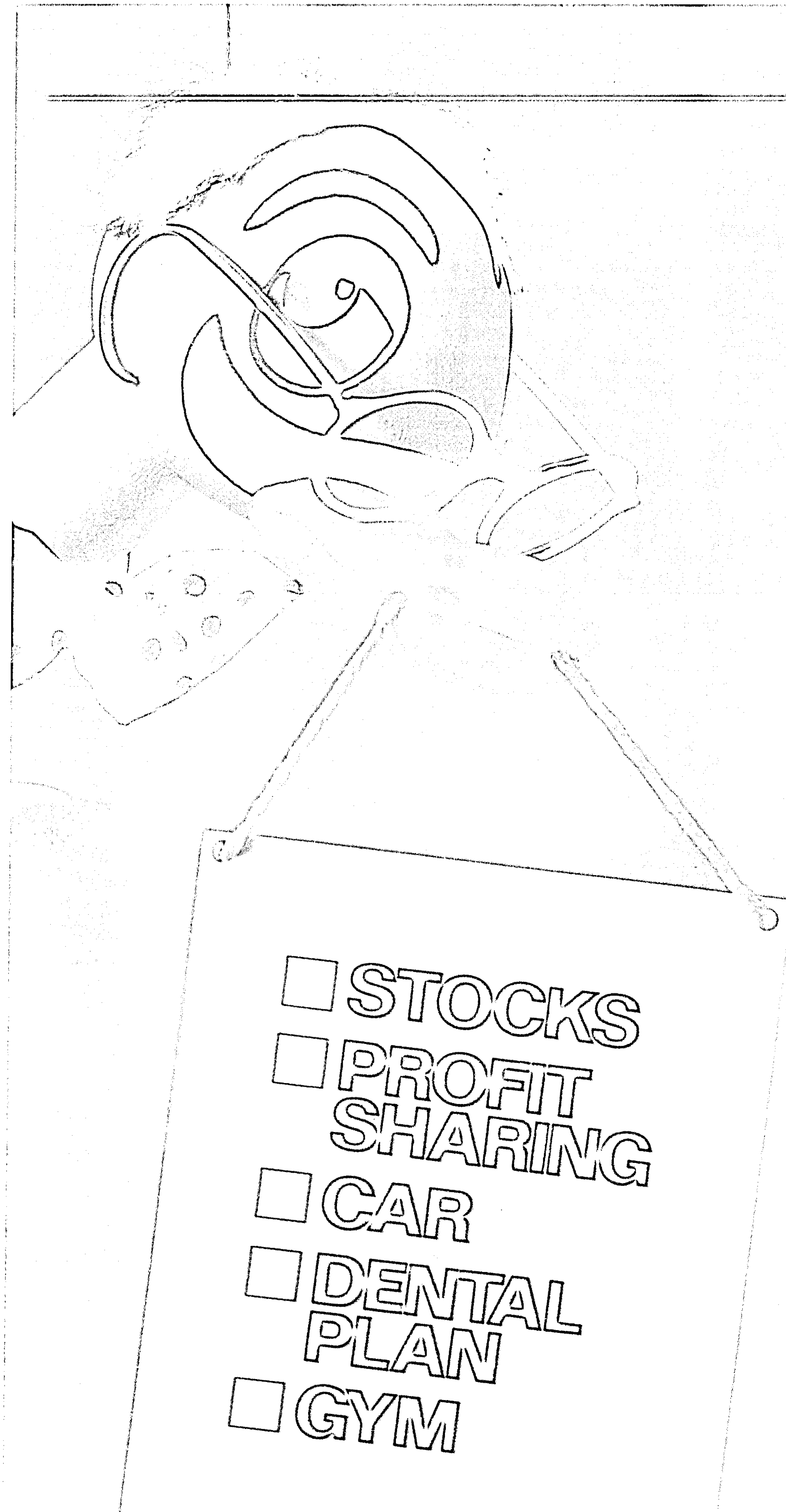


The 10% or higher raise is fading from sight, but companies are becoming concerned with improving overall job satisfaction.



1983 DP SALARIES— THE KEY WORD IS PERKS

by Larry Marion

As [illegible] it seems hard to believe, the nation's economy is gaining strength by the second, the stock market is going like gangbusters, and your company is adding a second shift. But the boss just said that a big salary increase is out of the question. "It's not in the budget," he insists, while you shake your head in disbelief. Last year you felt lucky to get a 10% pay boost while the economy—and your company—were in the doldrums. But this year's 7% or 8% increase does seem anemic by comparison.

Don't hold out hope: less than robust salary increases are going to be the rule in 1983 for programmers, analysts, operators, and others in the data processing industry, according to the 1983 DATAMATION salary survey.

Last year there was a one in four chance that a data processing center would offer at least a 10% salary increase to its personnel. But this year the odds were about one out of six. Furthermore, more companies are handing out less than 5% raises in 1983, compared to last year (see Fig. 1).

As the salary gains slow, interest in perquisites soars. Life and health insurance benefits are standard operating procedure for more than 90% of the companies surveyed. In addition, the rise of the two-income family has made the variety of other benefits important as those benefits are exempt from the 50% tax bite. How many [illegible] "perks" is the magic word for 1983?

"Money is less important for those at the middle level," says Vincent Morgan, managing associate at the recruiting company Korn/Ferry International. "When you're at

Bureaucracy and red tape help create the paradox of a healthy economy with substandard raises.

ready making $70,000 a year, it's not a big deal when somebody offers you a few grand more." He reports that many job offers to middle management include some sort of equity participation, the proverbial piece of the action, that will be taxed at the 20% capital gains rate.

The DATAMATION survey found that about 20% of the companies polled have stock options, a third have profit-sharing plans, and about a quarter have some sort of investment plan, which usually involves matching employee contributions for stock purchases. These percentages have been growing over the past few years, Morgan reports.

A case in point is MCA Inc. of Los Angeles. "Five years ago, I got stock options, but nobody else in the department did," notes Al Jerumanis, vice president and director of corporate data processing for the entertainment company that includes Universal Studios, the movie company that produced *Jaws*. "Now the six managers reporting to me have stock options." In addition to stock options for senior and middle management, the company offers several stock purchase plans.

For those at the bottom of the totem pole and ineligible for the perks, there is some good news. The modest salary increase averages mask some important distinctions that help explain why paycheck gains are minimal compared to the recovery of corporate balance sheets. Companies in some industries pay relatively large merit increases, while companies in other industries are struggling to stay above water, and therefore retard the overall averages. The recession may be over from the point of view of the economists and academics in their ivory towers, but for certain industries around the country, not just in the Midwestern industrial heartland, plenty of problems remain.

Petroleum-based companies are suffering from a glut of oil, so dp salaries are not soaring in Houston. The showrooms of heavy equipment manufacturers are still empty, despite the return of buyers to automobile showrooms. Yet the salary increases for relatively healthy firms are also not keeping pace with the past, according to the DATAMATION poll, and the explanation is based on another economic fact of life: the impact of disinflation on corporate compensation plans.

"Not only are business conditions taken into account, but there is also an inflation component in compensation," explains Mark Hurwich, a compensation consultant at Towers, Perrin, Forster & Crosby. "When inflation cools down, compensation cools down." The U.S. Department of Labor a few weeks ago issued some numbers that shed light on the impact of a reduced inflation rate on raises. In 1981 the median pay increase for white collar workers was 9.8% and the inflation rate was 10.6%—therefore, real income dropped. In the 12 months ending in March 1983, the annual median pay increase was 7.1%, the department reported, but after taking the 3.6% inflation rate into account, real income was up 3.5%. It may be small consolation to the systems analyst looking at a 5% salary increase, but the fact is that the real worth of that measly raise is far greater than the 9% or 10% raise paid a couple of years ago.

METHODOLOGY

Early in June, 623 DATAMATION readers filled out a questionnaire on the salaries paid to the data processing department staff as of May 1, 1983. The respondents were selected on an nth name basis from the DATAMATION mailing list's subsection identifying the key person at each computer site. Most of the forms were completed by the dp manager and the remainder by the personnel department or a corporate executive.

About half of the computer sites were in suburban or rural areas of the country, representing the general transfer of back-office dp functions away from high-cost urban real estate. About a third of the respondents were manufacturing companies, 11% colleges and universities, 10% were government offices, and 6% were hospitals or other institutions. The average dp shop has 26 employees, up 8.6% from the May 1982 level, and about 80% of the dp centers in the DATAMATION survey had an annual budget of $1 million or less.

Of the urban sites polled, the New York City metropolitan area had the highest return, with 39 shops responding. The Chicago area was second, with 37 shops or 5.9% of the total, followed by Los Angeles with 31 shops, or 5%. Other urban areas represented in the survey are Boston, with 23 sites; Philadelphia, with 28 sites; the Washington, D.C. area, with 23 sites; and Dallas, Houston, Atlanta, Detroit, Minneapolis/St. Paul, Denver, St. Louis, and Seattle.

In addition to indicating the average salary raise over the past year, the respondents included the benefits, average salary, and experience levels for 56 different job classifications considered typical of data centers, from the vice president of dp at the top to the data entry tyro at the bottom.

RED TAPE PLAYS A PART

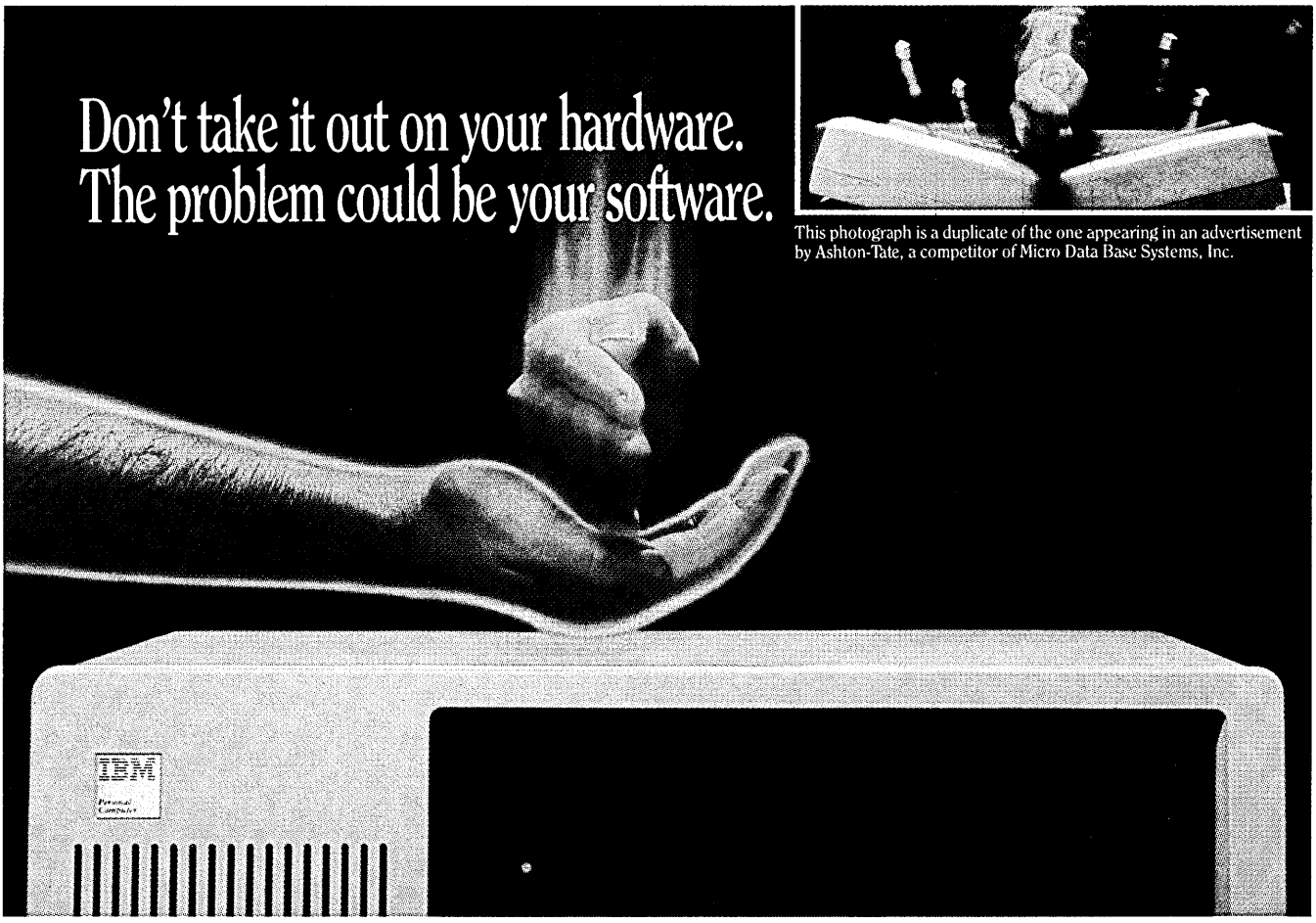
Bureaucracy and red tape also play a part in creating the paradox of a healthy economy with substandard pay increases. The rosy 1982 raises were determined by budget committees during innumerable meetings in mid-1981, when the economy was strong. Conversely, the 1983 salary increases were determined during the summer of 1982, which is going down in the record books as the lowest point for the nation's economic health since the Depression. "We prepare our budgets on a calendar year basis during the previous August and September," confirms J.C. Gracey, director of computer services for Tenneco Inc., Houston. "At that time [August 1982] we were looking for overall raises of two percentage points less than the range for 1982, basically due to economic conditions."

As a conglomerate, Tenneco represents both the good and the bad news on the economic landscape—its automotive divisions are doing well, but its large natural gas operations are not. In fact, the revenue and profit problems all over the Houston oil patch were so severe as to probably pull down the overall dp salary increases. More than half of the dp centers in Houston that responded to the survey said their salary increases would average less than 5% in 1983, compared to the typical 5% to 9% average last year. Furthermore, 37% of the Houston respondents indicated that 1982 raises averaged in excess of 10%, but for 1983 just one company indicated that a 10% or better raise was in the works. Notes a dp official at Gulf Oil Corp., Houston, "We had an average 9% raise in 1982, but only 6% in 1983, and I was surprised we'd have raises at all this year. The industry is in the pits."

The effect of the economy was more than to merely diminish the *size* of paychecks—the *number* of dp personnel getting paychecks also declined in certain areas. Houston employers polled by DATAMATION indicated that the number of people on their dp payrolls declined by 15.5%; in Minneapolis/St. Paul the decline was 20%. Detroit, of course, is down, but only 5%, due to the recent recovery of the auto industry.

Regional variations are not limited to the size and number of paychecks issued to data processing professionals. The life-style and attitudes of a community have an impact on salaries and benefits and on whether a job prospect will be hired at all. As a recruiter, Morgan of Korn/Ferry has heard many Northeastern companies order him not to offer jobs to people from the West Coast! The laid-back, hot-tub atmosphere is offensive to the normally intense Yankee from Boston. "They just don't like Californians," asserts Morgan. "They consider the work ethic there undesirable. They call it Silly Valley."

One of the West Coast perks that the



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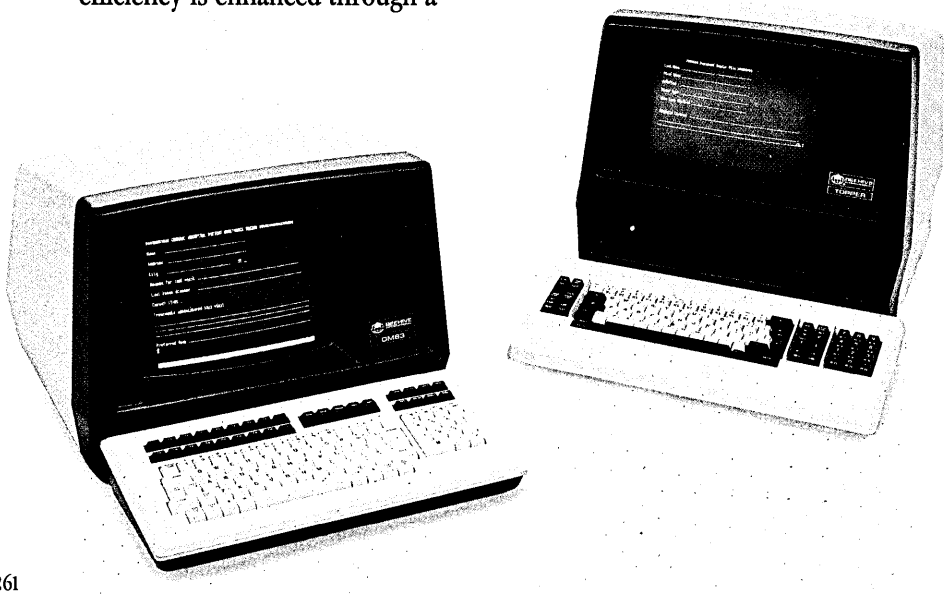

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The real worth of a 7% salary boost is far greater than a 10% raise a couple of years ago.

New Englanders find most annoying, adds Morgan, is the company car. "In the U.S., the car is an emotional issue," he says. "Once you have a company car, you never want to pay for one again. Just about every candidate I had for one particular position has a car in his current compensation package, but the New England company just won't do it."

Nationwide, about three out of 10 companies responding to the survey offer automobiles to their employees. The range in percentages is illuminating, though—only 22% of the Chicago shops, 6% of the Minneapolis/St. Paul shops, and 39% of the New York shops offer cars, but in the Sun Belt, cars are available from 42% of the Los Angeles dp centers, 46% of the Houston centers, and 47% of the Dallas centers.

Dental care is another benefit with regional differences. Dental plans are available nationwide at about 61% of the data processing shops responding to the survey, but in only about half of the Sun Belt areas compared to three quarters of the East Coast shops.

CRISIS AT CHRYSLER

In Detroit, Paul Anders has had more basic things on his mind than dental plans or company cars. As manager of the information systems planning for the Chrysler Corp., three years ago he had to lay off 40% of the data processing department at the beleaguered automaker. And for several years thereafter, he couldn't pay the remaining troops an extra dime. "In 1980 and 1981, there were stringent cost reductions with no internal raises," says the weary Anders. To pick up the workload, outside service bureaus were hired for routine jobs such as data entry. Anders only offers hints of the problems he faced trying to keep dp people without offering them raises and allaying their fears that the company was on the verge of bankruptcy.

The only thing that eased his situation, according to other local dp managers, was the sorry condition of other companies in the area. "In southern Michigan, it's not too likely that you can go across town and find another job," says a neighboring dp manager, gloating over his 1% turnover rate over the past several years.

All that is behind Anders now. Over the past six months he has been able to offer salary increases of as high as 25% to the faithful employees who waited three years to see a larger number on their paycheck. He is hiring a few new analysts and programmers, and reports that prospective hires don't laugh anymore when they hear the name of the company.

"It's easier to hire now than it was two years ago, because of the company's sta-

JOB DESCRIPTION GUIDE

Respondents to the salary survey matched, as closely as possible, their staff categories to the job descriptions that follow:

1. Vice President of MIS: The senior executive for all corporate information systems. Responsible for long-range planning, budgeting, and operations.

2. Director of Dp: In charge of all dp at the divisional/departmental level. Responsibilities parallel those of corporate officers, but may be at least partially guided by decisions made at corporate level.

3. Services Coordinator/User Liaison: Interfaces between dp department end users; represents users when operational problems occur. (For the seniority levels in each of the next four categories, see the separate box on job levels.)

4–7. Systems Analysis: Confers with users to define and formulate logical statements of business problems and devise procedures for solutions through use of dp systems.

8–13. Applications Programming: Develops, designs, and prepares computer programs.

14–19. Systems Analysis/Programming: Performs the functions of both the systems analysis and applications programming positions.

20–22. Operating Systems Programming: Programs, maintains, and introduces modifications to systems software.

23. Database Administrator: Plans, organizes, and schedules the activities of the database section. Establishes standards, maintains dictionary, coordinates corporate database needs.

24. Data or Telecommunications Analyst: Specializes in network design, traffic analysis, and data communications software.

25. Manager of Computer Operations: In charge of computer operations, including scheduling, assignment of operators, and monitoring efficiency.

26. Shift Supervisor

27. Lead Computer Operator: May be responsible for the operation of large-scale computers for the duration of a shift or the operation of a remote site.

28. Computer Operator: Assists in running the computers and may operate console under general supervision.

29. Production Control Supervisor: Responsible for setting up and scheduling jobs for processing so as to maximize utilization and meet turnaround requirements.

30. Production Control Clerk: Prepares jobs for processing, enters the appropriate job commands, gathers output for routing.

31. Data Entry Supervisor: Responsible for a staff that performs data entry and verification functions.

32. Data Entry Operator: Qualified to operate one or more data entry devices; requires only general supervision.

33. Word Processing Operator: Qualified and experienced in the operation of intelligent typewriters, wp systems, terminals for text editing/wp.

SENIORITY LEVELS DEFINED:

Manager: Advanced degree and minimum five years' experience or equivalent. Strong management skills, works on own, performs personnel evaluation, budgeting, and project management.

Lead: Bachelor's degree or equivalent and minimum four years' experience in dp with two of those years in a supervisory capacity. Works on own and performs all levels of supervision, generally as a project manager.

Senior: Bachelor's degree or equivalent and minimum four years' experience including some supervision.

Intermediate: Bachelor's degree or equivalent and minimum two years' experience. Works on own most of the time requiring direction on some activities.

Junior: Two to four years college and minimum six months' experience or equivalent combination. Directly supervised but works on own on some aspects of job.

FIG. 1

ANNUAL SALARY INCREASES IN 1982 VS. ESTIMATED 1983 INCREASES

(BY PERCENT)

	TOTAL	BOS	N.Y.	PHL	WASH/ BALT	DEN	HOUST	DALL	CHI	ST. PAUL/ MINN	DET	S.F.	L.A.
1982													
Under 5%	21.7	13.0	7.7	25.0	17.4	30.8	9.1*	10.5*	32.4	0	66.7	21.4	12.9
5%-9%	52.3	43.5	48.7	53.6	39.1	38.5	54.5	52.6	48.6	62.5	16.7*	35.7	61.3
10%-14%	22.8	39.1	38.5	17.9	39.1	7.7*	36.4	36.8	16.2	31.3	16.7*	28.6	25.8
15% and over	2.2	0	2.6*	3.6*	4.3*	23.1	0	0	2.7*	6.3*	0	7.1*	0
1983													
Under 5%	24.6	13.0	7.7	21.4	34.8	46.2	54.5	5.3*	37.8	25.0	50.0	35.7	12.9
5%-9%	58.4	52.2	53.8	64.3	30.4	46.2	36.4	84.2	54.1	56.3	16.7*	50.0	67.7
10%-14%	13.6	34.8	35.9	10.7	26.1	7.7*	9.1*	5.3*	5.4	18.8	33.3	0	12.9
15% and over	1.8	0	2.6*	3.6*	4.3*	0	0	0	0	0	0	14.3*	0

*FEWER THAN THREE SITES REPORTING

FIG. 2

BENEFITS OFFERED

BY GEOGRAPHIC AREA

(BY PERCENT)

		GEOGRAPHIC AREA											
BENEFIT	**TOTAL**	**BOS**	**N.Y.**	**PHL**	**D.C.**	**ATL**	**DEN**	**TEX**	**CHI**	**MINN**	**DET**	**S.F.**	**L.A.**
Auto	30	39	39	32	26	36	23	47	22	6*	42	29	42
Club membership	16	13	23	25	13	18*	8*	30	16	19	17*	7*	3*
Recreational facilities	14	17	18	14	22	9*	15*	10*	19	13*	0	21	3*
Dental plan	61	57	74	71	57	55	77	47	51	63	67	93	87
Profit sharing	32	22	39	39	22	64	8*	40	32	31	8*	36	52
Investment plan	26	26	18	36	13	27	23	40	24	44	17*	21	32
Stock option	20	26	21	29	9*	27	15*	23	14	25	17*	36	32

BY TYPE OF ORGANIZATION (BY %)

	TYPE OF ORGANIZATION						
	MFG	**FIN**	**INS**	**GOVT**	**EDUC**	**TRANS**	**UTIL**
Auto	33	33	46	16	7*	36	73
Club membership	21	25	14	—	6	9*	18*
Recreational facilities	11	5	5*	8	41	18*	27
Dental plan	70	54	32	62	53	100	64
Profit sharing	48	38	32	—	—	27	9*
Investment plan	36	12	27	—	11	18*	55
Stock option	30	25	9*	—	—	18*	36

*FEWER THAN THREE INSTALLATIONS REPORTING
—NOT MEANINGFUL OR NOT AVAILABLE

"I had to offer unusual wages in the past," says the Chrysler man.

bility," he says. "In the past, I had to offer unusual wages." In essence, he had to pay more than the going rate to compensate new employees for the uncertain future of the company.

Dp managers running computers in the financial industries have an embarrassment of riches—the fast recovery of the stock market last year and the reduction of interest rates are making life easy. Wall Street has dp job openings by the hundreds, and the deregulation of the banking industry offers untold opportunities for programmers, analysts, and applications writers familiar with securities and electronic funds transfer.

Financial organizations reporting to DATAMATION indicated a sharp jump in the average number of employees—29%—over the past year. Salary increases in financial districts from Wall Street to Mission Street generally ignored the inflation and recession lull, sticking to the same pattern over the past two years—about 90% of the financial companies that responded indicated the same 5% to 9%, or 10% to 14% ranges for salary raises in 1983, though 8.3% of the financial firms dropped their bonus levels to the less than 5% category in 1983—probably some banks burned by the oil glut.

Turmoil in the economy, the acquisition of his company by a far bigger one, and the departure of his corporate neighbors are some of the reasons George Ross is in a cheery mood these days. As executive vice president in charge of electronic data processing at Dean Witter Reynolds, the stock brokerage, he is spending less to keep the people he has, or to get the people he wants. Salary increases of 8% are the norm now, compared to 11% a few years ago. For newcomers he wants to hire away from other firms, 25% premiums were standard a few years ago but failed to find many takers. "We didn't get 60% of the people we offered jobs to," he says over an elegant lunch in the Wall Street financial district. "Now,' " he adds, "we get seven or eight out of the 10 people we go after with smaller premiums." It now takes one month to fill a vacancy instead of four.

Part of the reason dp talent searches at Dean Witter are of shorter duration is the impact of the recession on new openings and turnover. The head count at the average dp shop was up a rather modest 8.6% over the past 12 months, compared to the 13% to 15% growth of prerecession days. Hiring in the transportation sector of the economy was virtually nil, for example, but the uneven effects of the recession can be seen in the insurance industry—the average population actually doubled, to almost 41 persons per site from 20 last year.

With fewer new openings, turnover rates continued to be modest by past standards. About 85% of the companies reporting to DATAMATION said that turnover was less than 25%. Revolving-door hot spots are Dallas, with a third of the companies reporting 25% to 50% annual turnover rates, and other Sun Belt locations.

The weak economy might make it an employer's market, but other factors eased the recruiting burden. Many New York area data processing pros were loathe to work for a brokerage firm in the past because of the fickle nature of the stock market—today's boom could be tomorrow's bust. The combination of a rolling stock market and the recent acquisition of Dean Witter by Sears Roebuck and Co. changed the company's image, Ross declares. "It's easier to recruit people because the Sears backing makes us a bigger company, with more stability," he says. "Serious dp people are looking for stability, rather than growth, you know." The continuing trend of relocating employees from New York City to the Connecticut or New Jersey suburbs also makes life easier for Ross. "We've picked up some good people who didn't want to move with their companies." Given the large number of acquisitions and relocations over the past few years, Ross's experience may be more or less typical of what is going on around the country.

FIG. 3

AVERAGE ANNUAL DP SALARIES BY INSTALLATION SIZE

JOB TITLE	ALL	OVER $1 MIL	UNDER $1 MIL
Vice President of MIS or Dp	$50,469	$57,706	$47,410
Director of MIS or Dp	39,185	49,021	35,800
Services Coordinator or User Liaison	35,671	40,108	27,687
Systems Analysis Manager	35,247	39,962	32,373
Senior Systems Analysis	32,783	33,830	31,613
Lead Systems Analysis	29,837	31,699	27,871
Systems Analysis	27,556	28,884	26,265
Applications Programming Manager	33,551	37,644	30,075
Lead Applications Programmer	28,952	30,620	27,943
Senior Applications Programmer	26,427	28,335	25,116
Applications Programmer	21,288	23,400	20,358
Intermediate Applications Programmer	19,628	20,027	19,358
Junior Applications Programmer	16,789	18,531	16,071
Systems Analysis/Programming Manager	35,562	38,642	32,465
Lead Systems Analyst/Programmer	30,531	33,201	28,237
Senior Systems Analyst/Programmer	28,726	30,453	27,585
Systems Analyst/Programmer	24,302	25,505	23,375
Intermediate Sys. Analyst/Programmer	22,788	24,469	21,263
Junior Systems Analyst/Programmer	18,719	19,312	18,286
Operating Sys. Programming Manager	36,172	38,535	30,477
Senior Systems Programmer	32,156	32,876	29,775
Intermediate Systems Programmer	27,120	28,047	25,109
Database Administrator	29,379	31,455	23,715
Data or Telecommunications Analyst	26,666	27,541	24,150
Computer Operations Manager	27,495	31,550	24,270
Shift Supervisor	22,072	23,246	19,680
Lead Computer Operator	17,363	18,832	16,294
Computer Operator	14,848	16,254	14,164
Production and I/O Supervisor	22,149	23,206	20,836
Production and I/O Clerk	13,722	14,890	12,486
Data Entry Supervisor	17,318	19,334	15,842
Data Entry Operator	12,605	13,681	12,206
Word Processing Operator	14,959	14,829	14,939

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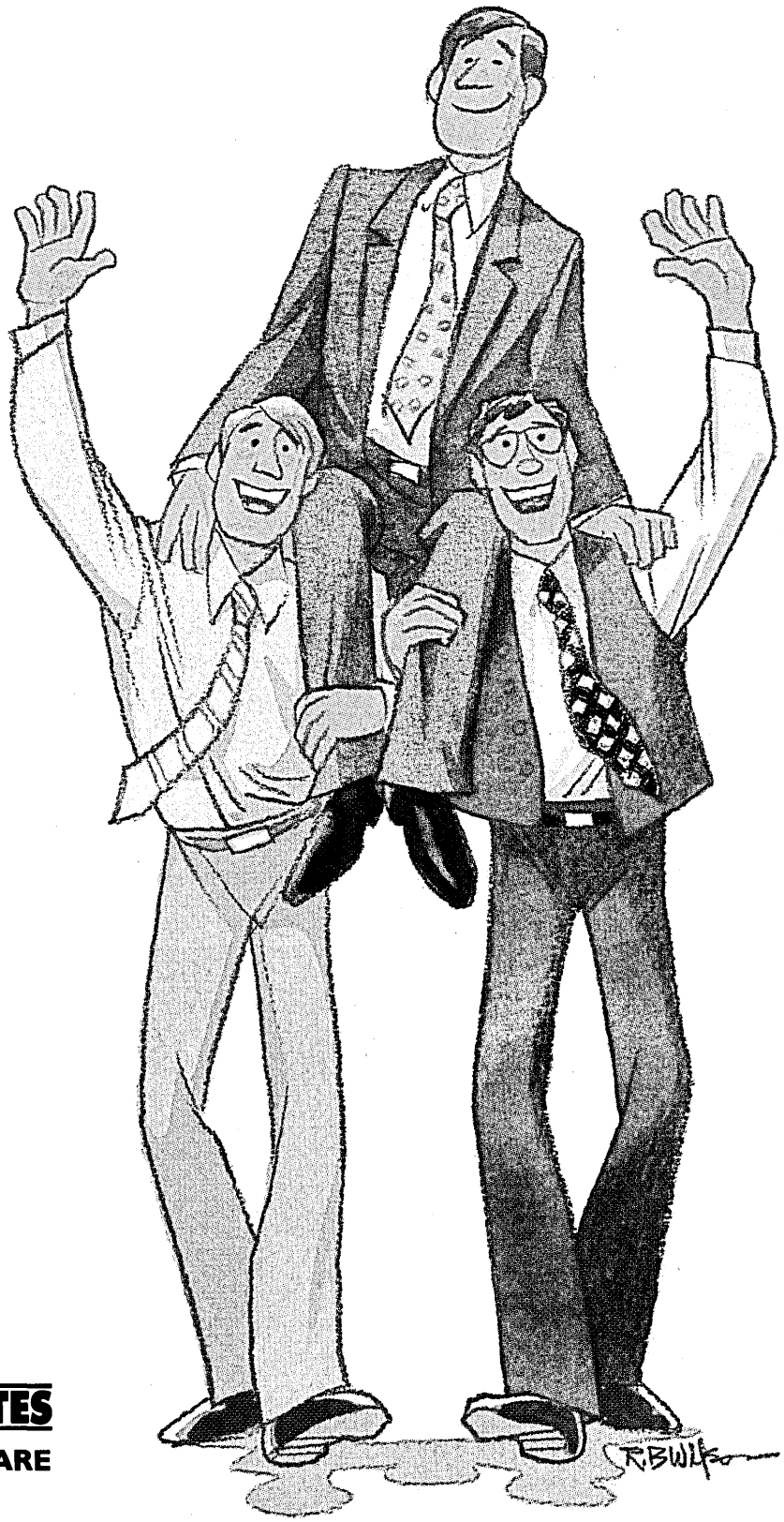

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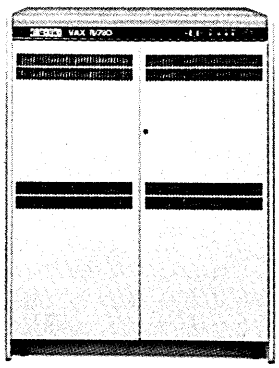
Disk Products.

FOR THE VAX UNIBUS...

SC12/V—Emulates DEC's RK711 controller combined with multiple RK07 drives on the VAX-11 Unibus. SC21/V—Emulates DEC RM03 (80 MByte) and RM05 (300 MByte) storage subsystems.



SC31—A low cost solution that allows you to install and operate large capacity disk drives on the Unibus of any VAX. Handles drives with high transfer rates of 1.8 MBytes per second in the 500 MByte range. Gives the same or greater storage capability than DEC Massbus installations at a fraction of the cost.

FOR THE VAX-11/750...

SC750—This software-transparent, single-board controller allows you to add up to four large disk storage units (80 to 675 MBytes) directly to the internal CMI bus. The SC758 lets you add up to eight drives of storage off a single controller.

FOR THE VAX-11/780...

V-Master/780—A mass storage adapter that houses one or two SC780 disk controllers, TC780 tape controllers or a combination thereof. Provides an interface and control through the Synchronous Bus Interface (SBI) of your VAX-11/780. Each SC780 disk controller supports up to four disk drives (80 to 675 MBytes). The SC788 is also available to fit in the V-Master/780 chassis and supports up to eight disk drives.

Tape Products.

FOR THE VAX UNIBUS...

TC11/V—Combines with any standard tape drive and the Emulex VMS/UT software driver/diagnostic package to provide reliable, economical tape storage on all VAX-11s.

TC12/V—Handles every industry-standard "Pertec" formatted half-inch tape transport, including conventional NRZ/PE start/stop and 1600/3200 bpi start/stop streaming tape drives.

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FOR THE VAX-11/750...

TC750—A single-board, software transparent controller that interfaces directly to the internal CMI to support 1-4 STC or 1-8 Pertec formatted type drives. Emulates DEC's TM03/TU77 with tape speeds up to 125 ips at 1600/6250 bpi. Supports both "old" and "new" GCR 6250 kinds of drives.

FOR THE VAX-11/780...

TC780—Fits in the V-Master/780 chassis to provide transparent emulation of DEC's TM03/TU77 through the SBI. Supports 1-4 STC or 1-8 Pertec formatted type drives at tape speeds up to 125 ips; 1600/6250 bpi. Both "old" and "new" GCR 6250 technology is supported. In addition, the TC780 is plug compatible with the TC750, offering users sparing convenience.

Communications Products.

FOR UP TO 16 LINES—CS21 SERIES...

CS21/F—Emulates the asynchronous portion of the DMF-32 for use on VAX-11s. Is software transparent with VMS Version 3.0 and above. Handles 16 lines per controller.

Statcon 21—Statistical concentration through the combination of the proven CS21 multiplexer with special microprogramming and the CM22/EX local statistical port concentrator. Handles up to 16 remote lines per statistical concentrator, up to 32 lines per controller.

FOR 16 TO 128 LINES AND MORE—CS11/CS32 SERIES...

CS11/F—Emulates the asynchronous portion of the DMF-32 for use on VAX-11s. Is software and diagnostic transparent, and can handle 16, 32 or 48 lines per controller.

Statcon 11—Combines the proven CS11 multiplexer with special microprogramming and one or more CM22/EX local statistical port concentrators.

CS32/F—A single-board communications controller that's totally software transparent to DEC's new DMF-32. One CS32 can handle up to 128 lines per controller board.

Statcon 32—Combines the CS32 multiplexer with special microprogramming and the CM22/EX local statistical port concentrator. A single CS32 controller board handles an amazing 256 remote and local lines in this statistical concentration mode.

For more information on Emulex products for VAX, call toll-free: (800) 854-7112. In California: (714) 662-5600. Or write Emulex Corporation, 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626.

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FIG. 4

AVERAGE SALARY BY INDUSTRY
(IN $)

JOB TITLE	ALL	MFG	FINANCE	INS	GOVT	MEDICAL
1. Vice President of MIS or Dp	50,469	54,368	50,220	41,456	52,100	60,750
2. Director of MIS or Dp	39,185	39,203	36,222	39,157	39,280	37,501
3. Services Coordinator or User Liaison	35,671	53,440*	33,000	23,000*	38,058	25,100
4. Systems Analysis Manager	35,247	38,966	30,833	33,000	33,833	29,167
5. Senior Systems Analysis	32,783	32,015	33,450*	28,302	31,517	29,500*
6. Lead Systems Analysis	29,837	30,591	27,000*	—	28,425	31,140*
7. System Analysis	27,556	27,835	25,000*	30,500*	29,254	26,500*
8. Applications Programming Manager	33,551	35,733	37,920*	25,250	37,212	35,000
9. Lead Applications Programmer	28,952	29,500	25,667	16,000*	29,880	27,019
10. Senior Applications Programmer	26,427	27,069	25,750	25,047	27,013	26,455
11. Applications Programmer	21,288	21,088	20,261	19,655	22,542	22,900
12. Intermediate Applications Programmer	19,628	20,259	18,060*	19,066	21,701	21,375
13. Junior Applications Programmer	16,789	17,353	16,240	16,024	16,708	17,245
14. Systems Analysis/Programming Manager	35,562	33,944	39,710	38,603	34,574	38,758
15. Lead Systems Analyst/Programmer	30,531	30,833	33,266	30,120	29,747	32,600
16. Senior Systems Analyst/Programmer	28,726	27,843	30,331	27,915	28,019	28,814
17. Systems Analyst/Programmer	24,302	24,338	24,170	25,020	23,193	23,167
18. Intermediate Systems Analyst/Programmer	22,788	22,090	23,494	23,976	22,025	23,840
19. Junior Systems Analyst Programmer	18,719	18,915	18,977	17,100	18,693	19,833
20. Operating Systems/Programming Manager	36,172	38,464	39,000*	39,180	36,957	30,000
21. Senior Systems Programmer	32,156	32,883	36,376	32,289	31,945	30,178
22. Intermediate Systems Programmer	27,120	27,519	30,500*	26,773	26,908	27,674
23. Database Administrator	29,379	30,917	30,000*	35,030*	32,117	22,000*
24. Data or Telecommunications Analyst	26,666	30,262	32,000*	28,244	25,930	—
25. Computer Operations Manager	27,495	26,808	28,940	30,956	29,245	26,288
26. Shift Supervisor	22,072	21,105	22,245	22,024	23,962	20,219
27. Lead Computer Operator	17,363	17,149	17,489	17,331	18,108	20,378
28. Computer Operator	14,848	15,186	13,659	14,581	16,322	14,476
29. Production and I/O Supervisor	22,149	24,706	19,486	23,657	22,686	22,179
30. Production and I/O Clerk	13,722	13,546	11,298	12,757	14,621	14,144
31. Data Entry Supervisor	17,318	17,696	19,597	17,194	17,121	15,828
32. Data Entry Operator	12,605	12,573	12,324	12,038	12,899	12,832
33. Word Processing Operator	14,959	15,756	14,500*	12,389	13,600	15,000

*FEWER THAN THREE SITES REPORTED
—NO RESPONDENTS IN THIS CATEGORY

HIRING IDEAS AT CITIBANK

George Ross's gains are Gloria Krimper-Mendez's losses. She's in charge of recruiting data processing personnel for Citibank N.A., the massive bank that has its dp operations spread from New York to California to South Dakota. Citibank recently offered stock brokerage services to its customers, so Krimper-Mendez is trying to hire applications programmers and systems analysts from the securities industry. The high salaries paid for the riskier environment of Wall Street are unknown in the safe world of banking, and she must look harder to come up with new ways of compensating personnel without giving away the vault. "People with brokerage background are used to a 50% bonus at the end of a good year, but we can't do that," she says. Among her ideas: offer annual pay raises in one lump sum rather than spread throughout the year.

Krimper-Mendez is thinking about novel compensation schemes as part of an overall trend toward enhancing job satisfaction. "In the past six years I've been in the business, I've seen tremendous change in what is important for dp people to change jobs," says Krimper-Mendez. "Money is not the main motivation." She cites the innovator reputation of Citibank as one of the prime attractions: "Our reputation is that if there's something new in the industry, Citibank has it." She's not just blowing smoke—Citibank was one of the first banks to design, build, and install an elaborate electronic funds transfer network, including widespread use of automated teller machines.

Intangibles such as "doing an interesting project," "taking a program from in-

An MBA and the ability to converse with businessmen is worth a 10% salary premium.

TRANS	EDUC	UTIL
52,167	42,625	80,000*
39,400	35,061	35,950
—	51,700*	—
32,500*	28,915	38,333
30,000*	32,287	32,667
—	25,000	—
—	22,243	28,800
33,667	29,282	35,000*
19,000*	22,500*	37,500*
21,710*	21,816	32,500*
21,167	17,427	25,000*
14,500*	15,841	17,000*
15,500*	12,913	20,000*
34,633	33,962	38,500*
35,000*	26,547	—
—	26,035	19,000*
26,800	21,450	28,000*
27,266*	18,183	39,000*
—	17,048	32,000*
36,550	28,750	42,000*
28,000*	26,083	42,000*
27,000*	22,000	35,000*
32,800*	32,000*	28,000*
16,500*	19,667	27,000*
28,850	23,472	30,800
21,000*	24,250	24,500*
13,400	15,659	19,605
12,714	14,019	15,933
—	19,226	26,000*
21,575	13,857	—
22,675	16,887	—
13,944	11,931	16,267
13,000*	—	18,500*

ception to debugging," and "improving the quality of work life" are a major new type of demand from data processing professionals. "I hear this job satisfaction issue more and more," says Gracey of Tenneco. "Many people here are now turning up their noses when we ask them to do some program conversion work. They don't find it interesting." Another job satisfaction issue is visibility. George Ross of Dean Witter notes that many of his dp people are attracted to the prospect of coming out from behind the code-writing tables and actually interacting with other parts of the company. "They're not isolated in the dp department anymore," he says.

For certain people, certain jobs, and certain employers, large piles of dollars are the first consideration, before they talk about the company gym. Recruiters and dp managers have a "prime picks" list, the ideal combination of skills, personality, and experience where the right job applicant can practically write his own ticket. The route to the blank check consists of an intimate knowledge of how businesses work and how businessmen think, an ability to communicate in the language of the user, not the language of a machine, and experience with the key technological issues of the day, such as telecommunications and database management.

The crucial characteristic for big salary increases or a better job is verbal communications skill. "I can't stress enough that the goal of most of my searches is to find people who can speak the language of the user," says Morgan of Korn/Ferry. The prospects are glowing for the manager of applications programming who can comfortably discuss financial benchmarks such as return on assets, market share, and product line margins and then prepare the software to deliver that information in the manner requested by the product manager. "The salary for someone with those qualifications is a $70,000 base with a bonus of $5,000 to $25,000," Morgan states. Then he pulls out a list with a dozen such openings he has at the moment. Many of the new hires he finds will replace current managers who were demoted. "Companies realize that their incumbent cannot talk to users and needs to be replaced," Morgan notes, explaining that the rise of personal computers and distributed data processing systems is moving the computer terminal and the technology closer to end users who demand results, not excuses.

THE PRIME JOB CANDIDATE

The most likely candidate for the golden paycheck is someone who spent a decade working on database management with an undergraduate degree in computer sciences and a graduate degree in business administration. That combination of skills is worth a 10% premium over another candidate without the MBA and unable to converse in English, notes Krimper-Mendez of Citicorp. "Before, we were never asked to find someone with a degree, just someone with experience in COBOL and CICS," she says. "Now they want to see an advanced degree in business along with a bachelor's in computer science." For such a person, a salary of up to $60,000 is available, she says.

Another prime job candidate is someone with telecommunications skills. The ability to design networks for transmitting megabytes of data across state and national boundaries is the most sought-after of skills by many dp managers right now. "Good telecom people are hard to find, and command premium prices," notes Al Jerumanis at MCA Inc. He has first-hand experience with the telecom marketplace—he just hired four telecom specialists as part of a corporate-wide review and revamp of voice and data communications systems.

Gulf Oil is about to venture along the telecom salary path, and an official there says he knows it will be rough. A pilot project now under way will lead to a new network configured with "an order of magnitude" increase in the number of points served and a sharp increase in the amount of data transmitted at a time. The new scheme will require the Gulf telecom staff to triple, an official says.

Nationwide, the DATAMATION survey indicates that the average pay for telecom managers is $36,370, but the scarcity of job candidates is reflected by the wide range of salaries—from $30,000 in Dallas to $53,000 in Denver. Manufacturing and finance companeis were more likely to pay the big bucks, while utilities were the lowest-paying industry category; given the fact that most utility operations are within one state, the telecom nets are not as complex.

The cost of telecom experts was more than Anders of Chrysler could pay—he gave up trying to find someone with the experience and willing to work for the salary he could offer. "We think the salaries we offer are fair," he says, "but we can't touch experienced telecom or office automation people." He hires less experienced data processing staffers and then tries to upgrade their skills.

With all those data flowing around the country, it follows that database administrators are also attracting higher salaries. The expanding number of microcomputer users means an ever-expanding number of demands for access to corporate databases. "The problem is dramatic," says the Gulf official. The average salary for directors of database administration was $33,164, but here again there is a wide range of respondents to the survey—$19,500 in New York, of all places, to $45,000 in Los Angeles. The gap between big shop and small shop is graphically illustrated by the 28% difference in salaries, $37,979 versus $27,447, in shops with larger than $1 million annual budgets compared to the smaller ones.

All the new buzzwords—office automation, telecommunications, and database management—are now part of the responsibility of the vice president of management information services or data processing, the head honcho in data processing. "In addition to the traditional dp tasks, he's much more likely to be given new ones he'd better know

FIG. 5

AVERAGE SALARY BY MAJOR CITIES

(IN $)

JOB TITLE	GEOGRAPHIC AREA ALL	BOST	NEW YORK	PHIL	WASH/ BALT	ATL
1. Vice President of MIS or Dp	50,469	46,667	64,344	52,250	42,667	58,500
2. Director of MIS or Dp	39,185	40,018	47,037	38,880	42,470	43,667
3. Services Coordinator or User Liaison	35,671	19,000*	33,250	50,000*	42,000*	—
4. Systems Analysis Manager	35,247	34,312	43,500	33,000*	33,437	38,000
5. Senior Systems Analysis	32,783	29,000*	37,500	32,607	37,600	36,000*
6. Lead Systems Analysis	29,837	40,000*	33,280*	29,000*	31,500*	—
7. Systems Analysis	27,556	—	28,400	28,000*	27,667	26,667
8. Applications Programming Manager	33,551	40,086	33,500*	35,333	36,000	31,000*
9. Lead Applications Programmer	28,952	27,875	33,000*	35,000*	30,667	28,500*
10. Senior Applications Programmer	26,427	28,200	29,857	26,000	26,600	24,055
11. Applications Programmer	21,288	20,571	20,757	21,606	21,187	19,667
12. Intermediate Applications Programmer	19,628	24,000*	23,624	20,500*	25,000*	25,000*
13. Junior Applications Programmer	16,789	18,667	17,460	13,350*	16,624	18,700*
14. Systems Analysis/Programming Manager	35,562	42,000	39,600	35,998	32,000	35,500*
15. Lead Systems Analyst/Programmer	30,531	27,000	34,500	34,333	27,600	26,500*
16. Senior Systems Analyst/Programmer	28,726	—	33,944	30,854	25,727	29,000*
17. Systems Analyst/Programmer	24,302	24,500*	26,036	25,030	20,467	24,000*
18. Intermediate Systems Analyst/Programmer	22,788	19,000*	22,187	23,433	17,933	—
19. Junior Systems Analyst/Programmer	18,719	17,000*	20,000	20,125	19,478	17,000*
20. Operating Systems/Programming Manager	36,172	39,333	19,000*	42,250	33,500	40,000*
21. Senior Systems Programmer	32,156	30,333	36,000*	40,333	35,000	28,000
22. Intermediate Systems Programmer	27,120	25,000*	29,000*	26,380	29,000*	—
23. Database Administrator	29,379	—	15,000*	—	38,000*	—
24. Data or Telecommunications Analyst	26,666	28,000*	25,000*	22,000*	—	16,500*
25. Computer Operations Manager	27,495	22,125	29,036	27,894	31,581	26,140
26. Shift Supervisor	22,072	—	19,750	18,875	32,000*	17,000*
27. Lead Computer Operator	17,363	16,967	18,635	16,107	18,174	16,033
28. Computer Operator	14,848	14,234	14,486	16,159	13,698	12,125
29. Production and I/O Supervisor	22,149	23,750	18,720*	25,000*	25,000	—
30. Production and I/O Clerk	13,722	11,500*	12,349	14,378	12,600	11,000
31. Data Entry Supervisor	17,318	19,333	18,735	18,650	15,270	13,500*
32. Data Entry Operator	12,605	12,300	13,324	12,470	12,523	11,929
33. Word Processing Operator	14,959	12,000*	16,125	15,250*	—	—

*FEWER THAN THREE SITES REPORTED
—NO RESPONDENTS IN THIS CATEGORY

about," says Vince Morgan of Korn/Ferry. Materials resource planning is a hot item these days, he says, along with the nuts and bolts in telecommunications.

"Companies are concerned with the coherent growth of personal computers, too," he adds, "and they don't yet have control, so we see requests for new people to come in and organize an internal system that would stop the micro proliferation by introducing something better."

SKILLS OF A DP VICE PRESIDENT

All of these skills are required of the top man these days. Of the 623 data centers responding to the survey, 109 had a vice president for dp and are paying an average of $50,469 a year in base salary. Of course, vice presidents in New York City earn more than a vice president in Detroit—$64,344 versus $38,000. Size of shop is one of the reasons—the average $1 million-plus budget has a vp salary of $57,706, while the smaller shop's vp receives only $47,410. The highest average salary was in the utility industry, with an annual base compensation of $80,000. The average vice president for dp has about 14 years of experience and is likely to live in Dallas, St. Louis, or somewhere in the Minneapolis area. His employer is probably a bank, brokerage, or utility, where each has an average salary of more than $60,000.

Most of the companies polled do not

A New York CICS consultant charges $1,000 a day.

DEN	HOUS	DAL	CHI	ST PAUL/ MINN	DET	S.F.	L.A.
—	57,000	50,714	56,083	52,000*	38,000*	45,500	51,943
46,612	48,971*	44,756	43,055	39,357	40,064	41,083	41,773
38,916*	48,000	23,000*	—	35,000*	—	36,000*	41,970
58,000*	35,467	37,833	40,590	34,715	—	36,000*	36,400*
42,000*	34,260	34,800*	34,744	34,500	44,150*	36,500*	38,245
33,000*	33,000*	31,300*	32,829	30,100*	30,000*	—	—
26,500*	—	28,500*	29,922	30,200	26,550*	—	26,667
39,000	—	37,500*	38,690	30,167	—	36,500*	36,657
50,000*	31,500*	32,000*	32,275	30,000*	25,900*	35,000*	28,200*
36,000*	32,507	26,367	28,463	18,500*	25,833	33,000*	32,900*
27,600	24,400	23,726	21,972	17,550	18,003	26,333	21,031
18,000	20,000*	20,125	18,457	13,000*	—	—	26,000*
13,500*	17,500*	16,667	17,259	15,000*	17,000*	20,375*	20,000*
42,100	38,533	40,778	34,440	43,500*	35,088	40,600*	41,165
34,133	41,000*	38,750*	31,812	31,000*	30,900	34,000*	35,470
31,500	28,208	29,625	30,733	28,000*	27,150*	30,625	31,081
26,500	25,162	27,100	22,271	26,000*	20,667	28,325	27,908
27,000*	23,250*	19,700*	22,000*	25,000*	22,487	28,100*	25,259
23,750*	19,833	17,667	12,900*	18,000*	14,413*	23,100*	19,094
53,000*	42,467	41,375	32,200	34,000*	36,267	39,000*	46,600*
33,433	40,430*	35,500	34,000	—	26,500*	36,500	38,976
28,850*	32,280*	32,500*	29,000*	26,000	21,700*	27,500*	34,696
40,000*	44,500*	26,500*	24,833	29,000*	32,650*	—	22,500*
38,000*	—	27,000*	32,000*	—	—	—	28,000*
32,629	31,540	29,500	32,581	22,950	28,420	30,000*	29,206
25,325	19,500	23,000	24,500	18,000*	26,250*	33,500*	23,822
24,267	19,200	18,172	17,413	16,600	16,756	16,500*	20,878
17,544	15,978	16,051	15,400	13,977	14,581	17,900	16,325
26,700	24,100*	20,425	21,300	20,000*	26,550*	—	25,988
16,700	16,444	11,500	13,729	—	14,839*	19,000*	14,259
21,500	18,907	16,114	17,883	14,100*	18,687	18,000*	16,281
14,100	13,165	12,992	13,120	11,714	13,914	14,408	13,725
12,700*	—	16,000	18,500*	18,200*	—	—	15,000

have a vice president of data processing, but instead a manager of data processing. He or she earns about $39,185, or about $25,000 less than the vice president, even though the average dp manager has more experience—an average of 14.95 years versus 14.34 years.

Houston dp managers have the highest average salaries, according to the survey, at $48,971. Transportation firms are likely to pay higher salaries to dp managers than colleges, but the range is relatively narrow—less than $4,000 separates the highest-paying industry average from the lowest.

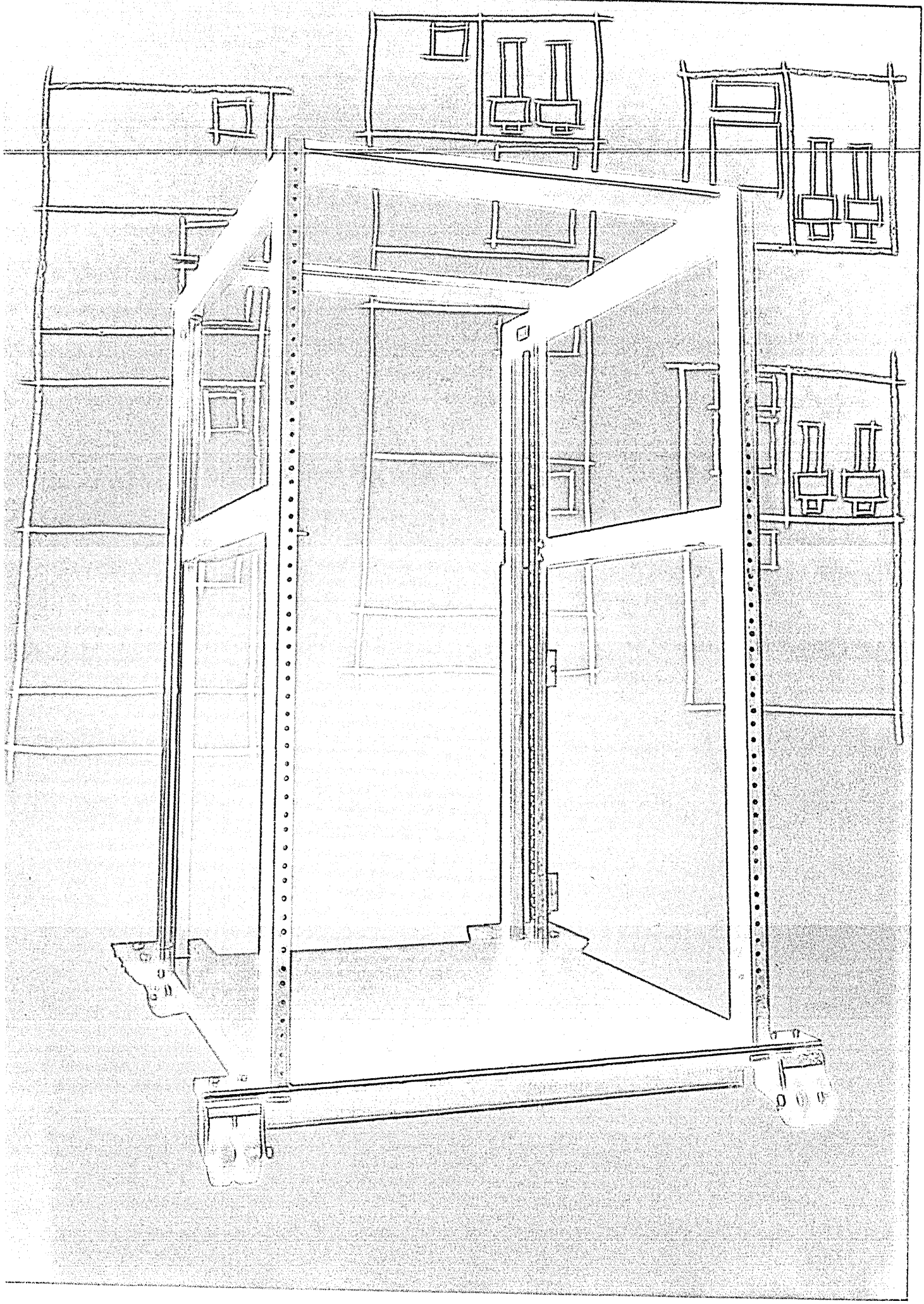
The managers of systems analysis average $35,247 per year, and their subordinates receive salaries that range from the $34,744 average for Chicago-area senior systems analysts to the $21,000 for junior analysts around the country. In big shops, the average salary for the manager of systems analysis is $39,962; in small sites, $32,373. Operating systems analysts probably command a premium compared to their applications analysis colleagues. Gracey of Tenneco reports that a recent campaign to add operating systems analysts to his staff failed to find any takers, though several applications analysts applied. "When you run an ad and nobody qualified replies, you know you have to give a 25% premium to find good people," he says.

Less glamorous jobs unfortunately pay less well. The unappreciated computer center operator, the manager who is the first to be blamed for a systems crash but the last to be thanked when things go right, has an average salary of $27,495; the highest-paying location for operating managers is Denver, with an average salary of $32,629. The insurance companies that responded to the survey apparently have the highest rates, $30,956 per year. For big budget sites, the manager receives $31,550, for small sites the paycheck is $24,270.

As for the lead computer operator, the average salary is $17,363, but the range varies from a modest $16,000 in Atlanta to the comparatively robust $24,267 in Denver. Health care organizations have the highest average salary for lead computer operators, $20,378.

The more modest salary increases of the past few years have not necessarily limited the income options of some programmers and analysts. Krimper-Mendez of Citicorp reports that CICS consultants get $800 to $1,000 per day in New York City. Nationwide, a survey by J. Dick & Co., a publisher of computer software consultants, found a rising number of consultants and sharply higher fees. "The billing rates of computer software consultants shows that the profession has come of age," says John Dick. Of the 800 consultants in his survey, the billing rates for those with mainframe expertise reach $150 per hour.

So if the current level of salaries and benefits are not to your liking, there is an alternative—hang out a shingle and become a consultant. For $1,000 a day, it's nice work if you can get it. ✱



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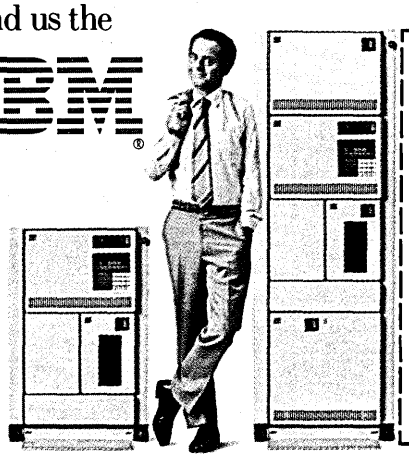

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CIRCLE 57 ON READER CARD

Analyst, programmer, and operator positions should increase significantly during the decade.

THE DP POPULATION BOOM

by Bruce Gilchrist, Ates Dagli, and Arlaana Shenkin.

Employment opportunities in the largest data processing fields will continue to be very good throughout the 1980s. In total, the number of new positions in systems analysis, programming, computer operations, and key entry operators should increase 54%, or 1.7 million, for a total population of 3.1 million by the end of the 1980s. This compares with slightly over 700,000 added in the '70s. This optimistic forecast is based on recently available data from the 1980 census and a review of the factors that are likely to affect employment in each of the four occupations.

The largest increases will be seen in the computer operator category, expected to experience a 13.6% annual growth rate for the decade or about 1 million new positions. The reason for the sharp jump is the increase in the number of small business computers and other desktop units now used by computer operators who were, in many cases, clerks in the past. Systems analyst positions are expected to increase by 9.7% per year to more than 511,000, and the programmer population may increase at a 7% annual rate, reaching a total in excess of 317,000 by the end of the decade. The compound annual growth rate of keypunch operators will slow to about half of the 3.9% rate recorded during the 1970s, but the data entry population will rise to about 477,000.

These estimates are based on an analysis and comparison of the 1970 and 1980 data published by the Bureau of the Census of

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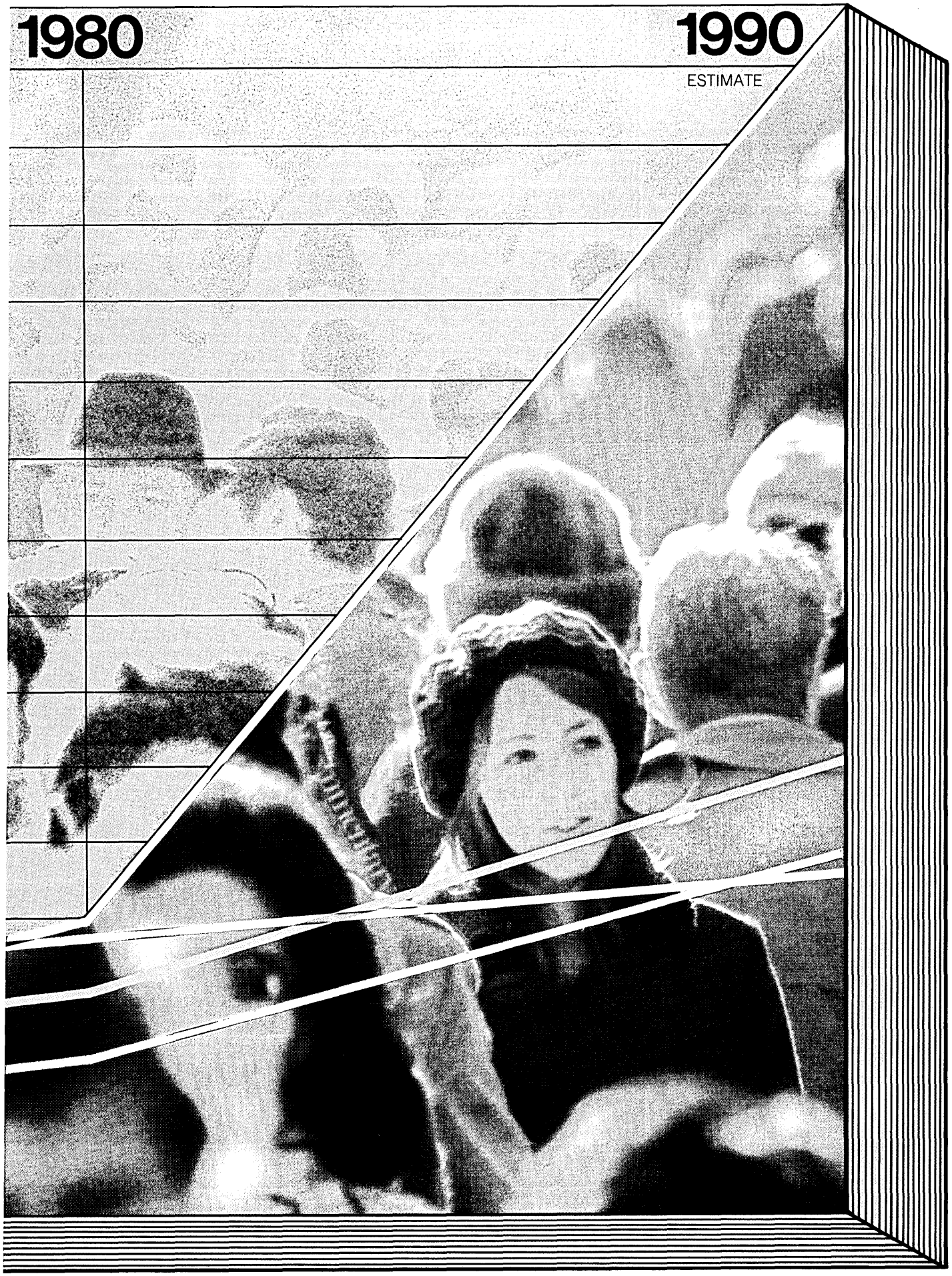
1980
1990
ESTIMATE

The large inventory of COBOL programs will need to be maintained for a considerable number of years.

the U.S. Commerce Department. Fundamental to any forecast of the next 10 years is a review of the factors behind the larger-than-expected increases in data processing jobs during the past decade.

For some years the U.S. Department of Labor has been predicting that the number of key entry operators is about to decline. The census data for 1980 suggest that the announcement is at least premature. True, there have been considerable advances over the recent years in source data recorders, optical character readers, and system to system data communications, but two offsetting factors have kept the data entry payrolls growing.

The first is that the volume of data required by the rapidly growing number of computers and computer-based applications has been increasing. The second is that, although moving the data entry function to the user area may have decreased the number of data entry operators employed directly by data processing centers, it has resulted in some user area personnel regarding themselves, probably correctly, as data entry operators rather than, say, clerical assistants or order entry clerks. Therefore, further growth, albeit somewhat modest, is projected in the number of people functioning as key entry operators.

There are many reasons why the population of systems analysts will continue to increase at a high rate. Despite the development of personal computers, distributed processing, information centers, and structured analysis tools, the fundamental need remains for situations to be analyzed and procedures developed for their solution. The applications backlog at large installations and the continued rapid expansion of the use of inexpensive computers in smaller organizations, or in subunits of bigger ones, suggest that there will be no slackening in the demand for systems analysis skills. Some of this work will undobutedly be done by people not classified as systems analysts. Enough will be done, however, by people who regard themselves as full-time systems analysts to keep employment in this classification growing.

FIG. 1

NUMBER OF FEMALE, BLACK, AND HISPANIC DP EMPLOYEES, 1970 AND 1980
(BY PERCENT)

	FEMALE		BLACK		HISPANIC	
	1970	1980	1970	1980	1970	1980
Systems Analysts	15	23	3	5	1.9	2.4
Programmers	23	31	4	6	2.2	2.8
Computer Operators	29	59	8	12	4.1	5.2
Key Entry Operators	90	92	12	17	4.1	6.3

FACTORS AFFECTING JOBS

As for programmers, the last few years have seen very significant growth in two areas that can adversely affect the employment outlook. One is in programming packages and the other is in programming tools. Although both developments require a considerable number of expert programmers, this employment should be more than offset by the increased productivity of applications programmers who use the packages and tools.

At the same time as the productivity of programmers is increasing, however, the number of applications and the number of computers continues to grow rapidly. One published estimate indicates that the number of computers in use in the U.S. will grow from 2 million in 1981 to 16 million in 1986. This growth is primarily in the micro area, but significant growth is expected in minis and some also in large computers. The increase in computer power is even greater than these numbers would suggest since the computational power per machine is also growing rapidly. Also, don't forget the very large inventory of COBOL programs that will need to be maintained for a considerable number of years using existing techniques.

The net effect may well be that the combination of inertia and the need of many small computer installations for at least one person who devotes close to full time to programming will result in continued growth in the number of full-time programmers. Since the developing productivity tools will likely have a greater impact on programming positions than on systems anaylysts jobs, it is expected that the employment of programmers will continue to increase at a slower rate than will the employment of systems analysts.

The computer operator population growth will occur despite several negative factors. The larger installations are benefiting from improved operating systems, peripherals that requires less operator attention, and a move of input/output to user areas—the net result of which will probably be relatively little growth in the number of operators at such installations. The very rapid growth in the number of small installations, many of which will require at least one operator, however, should result in continued rapid increase in the number of professional operators.

In the case of micro systems in small companies or the branch offices of large companies, the operators may be regarded as clerical employees by management but will report themselves—probably correctly—as computer operators to the census. The dramatic increase in the number of women reporting themselves as computer operators suggests that this is in fact happening. To keep 1970 and 1980 data comparable, the 1980 data for peripheral equipment operators have been combined with that for computer operators.

Turning these qualitative comments on employment into precise quantitative projections is at best a risky operation. To do so for the dp occupations is doubly so in light of the countervailing trends. Nevertheless, on the basis of current industry trends, it is highly likely that the growth rates of the '70s will continue through the '80s except in the case of data entry operators, where it will probably drop to half the previous level. This leads to the estimate that the 1990 employment in the four occupations will be over 3.1 million.

For systems analysts and programmers, these projections are approximately 25% higher than those published by the U.S. Department of Labor in late 1981; recently Labor Department data on employment in 1982 strongly support the higher numbers suggested here. In the two operator categories the projections are almost double those of the Labor Deparment continuing its conservative approach. The DoL also uses the employer viewpoint of what a job should be called, whereas this projection assumes the census or employee view of job definitions.

SUPPORT JOBS WILL INCREASE

Although the relevant data are not collected, it can also be assumed that employment in areas such as management, administration, clerical, maintenance, and in other supporting roles directly associated with data processing has and will continue to increase at rates comparable to those of the explicitly defined and counted dp occupations.

The census data reflect what individuals reported as their occupation during one particular week in April of each census year. Persons employed in more than one job are

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CIRCLE 58 ON READER CARD

Government forecasts were unduly cautious. Instead of the 3.6% growth rate for programmers in the 1970s, it turned out to be 7%.

FIG. 2

TEN LARGEST DP STATES

DP POPULATION BY JOB TITLE

	ANALYSTS			PROGRAMMERS			OPERATORS			KEY ENTRY			TOTAL		TOTAL GROWTH
STATE	1970	1980	% Δ	1970	1980	% Δ	1970	1980	% Δ	1970	1980	% Δ	1970	1980	(BY %)
Calif.	10,465	29,907	186	22,187	43,294	95	14,136	50,679	259	26,930	47,159	75	73,718	171,039	132
N.Y.	9,077	19,858	119	21,596	30,696	42	14,675	35,656	143	31,494	36,993	17	76,842	123,203	60
Texas	4,044	11,134	175	8,376	21,237	154	6,672	29,444	341	14,128	25,883	83	33,220	87,698	164
Penn.	4,593	9,585	109	8,902	15,887	78	6,164	19,781	221	17,568	20,893	19	37,227	66,146	78
N.J.	4,312	10,139	135	8,569	15,409	80	5,556	17,114	208	12,694	17,386	37	31,131	60,048	93
Ohio	4,253	8,080	90	7,672	13,130	71	6,133	18,521	202	14,940	19,650	32	32,998	59,381	80
Mich.	2,926	7,584	159	5,946	10,164	71	4,755	15,250	221	11,473	13,955	22	25,100	46,953	87
Mass.	3,061	8,719	185	6,886	12,485	81	4,183	12,886	208	10,799	12,617	17	24,929	46,707	87
Fla.	1,669	5,511	230	3,721	9,101	145	3,145	15,225	384	6,202	12,146	96	14,737	41,983	185
Md.	4,708	9,574	103	6,816	11,460	68	4,040	11,304	180	6,506	9,461	45	22,070	41,799	89

FIG. 3

TEN FASTEST GROWING DP POPULATIONS BY STATE

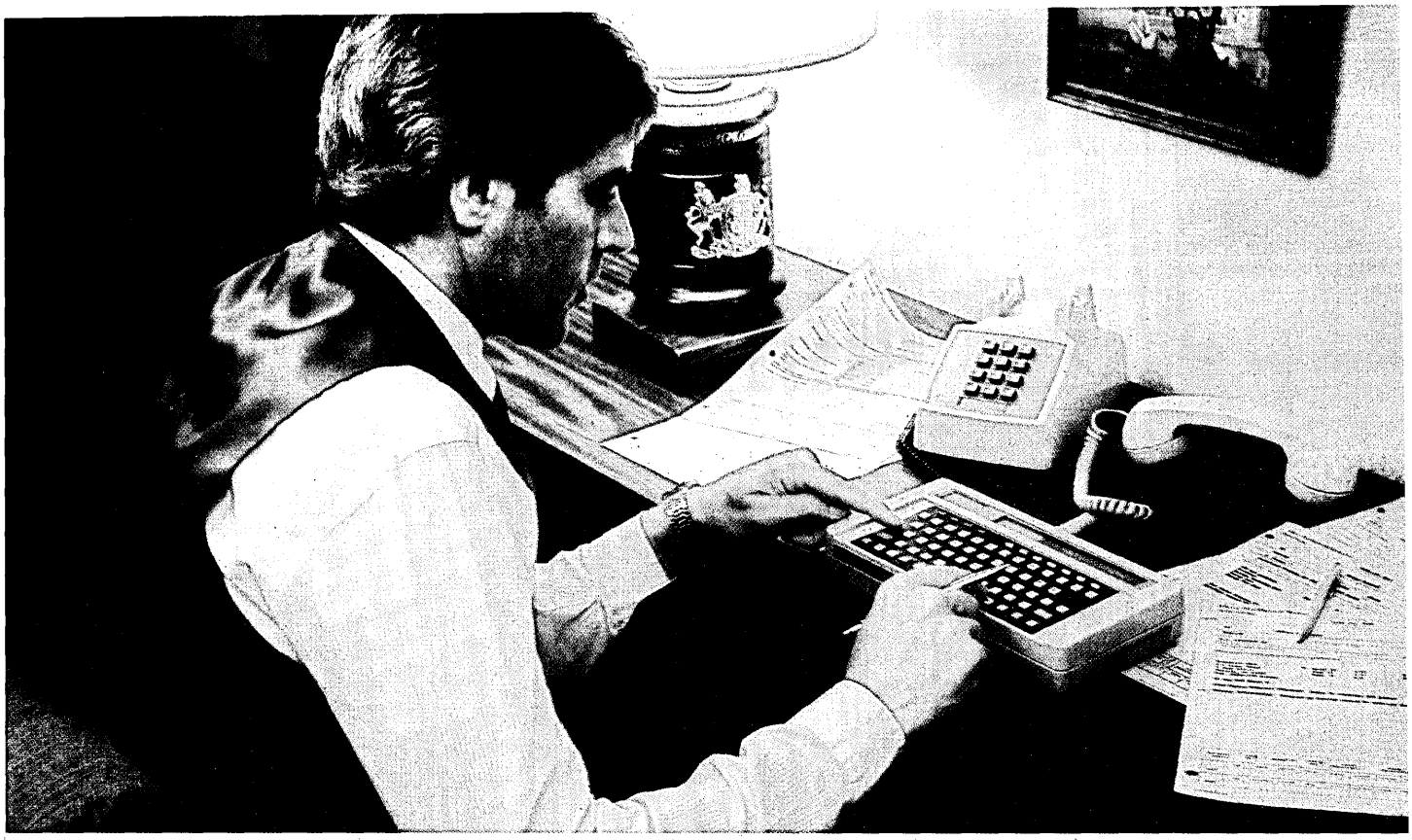
JOB TITLE

	ANALYSTS			PROGRAMMERS			OPERATORS			KEY ENTRY			TOTAL GROWTH
STATE	1970	1980	% Δ	1970	1980	% Δ	1970	1980	% Δ	1970	1980	% Δ	(BY %)
N.H.	162	1,362	741	537	1,949	263	283	1,658	486	859	1,644	91	259
Idaho	72	290	303	247	739	199	185	1,364	637	405	816	101	253
N.Dak.	26	143	450	157	424	170	49	636	1,198	242	432	79	245
Ariz.	763	2,605	241	1,357	3,754	117	827	4,855	487	1,790	4,606	157	234
Nev.	88	411	367	283	734	159	260	1,225	371	363	928	156	232
S.Dak.	22	98	345	71	399	462	119	724	508	315	500	59	227
Wyo.	39	74	90	77	231	200	91	526	478	154	344	123	225
Alaska	54	201	272	153	287	88	80	669	736	201	422	110	224
Colo.	1,085	3,712	242	2,256	6,755	199	1,491	6,870	361	2,886	5,747	99	199
Maine	102	421	313	165	715	334	244	1,269	420	721	1,164	61	190

counted only once in the census—according to the job at which they work the greatest number of hours during the reference week. After the individual completes the census form, a trained census coder slots the response into one of 503 census occupational classifications. Therefore, the possibility exists for individuals to describe their jobs incorrectly and/or the coder to assign the classification numbers erroneously. More important, individuals may view and report their jobs differently than might their employers. Thus, for example, some junior accountants assigned to spend most of their time developing financial reports using a report generator (RPG) program might describe themselves to the census as programmers. Similarly, the one programmer at a small installation might describe himself or herself as the "manager of programming" and be classified by the census coder as a manager rather than as a programmer.

The job self-classification problem inherent in the census is not too serious when comparing one census with another because, presumably, individuals will have about the same biases each time. As pointed out in the earlier discussion of the operator projections, however, the problem becomes much more serious when census data are compared with data from other sources that do not use self-classification. Unfortunately, the census is only taken every 10 years, so that in the interim periods, other sources of information must be relied upon. This can give rise to fluctuating estimates as can be seen from a brief examination of the history of estimates of the number of programmers.

In 1966, the American Federation of Information Processing Societies (AFIPS) published an overview of the information processing industry that included several estimates of programmer employment in 1970. These varied between 200,000 and 650,000. In 1971, Walter Carlson, president of the Association for Computing Machinery (ACM), testifying at a Labor Department hearing, said that consensus data would appear to support there being approximately 250,000 programmers in 1970, with an expected increase to 500,000 by 1975. One of the more conservative estimates made before the publication of the 1970 census data was by the Labor Department in its very widely distributed *Oc-*



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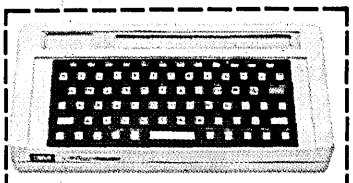

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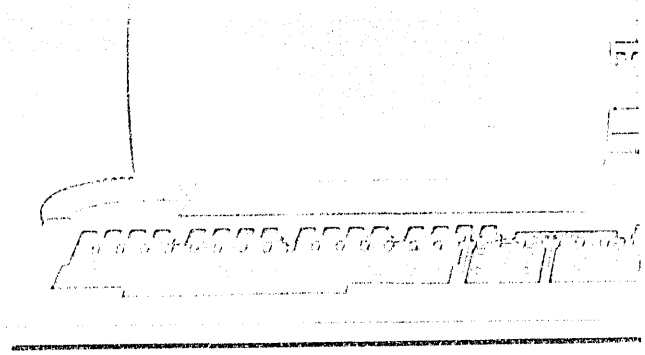

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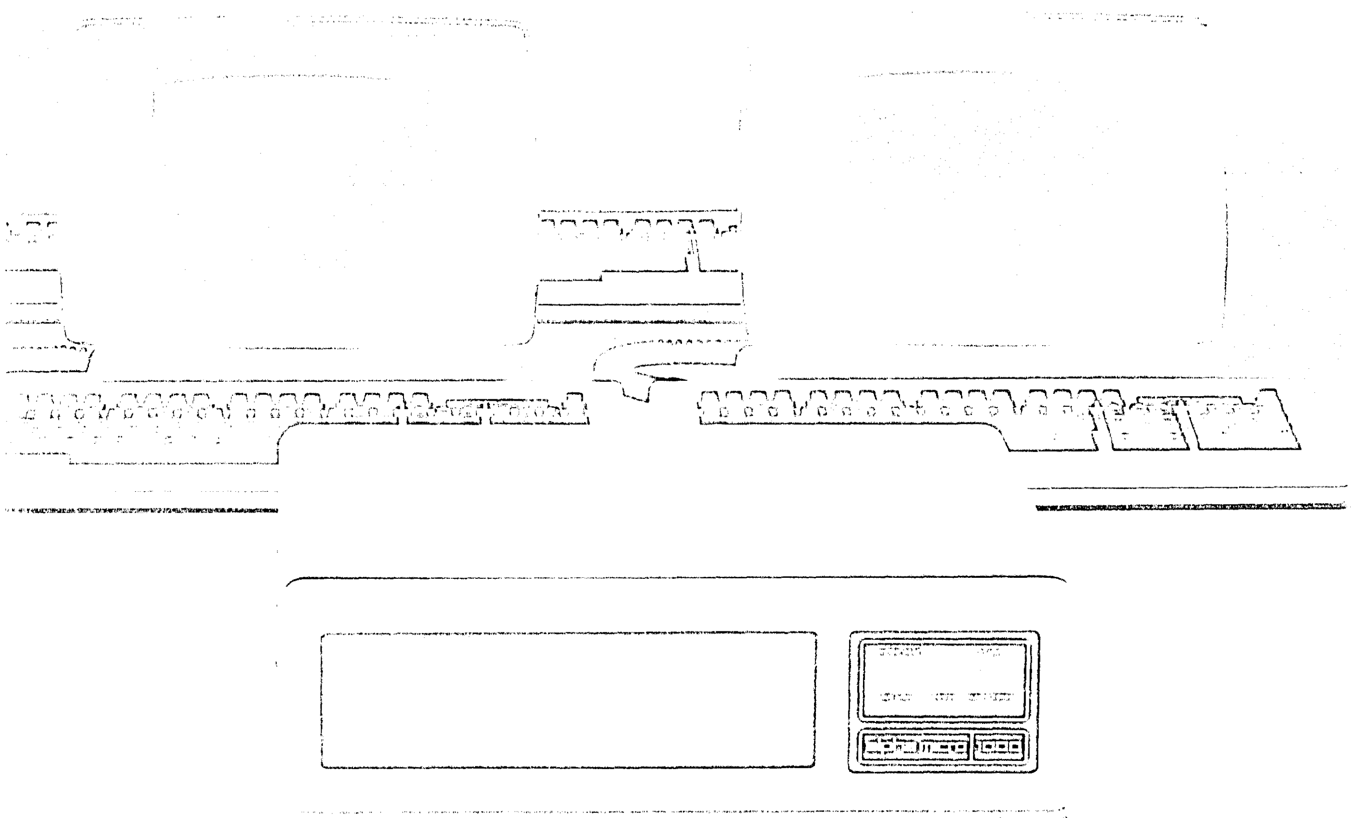

CIRCLE 60 ON READER CARD

It is very hard to predict a change in growth rate, let alone its precise timing.

cupational Outlook Handbook. The 1972-'73 edition stated that nearly 200,000 programmers were employed in 1970. When the 1970 census data were finally released, it was seen that 161,377 programmers were actually "counted" in April 1970.

After the 1970 census had demonstrated that both government and private forecasters has been overestimating the number of programmers, the government forecasts became much more conservative. Some might say they became unduly cautious. For example, although a nongovernmental analysis of the 1970 census and comparable data from the Labor Department's Area Wage Surveys had shown that the annual growth rate for programmers was over 6% in 1970, the Labor Department in 1974 used an annual growth rate of only 4.6% in projecting that there would be 250,000 programmers by 1980. Two years later, in 1976, the Labor Department was even more conservative and estimated that the 1974 programmer employment was 200,000 and that it would grow to 285,000 by 1985—an average annual compound growth rate of only 3.3%. As late as 1982, the *Occupational Outlook Handbook* stated that "in 1980, about 228,000 persons worked as computer programmers." This last figure implied a mere 3.6% average annual compound growth rate from 1970.

GROWTH RATE CONTINUES

As stated earlier, the 1980 census showed that, in fact, there were 317,673 programmers in April 1980. This is equivalent to a 7% annual compound growth rate over the 10 years from 1970. In other words, the slowing down in the growth rate that the Labor Department had consistently assumed throughout the decade simply had not occurred.

A similar story can be told of widely varying projections of employment in the other dp occupations. To give just one example: Carlson, in his previously mentioned 1971 testimony, also reported that census data at that time supported the estimate of approximately 500,000 computer operators in 1970 and 900,000 in 1975. In fact, the 1970 census reported 117,222 operators and by 1980 there were still only 420,581. The growth to 900,000 will certainly come, but some 10 years later than Carlson suggested.

The main lesson from history is to treat all dp employment estimates with caution, especially those that incorporate a change from an observed growth rate. It is simply very hard to predict a change in growth rate, let alone its precise timing.

So far, census data have been quoted down to the single individual. To the unwary, this might seem to imply that everyone is asked his occupation and that, leaving aside definitional questions and the problem of general undercounting, an absolutely precise count is obtained. Such is not the case.

In both the 1970 and 1980 censuses, the employment data came from samples. In 1980, the sample was chosen as follows: in counties, incorporated places, and minor civil divisions estimated to have fewer than 2,500 persons, one half of all housing units and persons in group quarters were included in the sample; in all other places, one sixth of the housing units or group quarters were sampled. Overall, approximately 19% of U.S. housing units were included in the census sample.

Of course, all employment data provided by the census are subject to sampling errors. These can be estimated using standard statistical techniques described in technical documentation available from the Census Bureau. In general, when the number of individuals reported in a particular classification such as occupation, sex, or location is in the hundreds, the sampling error can, for most practical purposes, be ignored. When the number is less than 100, however, the sampling error can be relatively large and effectively mask any change from one census to the next. This should be remembered when reviewing the table that shows dp employment by state.

To be a little more precise, a conservative estimate of the standard error due to sampling is the larger of 16 or 2.9 times the square root of n where n is the number of individuals reported. Thus, for n = 100, 1,000, and 10,000, the standard sampling errors are 29, 92, and 290, respectively. These numbers suggest that national totals for the four dp occupations should only be quoted to the nearest thousand, and that care should be taken when interpreting data and especially change data from the less populous states.

Looking at the data by state, it is clear

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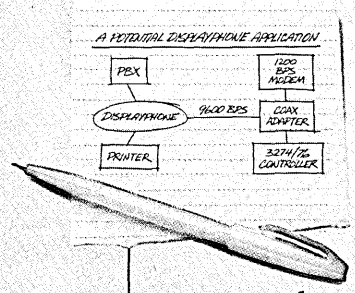

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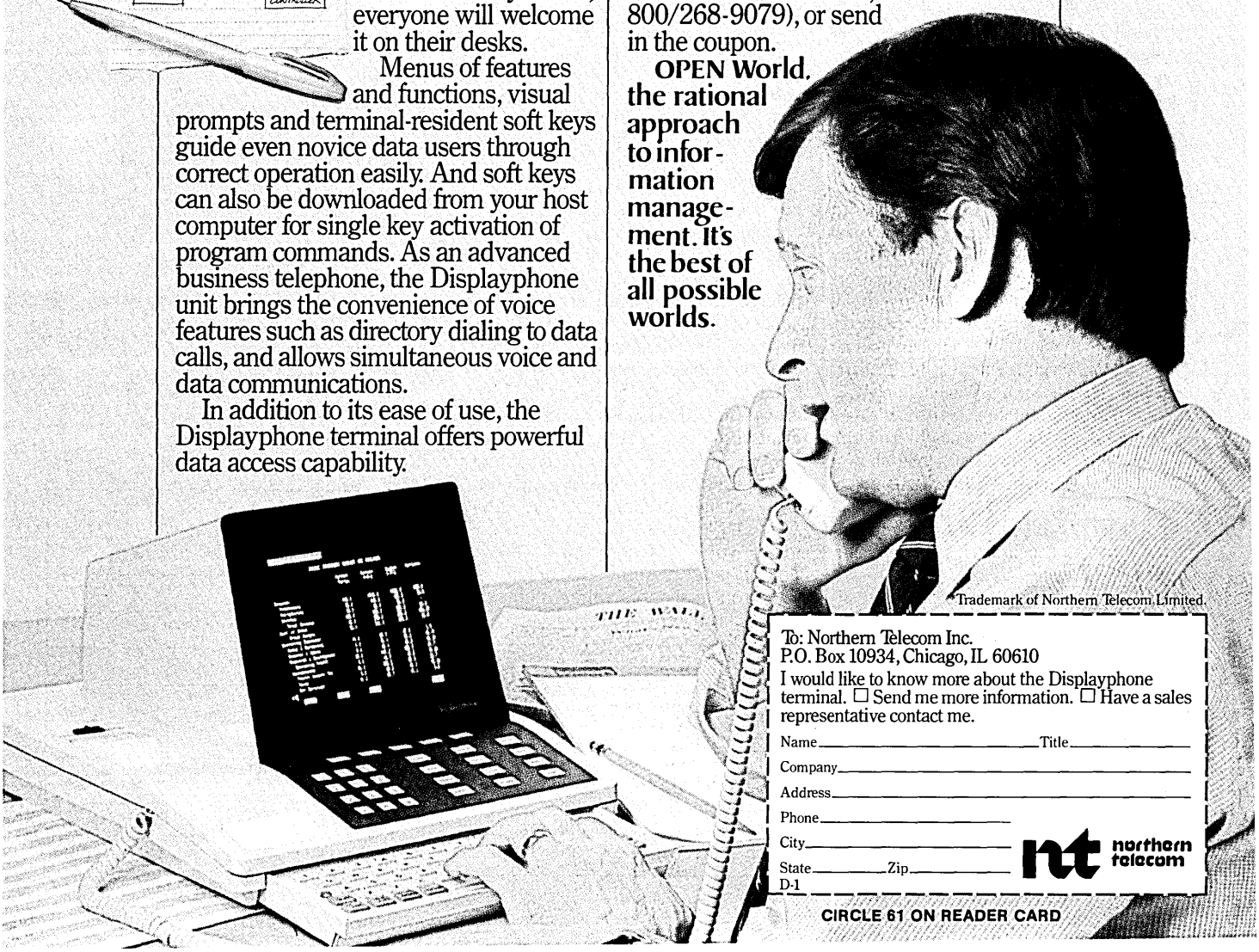

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Computer operator positions in the South increased 313% in the '70s.

that there has been significant growth in all states for all four dp occupations. Some states, however, have grown faster than others. In particular, California, which in 1970 had approximately the same dp employment as New York, had moved way ahead by 1980—its 132% growth, to 171,039, was more than double the 60% increase for New York. Similarly, Texas, Florida, Virginia, Georgia, and Washington among the larger states show well above average growth. On the other hand, below average growth occurred in the industrial states of the Northeast and Midwest. The overall growth rate for the snow belt, 83%, was dwarfed by the 141% increase for the West and South.

The overall pattern of growth shows up very clearly if the states are divided into two groups—the 14 states in New England, and Mid-Atlantic, and East North Central regions (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, Pennsylvania, Illinois, Indiana, Michigan, Ohio, and Wisconsin) in one group and the remaining 36 states and the District of Columbia in the other. Adding the total employment figures for the four dp occupations for the states in these two groups, the growth in the 14 states in seen to be much less than in the rest of the country. A similar pattern holds for the four dp occupations taken individually. Computer operator positions in the North increased at a 209% rate in the '70s; in the South, the increase was 313%.

It must be remembered that the census reports the occupations of individuals according to the state of residence, not the work location. This accounts for the relatively low numbers reported for the District of Columbia, where many workers live in neighboring Maryland and Virginia suburbs. In this case, the census reports for the Washington, D.C. Standard Metropolitan Statistical Area (SMSA), which includes the nearby suburbs, are more relevant. For 1980, they show a total dp employment of 47,499. This puts the Washington, D.C. area in fourth place among SMSAs with respect to dp employment, immediately behind New York, Chicago, and Los Angeles-Long Beach.

It is interesting to note the unusually high proportion of systems analysts and programmers in the Washington, D.C. SMSA as compared to New York, Chicago, and Los Angeles. The 50% larger analyst population in D.C. presumably reflects the pattern of dp employment in the federal government.

The census also reports employment by sex and ethnicity. This presents an opportunity to see how well the dp field is doing with respect to equal opportunity. Fortunately, the data show progress in all four dp occupations.

Sharpest increases for female and black employment in the data processing industry were shown in the systems analysts and computer operator categories. Female computer operators were once in the minority but are now in the majority with 59.2% of the positions, probably due to the aforementioned rise of the small business computer and the microcomputer making clerks into computer operators. Black programmers were 3.6% of the total but are now at least 5.7%. Female programmer numbers also increased, from 22.5% of the total to 31.2%. Fewer males are entering data at computer centers these days, as the percentage of female key entry operators is now 92.4% from 89.8% in the 1970 census.

A detailed evaluation of the sex and ethnicity data is clearly beyond the scope of this article; readers are left to draw their own conclusions. The change in the proportion of female computer operators, however, merits comment. The Census Bureau insists that the numbers for male and female computer operators were not reversed. Further confirmation comes from recent Department of Labor data on 1982 employment that give an even higher female computer operator percentage—63.3%. Since the sex ratio is not in accord with some observations of a number of larger computing facilities, the only rationalization apparently remaining is that mentioned earlier, namely, that erstwhile clerical employees at places with micro or small business computers are reporting themselves as computer operators because that is, in reality, what they spend most of their time doing. Despite this tremendous surge of females into computer operations, males need not give up hopes of computer operator jobs. The growth in operator requirements was such that male employment increased by 107% from 1970 to 1980; there should be plenty of room for growth in male computer operator employment in the coming 10 years. ❋

Bruce Gilchrist is director of Computing Activities at Columbia University, Ates Dagli is a research associate in the university's Center for the Social Sciences, and Arlaana Shenkin is a research assistant in the Center for Computing Activities.

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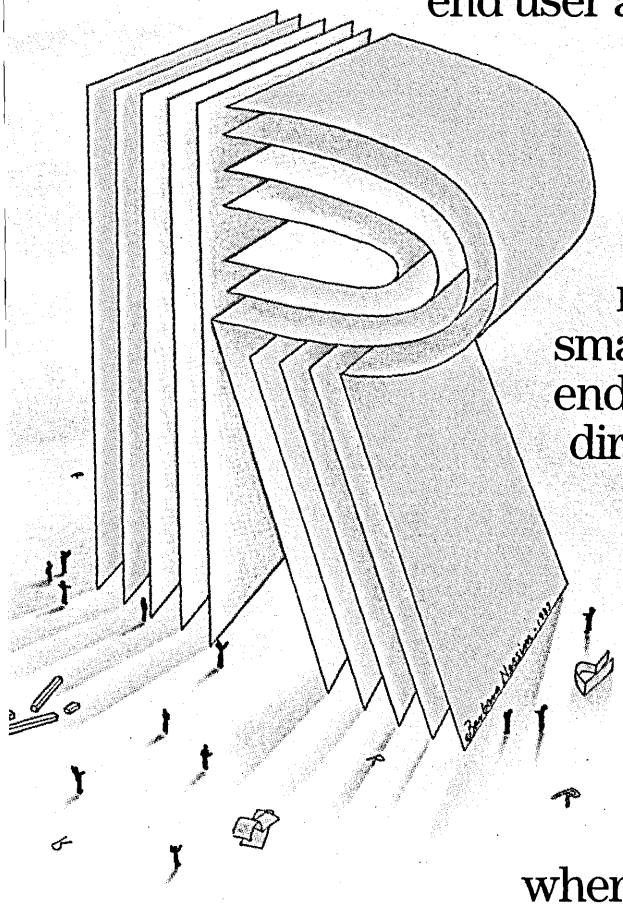

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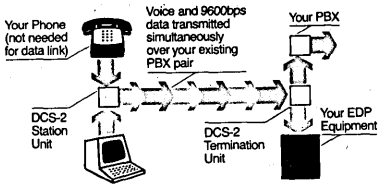

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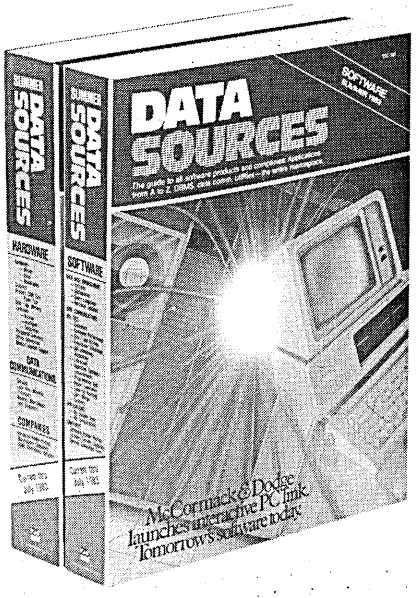

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CIRCLE 64 ON READER CARD

Though many people think of her as a Pentagon dweller, she may soon be ready to join the general dp community.

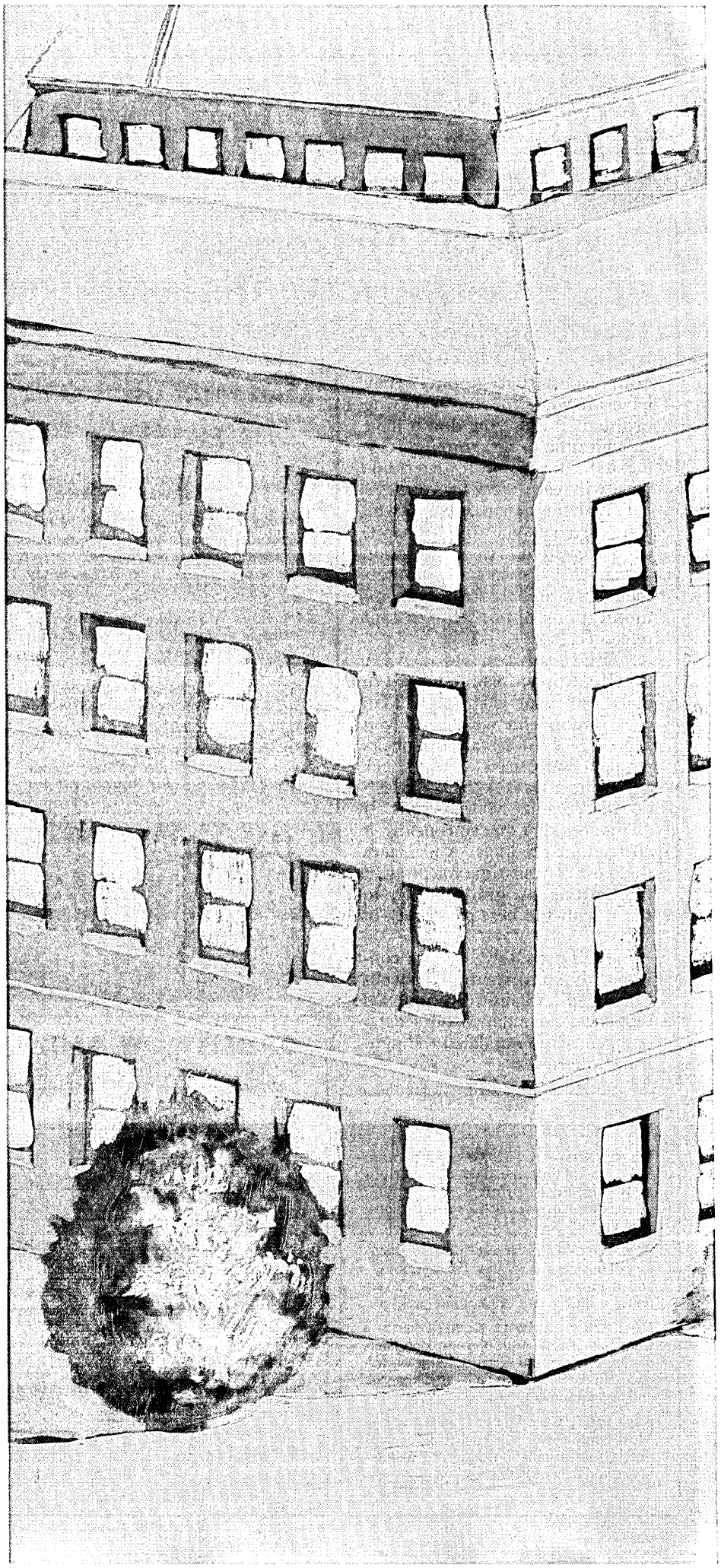
ADA STEPS OUT

by Edward V. Berard

Ada will directly affect more software professionals in the 1980s than COBOL did during the 1960s and 1970s. While its use is being encouraged by the U.S. Department of Defense (DoD), several nonmilitary, commercial users have already committed to Ada as the development language of choice. In fact, some of the largest applications of Ada (measured in lines of code) include payroll systems and manufacturing control applications.

Despite rumors to the contrary, Ada is real. Million of lines of Ada code have already been written and executed. Large (over 10,000 lines of code) Ada applications are currently being used in production. There are now at least three DoD-validated Ada compilers, and the odds are that there will be upwards of 20 validated compilers by the end of 1984. In addition, there are numerous nonvalidated Ada compilers available, most of which will eventually be approved by the DoD.

Ada compilers exist on a wide range of computers and run under a variety of operating systems. Examples of computers on which Ada compilers currently exist include: Apple IIe, Amdahl 470, DEC VAX, DEC PDP-10, IBM 370, Burroughs B6700, Univac 1100, and various European and Japanese machines. Ada compilers are currently most prevalent on minis and micros; a large number are targeted for the Motorola 68000, and TeleSoft, San Diego, Calif., has a compiler that runs on the IBM P.C. The operating systems under which Ada compilers run include Digital Research's CP/M, VMS on the DEC VAX, NOS on the CDC Cyber 170, and Unix. For the near term, the Unix operating system will probably be one of the most commonly chosen operating systems for Ada implementations. Ada under Unix can be found on the Gould Concept/32 systems, DEC VAXs, and



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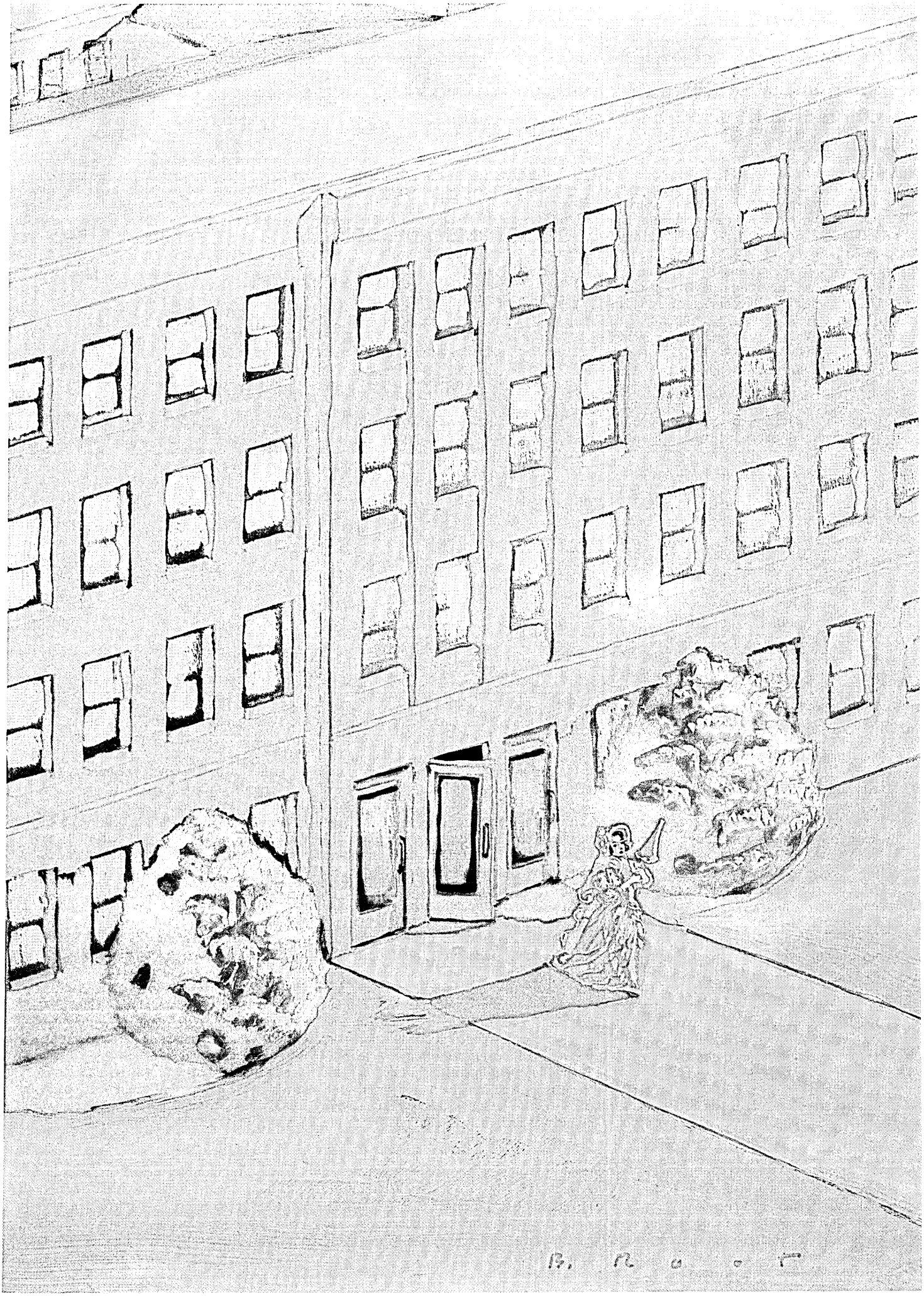


The characteristics that make Ada cost effective for military systems also make it attractive to the commercial software developer.

many Motorola 68000-based systems.

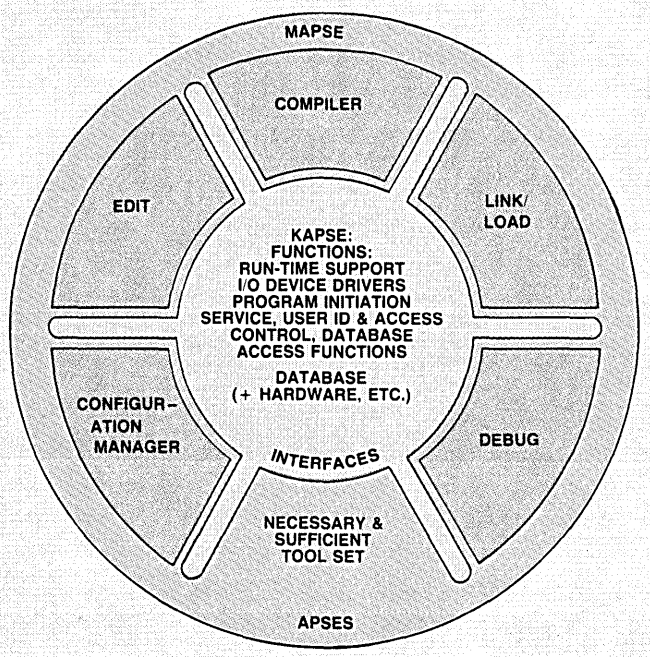
Why should anybody be interested in Ada? If you are a military contractor, the answer is obvious. This year the DoD will spend in excess of $4 billion on embedded systems software. (Embedded systems are systems in which the computer is but part of a larger whole, i.e., the computer is 'embedded' in a cruise missile, a jet aircraft, or a modern tank.) By 1990, the DoD estimates, this figure will exceed $30 billion. Ada was created specifically for embedded systems, and the DoD has taken steps to require Ada as the preferred language for implementing them. DoD Draft Directive 5000.31 (June 10, 1983) had both expanded Ada's use to include mission-critical systems and set specific dates in 1984 for requiring Ada as the language of choice for the implementation of these systems. (Mission-critical systems are those systems that are critical to the success of a military mission. They need not be embedded; for example, a radar tracking system that feeds its output to a computer might be deemed mission critical.

But Ada is also generating a great deal of interest outside of the military. Embedded systems tend to be large, long-lived, and critical. There are often severe constraints on execution speed and the amount of memory available. These characteristics are hardly unique to military software. Ada was designed to save money throughout the entire software life cycle—during design as well as maintenance. Those characteristics of Ada that make it cost effective for military systems also make it attractive to the nonmilitary, commercial software developer.

Ada is a powerful high-level language that affords its users the ability to "twiddle bits" and manipulate text with equal ease. The absence of subsets or extensions makes Ada code very portable. The use of packages (collections of logically related entities such as subprograms) and generics (which allow for quick generation of code when, for example, only the type of data being manipulated is changed) encourage the reuse of code, thus boosting productivity. Features such as user-defined data types greatly ease the burden of maintenance programming. Exceptions allow systems to degrade gracefully. Concurrent processing is handled directly via Ada's task capability.

FIG. 1

THE STONEMAN MODEL



A BRIEF HISTORY OF ADA

Ada began in 1974 when the DoD, the largest consumer of software on the face of the earth, decided it was spending too much on computer systems. A study showed that rougly half the military's annual computer budget (about $7.5 billion in 1973) was being spent on software. More than half the software costs were those associated with embedded systems. In 1975 the DoD circulated the Strawman requirements document, which listed the qualitative requirements for a military programming language. Comments received on Strawman resulted in Woodenman and eventually in a complete set of desired characteristics for a DoD high-level language: Tinman.

By 1977 it became apparent that no existing programming language was suitable for use as a common high-level language for DoD embedded computer systems. It was also determined that a language that met the Tinman requirements was not only feasible but was desirable. Later in 1977 Tinman was modified to Ironman, and proposals were requested for the development of a language based on the Ironman document. Four of the proposals received were deemed acceptable and were color coded for evaluation purposes. The four selected offerers were: SofTech (Blue), SRI International (Yellow), Intermetrics (Red), and CII-Honeywell Bull (Green). The Yellow and Blue designs were eliminated and analysis continued with the Red and Green designs.

The name Ada was chosen in 1979 in honor of Augusta Ada Byron, Countess of Lovelace, daughter of poet Lord Byron. Ada Lovelace (1818-1851) was a mathematician who worked with Charles Babbage. Babbage had created a "difference engine" that could be "programmed" much like the Jacquard loom. Since Ada often "programmed" the difference engine, she is considered by many to be the first programmer. The military standard specification (MIL-STD 1815) was chosen to reflect the year of her birth.

Later in 1979, the DoD declared the Green language (CII-Honeywell Bull) the winner of the competition. The primary designer of the Green language was Jean Ichbiah (who now has gone on to form his own company, Alsys). The preliminary design document was published by the Association for Computing Machinery's (ACM) Special Interest Group for Programming Languages (SIGPLAN) in the summer of 1979.

In August of 1980, what has become known as the 1980 standard for Ada (MIL-STD 1815) was approved. Comments were sought on the standard, courses on the Ada language were conducted, and in July of 1982 a revised version of MIL-STD 1815 was issued. Further revisions were made in Ada and on Feb. 17, 1983, an ANSI standard for Ada became a reality, MIL-STD 1815A (1983).

On April 11, 1983, the Ada/Ed interpreter (created at New York University's Courant Institute) became the first validated Ada translator. (A translator is any piece of software that translates source language statements to machine executable form in a mechanical manner. Translators include in-

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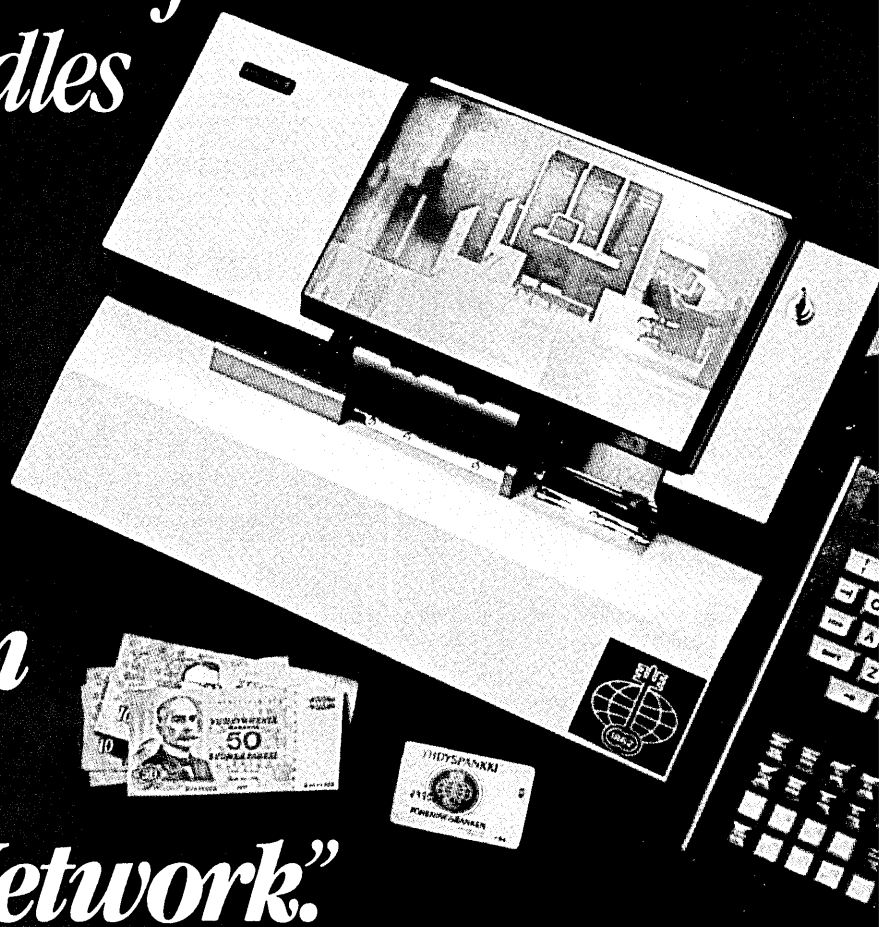

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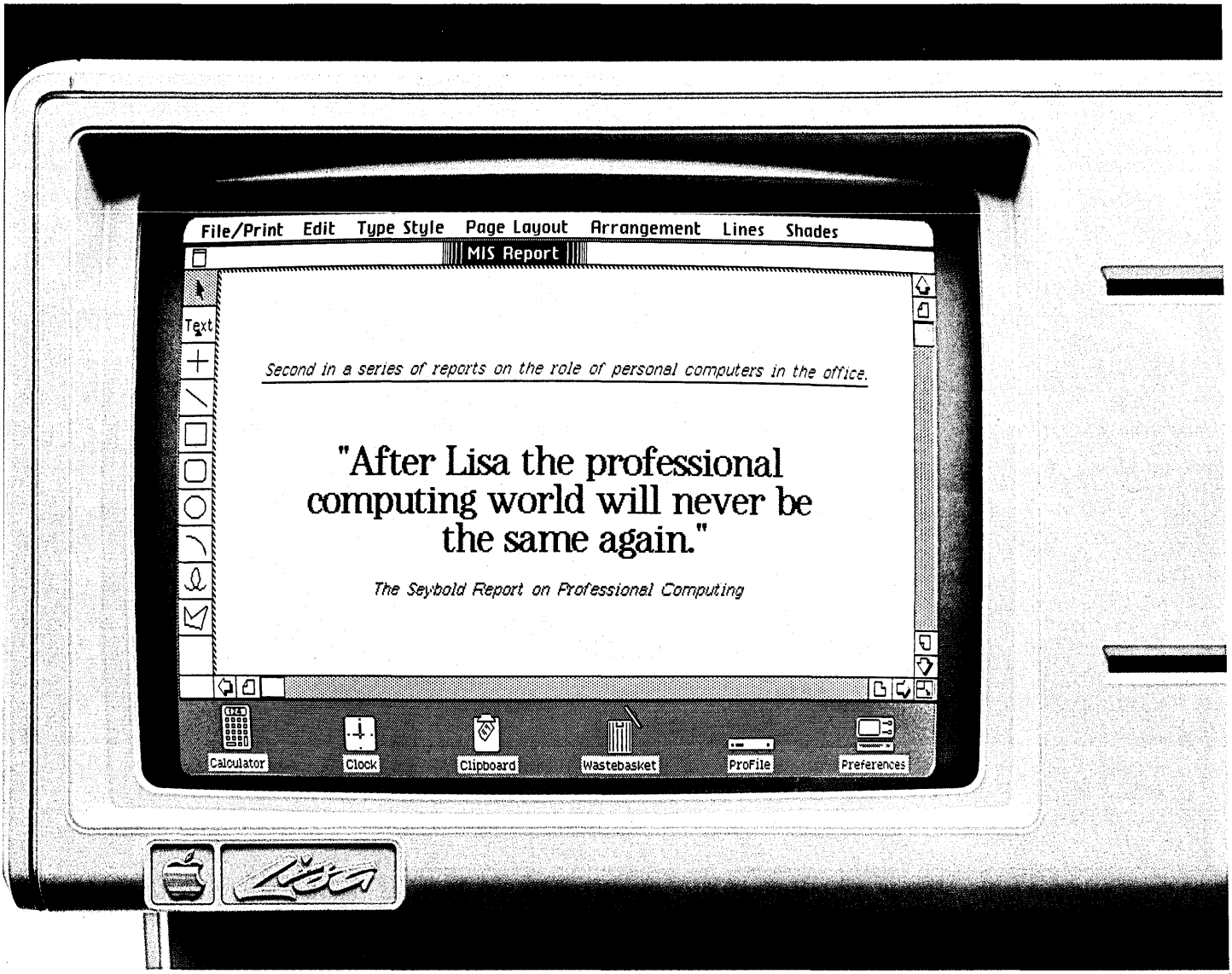

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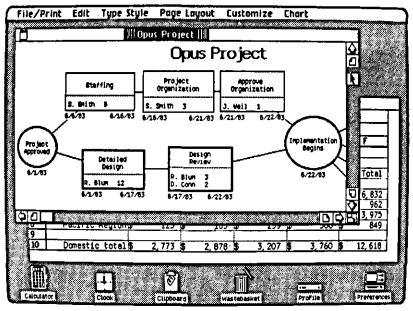

Lisa's revolutionary software lets users perform several applications simultaneously, even "cut" and "paste" them together. The powerful project management program seen here is a Lisa exclusive.

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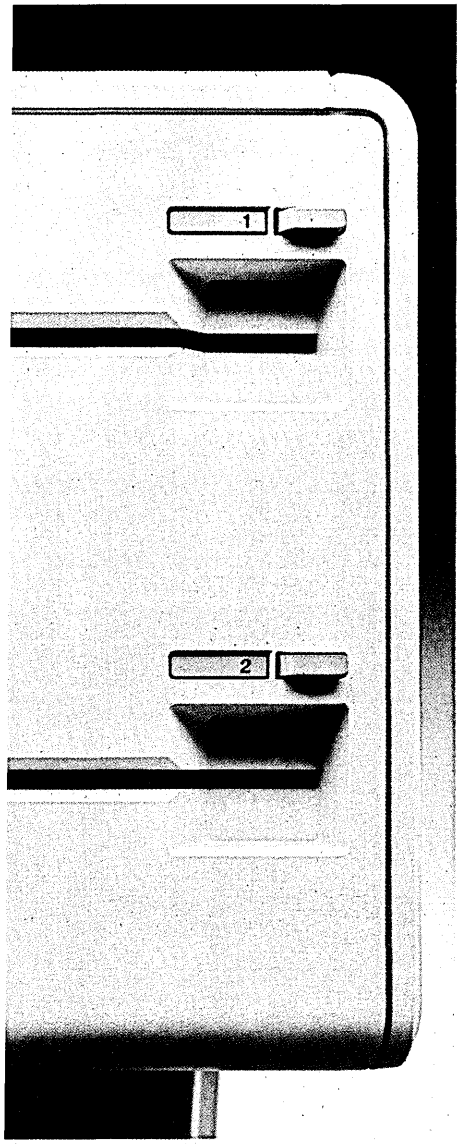

There's even a program—LisaProject—that lets you use the mouse to chart the progress of complex projects, automatically recalculating when deadlines or resources change.

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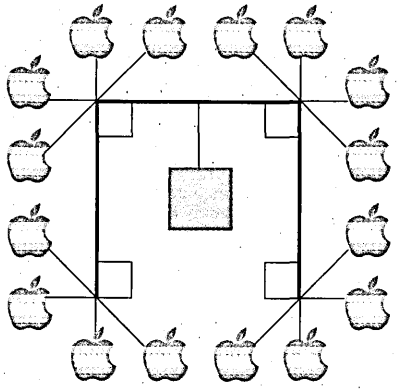

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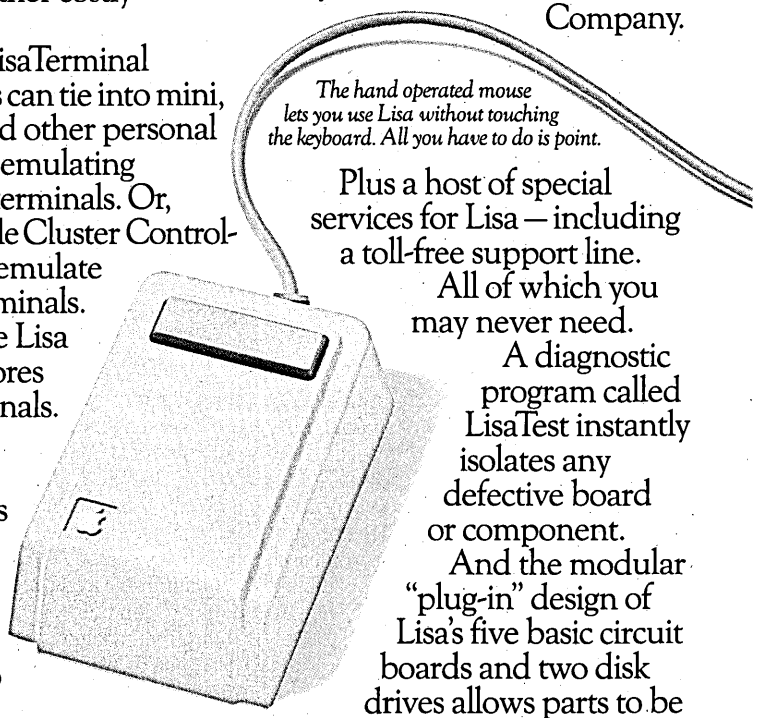

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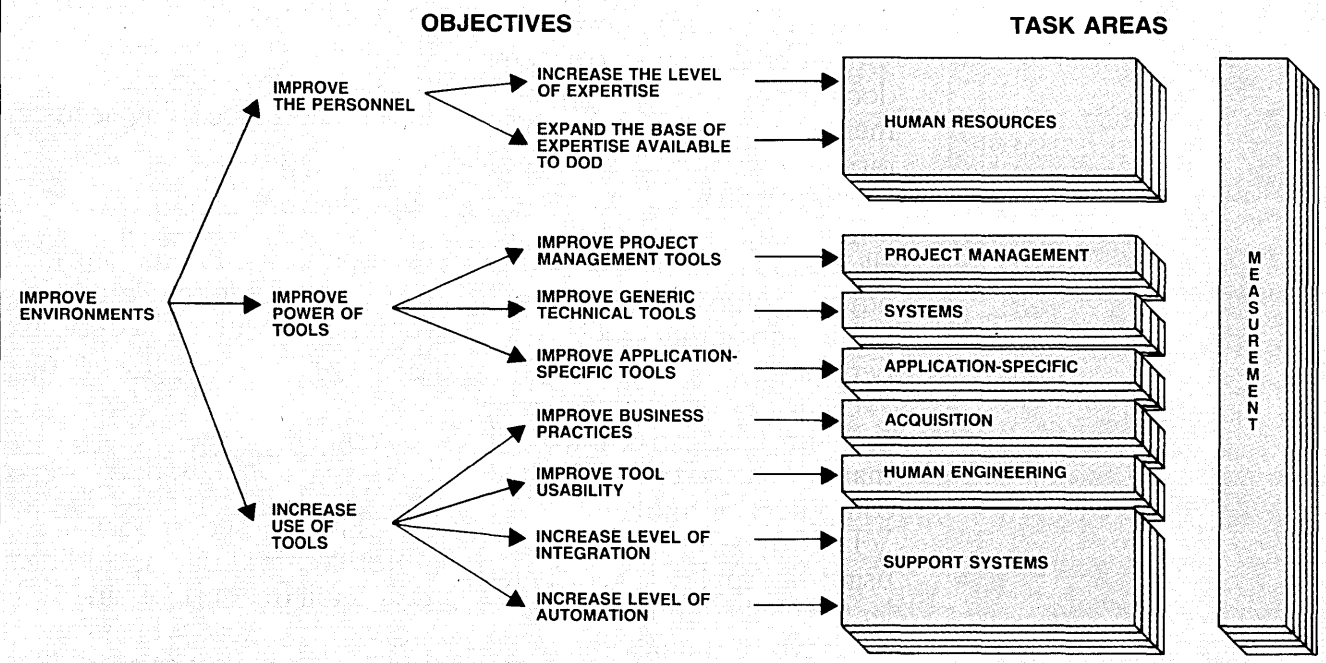
FIG. 2

SOFTWARE TECHNOLOGY FOR ADAPTABLE RELIABLE SYSTEMS



terpreters and compilers.) On June 13, 1983, Rolm Corp. validated the first production-quality Ada compiler. The Rolm validation also includes the Data General MV/4000, MV/6000, MV/8000, and MV/10000. As this article went to press, Western Digital was about to become the third vendor to have a compiler validated, and one or two additional compilers may be validated before the end of 1983. In 1984 there should be a flood of requests for validation, quite possibly resulting in more than 20 validated compilers by the end of 1984.

The Ada name has been trademarked by the DoD, and no one may claim to have an Ada compiler unless it has been validated by the DoD. In order to be validated, a compiler must pass a suite of about 1,850 programs—the Ada Compiler Validation Capability (ACVC). About 80% of these programs are applicable to all Ada compilers. A portion of the remaining programs or tests will also be required depending on which optional features (specified in the Ada standard) the implementer has chosen. Along with the compiler, the operating system, the computer hardware itself, and any additional hardware and software that will be used to produce Ada-containing products must also be validated. Vendors will be required to revalidate their compilers each year. The DoD plans a possible revision of the ANSI standard for Ada in 1988, but no sooner.

The ACVC is a fairly rigorous set of tests. It checks not only for the syntax of the complete language, but also for such things as extensions to the language. A validated compiler must pass all applicable tests; failure of even one small part of one test is grounds for denying validation. Upon completion of the validation process (a process that may take several weeks) the compiler implementer is issued a validation certificate that states, among other things, the date of validation, the hardware included in the validation (a compiler can be validated for several different machines), the operating systems for which the validation is applicable, and the version of the ACVC that was used for the validation process. The ACVC is continually being extended and improved.

APSE, KAPSE, MAPSE

During the development of Ada it became apparent that the language was just one component of a tool kit that would be necessary for handling software throughout its life cycle. So a series of requirements documents (Sandman, Pebbleman, and Stoneman) for an Ada Programming Support Environment (APSE) were created. These documents detailed the tools (e.g., a compiler, linker/loader, and configuration manager) deemed necessary for cost-effective handling of software throughout its life cycle. Ada should always be thought of in the context of an APSE.

An APSE consists of three components: a kernel APSE (KAPSE), a minimal APSE (MAPSE), and additional software specific to a particular APSE. The KAPSE interfaces with the existing operating system (if any) and provides run-time support and several other low-level functions. The MAPSE contains minimal support tools for Ada software throughout its life cycle: the Ada compiler, an editor, a linker/loader, a debugger, a configuration manager, and other tools. The MAPSE may be augmented by other software. The DoD will require that most, if not all, of the tools in an APSE be written in Ada (see Fig. 1).

While a few APSE-like environments exist (e.g., Rolm's Ada Development Environment), APSEs are now only beginning to emerge.

Ada is part of a larger DoD effort to improve software technology—Software Technology for Adaptable Reliable Systems (STARS). Originally known as the Strategy for a DoD Software Initiative, STARS was developed to exploit and improve existing software technology. The overall aim of STARS is to "improve software productivity while achieving greater system reliability and adaptability" (see Fig. 2). The specific goals of STARS are to:

- improve the personnel resource by increasing the level of expertise and expanding the base of expertise available to the DoD,
- improve project management tools, application-independent technical tools, and application-specific tools, and
- increase the use of tools by improving business practices, usability, and raising the level of integration and automation.

Ada was chosen by the DoD as the backbone of the STARS effort. Thus, to look at Ada as just another programming language is not unlike viewing the cornerstone of a building as the entire edifice. The DoD is placing a

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Even the staunchest of Ada's supporters will grant that the language is complex.

great deal of emphasis on applying software engineering to the entire software life cycle and is using Ada to facilitate this goal. It is not enough to know the syntax of the Ada language; one must know how to engineer, in the most rigorous sense of the word, Ada software. This has direct implications for those who are planning to obtain software-related contracts with DoD.

It is a sad fact that, for most of today's data processing shops, the software life cycle is much as it was 20 years ago. The hardware is perhaps new, but programmers still submit compilation after compilation before they are satisfied with a module—and any more than four compilations for a module before it is delivered indicates wasted effort. Managers and programmers alike still seem to feel that all that one needs to know to be a programmer is the syntax of a language and how to use a text editor. Few shops keep specific records of such things as numbers of errors, types of errors, effort expended per line of code, and average complexity per module. Few shops have any systematic strategy for testing, maintenance, or quality control.

Unfortunately, many of today's software developers liken computer science to astrology in terms of technical value. Too often colleges granting degrees in computer science turn out graduates who are more "fact idiots" than software engineers. It has been said that "college give you all the answers, but none of the questions." It is the goal of STARS to solve this problem. STARS aims to bring computer science, mathematics, engineering disciplines, and communication skills to bear on the problems of the software life cycle. This should help to bring about a rapid evolution of the state of the art in software engineering.

STARS should also help in another area: foreign competition in software development. While the Japanese and the Europeans may not lead the U.S. in development of software technology, they far surpass the U.S. in applying it. If you feel that the Japanese challenge is not real, you should read up on the Japanese fifth generation computer project. There is much truth in the phrase "programmers are the auto workers of the 1980s."

LEARNING TO USE ADA

But if Ada is to help solve any of these problems, people are going to have to learn to use it. That won't happen overnight; although Ada educators may differ on approach or ordering of topics, the one point that most of them do agree on is that education of Ada professionals will take time. While people who know a high-level language should be able to learn what is referred to as the Pascal subset of Ada with about four weeks of full-time study, many educators report that it takes six months to learn to make effective use of the language. Those attempting to learn the language should be aware of a number of factors:

- Ada is, in a very real sense, the most complicated programming language yet. But in the hands of an educated professional (someone versed in computer science, software engineering, and the syntax of the language) it can be one of the simplest languages. Few people currently have adequate background for effectively learning Ada. This is changing as college computer science and software engineering curriculums improve.
- Many people who will need to learn Ada will also have to be versed in object-oriented design, structured design, and design methodologies for real-time software applications, e.g., SADT and SREM.
- Structured programming is a definite requirement for developing Ada software.

Ada must be taught in a software engineering context. Courses and books that merely emphasize the syntax of the language (and there are plenty of both) are not desirable. One of the best books currently available is Grady Booch's *Software Engineering With Ada*, published by Benjamin/Cummings.

Not everyone is capable of learning Ada. While it may be true that, given enough time, most of today's programmers can be trained to use Ada, many simply lack the analytical and other skills necessary to develop reliable Ada software. Just as everyone cannot be a scientist, there are those who cannot become software engineers.

There are some Adaphiles who would have you believe that Ada is absolutely perfect. But, as with any language, there are some potential drawbacks. Some of these will disappear with time; others will require that we change the way we look at the software life cycle. The drawbacks will be felt most acutely while the language is young.

One of the most widely publicized complaints about Ada is its sheer complexity. C.A.R. Hoare, winner of ACM's Turing Award, is perhaps the best known of Ada's critics. In his Turing Award acceptance speech he stated: "At first I was extremely hopeful. The original objectives of the language included reliability, readability of programs, formality of language definition, and even simplicity. Gradually these objectives have been sacrificed in favor of power, supposedly achieved by a plethora of features and notational conventions, many of them unnecessary and some of them, like exception handling, even dangerous."

Later in the acceptance speech, he said: "I believe that by careful pruning of the Ada language it is still possible to select a very powerful subset that would be reliable and efficient in implementation and safe and

ADA PROFESSIONAL ORGANIZATIONS

The DoD established the Ada Joint Program Office (AJPO) to manage all Ada-related activities. AJPO has, in turn, set up the Ada Information Clearinghouse to facilitate the transfer of information between AJPO and the Ada user community:

Ada Information
Clearinghouse
Ada Joint Program Office
3D 139 (400 A/N)
The Pentagon
Washington, DC 20301
(202) 694-0208

The ACM has established a technical committee on Ada (AdaTEC), which will soon become a special interest group (SIG) in its own right. AdaTEC is probably the largest professional Ada organization. Its publication, *Ada Letters*, is required reading for anyone with a serious interest in Ada. To request membership in AdaTEC or a subscription to *Ada Letters*, contact:

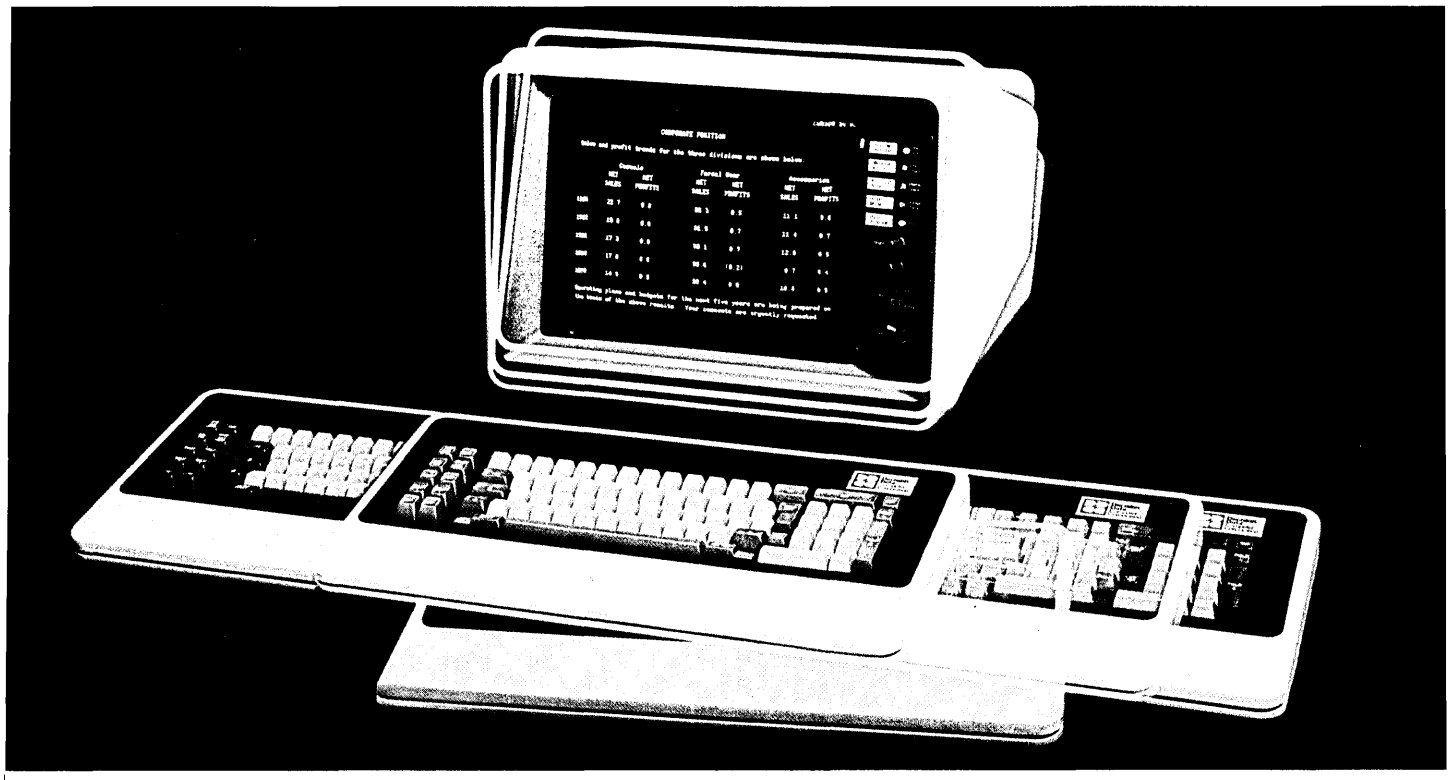
Association for Computing
Machinery
11 West 42nd St.
New York, NY 10036
(212) 265-6300

The Ada-Jovial User's Group (ADAJUG) is an organization that deals with both Ada and Jovial. It holds three meetings a year and will be coordinating joint meetings with AdaTEC. (The first joint AdaTEC-AdaJUG meeting will be in Dallas, Texas, during the third week of October.) Once you register at an AdaJUG meeting you should be on a mailing list for future meetings. For more information contact:

Tina Underwood
ASD/ADOL
Wright-Patterson AFB, Ohio 45433
(513) 255-4472

Ada also has a large following in Western (and Eastern) Europe. The Japanese also have several Ada-related projects (including compilers) in various stages of completion. Information regarding the status of Ada outside of the U.S. can be obtained by contacting AdaTEC's international representative:

Maarten Boasson
Holl, Signaal App.
Riethberglaan 17
Borculo, Netherlands
31-74-482129



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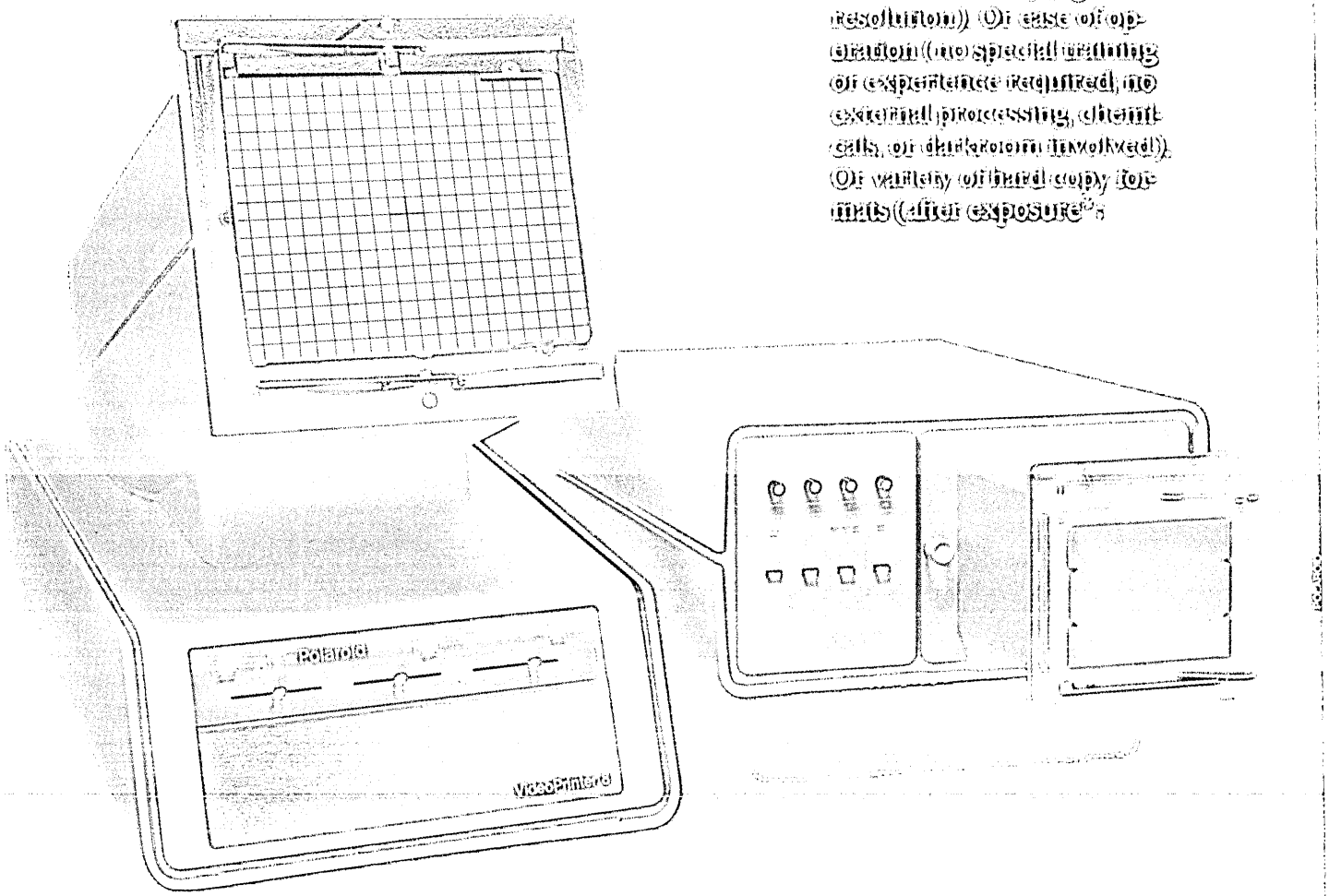

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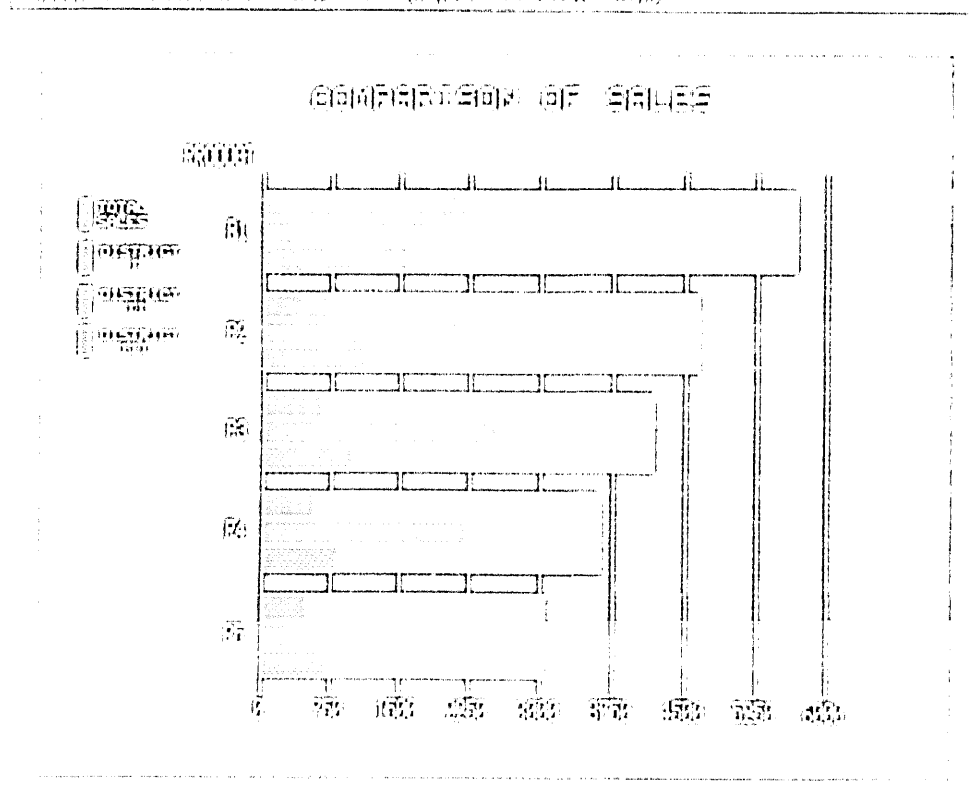

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Implementers of Ada compilers have already begun to share information on ways to effectively and accurately create them.

economic in use."

Many people cite Hoare when they decry the complexity of Ada. They point to languages like Pascal as more sensible approaches. If programmers are unable to generate relatively error-free code in languages like COBOL or FORTRAN, critics argue, giving them Ada will only exacerbate the situation. The reasoning is that there are two variables that can be controlled—the programmers and their tools—and it makes far more sense to control the tools.

Even the staunchest of Ada's supporters will grant that Ada is a complex language. This complexity can be managed in two very important ways. The first is to improve the training of those software professionals who will be generating Ada software. There are those who want to keep software technology where it was in the 1960s, i.e., keep everything at a level where very little knowledge is required to generate software. This approach is ideal for users of application generators and database query languages, but it is totally inappropriate for users of third generation languages, especially Ada. The DoD plans to require that the level of education for Ada software professionals be kept high and has taken steps to see that this happens—for example STARS and the Software Engineering Institute.

The second way to manage the complexity of Ada is to require that programmers use techniques to recognize and control complexity. Ada has a wealth of these tools. For example, packages provide a means of encapsulating logically related entities, and generics allow a programmer to design the logic of an algorithm once and to reuse this same logic for many different data types. Complexity requires that the Ada professional have a strong background in software engineering principles. This will only come about when software engineering is recognized for what it is: a true engineering discipline requiring specialized training. While software engineering technology is constantly being expanded and improved, software professionals are only beginning to realize that there is more to being a programmer than knowing the syntax of a particular language.

DRAWBACKS TO USING ADA

It is a foregone conclusion, however, that there will be hordes of undereducated programmers attempting to use Ada, at least initially. While these programmers will have the best of intentions, the results in some cases could be catastrophic. Ada is a powerful tool, and if you put a powerful tool in the hands of someone who's not competent to use it, you run some risks.

Another drawback is the size and complexity of the compilers that Ada will require. Current compilers often require at least 128KB of main memory to run comfortably, and this limits the types of computers on which Ada can be easily implemented. While implementations of Ada compilers on 8-bit cpus are not unheard of, the address space and speed of 16-bit cpus makes them far more practical. Computers based on 16-bit cpus unfortunately tend to be higher in cost than those based on 8-bit cpus. Further, the technology for 8-bit cpus is more mature than for 16-bit cpus.

The efficiency of the object code generated by Ada compilers is a prime concern of those who must actually implement embedded systems in Ada. Typically, embedded systems have severe restrictions on execution speeds and the amount of memory that can be supplied. The writer of an Ada compiler is faced with an interesting set of problems. Optimizing compilation speed is often done at the expense of execution speed and the size of the object code generated. There are many features in Ada that are unique to the language, and thus new to the writer of the compiler. This fact, coupled with the size of the language, makes the creation of compilers that generate efficient object code that much more difficult. Fortunately, implementers of Ada compilers have already begun to share information on ways to solve these problems.

Another difficulty stems from the uncertainties that remain in the current version of the standard. For example, for Ada compilers that run on a machine with a single cpu, concurrent processing must be simulated using some algorithm that is "fair"—i.e., one that will not give the appearance of favoring one task over the other. The criteria to be used and the algorithm itself are left to the implementer. Another example is the way that array elements are stored. While many Ada compiler writers seem to be storing them in rows, there is nothing in the Ada standard that mandates this. This has very real implications for scientific programmers who often optimize their programs by taking advantage of the way they think array elements are stored in memory.

A problem that will only be solved with the passage of time is the availability of validated, production-quality Ada compilers. In addition, the number of different hardware architectures for which object code from Ada compilers can be targeted is somewhat limited. As more compilers are validated—remember that compilers are often validated for more than one machine and more than one operating system—this problem will become less severe.

This last problem will affect both military and commercial users of Ada. Not many cpus have been approved for use in embedded military computer systems, and these are currently few, if any, validated Ada compilers that will generate object code targeted at these approved cpus. While a number of companies are working on Ada compilers for these machines, it will be some time before they are validated.

While the dearth of validated compilers is of less concern to commercial (nonmilitary) Ada users, it will prevent some of the advantages of Ada (e.g., true portability of Ada source code) from being realized immediately. Fortunately, Ada compiler implementers are not implementing any extensions to the language. The main problem plaguing commercial users at present would seem to be the lack of some desired feature in a partial implementation of Ada.

By 1986 we can expect to see a few dozen validated Ada compilers. We will also see the emergence of a number of APSEs, and the STARS program will begin to have an effect on the way we view the traditional software life cycle. People will become interested in software metrics, software engineering, and the development of reusable code. People will no longer wonder what Ada is or whether any compilers exist, but will focus on which compiler implements Ada most effectively. There will also be a definite decrease in the use of FORTRAN, COBOL, and assembly languages for DoD software systems.

In the years 1986-1990 we can expect to see an increasing number of hardware architectures influenced by Ada. We will also notice a definite decrease in the number of traditional programmers, i.e., those professionals who do not have degrees in computer science or software engineering. As software professionals—or the companies that employ them—are required to take responsibility for their work, we will notice a decrease in people who claim to be professionals in other fields (e.g., business or electrical engineering), but still develop software. (Just as today, you wouldn't expect someone to take one or two courses in engineering and then describe himself as an engineer.) Ada and STARS will accelerate the evolution of computing and software development from black magic to true science and engineering. ❋

Edward V. Berard is president of EVB Consulting Inc., a software engineering consulting firm. Mr. Berard has developed and currently gives a number of seminars and hands-on workshops on the Ada language and its associated technology. He also consults in the area of Ada education. For the past five years, Mr. Berard has lectured and consulted on software engineering in the U.S., Canada, and Europe.

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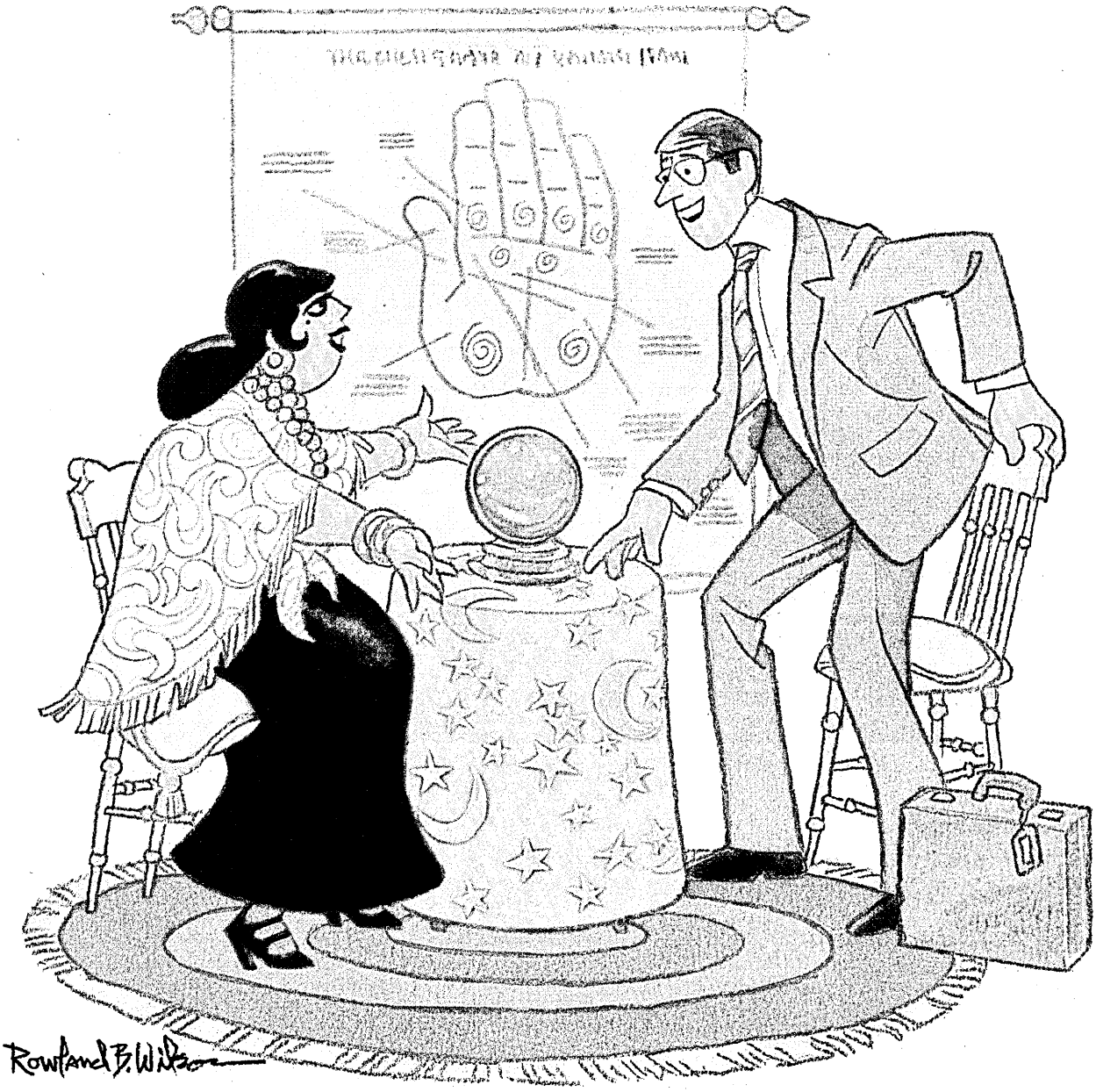

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Microcomputers and APL are a perfect match for the untrained user.

A NEW DAWN FOR APL

by Claiborne Lange

Fourteen years ago a young computer language called, simply enough, A Programming Language, was greeted with great fanfare as "innovative," winning an enthusiastic following in International Business Machines Corp., in universities, and in industry at large. "It could change the programming habits of the entire computing community," said an observer at the time.

A decade later, APL had attracted a loyal following, but not the entire computing community. More than 30,000 users within IBM and a score of companies including Coca-Cola, Exxon, and CitiCorp. were established APLers, along with several timesharing organizations such as I.P. Sharp Associates and STSC Inc.

Nevertheless, APL had failed to capture a significant segment of the overall programming population, a fact that puzzled dedicated users who had found that for applications development, APL typically was five to 10 times faster than compiled languages and two to four times faster than other interactive languages.

Now, more than 20 years since its conception by Harvard mathematician Kenneth Iverson and 15 years since IBM nudged the first APL 360 Terminal System into a world of COBOL and FORTRAN loyalists, it appears that APL, loaded with commercial enhancements, has found its rightful home on microcomputers, the interactive media of the '80s.

Nine companies now offer versions of APL, with interpreters ranging in price from $275 to $1,500 for 8-bit and 16-bit microcomputers. As the 32-bit microprocessors appear, APL is sure to be there too. Whether your processor is a Z-80, 6502, 8086, 8088, Z-8000, or 68000 running CP/M, CP/M-68K, Unix, MS/DOS, or a myriad of other operating systems, there is almost certainly an APL interpreter for your machine. IBM's new APL packages for P.C.s reinforces its newfound popularity. And with add-on memory cards and extra processor boards that allow you, for example, to put a 68000 chip in your IBM P.C. or a Z-80 in your Apple II, almost any microprocessor can be made to run APL, regardless of its current configuration.

Full implementations are available for at least 25 sophisticated business micros, as well as for for the popular personal computers manufactured by Apple, Radio Shack, Texas Instruments, Osborne, Fortune, Xerox, Commodore, and IBM. The fact that APL is available on the IBM P.C. is significant, since the P.C. accounts for at least a third of all business micros shipped. It is also worth mentioning that some of IBM's most powerful and best-known software systems—such as its Information Center components, APL Data Interface, and A Departmental Reporting System—are written in APL.

APLDI and ADRS are expected to be important areas of interest for APL microcomputer users because those products, as part of the overall Information Center, have been successful in bridging the gap between data processing departments and corporate managers anxious for information.

The personal computer will play a very large role in allowing end users to obtain corporate accounting data for their personal use. An executive who has APL 68000 running on an IBM P.C. could use APL to access and analyze financial data in other languages on his or her company's mainframe. APL also interfaces with printers and other peripheral devices.

Several commercial timesharing firms already have APL systems compatible with microcomputer use, which save their customers a significant amount of money by processing data on the micro. An APL timesharing customer using the mainframe's processing power might spend $4,000 a month for the service, while the same user could cut the bill to a fraction of the cost by using a microcomputer downloading from the timesharing firm.

You can also expect to see APL, now affordable, playing a bigger role in education. At Yale University, APL is the first language taught to computer science students. At the State University of New York at Binghamton, it is offered to all math and science students. And at the University of California at Los Angeles, APL is an important part of the curriculum for graduate business students. Increasingly, APL is being used in secondary schools to help teach students math and science. Harvard's Iverson is developing courseware for teaching APL.

At last count, there were about a hundred independent APL software developers scrambling to write new applications and to modify existing mainframe systems to take advantage of the booming, full-screen micro market—a major undertaking, since APL traditionally has been line oriented. Some critics of the language have cited APL's line orientation as one characteristic that would make the language obsolete on screen-oriented microcomputers, especially because one of APL's particular strengths is solving spreadsheet problems—a task that has been much easier to visualize using screen-oriented packages such as VisiCalc.

APL RISES TO THE CHALLENGE

But APL on microcomputers rises to the challenge. Several full-screen packages are now available for APL. John Myrna, senior vice president of STSC Inc., pointed out that virtually all new APL code is screen oriented. "A screen is a table. Once you get APL's orientation away from line-to-line to screen, you have a rectangular array. You can grab it, manipulate it, and put it back." VisiCalc and other similar packages should be viewed as small subsets of APL because of their matrix formats. With APL, multiple dimension arrays (tables of tables) are possible and can apply formulas to whole regions of an array, rather than work within the limitations imposed by rows and columns. Selection criteria, solving simultaneous equations, matrix inversion, and other tasks are done with one operation in APL.

James Martin and other industry seers say APL is a fourth generation application development and end-user language—one that is considered by some devotees to be the most advanced general purpose language currently available. In his book, *Application Development Without Programmers* (Prentice-Hall Inc., 1982), Martin says APL is "an easy way to enable an end user who has never programmed to start using a computer, and expe-

Ad hoc analysis is something APL does better than any other language. "You can do 'what-if' till the cows come home."

rience seems to show that he will join the ranks of enthusiasts. Often his enthusiasm will rival that of a religious convert."

If that is true, what's kept people from worshiping APL for the past 15 years? And why are we witnessing a "born again" APL phenomenon now?

APL got off on the wrong foot. The language in its early form was ill suited for commercial use. The original APL/360 from IBM had no file system and couldn't handle COBOL-like picture formatting of dollar signs, commas, and other features desirable for report formatting. The commercial timesharing companies recognized early on that these deficiencies needed to be remedied and did so, but IBM was still selling plain "vanilla" APL to universities and other customers.

Michael Halpern, vice president for research and development for EASI APL Systems, agrees that IBM's failure to market APL effectively hurt the language. Halpern, formerly of the IBM group responsible for the design of APL.SV, a more commercial version of APL released in 1973, says "APL was exceedingly popular internally but salesmen didn't understand the product and tended to follow the path of least resistance concerning their customers. The extra commission they would receive from leasing additional equipment to the customer for the support of APL wasn't enough to encourage them to take the time required to learn about it. Conventional products such as COBOL and PL1 were already known to the customers and therefore were easier to sell."

Many industry officials say IBM, in characteristic fashion, will release its own version of microcomputer APL after the market has been stimulated by smaller firms specializing in APL products.

What hurt APL was the tremendous expense to use the language, given the technology that existed at the time APL was introduced. The APL interpreter feasted on memory at a time when memory cost plenty on mainframes and was severely restricted on smaller machines. Early users were confined to 32K work spaces. And because APL is interpreted rather than compiled, it also consumed lots of cpu time when mainframes costs millions to buy and were no real bargain via timesharing. Compiled languages used lots of programmer time but were faster than APL on the machine in those days. Consequently, only very large companies with specific needs could justify the cost of using APL, while schools and universities that could have generated interest in the language could not afford it.

But now the cost of computer logic devices and memory are falling. Since the computer now costs less than the programmer, its's not machine time you worry about, but programmer time. And when it comes to making programmers more productive, APL has no competition. Full implementations of APL now cost between $2,000 and $20,000, depending on the version of APL and the microcomputer selected.

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THREE APL MARKETS

The market for APL products was divided into two categories: the applications developers who use APL to write problem-solving programs and the end users who rely on those applications packages to provide them with the means to gather information needed for making decisions. But now that APL has found its way onto microcomputers, a third group of APL users has emerged: the end users Martin refers to, who also program many of their own applications or extend existing applications packages by adding their own customized routines written in APL.

The same factors that are responsible for APL's migration from mainframes to micros—cheaper memory and faster execution speeds—have moved much of computing, via the new micros, out of the cloistered batch-oriented dp departments and onto the desks of corporate executives, managers, planners, engineers, and consultants who need fast answers. "You can sit down at a micro and you can 'what-if' till the cows come home and it doesn't cost you anything," notes one APL promoter. Ad hoc analysis is something interactive APL does better than any other language, allowing the user who knows a discipline such as finance, accounting, or engineering, and a particular business to bypass analysts and programmers to solve his problems directly and immediately, without creating detailed functional specifications, flowcharts, or coding sheets. That APL is appropriate for end users should not be surprising when you remember that APL was originally developed as a concise notation intended to help people understand computer concepts, according to a marketing manager for an APL vendor.

Ed Cherlin, vice president of EASI APL Systems and author of numerous articles and a book on APL for microcomptuers, says APL "excels in quick calculations, complicated operations, and any kind of program that has to be changed often. Even in cases where APL is not ideal for production runs, it is frequently more effective to write a prototype in APL and then translate to some other language when speed of execution is the main concern."

Interestingly, while APL on mainframes has almost always been much slower than compiled languages, the new APL software on 16-bit microcomputers often runs faster than software written in compiled languages, primarily because software written in compiled languages has been converted from slower 8-bit-based programs. Myrna of STSC

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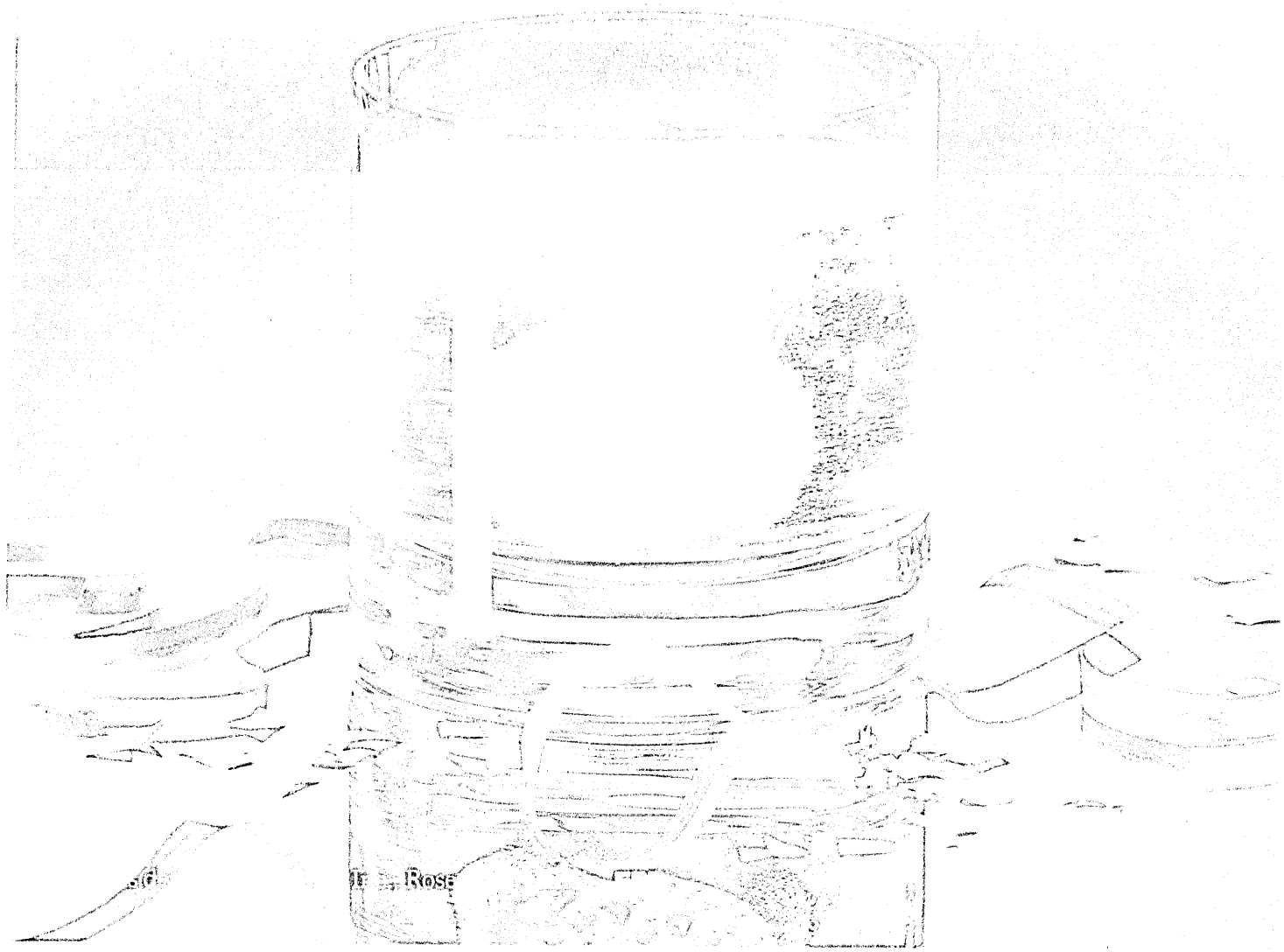

Where division is creation

Bell Laboratories

A sorting algorithm takes 30 to 40 lines in any other language, but just one in APL.

says, "One of the things we're finding [at STSC] is that people are buying our software for the IBM P.C. because it's [30 times] faster." He suggested that one reason APL is receiving so much attention now is that, unlike conventional languages, "APL makes very effective use of larger and larger amounts of memory and is best positioned to exploit the technology."

One of the key drawbacks to APL in the old days that is not of great concern now is the large number of unique symbols—six—used as keyboard instructions. For microcomputer users, the symbols simplify commands. A single APL expression can be used to manipulate a single set of figures, lists of figures, or tables of data without requiring the loops or loops within loops usually needed by other languages. The concentrated power of its rich group of symbols and functions includes many from mathematics and logic and additional ones for manipulating tables of numbers. A single operation will transpose, rotate, or completely restructure a numeric table. The language is infinitely expandable for each user who defines new functions.

Many ways exist to incorporate APL symbols into a microcomputer system, the most ingenious of which is the programmable character set. Most systems currently offered come with a custom plug-in read only memory board to enable the user to display the APL character set. Adhesive key-cap labels can be placed on the keyboard to indicate the location of the special APL symbols.

SYMBOLS POORLY TAUGHT

Most APL programmers insist that the symbols are not inherently intimidating, only poorly taught. Users have been overwhelmed when presented with the whole set of functions, each of which can perform a powerful operation and some of which require overstruck characters on the keyboard. Iverson recently said that APL often scares people off because they think they have to memorize all the symbols in order to use the language. "Suppose you taught English like that," he noted. "You'd drag out the 13-volume edition of the *Oxford English Dictionary* and say, 'Look, here are the words in the language. Learn them and after a while you'll begin to see what the language is for.' "

One of the often overlooked advantages of the APL symbols is that they make the actual program structure independent of spoken language. Whether you speak English, French, or Swahili, the expression x[⍋x] means sort and print in ascending order the numbers in variable x. In BASIC, COBOL, FORTRAN, or any other language, a sorting algorithm will take at least 30 or 40 lines. Learning a few symbols is a small price to pay for those kinds of rewards.

As might be expected, APL is catching on in non-English-speaking countries. AMPERE, a leading Japanese systems developer for 68000-based microcomputers, will market and support APL .68000 on an exclusive basis in Japan. According to AMPERE's president, Takashi Kusanagi, "AMPERE has already contracted some major systems vendors and software development houses in Japan, who unanimously agreed to the highly promising prospects for APL."

Plans are also under way to establish a standardized version of APL. Larry Breed, staff member at IBM's Palo Alto Scientific Center, says that ANSI committee X3J10 and several other national committees have been working through the International Standards Organization to assemble a standard version of APL. It will consist of Iverson's core language and the extensions to the language on which there is universal agreement.

Breed emphasizes that the committee's goal is to resolve minor differences between systems without affecting the ability of language designers to make extensions to APL. Breed said that the working group of ISO hopes to have a draft available for public review by the end of 1983. He shares the opinion of most APL programmers, though, who see the standard as mostly a necessary formality that will make APL more acceptable to newcomers. "APL has probably been better standardized, de facto, than any other language going," Breed says, because the core of the language as developed by Iverson and IBM is shared by all APL firms.

Ed Cherlin of EASI APL maintains that the main obstacle for APL to overcome in order to achieve wider acceptance is not lack of standardization or the conversion of APL's symbols to English-language functions. What is lacking, he says, is simply the education of the public. "In situations where APL is made available to people and they can try it, they're easily convinced," he says. The problem is that until recently APL hasn't been available. Cherlin's company is one of several trying to change that. EASI APL Systems plans to distribute 200,000 copies of APL to public high schools in the U.S.

It is too soon to tell whether APL will ever "change the programming habits of the entire computing community" as predicted 14 years ago, but many companies are committed to giving APL a fighting chance on the new generation of low-cost, powerful microcomputers. ✱

Claiborne Lange is a free-lance writer based in Charlottesville, Va. She was formerly a technical writer for The Computer Company.

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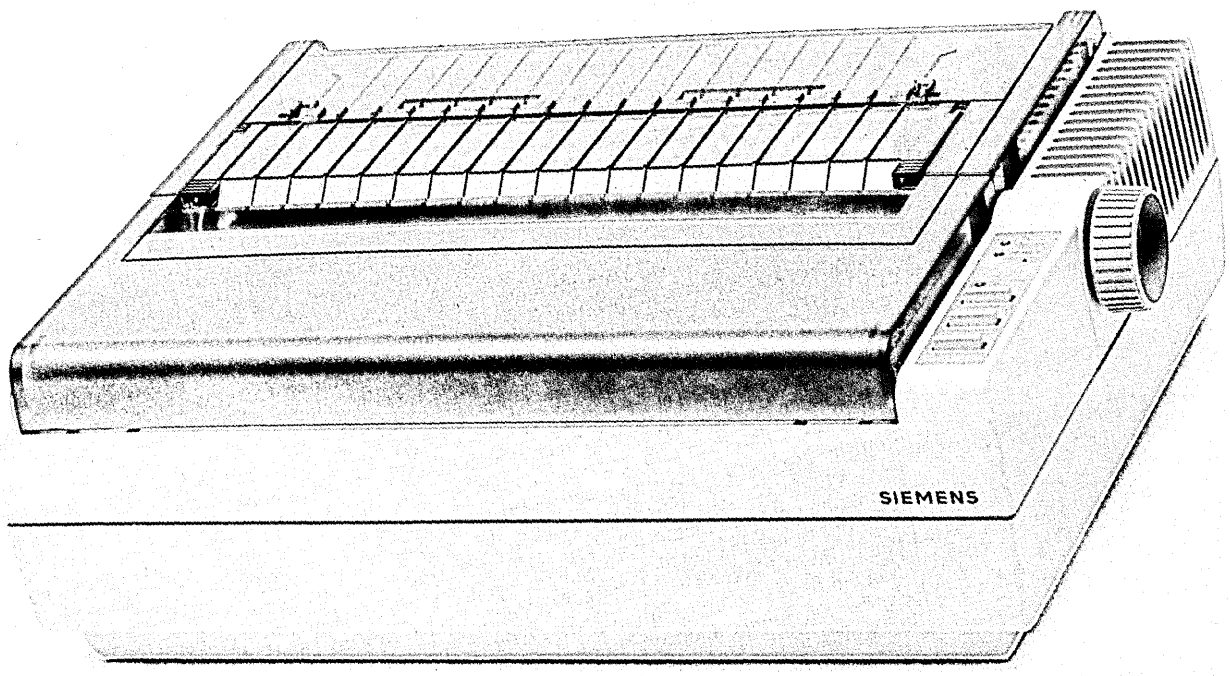

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CIRCLE 74 ON READER CARD

An overview of the several standards the IEEE is hammering out for local networks.

802: A PROGRESS REPORT

by Jim Nelson

As is well known to most DATAMATION readers, the Institute of Electrical and Electronic Engineers Standards Committee 802 has been working for the last three years to develop standards for shared medium local area networks. Now that one of these standards has been approved, and others are nearing completion, it seems appropriate to report on the committee's efforts.

A quick sketch of some basics should help to ground the discussion. A local network is a system for interconnecting computer, terminal, or peripheral data stations so they can communicate in a local environment—a set of buildings, an office campus, or a manufacturing complex where all of the devices are within a few kilometers of each other. It is possible that several local networks may exist in the same setting.

Any local network will permit a station to attach to a medium for the purpose of transmitting and receiving data. Shared medium local networks are local networks with one further requirement: they must permit several different information processing systems to concurrently use the medium. There is normally no master station or controller of the medium (such as a PBX) in a shared medium local network. Therefore, access to the medium must be autonomous (see Fig. 1).

The physical interfaces and protocols of shared medium local networks are designed for efficient operation over short distances (a few kilometers) using high-quality media (shielded twisted pair, coax, optical cable) resulting in low error rates (on the order of one in 10^8 bits). Data rates are high—above one megabit per second—permitting many data stations (on the order of 200) to share a single local network transmission medium.

The basic motivation for standardizing shared medium local networks stems from the customer's desire to minimize the cost (and duplication) of installing and maintaining several different networks. Shared medium local networks permit different computer systems, each with its own terminals and peripherals, to attach and concurrently use the same physical medium. This is a first step towards the eventual goal of sharing expensive peripheral devices among different computer systems on the same medium. This goal, however, requires standardization of higher layer protocols.

It is the first step with which we are concerned here. The IEEE 802 is currently working on standards for several different media and access methods, and is consequently divided into several working groups (WGs) and technical advisory groups (TAGs). The structure of IEEE 802 is shown in Fig. 2.

Standards are being developed for baseband and broadband bus media using a contention method called carrier sense multiaccess with collision detection (CSMA/CD) (IEEE 802.3), for baseband media using a token ring access method (IEEE 802.5), and for baseband and broadband bus media using a token bus access method (IEEE 802.4). A baseband medium can be defined as a single medium capable of carrying a single information channel. A broadband medium is a single medium capable of carrying multiple information channels, similar to a community access television (CATV) system.

Some standards efforts are further along than others; for example, development has just begun for a metropolitan area network standard (IEEE 802.6). A metropolitan area network is a form of local network that stretches the meaning of "local," since it encompasses a radius of up to 25 kilometers (using CATV or other media).

All of the shared medium and medium access standards have been specified to work under the control of a single logical link control standard (IEEE 802.2), capable of providing connectionless and, if required, connection service for any one of the shared media or media access methods.

Finally, a standard for higher layers of shared medium local networks (IEEE 802.1) is being developed to specify a consistent method for internetworking, addressing, and managing local networks and for addressing at (and possibly above) the network layer. This standard will also be used as a companion document to specify the relationship between all of the other IEEE 802 standards.

BASEBAND, BROADBAND STANDARDS

Two forms of CSMA/CD standards are being prepared by the IEEE 802: baseband and broadband.

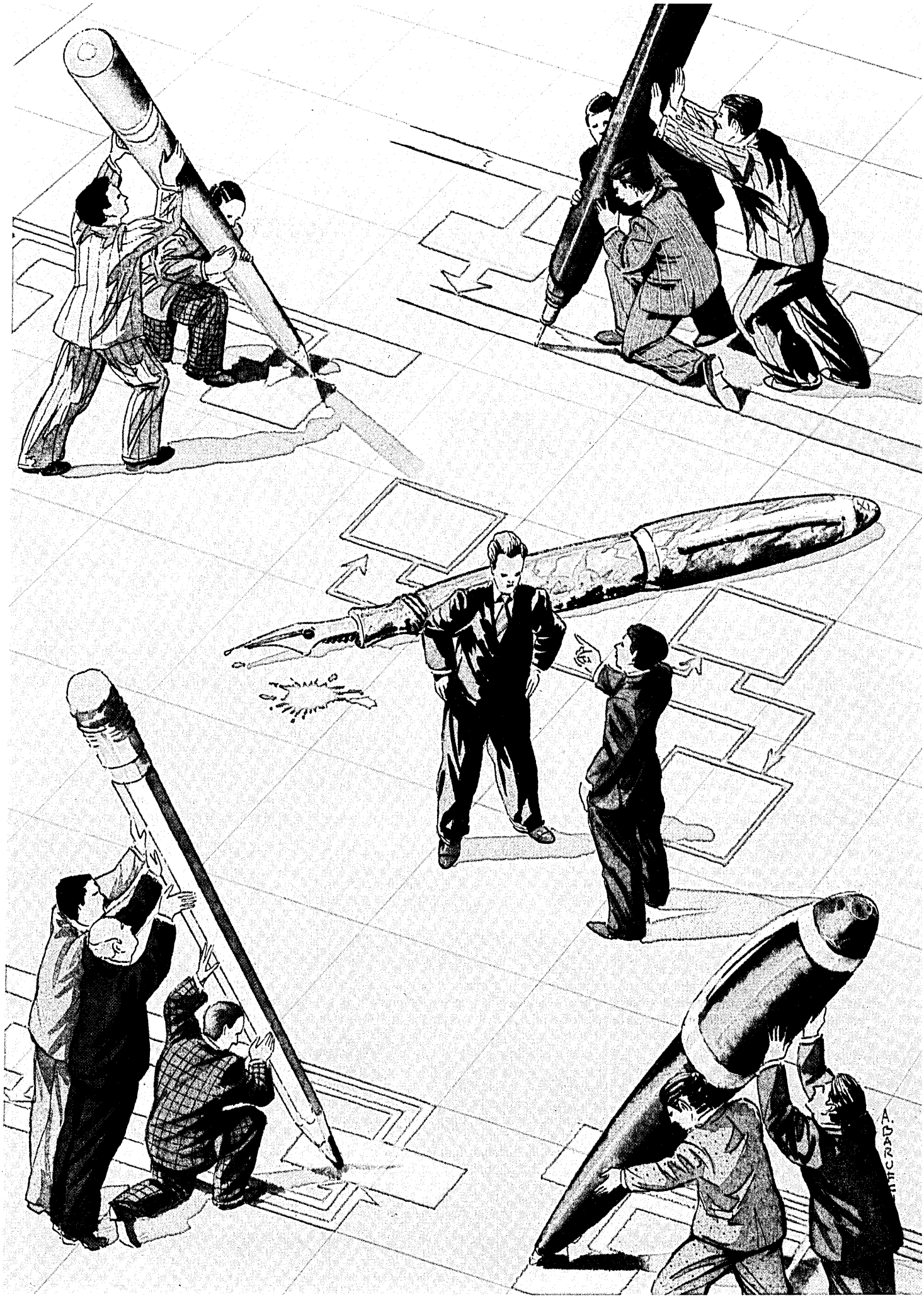
CSMA/CD baseband. The CSMA/CD baseband network standard specifies an interconnection technique for data stations to share access to a 50-ohm baseband coaxial cable bus (see Fig. 3). The system corresponds topologically to a branching nonrooted tree. The bus operates at a data rate of 10 megabits per second. Data are impressed upon the bus using a Manchester encoding/decoding technique (see box p. 148).

The carrier sense part of the CSMA/CD medium access protocol means that before transmitting a message, a user data station must monitor the bus. If the bus is active, the station must wait. When activity ceases, the station may, after a short delay, transmit its message. The station, however, must also monitor the bus (for a period equal to the propagation time of the bus) to ensure that no other station is also transmitting. This is collision detection.

If no collision is detected, the message is transmitted. If a collision is detected, the data station "jams" the bus by transmitting a detectable signal, then terminates the message transfer and requeues the message. If collision is again detected, the station increases the delay exponentially, up to a limit. The process continues until a maximum number of collisions is reached, at which point higher layer protocols are advised of the problem.

Each station monitors the bus for its

ILLUSTRATION BY ANDREA BARUFFI



The IEEE 802 token bus standard has been written to include both baseband and broadband systems.

destination address (or an all-parties address or a group address). If a station detects a message with its destination address, it captures and queues the message for a higher layer input process.

Since it is possible to concurrently operate multiple logical data links on the medium, it is necessary to provide both a destination and a source address in the medium access layer protocol. The standard permits address lengths: a 16-bit address for purely local addressing, or a 48-bit address when (internetwork) addresses of global significance are desired.

The 802.3 baseband CSMA/CD standard was approved by the IEEE Standard Board in June of 1983.

At the time this article went to press, 15 companies had announced that they intend to implement local networks that comply with the IEEE 802.3 draft standard. These companies are Bridge Commmunications, Data General, Digital Equipment Corp., Fujitsu, Hewlett-Packard, Intel, Interlan, National Semiconductor, Siemens, Tektronix, 3Com, Ungermann-Bass, Xerox, ICL, and NCR. Seven companies have indicated that they intend to produce LSI chips for implementation of IEEE 802 CSMA/CD systems. These companies are Intel, AMD, Mostek, SEEQ, Fujitsu, Rockwell, and National Semiconductor.

CSMA/CD broadband. Efforts to develop this standard are still in their early stages. The CSMA/CD Working Group has begun to specify an interconnection technique for data stations to attach to a broadband coaxial cable bus, and to share access to one particular subchannel of the broadband bus (see Fig. 4).

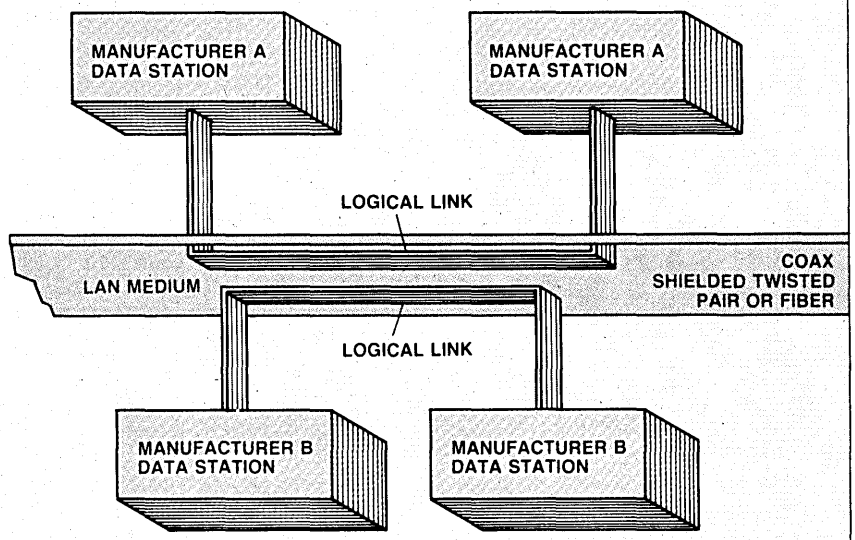
In order to achieve two-way transmission on a broadband system, either dual cables or a remodulator/translator device is required. A remodulator receives data from any one of the data stations transmitting on subchannel frequency, shifts it to a higher frequency, and retransmits the data down the same coaxial cable. The data stations transmit on the lower frequency and receive on the higher frequency. The remodulator is normally located at the transmitter end, or head end, of the coaxial cable. The topology corresponds to the rooted tree (because of the remodulator) with branching.

Two broadband CSMA/CD systems are under consideration. The first would operate at a data rate of 10Mbps, and is intended to use a larger portion of the existing broadband standard. A bandwidth at least equivalent to two tv channels will be required to transmit the signal over a CATV cable system.

The second system is optimized for broadband operation at a data rate of 5Mbps, so that it would require at most the bandwidth of a single tv channel.

FIG. 1

SHARING A LOCAL NETWORK MEDIUM



Submission of a broadband CSMA/CD draft standard to the IEEE Technical Committee on Computer Communications is not expected until 1984 at the earliest.

The baseband token ring standard. The draft token ring standard being developed by IEEE 802 specifies a point-to-point ring topology and a token-passing access method (see Fig. 5). The token ring baseband standard specifies an interconnection technique for stations to share access on a topological ring. Lower-speed (1Mbps to 4Mbps) stations are interconnected in a point-to-point manner using 150-ohm shielded twisted pair media, while higher-speed stations require interconnection with coaxial cable or optical fiber. The modulation technique used is Differential Manchester (see box p. 148)

The token ring requires that when an operating data station is not originating data transmission, it must repeat the data that it receives. Medium access is controlled by means of a token that is passed from station to station, and grants the holder the right to transmit information on the ring. A station passes the token to its physical successor when it has no more data to transmit, or when a token-holding timer has expired. The token-holding timer prevents one station from hogging the ring.

As each data unit is passed around the ring, a data station that has a message queued for tranmission is permitted to make a priority reservation by modifying three bits in a header that eventually indicates the highest priority of messages queued by all other members of the ring. If the message priority of the repeating device is greater than the priority held in the received "reservation" bits, the device may modify the reservation bits to indicate its higher priority request. If the priority of the device is less or equal to the received reservation bits, no modification is made.

When the message is returned to the transmitting station (the token holder), the priority of the reservation is noted. When the token-holding station has completed its transmission, either because it has exhausted its priority data or because the token-holding timer has expired, a free token is issued whose priority is set to either the highest reservation received or the priority of the originally received free token, whichever is greater.

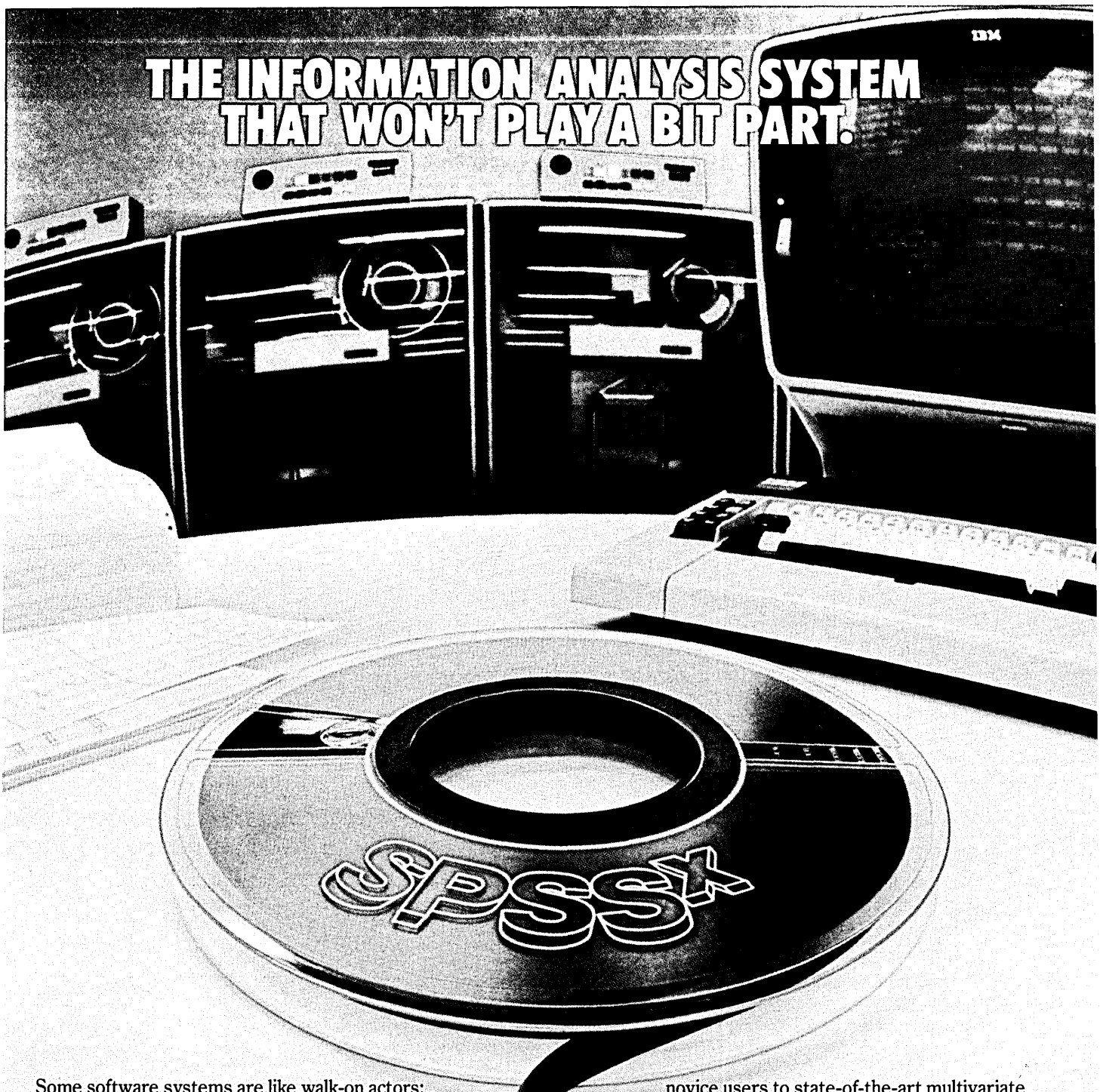
Both sixteen-bit and 48-bit addressing are permitted by the token ring local network standard.

When completed, the IEEE 802.5 token ring draft standard will be sent to the IEEE TCCC for review and ballot. If accepted, the draft standard will be sent to the IEEE Standard Board, which may approve the standard before mid-1984.

IBM is known to be implementing token rings at 4Mbps (and possibly higher data rates) as its primary local network offering. Texas Instruments is known to have entered into a joint development contract with IBM to produce LSI chips to implement the token ring physical and medium access layer interfaces and protocols. TI has indicated that it intends

CHARTS BY PAUL GOODFRIEND

THE INFORMATION ANALYSIS SYSTEM THAT WON'T PLAY A BIT PART.



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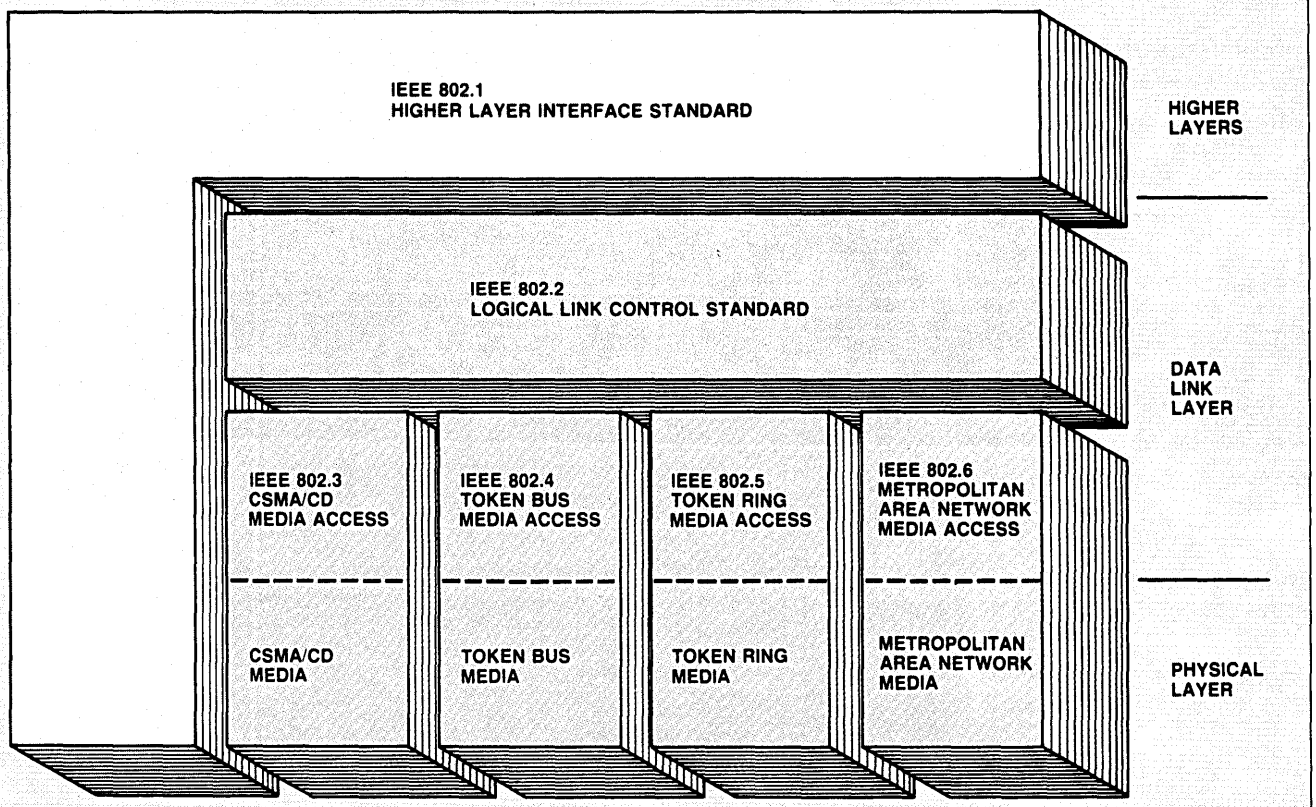
CIRCLE 75 ON READER CARD

Metropolitan area networks may provide access to local networks and to satellite or other wide area networks.

FIG. 2.

IEEE 802 STANDARDS ORGANIZATION



to supply token ring LSI chips to the industry at some future date.

TOKEN BUS STANDARD COMPLETED

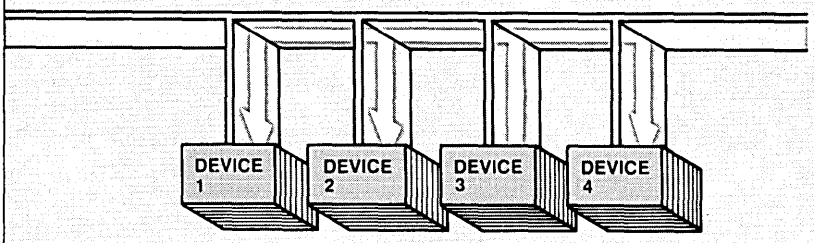
The draft IEEE 802 token bus standard defines an interconnection technique for devices to share access on a physical topological bus. The standard defines protocols used by the physical and medium access control layers, interfaces between those layers, and interfaces to the medium, and to higher layers.

The IEEE 802 token bus standard has been written to include both baseband and broadband systems. The intent of producing a single standard for these two media is to permit an easier transition from baseband to broadband local network systems, with little change in the installed medium or termination equipment.

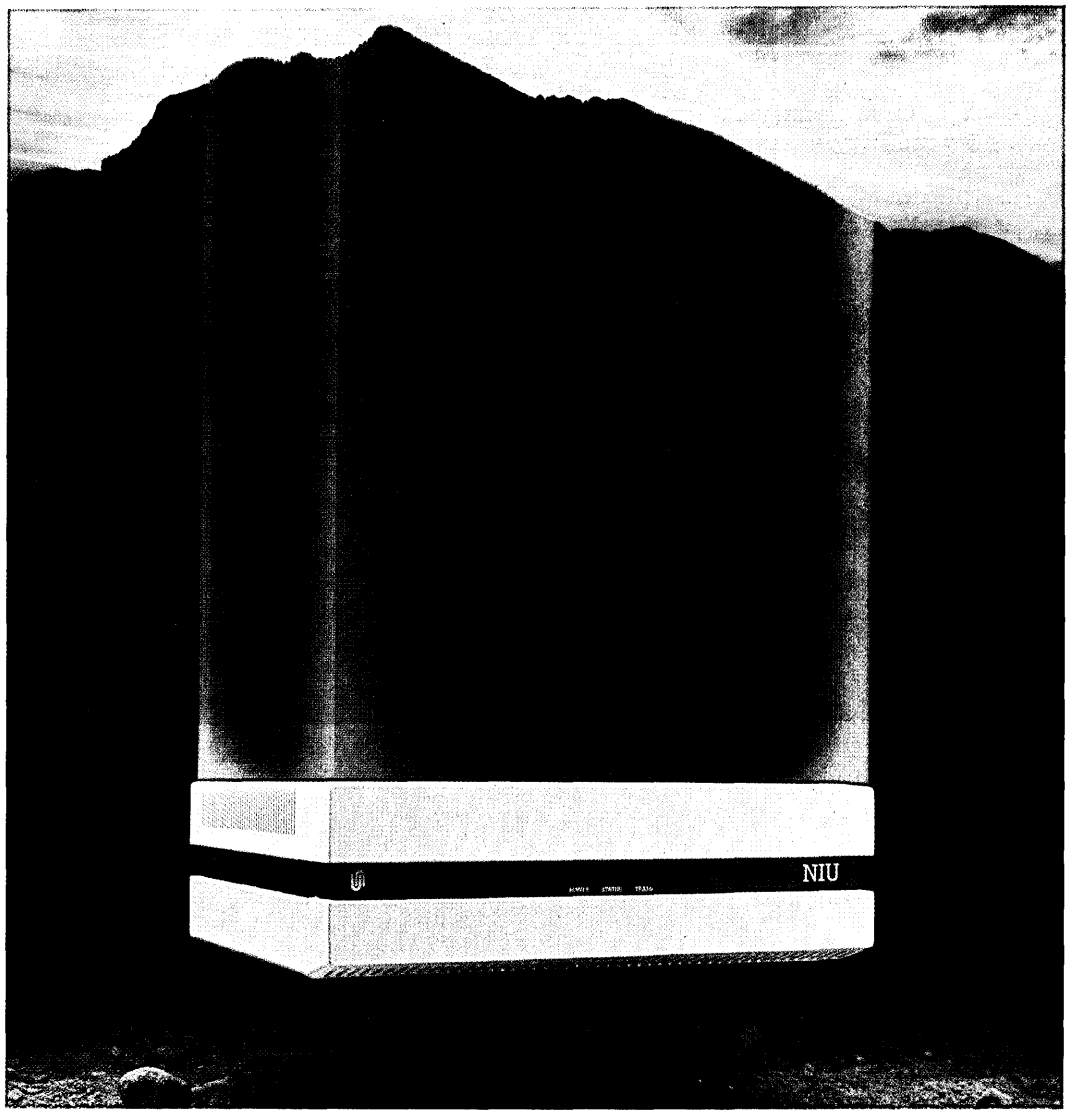
The IEEE 802.4 token bus baseband and broadband draft standards have already received an affirmative ballot from IEEE TCCC. A confirmation ballot is now being conducted to approve some editorial changes to the draft standard. Approval by the IEEE Standard Board is anticipated in late 1983 or early 1984.

FIG. 3

BASEBAND BUS—CSMA/CD ACCESS METHOD



Baseband token bus. This standard specifies an interconnection technique for devices to attach to a 75-ohm baseband truck coaxial cable bus, and to share access to that bus using a token-passing medium access protocol (see Fig. 6). Bus operations at data rates of 1Mbps, 5Mbps, 10Mbps, and 20Mbps are specified. The standard specifies two different modulation techniques. Lower-speed (1Mbps) systems use Differential Manchester encoding with phase modulation frequency shift keying. Higher-speed (5Mbps and 10Mbps) systems directly encode the data using a phase coherent modulation technique.



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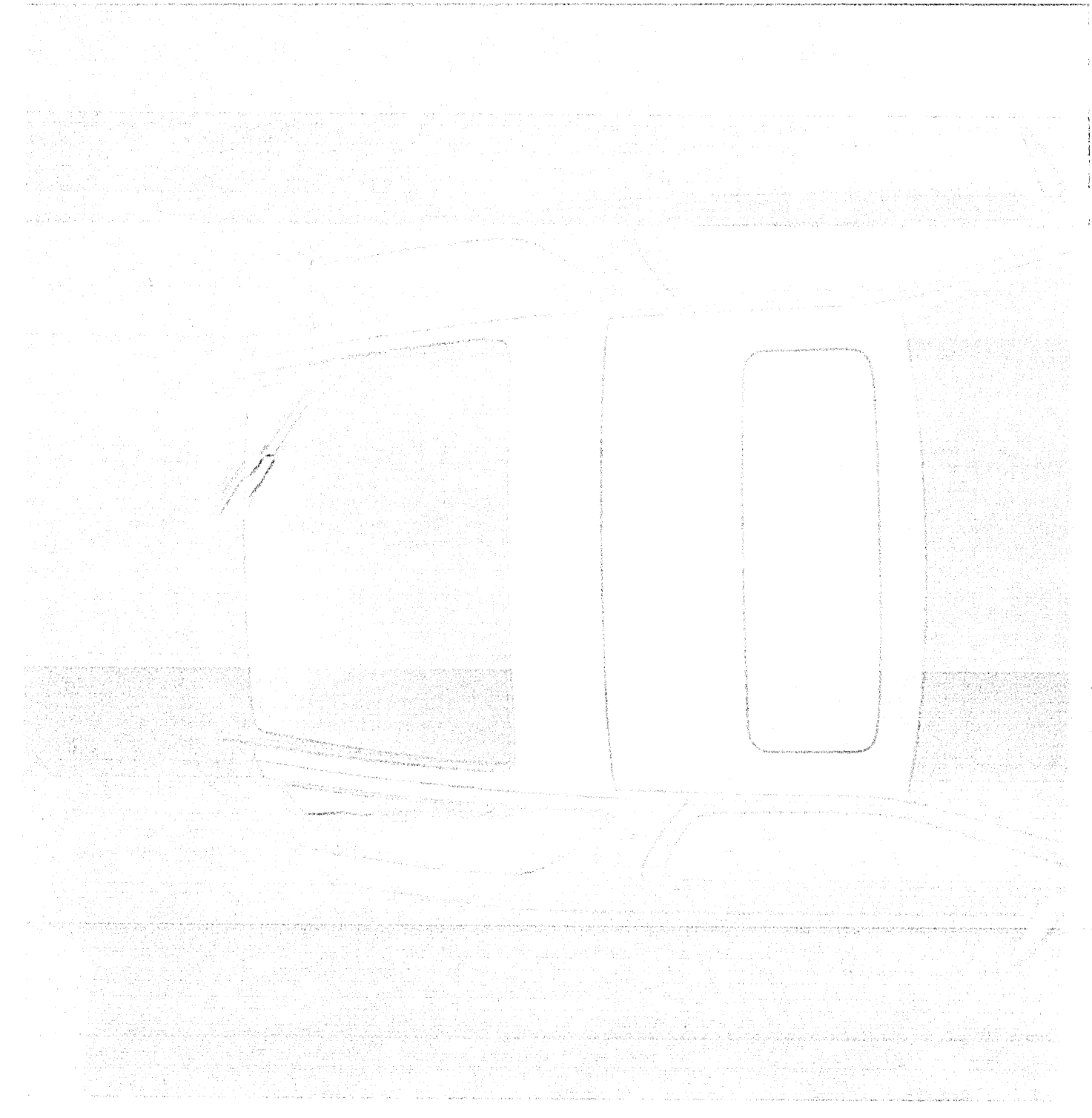

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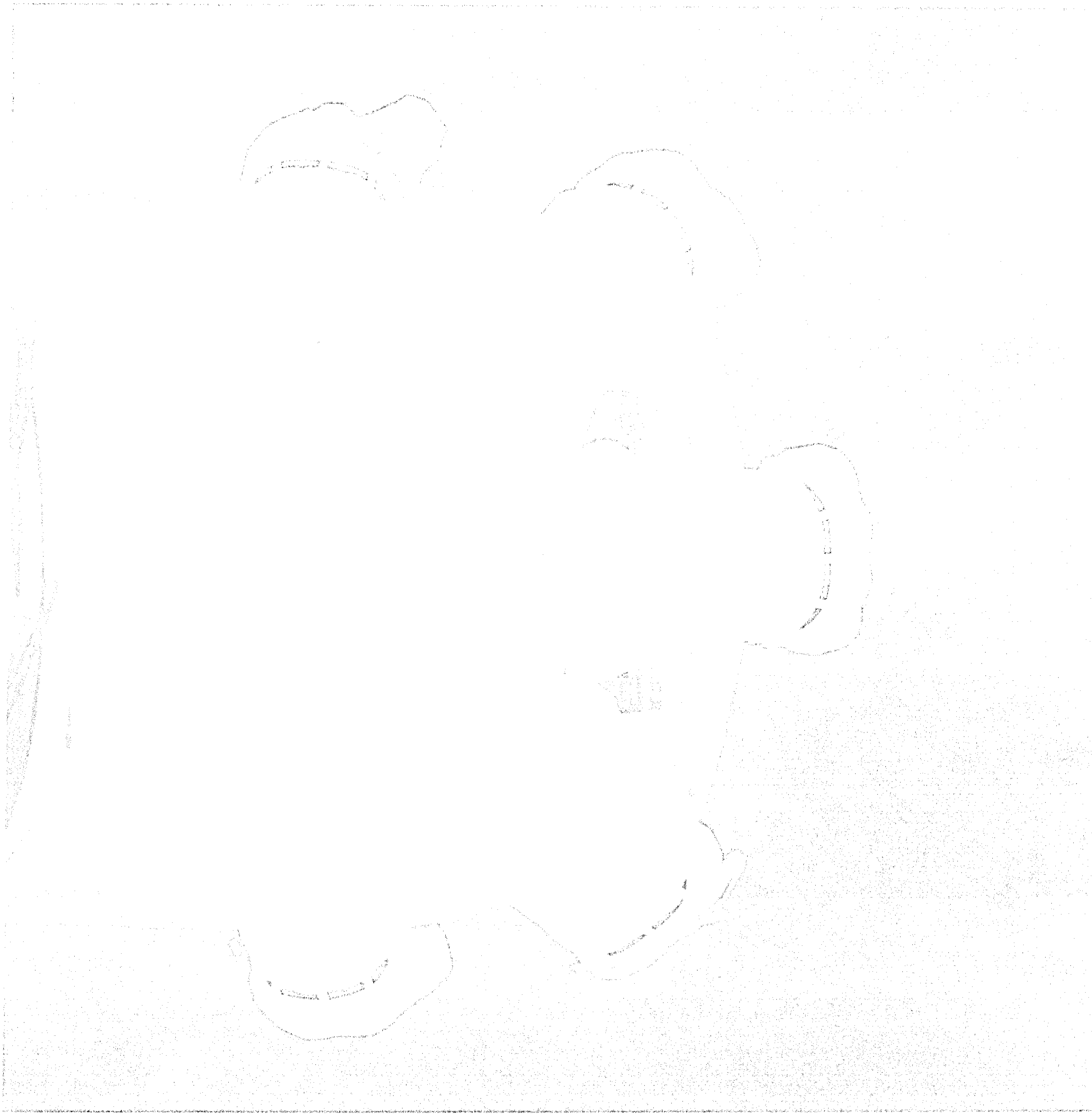

Either 16- or 48-bit source and destination addresses may be used as station addresses in the baseband token bus medium access protocol.

The token bus medium access protocol is similar to, but must differ from, that used in the token ring since the medium does not form a physical ring. Therefore, the token cannot simply be passed to the next physical data station. The token must be logically addressed to a particular data station, known as the transmitting station's "successor." The transmitting station must maintain the address of its predecessor and successor station so it can maintain token-passing operation on the bus in case of failure.

A multiple-level priority mechanism is built into the token bus medium access protocol. But unlike the token ring, where a new priority request can be made as each data unit passes around the ring, the token bus priority mechanism requires that priority be based upon a higher (above medium access) level agreement among the token bus stations, and requires additional individual data unit transmissions among the stations to set up and maintain that agreement.

Western Digital Corp. has announced that it is developing a semiconductor chip set for use with IEEE 802 baseband (or broadband) token bus systems. This chip set is expected to be available by late 1985.

Broadband token bus. The token bus broadband standard specifies an interconnection technique for devices to attach to 75-ohm broadband coaxial cable bus. The data stations use a token access protocol to share a particular broadband subchannel of the medium (see Fig. 7). Use of two separate physical broadband access cables, one for the data stations originated transmissions, one for head-end originated transmission, is also permitted, but not recommended, in the IEEE 802 broadband token bus standard.

The token bus broadband subchannel may operate at data rates of 1Mbps, 5Mbps, or 10Mbps. At 1Mbps, one fourth of a standard 6 megahertz CATV channel is required to carry the data from the data station to the head end to the data station.

At 5Mbps, one standard 6-megahertz tv channel is required to carry the data from the data station to the head end, and another 6-megahertz channel is required to carry the data in the other direction. At 10Mbps the channel width requirement is doubled.

A single method of data modulation is used in this broadband token system. It is a variant of Duobinary AM/PSK, and requires the encoding and detection of three levels of amplitude that are used to distinguish between symbol codes.

The medium access control protocol used for broadband token bus is identical to

FIG. 4

BROADBAND BUS—CSMA/CD ACCESS METHOD

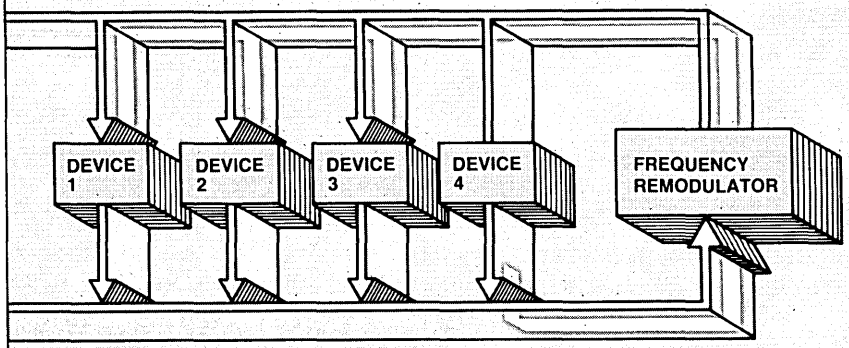

FIG. 5

SEQUENTIAL RING—TOKEN ACCESS METHOD

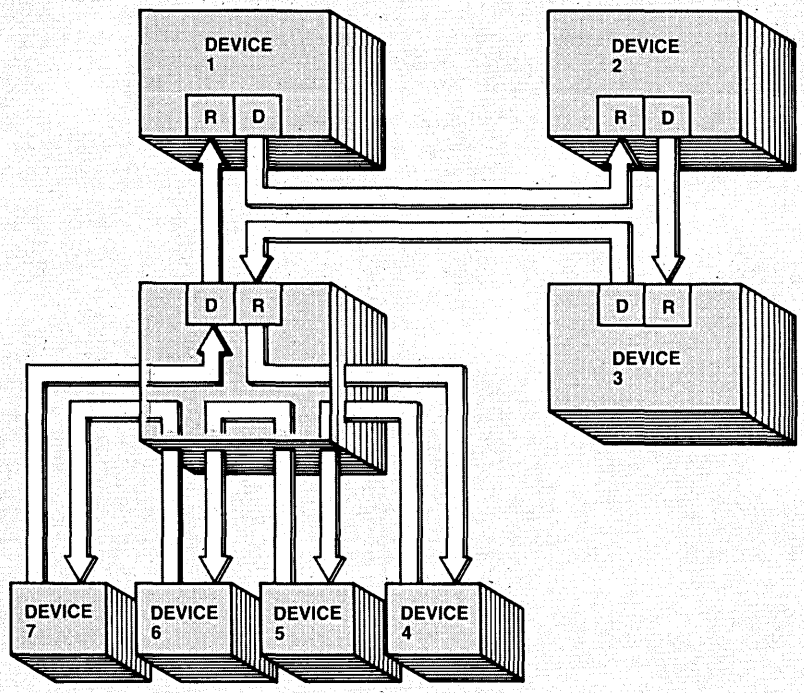

FIG. 6

BASEBAND BUS—TOKEN ACCESS METHOD

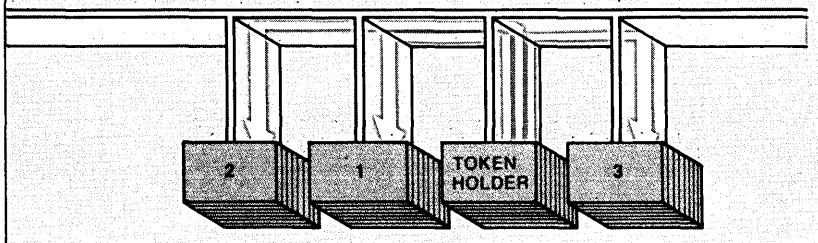

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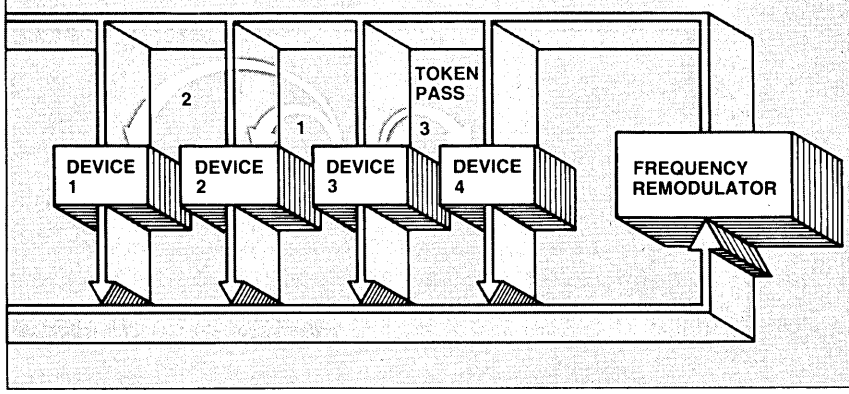
FIG. 7

BROADBAND BUS—TOKEN ACCESS METHOD



that used for the baseband system, with some additional functions required to interface with the head-end remodulator.

Concord Data Systems has announced a broadband token bus system (Token-Net) that claims eventual compatibility with the IEEE 802 broadband system. The system is intended to operate at data rates of 5Mbps over a 20-mile distance using CATV compatible media. Interactive Systems, a 3M subsidiary, is reportedly working with Allen Bradley and Western Digital to produce a broadband token bus system compatible with draft standard 802.4.

Metropolitan area networks. The IEEE 802 executive committee has received permission to expand its charter to write standards for metropolitan area networks operating over distances of five to 50 kilometers at data rates at or above 1Mbps. Several proposals for MAN standards have been made to the MAN Standard Committee, including systems using broadband cable tv, fiber optics, and packet radio. Possible services to be provided are bulk data transfer, digitized voice, compressed video, videotex, and transaction service. This standard is in the initial definition stage.

MANS MAY ACCESS LANS

It is anticipated that metropolitan area networks may provide access to local networks and also serve as a means of access to satellite or other wide area networks. The approval cycle for the metropolitan area network standard is not expected to begin before 1985.

Logical link control standard. The standards discussed previously define a physical means to attach a data station to a medium and an access method protocol for sharing the use of that medium. Any link protocol could be used to transmit data unit messages across the medium, provided it is enveloped in one of the medium access protocols.

Because the standard calls for an autonomous medium access protocol, it is possible to operate several independent (logical) links concurrently over the same medium, using the same medium access control protocol. The user, however, may want a single data station to be able to concurrently operate on several different logical links through the same single connection to the medium.

If this is the case, then the station must have a method to multiplex, demultiplex, and otherwise sort out the data from the multiple concurrent data links that are intended for different users in that station.

The IEEE 802 logical link control standard specifies protocols to control one or more logical links on a single medium, through a single physical attachment of each station to the medium, using a common medium access method. The logical link control protocol uses the services of one (and only one) of the following standard protocols: CSMA/CD, token ring, token bus, or metropolitan area network.

The logical link protocol permits the multiplexing to (and from) up to 128 distinct logical links in the destination (and source) data station. The number of logical links actually maintained is a function of the resources (buffering and control) available in the data station.

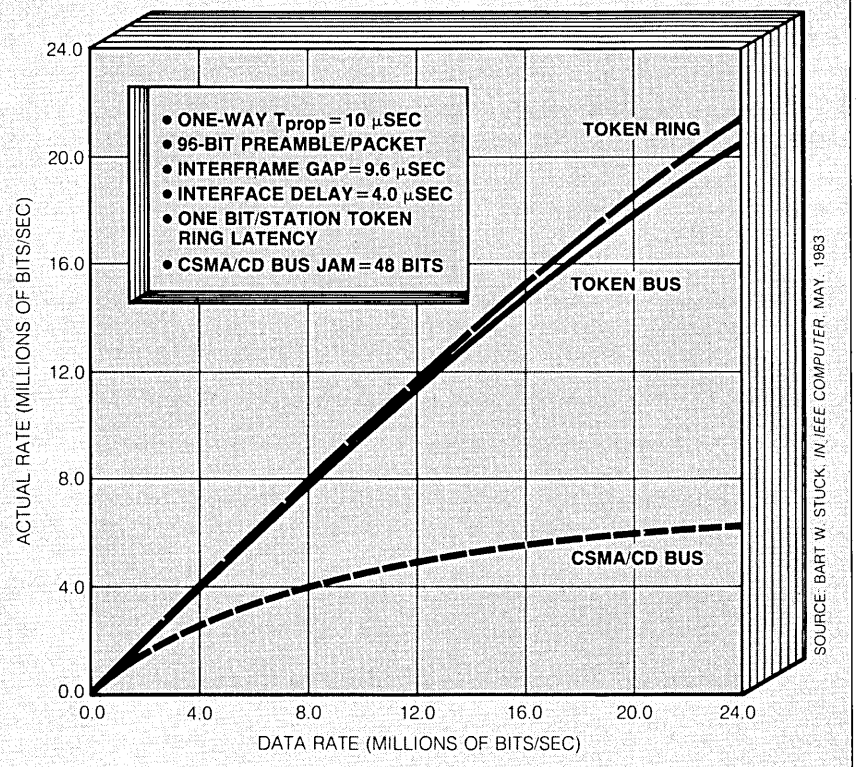
Two forms of logical link protocol service (control) are defined in the standard. Connectionless service is required; connection service is optional (see box p. 152).

Connectionless logical link service is

FIG. 8

PERFORMANCE COMPARISON

Maximum mean carried data rate versus actual transmission rate when all 100 stations are active: 2,000 bits per packet.



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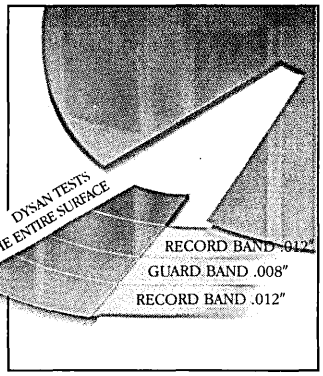

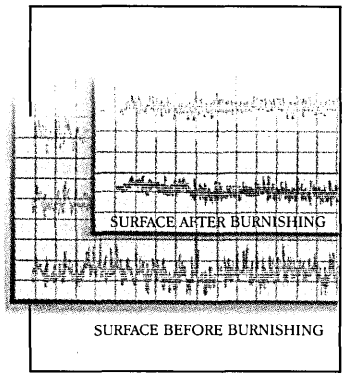

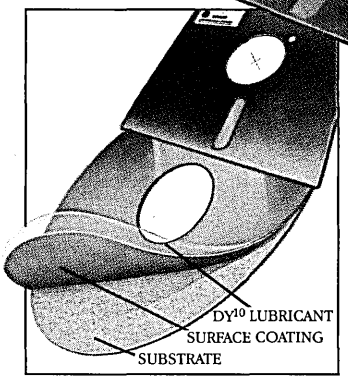

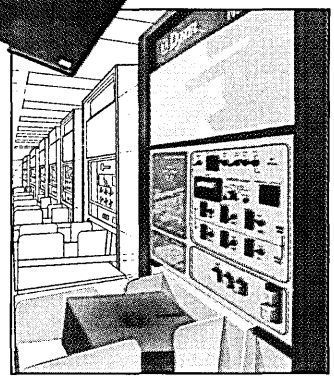

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similar to datagram service, where the receipt of a link data unit transmission is not acknowledged via the logical link protocol. It is assumed that data units are acknowledged at some higher protocol level, and that retransmissions, when required, are requested by a higher-level protocol. It is assumed that the medium bandwidth is adequate to streamline the transmission of data over highly reliable local networks.

Connection service is similar, in fact, almost identical, to the type of service provided by an X.25 balanced-mode link layer protocol. Acknowledgement of data units and flow control both exist at the link level. Connection service requires higher operational overhead at the link level, but assures that the logical link can operate without overloading the limited buffering capacity of the data station.

Several implementors intend to envelope other (older) link protocols (SDLC, bisync) within the IEEE 802 logical link control protocol in order to provide migration paths to permit older equipment to be multiplexed onto a shared medium local area network.

The IEEE 802.2 logical link control draft standard has been approved by the IEEE Technical Committee on Computer Communications, and approval by the IEEE Standard Board is anticipated during the next few months. The U.S. National Bureau of Standards plans to issue a standard that specifies only the connectionless form of IEEE 802.2 logical link control.

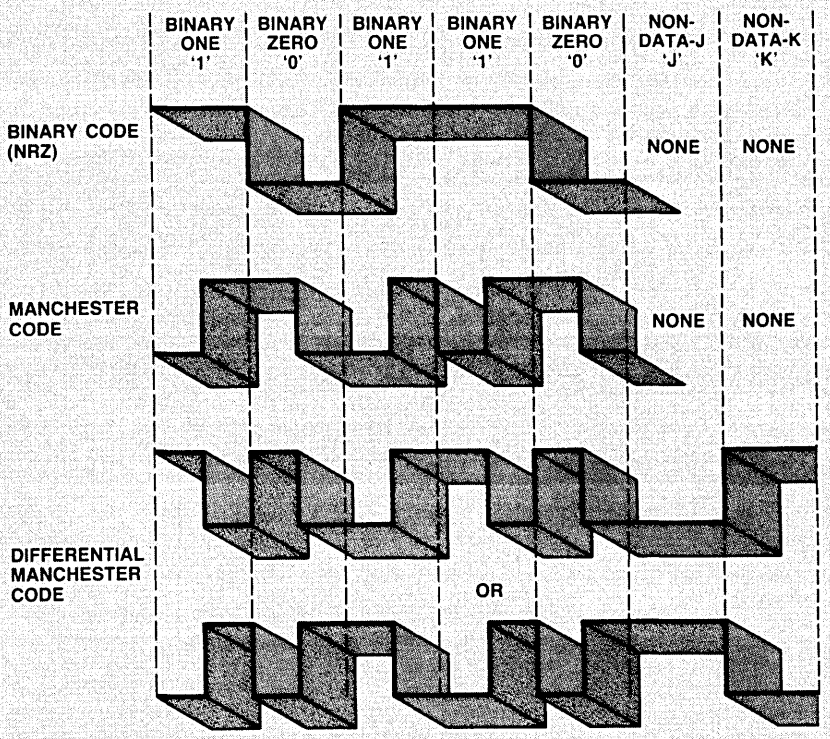
An ad hoc group of implementors recently met together at the National Bureau of Standards and decided to attempt to demonstrate interoperability on a common medium, possibly at the National Computer Conference in 1984. All systems will use an IEEE 802 medium and medium access protocol working under a connectionless IEEE 802 logical link protocol.

Higher layer interface. When originally established, the function of the higher layer interface group (IEEE 802.1) was to write a companion document for the more detailed IEEE 802 standards to explain the overall intended architecture. But in the process of developing these individual standards, it was determined that a number of similar problems existed in and between these standards, particularly in the areas of addressing, gateways, internetworking, and network management. The work of the IEEE 802.1 group was therefore expanded to standardize these areas.

A gateway is a device used to forward data units between two different local networks, or between a local network and a wide area network (see "Beyond Local Networks," August, p. 166). The protocols used by the individual (local or wide area) net-

FIG. 9

EXAMPLE OF SYMBOL ENCODING



MANCHESTER AND DIFFERENTIAL MANCHESTER ENCODING

In order to transfer information from a transmitter to a receiver, it is necessary to synchronize the two devices so that the receiver can determine when to look for the valid transmitted information. One way to do this is to inject a clock signal between every data symbol transmitted. This technique is called Manchester encoding.

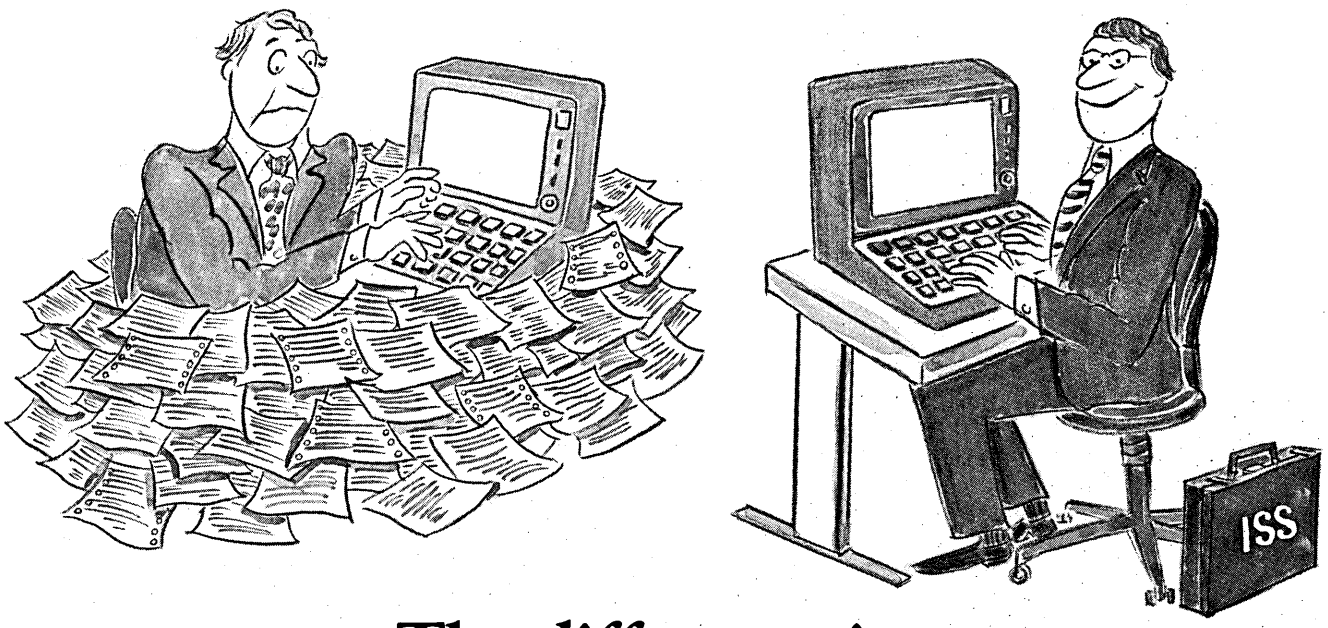
Normal Manchester code consists of two bit symbols. The first bit symbol is the complement of the value of the data bit to be transmitted, while the second bit symbol is the value of that data bit. This form of encoding guarantees that there is one signal level transition, high to low or low to high, during the midpoint of the transmission of a single data bit. A clock signal may be derived from these transitions.

There remains the problem of initially starting or synchronizing the clocks at the transmitter and receiver. In CSMA/CD systems synchronization is obtained by detecting that there is no signal on the medium. Quiet is followed by a preamble, a string of 62 alternating one and zero data bits, followed by two one data bits. This series of signals is used to synchronize the receiver and transmitter clocks.

Following initial synchronization, the clock is maintained by the guaranteed rise or fall of the transmitted signal in the middle of each data bit period.

For token ring and lower speed token bus systems, a different method of bit symbol encoding, called Differential Manchester, is used. In this encoding system a zero is represented by two transitions in a single data bit transmission time, whereas a one is represented by only one bit transition in a single data bit transmission time. The data bit transmission is therefore independent of signal time. The data bit transmission is therefore independent of signal polarity. (Note: an idle is represented by continuous one data bits.)

A different form of initial synchronization is also used. Since each data bit is represented either by one or two transitions, depending whether it is a zero or a one, a data bit represented by no transition would not normally occur. These no-transition signals are used to represent starting or ending delimiters when they occur in the middle of a data bit period. **—J.N.**



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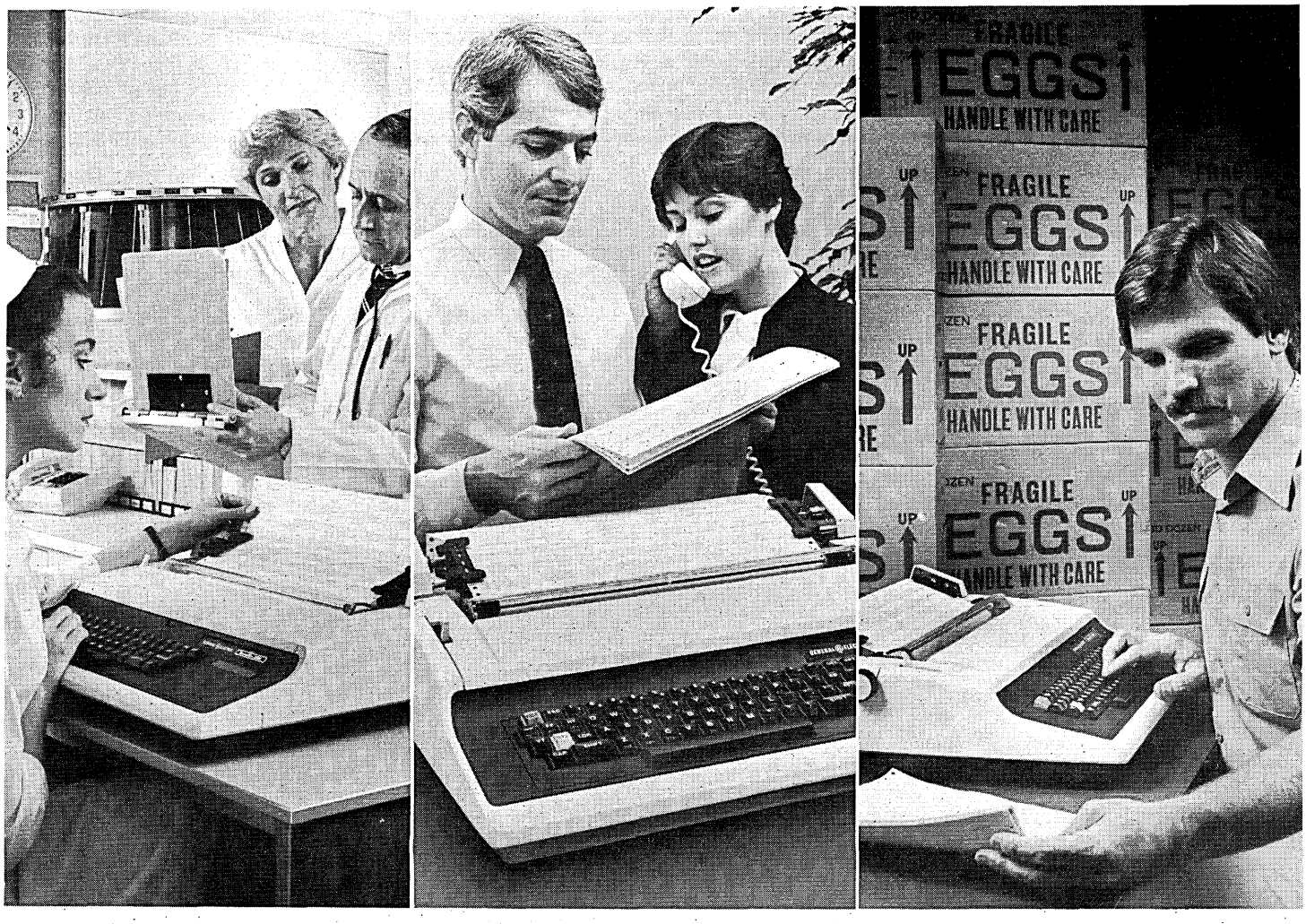

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Token ring baseband systems have been chosen by IBM and several other major computer manufacturers as their preferred LAN.

works may or may not be the same. To transmit data from one of these networks to another, a gateway device must extract data units from the source network, buffer them, and retransmit them onto the destination network. At the same time, differences in protocol must be ironed out at the gateway (which corresponds to the network layer of open system architecture).

The source and destination local networks may be at the same site, in which case identical addressing structures may be used. Alternately, the two local networks may be at different sites, using different addressing structures that require address transformation. Finally, the local networks may use the services of a wide area network, requiring yet another addressing transformation, as well as a protocol change. These problems are being considered by IEEE 802.1 members as they begin to write the addressing and interconnection portion of their standard.

The architecture portion of the draft IEEE 802 higher layer interface standard (802.1) will soon be sent to the IEEE Technical Committee on Computer Communication for review and ballot. If accepted, this portion of the standard will be sent to the IEEE 802 Standard Board, and approval could occur in 1984. The addressing and internetworking portion of the IEEE 802.1 draft standard is not expected to enter the review process before late 1984.

COMPARING THREE SYSTEMS

A subcommittee of the IEEE 802 has prepared a report on expected performance of three of the types of media access control systems specified by the IEEE 802 draft standards (see "Calculating the Maximum Mean Data Rate in Local Area Networks," Bart W. Stuck, *IEEE Computer*, May 1983, pp. 72-76). That report indicates that the CSMA/CD systems can be expected to yield the shortest delay under light loading, but that the token bus and token ring systems give superior performance under moderate to heavy loads (see Fig. 8).

In their analysis, the subcommittee did not consider the built-in priority functions of the token bus and token ring systems, since they were not yet defined. In light of this added capability, the token bus and token ring local network systems must be considered superior to the CSMA/CD systems for those applications where data of different priority must be transmitted across the same local network.

Because medium access and logical link LSI devices are now becoming available for CSMA/CD systems, these will be the dominant form of commercial shared medium local networks during the next few years. LSI devices for token ring and token bus access will be available in the next one to two years.

Token bus baseband and broadband systems seem to be the choice of the industrial automation users, based upon the work of the U.S. Process Data Highway Committee (PROWAY) of the International Electrotechnical Commission (IEC) standard body. Subcommittee 65, Working Group 6 of the IEC is presently extending the IEEE 802 token bus draft standard for use in industrial environments.

Token ring baseband systems have been chosen by IBM and several other major computer manufacturers as their preferred LAN because of the token ring multipriority level capability, because the token ring provides a deterministic, rather than statistical, access time, and because as data rates increase, the required dead time between transmissions on a LAN ring is shorter than that required for comparable bus topologies.

It is interesting to speculate what form local networks will take in future applications for large commercial organizations, particularly organizations requiring transmission of a mixture of video, digital data, and digitized voice. Such systems might use dedicated broadband channels to provide point-to-point television communciation between conference rooms and use other channels on the same cable to provide token bus data trunks between geographically separated installations at the local network site.

For example, broadband trunk token bus data stations might be located in each building, or on each floor of a building at a local network site. These broadband trunk stations might contain gateways to baseband token rings using twisted pair, coaxial, or optical media. The baseband token rings would connect to computers, terminals, and shared peripheral devices. Since token buses and token rings use similar medium access protocols, these gateways need not be overly complex or expensive.

These broadband trunk systems might also be used to link digital voice transmissions to distributed PBX controllers. These PBX controllers could interconnect a group of digitized voice telephone stations. The PBX controllers would communicate among themselves or to a PBX master station over the broadband medium.

As technology progresses, the PBX controller might itself be distributed over a shared medium local network into a number of intelligent token ring stations, each of which corresponds to a telephone voice station. At this point terminal voice and data stations might be interconnected by means of a single physical connection (probably shielded twisted pairs) into one or more hierarchical shared medium local networks. ✻

CONNECTION AND CONNECTIONLESS SERVICE

A connection is an agreement between a pair of data stations to reserve a set of resources (such as buffers and programs) for their exclusive use, so as to maintain orderly communcation and status information.

Making a connection is analogous to making a reservation at a high-class restaurant, which sets aside a table for the exclusive use of the parties who reserved it. The communication principles also have analogies in high-class restaurants: flow control is similar to making sure the courses arrive in correct sequence and on time, and data assurance is like making sure the food arrives properly prepared, and requesting a replacement dish if it is not. The overhead in such restaurants, however, is obviously high.

Connectionless service means that no agreement need be made between a pair of stations before data can be transmitted between them. No buffering or other resources are reserved. If data arrive at a station that has no resources to buffer the incoming information, or if the station is busy for any other reason, the data are simply lost. The transmitting station is not informed of the loss and must depend on a higher-layer entity, perhaps with a time-out function, to determine that it has occured. The higher-layer entity must then attempt to retransmit the data.

A connectionless service is analogous to having a meal at a lunch counter. If no resources (stools) are available, the user must either go elsewhere to satisfy his needs, or wait until resources become available. —J.N.

Jim Nelson is currently serving as secretary of the executive committee of the IEEE 802 Standards Organization and is also a member of the IEEE's Communications Group. He works for Sperry Corp. as a staff consultant in the area of local network communications systems.

The IEEE 802 standards represent a consensus developed from many different viewpoints. This article reflects the views of an individual technical expert rather than the formal position taken by the IEEE.

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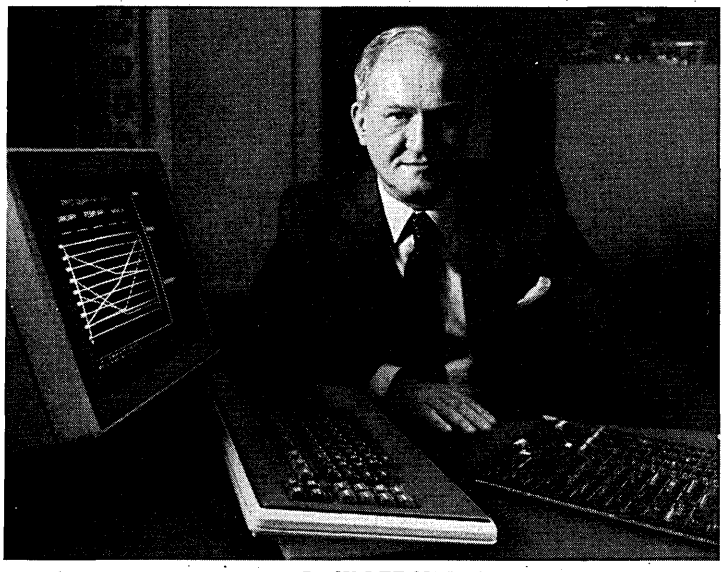

Dr. W. LEE SHEVEL
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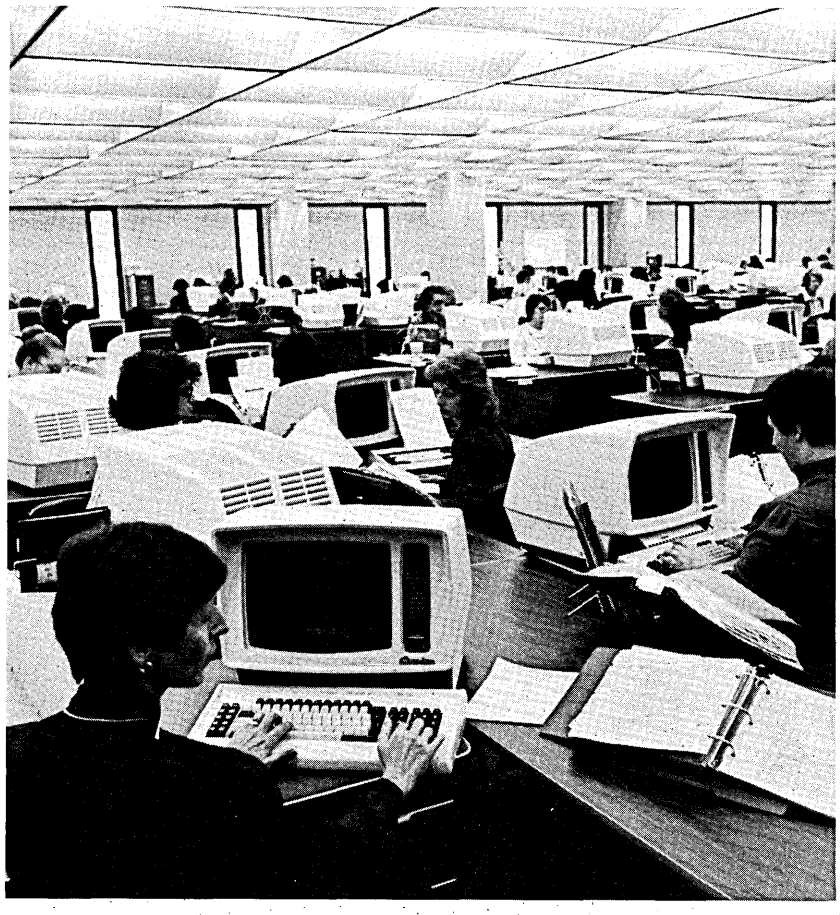

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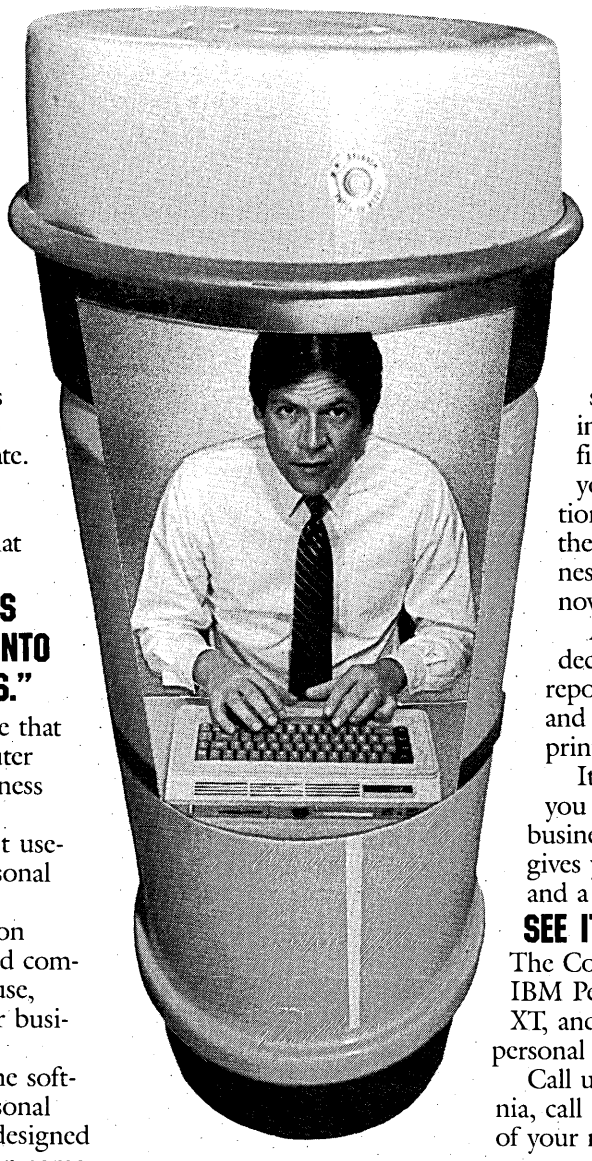

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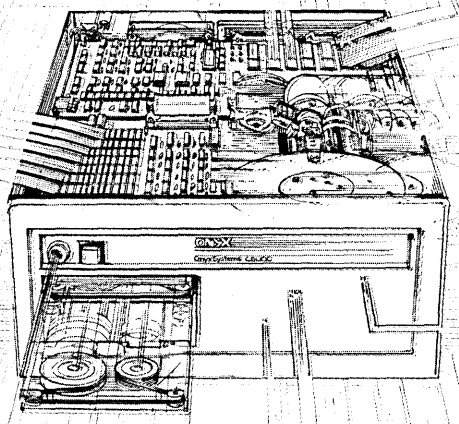

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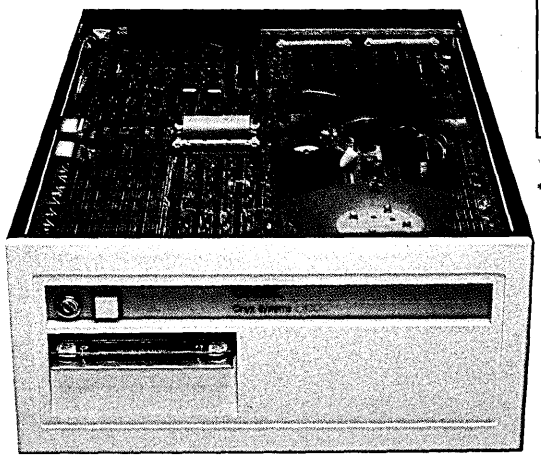

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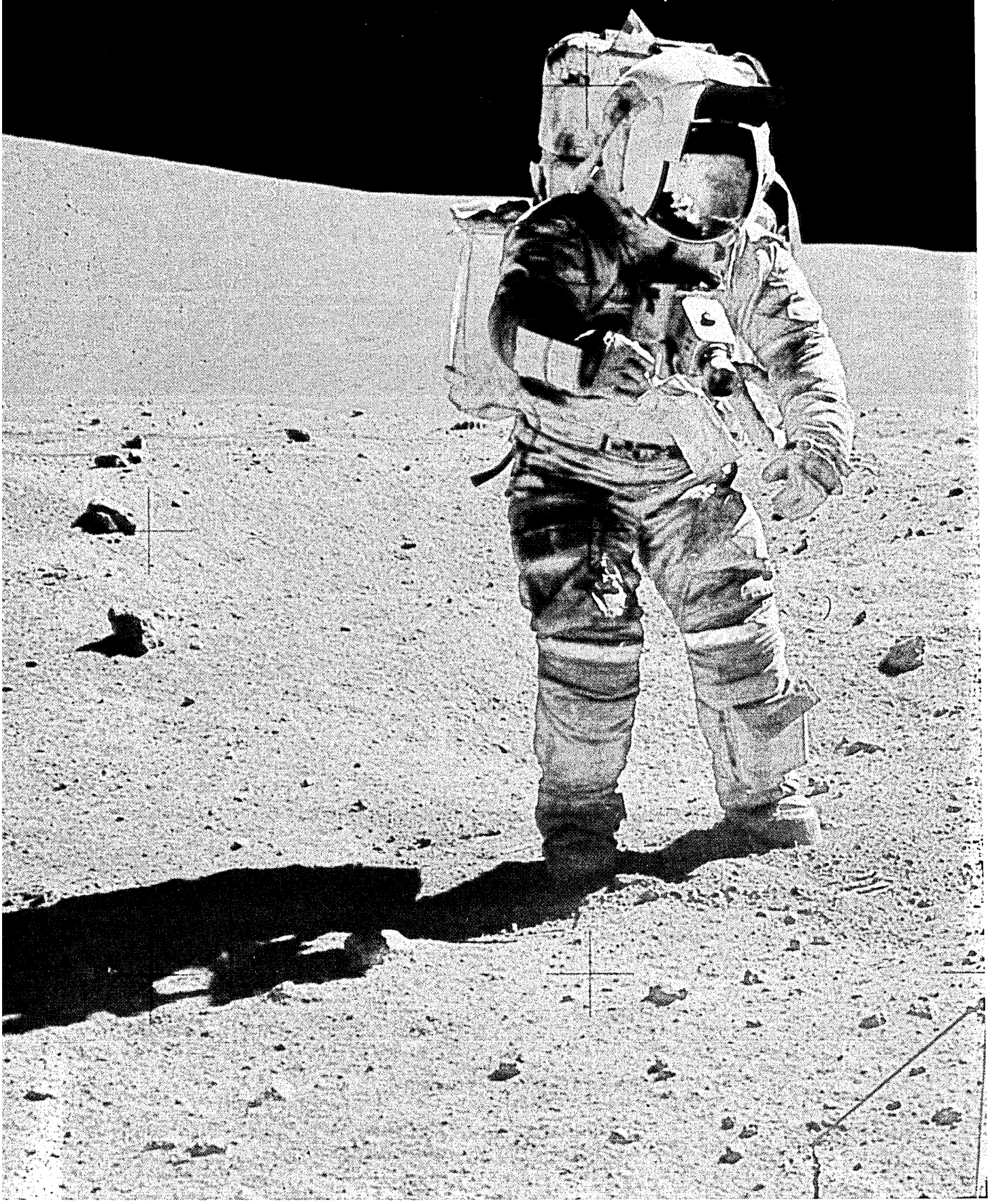
CIRCLE 85 ON READER CARD

Born of an affair between IBM and Rockwell, it put men on the moon and billions of corporate records on-line.

by William P. Grafton

Fifteen years ago, in the early morning hours of Aug. 14, 1968, a group of excited people at the Rockwell Space Division plant in Downey, Calif., watched as the words "IMS-READY" printed on the 2740 typewriter Master



Terminal, and the operator entered the command, "START REGION 0." IMS/360 was about to go into commercial production for the first time. Almost immediately, a stream of transactions began arriving from the manufacturing shop floor, as workers entered queries and status about work orders for the Apollo Project. Two hours later, I turned to Hugh Hoskins and said, "I think it is going to stay up. Let's go get some breakfast." As I recall the moment, Hugh said, "You go. I think I'll stay here and watch it a while longer."

These thoughts about the history of IMS are based largely upon material prepared for a presentation I gave to IBM at Santa Teresa in May 1982. At that time, I made the comment that I felt as if I had been invited to give a lecture on Christianity at the Vatican. Nevertheless, if IBM Santa Teresa is the Rome of IMS, then perhaps I can

IMS: PAST, PRESENT, FUTURE

If IBM Santa Teresa is the Rome of IMS, then perhaps I can say I was present at its Bethlehem.

say that I was present at its Bethlehem.

That, of course, would be the Space Division of North American Aviation (Rockwell International), where IMS was born. While there, I participated in the early development of IMS and had the privilege of managing the first production IMS installation.

I have been continuously involved with IMS since that time, in hardware and software management, in networking and distributed processing, in application development, and in data and database administration. During the 15 years that IBM has spent developing and marketing IMS, I have been busy trying to make it meet the information needs of business. This activity has included employment at three major IMS user companies, consulting assistance to five other large IMS installations, membership in several IMS user organizations, and technical presentations to a number of educational, professional, and technical institutions.

As many know, IMS is the illegitimate offspring of an affair between IBM and Rockwell International. In 1961, Rockwell was selected prime contractor of Apollo, the largest single engineering undertaking ever contemplated. The need was recognized for mechanized control of the engineering data involved. A special requirement was an automated indentured parts list that would associate all of the parts necessary to manufacture a complex end item. There grew to be about two million parts in the Apollo spacecraft.

HISTORY OF EARLY SYSTEMS

There was no technology at the time that satisfied the requirements, so a magnetic tape-based system was developed, incorporating a complex search technique that used core storage as a pseudo-direct access device. The system worked but was extremely inefficient. The file occupied 18 reels of tape, with low activity against any specific record. Sixty percent of the file was redundant repetition of assembly and part numbers, next items, effectivity, etc.; machine time was excessive; and the batch processing technique meant that the file was never up-to-date.

It was determined that the next step should be a generalized file access method that was direct-access based. The method had to be one that could be taught quickly to programmers with little or no direct access experience. It had to be capable of processing hierarchical file structures such that file management techniques eliminating redundant data could be employed, and it also had to be relatively device and language independent.

The resulting software was called GUAM—Generalized Update Acess Method—and was the forerunner of Data Language/One (DL/I). It was used to implement the Disk Oriented Engineering System (DOES) at Space Division in September 1965, utilizing the IBM 7010 and 1301.

Rockwell developed two Apollo teleprocessing applications in parallel with DOES: the Engineering Document Information Collection Task (EDICT) and the Logistics Inventory Management System (LIMS).

EDICT was designed to track the current status of engineering drawings and specifications. The Apollo effort was worldwide, and a request for status information could originate almost anywhere. The IBM 1460 was the central processor for EDICT, which utilized the 7770 Audio Response unit and 1301 and 1311 disk storage. A series of 1026 control units monitored and controlled input from twenty 1050 terminals. LIMS used essentially the same configuration, with the exception of Audio Response, and allowed on-line update and inquiry about the status of critical parts in the Apollo project.

The teleprocessing monitor that supported EDICT and LIMS was known as RATS—Remote Access Terminal System—and was developed jointly by Rockwell International and IBM during 1964-'65. It was a generalized system that performed the functions of polling terminals, interpreting messages, and calling the application programs. One message at a time was processed with no task switching interrupts. It was the forerunner of IMS DC.

A new type of redundancy was now recognized. Half the data in a DOES record were identical to that already existing in an EDICT record, and 99% of the EDICT records were also in the DOES file. Combining the two files, however, would require recoding both systems. This was the situation when System/360 arrived. It was decided to exploit the capabilities of the new computing system by designing a software package combining the best features of GUAM and RATS, and adding capabilities for concurrent message processing; external definition of file structures; protection of sensitive data; improved search, retrieval, and storage techniques; multiple device support; and other features. IMS was conceived.

THE IBM ROCKWELL PROJECT

Dr. Robert R. Brown, director of data processing at Rockwell, formed a joint project with IBM to develop the new package. The product was initially called ICS (Information Control System) but was later rechristened IMS when IBM uncovered some sort of trademark or copyright problems with the original name. Dr. Uri Berman of IBM and Bob Patrick, a senior consultant, developed much of the original architecture and specifications. Ed Morris of IBM was named project manager. Pete Hill of IBM and Pete Nordyke of Rockwell were named co-development managers. Pete Hill assumed the project management role on Jan. 1, 1968, and led the project during the crucial implementation and product development years. Some of the key development personnel were: for DL/I—Dan Gilbert, Pete Nordyke, Marv Nichols (Rockwell), Uri Berman, Sid Kornelis (IBM); OSAM—Lee Meador (Rockwell); scheduler—Don Lundberg, Thomas Work (IBM); buffer management—Tom Sawyer (IBM); system macros—Craig Franklin (Rockwell); checkpoint/restart—Don Hyde (IBM), Earl Carbone, Hugh Hoskins (Rockwell); teleprocessing—Les Premo (Rockwell), Carl Chamberlain, Howard Keller (IBM); audio response support—Bill Erwin (IBM); and for documentation—John Calvert (IBM).

The bulk of the system design work was completed during 1966-'67, with coding and checkout taking place in 1967-'68. The development machine was a 512K S360/50. The work was done at the Downey, Calif., facility of Rockwell Space Division.

In parallel with the development of IMS, Rockwell was conducting beta test implementation of OS/MVT in order to have an operating system that could support the multiple control regions required by IMS DC. During 1966-'67, I was helping to develop the controls, procedures, and operational environment required to run OS/360, and to drive the conversion of over 100 applications from 7010 to S/360 technology.

My association with IMS began in the spring of 1967. Bob Brown was scheduled to give a talk on "ICS" at the International Federation of Information Processing Societies (IFIPS) conference in Rome, and asked me to help him prepare the speech. The research resulted in a document that for the first time presented a comprehensive overview of the objectives, philosophy, architecture, and structural organization of IMS. Bob was pleased and the speech was a great success. Not long after his return from Rome, Dr. Brown transferred me to the project team.

My "surface" assignment was interesting. I was to work on the man-machine interface to IMS—the terminal commands, the master terminal function, the operational procedures, the manuals, the training and education. But, there was a second and even more intriguing covert assignment. Dr. Brown was extremely concerned that the IMS Project was falling seriously behind schedule and might well be out of control. Manned Apollo flights were upon us, and the first lunar landing was only a year and a half away. It turned out that my real assignment was to determine the status of the project and to recommend the specific actions required to implement IMS as a production system.

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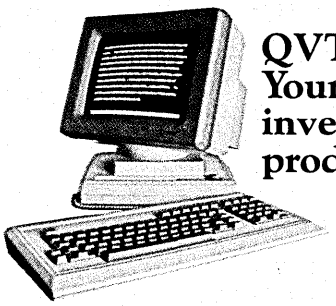

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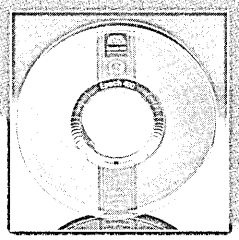

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CIRCLE 87 ON READER CARD

In March 1968 things were beginning to turn around. Then the Rockwell development manager and most of the Rockwell IMS team resigned.

What I discovered and reported to Brown was not encouraging: there was no detailed implementation plan that anyone was seriously attempting to manage. The Rockwell team had become alienated from its management, and important information about status and project activity was being withheld. The project was indeed out of control; there seemed to be little sense of urgency or personal commitment to the Apollo Project among team members.

The Rockwell team was expending a great deal of effort on IMS enhancements and extensions, such as an on-line query language, that were outside the scope of their mission. This was at the expense of completing the basic product. The IBM team was busy redesigning and recording functions that had been reported complete months earlier. I was not to understand the motivation for this until the unbundling announcement sometime later in 1968.

There was no comprehensive testing program to exercise the system methodically, identify problems, and fix them. IMS simply would not run reliably and no one was doing anything about it. The project team had developed an elitist "priesthood" attitude toward the application development group, who were trying to implement three major on-line systems under IMS. The project team hogged the computer resources, crashed the system repeatedly, ruined application tests, and destroyed databases. Application programmers who were seeking help were treated with disdain.

NEED FOR DRASTIC ACTION

Brown asked me what I thought he should do about the situation. I recommended drastic action:

- The joint develoment relationship with IBM should be terminated. The mutual interests of the two companies had diverged. IBM wanted to develop a marketable product. Rockwell wanted to go to the moon.
- The present design of IMS should be frozen and the Rockwell team should concentrate its efforts on making it work.
- The IMS development machine should become an implementation machine. IBM should move its development efforts elsewhere.
- Considerably more attention should be paid to project management and control, testing, application support, and the operational environment.
- A few prima donnas should have their attitudes adjusted.

Dr. Brown then asked me when I thought IMS could be ready for production should he follow my advice. I told him by July 15, 1968, one year prior to the planned landing on the moon.

I am sure that I was not the primary catalyst for the events that followed. Others must have observed the facts that seemed so obvious to me. Dr. Brown himself must have had a pretty clear idea, or he would not have asked me to investigate. Nevertheless, the joint project was ended, IBM moved the development team to Century City, and the design for the first implementation of IMS was frozen. The Rockwell team was directed to concentrate solely on implementation.

I set out to test the system command by command, module by module, transaction by transaction, function by function, utility by utility. Every time I found a problem, I gave it a number. I organized a problem resolution committee that met almost daily to classify the problems, determine priorities, and assign responsibilities for solution. IBM was a member of the committee and was given a copy of every problem. We kept in close telephone contact with IBM team members in Century City.

I also developed a PERT schedule of major implementation events and activities in order to track progress. Jo Ann Storts and I put together a master terminal room, trained the first IMS Master Terminal Operators, and wrote an MTO handbook. I blocked off a corner of the machine room and reorganized the transmission controllers, modems, dial sets, and plug boards into an embryonic network control center complete with a secondary master terminal.

In March 1968, things were beginning to turn around. Then, the Rockwell development manager and most of the Rockwell IMS development team suddenly resigned from the company en masse. Dr. Brown asked me if I thought he should write off the project and give Apollo management the bad news. I told him no—there was a nucleus of good, dedicated people left, and it could be done. Brown asked when; I said push the date ahead a month to Aug. 15, 1968. I walked out of his office as manager of the IMS project. During the next four months we cleared up over 200 system problems and completely rewrote the database recovery facility. In mid-August, the system went into production on schedule on a S/360 65 with 512K bytes of memory. It has been running ever since.

Gene Brault and Hank Epstein managed the first group of IMS applications with supervisory support from Al Barnett, Bob Whitaker, and Dick Duffy. Jim Lightfoot and Ed Duncan were the development project leaders. Some of the key programmers involved were Rod Shahanian, Dan Weller, Dave Johnson, Carol Roark, George Foote, and Roy Gray. Implementation was performed on a step-by-step basis. Complexity was added gradually. During 1968–'69, we implemented eight applications. The first IMS application in August 1968 was POLAR, a Production Order Location and Reporting System that featured uncomplicated databases, 2740 terminals, and simple transactions.

For the statistics buffs, by 1969 the system utilized 130 terminals and 110 lines; occupied four 2314 units for 30 databases spread over 32 disk packs; generated 17,000 to 20,000 transactions a day; supported 260 transaction codes; operated on a 20-hour day; and had an average response time of two to five seconds.

FEATURES OF IMS DESIGN

For marketing reasons, IBM insisted that IMS be able to run on a 256K machine. This restriction permeated the IMS design, affecting everything from what functions would be implemented to module sizes, queueing strategy, control block limitations, and programming techniques. If this seems odd in these days of multimegabyte memories, consider that when IMS was designed, memory technology was magnetic core based and very expensive. There was no virtual storage, and 256K was a reasonably large machine.

IMS was built on top of OS/360 as an extension of, but not a part of, the operating system. I believe this was done because IMS was developed as a Type II Program by the Manufacturing Industry Development Group of IBM, while OS/360 was a Type I Program out of that holy of holies, the Data Processing Division. Navigating the OS/360 interfaces was probably less traumatic than getting two different IBM organizations to cooperate with each other. In addition, OS was every bit as new and untried as IMS; and the development team members probably felt they had enough variables to deal with without having to cope with integrating IMS into OS/360. For whatever reasons, IMS was layered on top of OS, and there it sits today—passing, posting, queueing, saving, restoring, interrupting, masking, and boundary crossing.

Why were hierarchical databases chosen for DL/I? I can remember the debate at Rockwell. There were advocates of the network approach being used by Bachman at GE, and of the inverted file concept used by some of the library automation projects.

But disk files were small at the time, and the Apollo storage requirements were large. Hierarchical storage techniques conserved disk space. Rockwell and Caterpillar had an urgent need for parts-list and bill-of-material processing, which were natural hierarchical database applications. Finally, the GUAM software mentioned earlier was the forerunner to DL/I, and it was based on the hierarchical model.

For relinquishing its rights to IMS, Rockwell received an acknowledgment, a waiver of license fees, and 10 free sets of manuals.

There were strong convictions among many of the project team, myself included, that IMS should be driven by an integrated data dictionary—that all data entities should be defined and all data accesses controlled through a common facility. The proposal was defeated, a victim of schedule pressure and the 256K limitation. I am sorry we lost that one!

QUESTIONS OF INTEGRITY

One subject that found universal acceptance throughout the development team was the principle that data entrusted to IMS should not be lost, corrupted, or compromised; and that the system should be immune to bad data, bad programs, and bad operators. I believe that this philosophy stemmed from the extreme safety and integrity requirements of the Apollo program. A few anecdotes may serve to illustrate the point:

Automatic backout of aborted transactions. In our testing of an early version of IMS, we demonstrated that it was likely that an abend of IMS or an application program would leave a database in damaged condition. In this case, a full forward recovery was necessary before restart could be attempted. This was clearly unacceptable from a user service standpoint, but it was the way the system was implemented.

Don Hyde of IBM did not like the situation. He proposed a revision of the checkpoint/restart architecture to include automatic backout of partially completed transactions, and provisions for rescheduling them during restart.

This sounded like a major effort to me and I said so. Don assured me it was "no problem." Such statements tend to terrify me, but Don was as good as his word and had the modifications coded in an amazingly short time. The changed system sailed through regression testing without major difficulty, and we now had much better database intergrity. I believe this improvement may have been the most significant factor in making IMS an operationally viable system—and I almost vetoed it for the intitial implementation!

Improved database recovery. Our testing of IMS utilities showed conclusively that the first version of database recovery was not reliable. It was based upon the concept of restoring the database from the last unload tape, and then reprocessing all subsequent transactions against the database up to the point of the failure.

Marv Nichols and I developed a new database recovery method. Don Hyde had written code to record all database update "before" images on the IMS log in order to affect his backout and restart capability. Marv and I extended Don's code to record the "after" images also. Our recovery technique merged the database unload tape with subsequent after images from the IMS log in a single batch pass that produced a recovered, reorganized database. This assured an accurate recovery, reduced the time for recovery by an order of magnitude, did not reprocess transactions, and did not require IMS to be up. IBM later adopted a similar approach to recovery in IMS/360, Version 2.

Quality assurance testing. Our techniques for system acceptance testing proved invaluable in keeping bad code out of the system. We developed a battery of test scripts and cases, test data, and special testing utilities. Whenever a bug slipped by us, we installed a test in our arsenal that would have caught it. We adopted the position that nothing that IBM gave us was any good until we had tested it and proved otherwise. Whenever we uncovered flagrant examples of destructive or unexecutable code in delivered software, we blistered IBM and demanded that they do a better job of testing their work before release.

At this point, I want to emphasize that I have the highest regard for IBM, both as an organization and as a group of extraordinarily talented and dedicated people. Many of the IBMers with whom I worked on IMS have become lifelong personal friends. I have never, before or since, encountered a team that gathered together in one place so much talent, integrity, and fellowship as the IMS Development Project. They were the best.

The problem was that IMS was the first, or nearly the first, large commercial program product ever marketed by IBM. Added to this was the fact that IMS represented a new way of doing business to its users, and the customers were betting their companies on the reliability and availability of the IMS DB/DC system. I do not believe that the associated product quality implications were fully understood in the beginning. Eventually IBM created a quality assurance organization for IMS that adopted much of our philosophy and methods. Soon, IMS became one of the most solid software products available, with a well-earned reputation for reliability and integrity.

WHY IMS WAS A SUCCESS

I estimate that IMS must generate at least $50 million in revenue per year in lease and license fees. When the income from associated sales and leases of supporting software products, terminals and controllers, modems and communications processors, direct access storage, and large mainframes is added, one must conclude that IMS has been one of the most successful of all program products. It would be useful to know why.

Success was obviously not self-evident from the beginning, at least to some folks. When Rockwell negotiated the termination of the Joint IMS Development Project with IBM, Rockwell relinquished its rights to the product in return for: 1. an acknowledgment on the inside front cover of the first issue of the manuals, and 2. a waiver of license fees, and 10 free sets of manuals for the first three releases of IMS. Those of us on the Rockwell team considered that IBM had struck the greatest bargain since the Dutch bought Manhattan from the Indians.

These are some of the most important factors in the success of IMS:

IMS works. The flexibility and power of DL/I have been used to solve the database problems of the world's largest and most complex organizations. Its data integrity protection is so reliable that these companies have entrusted it with their primary financial, marketing, product, and personnel records. The IMS data communications architecture has the capacity and operational reliability to put an entire enterprise on-line, with assured growth potential for the future.

S/360 compatibility. Its compatibility with S/360 and OS/360 was a key factor in the success of IMS.

SHARE/GUIDE contributions. The SHARE IMS Project is discussed in detail later in this paper, because I was personally involved with it, but I certainly do not mean to diminish the importance or contribution of GUIDE.

Project management. The engineering project management approach to development resulted in a product that was a true system, was technically sound, and was operationally reliable.

End-user involvement. The bundled environment in which IMS was developed fostered a free and open exchange between developer and user that is lacking when development takes place in an ivory tower atmosphere. IMS was designed and built on-site by the end-user and industry specialists from IBM. It filled a critical market need at exactly the right time.

Vendor support. IBM product support and the commitment to continuous enhancement, along with upward compatibility, built customer confidence in IMS as a long-range product direction.

Integrity and recovery features. The data and system integrity and recovery features of IMS were superior to competing products.

Pete Hill. The charsima, leadership, energy, and commitment of Pete Hill were of incalculable value in the success of IMS.

In 1969, I was asked by IBM to attend the SHARE summer session in Boston, to discuss the possibility of organizing a joint

SCIENCE/SCOPE

A Very High Speed Integrated Circuit chip has been produced at Hughes Aircraft Company, marking a significant step toward using advanced semiconductor technology in military systems. The chip, built after less than two years of development, contains 72,000 transistors in an area the size of a thumb tack. The VHSIC program is being conducted by the U.S. Department of Defense to develop chips that will give military electronic systems a tenfold increase in signal processing capability. The high-speed, compact VHSIC chips will be more reliable and will require less power than integrated circuits now in use.

A new video graphics projector that's brighter and sharper than conventional projection TV may be the next addition to office computer systems. The Hughes projector displays monochromatic computer-generated alphanumerics, symbols, and graphics. It could be used for displaying dynamic computer data and facsimile video pictures in board rooms and other areas, and for teleconferencing. The projector uses a device called a liquid-crystal light valve, a cousin of displays in digital watches. This device intensifies the image from a cathode-ray tube and projects it onto a screen up to 12 feet wide. The picture is so bright and has such high resolution that the viewing room needn't be darkened.

A uniquely shaped waveguide antenna is one of 13 patentable innovations built into the Advanced Medium-Range Air-to-Air Missile. The antenna is configured to occupy a very small space and yet provide a low-frequency-band data link to launching aircraft. Its novel shape also minimizes interference and provides a moderate amount of cross-polarization, a feature that improves communications. Hughes designed and developed AMRAAM for the U.S. Air Force and Navy.

The U.S. Navy's A-6E Intruder aircraft will carry an improved turret for its electro-optical system, which lets the aircrew see and attack surface targets shrouded by darkness, smoke, or haze. The turret, located on the aircraft's chin, is part of a combination laser and infrared device, the Hughes Detecting and Ranging Set. While the original turret allows access from the bottom, the new clamshell-like design allows quick access from both top and bottom to simplify maintenance. The design also reduces the length of flat cable in the turret by 35 feet. The new turret will be introduced in December.

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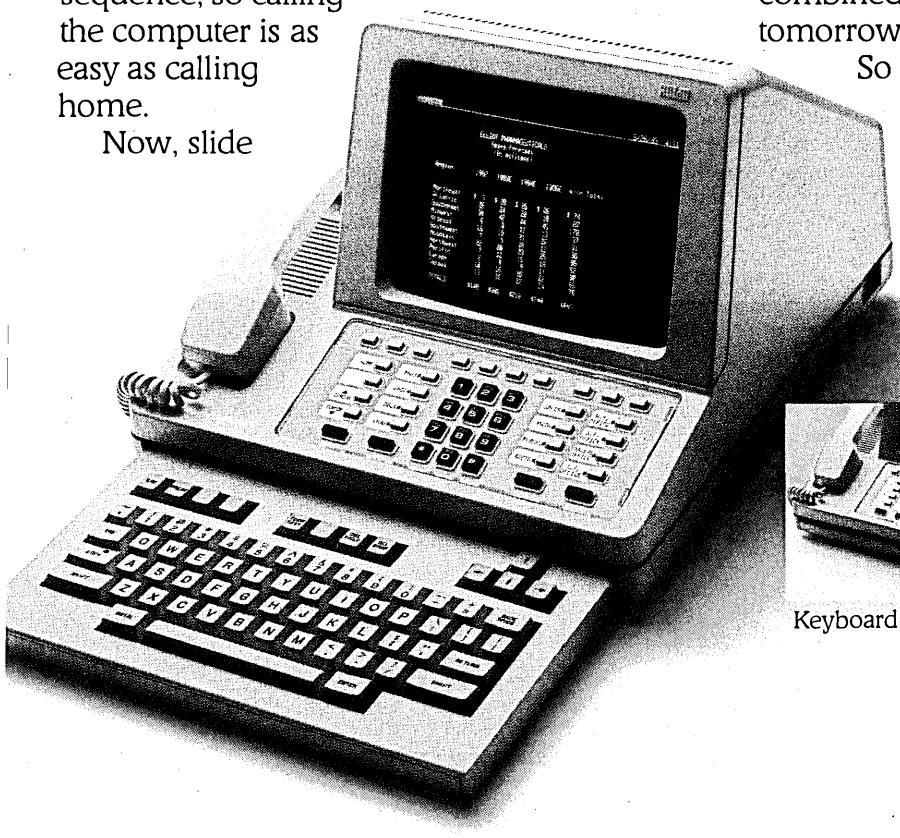

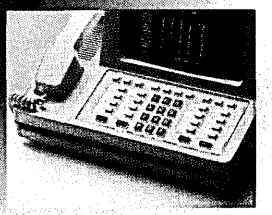

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The truth of the matter at that time was that IMS wouldn't work as received from IBM.

SHARE/GUIDE group made up of the beta test users of IMS. The initial meeting was sponsored by the database committee of the Data Management Project, with Jim Frye of Mitre as chairman. The net result was the formation of an IMS Subcommittee, led by one of the real giants in the saga of IMS, Joan Heinonen of TRW. Her leadership, courage, and sound policies were instrumental in the growth of SHARE/IMS from a subcommittee of six in Boston to its status today as a full division with hundreds of members and dozens of projects, committees, and subcommittees of its own.

The joint SHARE/GUIDE aspects of the organization did not work out because SHARE and GUIDE themselves were attempting to merge at the time, and the effort failed. Instead, each IMS group decided to go its own way, and I elected to stay with SHARE. The founding members of SHARE IMS were: Joan Heinonen; Clifford Pasley, Caterpillar Tractor; Daniel Brooks, LTV; Richard Lewis, First National Bank, Chicago; Ronald McDowell, Chevrolet; and myself.

Joan succeeded in establishing a rather remarkable relationship with IBM. She persuaded the company to sign a nondisclosure agreement with each of the individuals involved. This arrangement facilitated closed-door sessions between the group, who were all IMS beta test participants, and Pete Hill and other IMS development team members. Thus, the tradition was established of direct communication between the users of IMS and its developers. The power and flexibility of IMS today is due in large measure to this communication.

Joan Heinonen established a policy of closed working sessions during the first three days of SHARE week. Open information meetings, round table discussions, and user experience presentations were scheduled for later in the week. The policy of work sessions was fruitful. Many of the eventual external design features of IMS/360 Version 2 and IMS/VS were hammered out at SHARE/IMS meetings and presented to IBM as resolutions. Jerry Kral, of First National Bank of Chicago, led much of this effort. The closed working session technique is now common throughout SHARE and GUIDE.

The closed session concept did not sit well with some of the old-time SHARE attendees who loved to roam the halls of the conference headquarters, wandering in and out of meetings without ever producing anything. One disgruntled attendee who found his way into a closed session blocked by Joan (who was formidable), complained to SHARE management that the IMS Project was a secret society run by a "dragon" who would not let anyone in. This comment became an instant classic. Joan was forever after known as the "Dragon Lady," and the symbol of IMS came to be a huge green dragon straddling the globe.

Another valuable product of the SHARE/IMS Project was the publication of IMS Flyers. These were papers authored by project members and sent to all the membership. Dan Brooks submitted the first flyer. Lew Bethards, of the Federal Reserve Bank, Kansas City, made a major contribution by taking care of all the printing, mailing, and filing work.

After the first issue, the flyers languished. A few more were submitted, but they were mostly lightweight. I decided to do something about the situation. The truth of the matter about IMS at the time was that it wouldn't work as received from IBM. We at Rockwell had performed major surgery on the product in order to implement it as a useful production system. I decided to publish the key results of our work as IMS Flyers, so that other users could get off the ground. The subjects ranged from bug fixes and code modifications to operational procedures, parameter settings, and analysis techniques.

The results were electrifying. Tom Schroeder of United Technologies contributed a group of equally meaty documents, and other members of the project followed suit. The logjam in IMS was broken. A set of the SHARE/IMS Flyers became a required acquisition in every IMS technical library. Without them, I think that the majority of the users would have abandoned IMS.

One of the wisest actions of the Steering Committee was to avoid perpetuating itself in office. In order to give new blood a chance at the enriching experience of managing SHARE/IMS, the founding members eventually founded a "Geriatric Committee" and designated themselves members emeritus. This status permitted them to give advice and counsel and to attend the nondisclosure sessions with IBM, but turned over the leadership of the project to bright new talent such as Tom Schroeder of United Technologies, Hugh Hoskins of Rockwell, Gary Polette of MacAuto, Cathy Stanley of John Deere, Bob Ojala of Motorola, Jerry Kral, and Mike Soulakis of Mellon Bank.

There is one more story that must be told about SHARE/IMS. Joan Heinonen, who could not be outmaneuvered or outfought by any human adversary, fell victim to a crippling spinal problem and had to retire from the computing profession. She is confined to her home in Laguna Hills, Calif., with her body broken but her mind as sharp as ever.

When Joan had to withdraw from SHARE/IMS, the job of leading the project fell to Bill Petefish of Caterpillar Tractor. Where Joan was fire and ice, Bill was calmness and efficiency. He brought a professional management perspective to the organization exactly when it was needed. IMS was no longer a minor product, and the IMS Project was no longer a minor part of SHARE. Bill formalized the relationship with IBM, as the product, the development team, and SHARE/IMS matured. He managed to keep the communication process going while the IMS dragon came to straddle the world, and SHARE/IMS became the biggest division in the SHARE organization.

IMS IN THE PRESENT

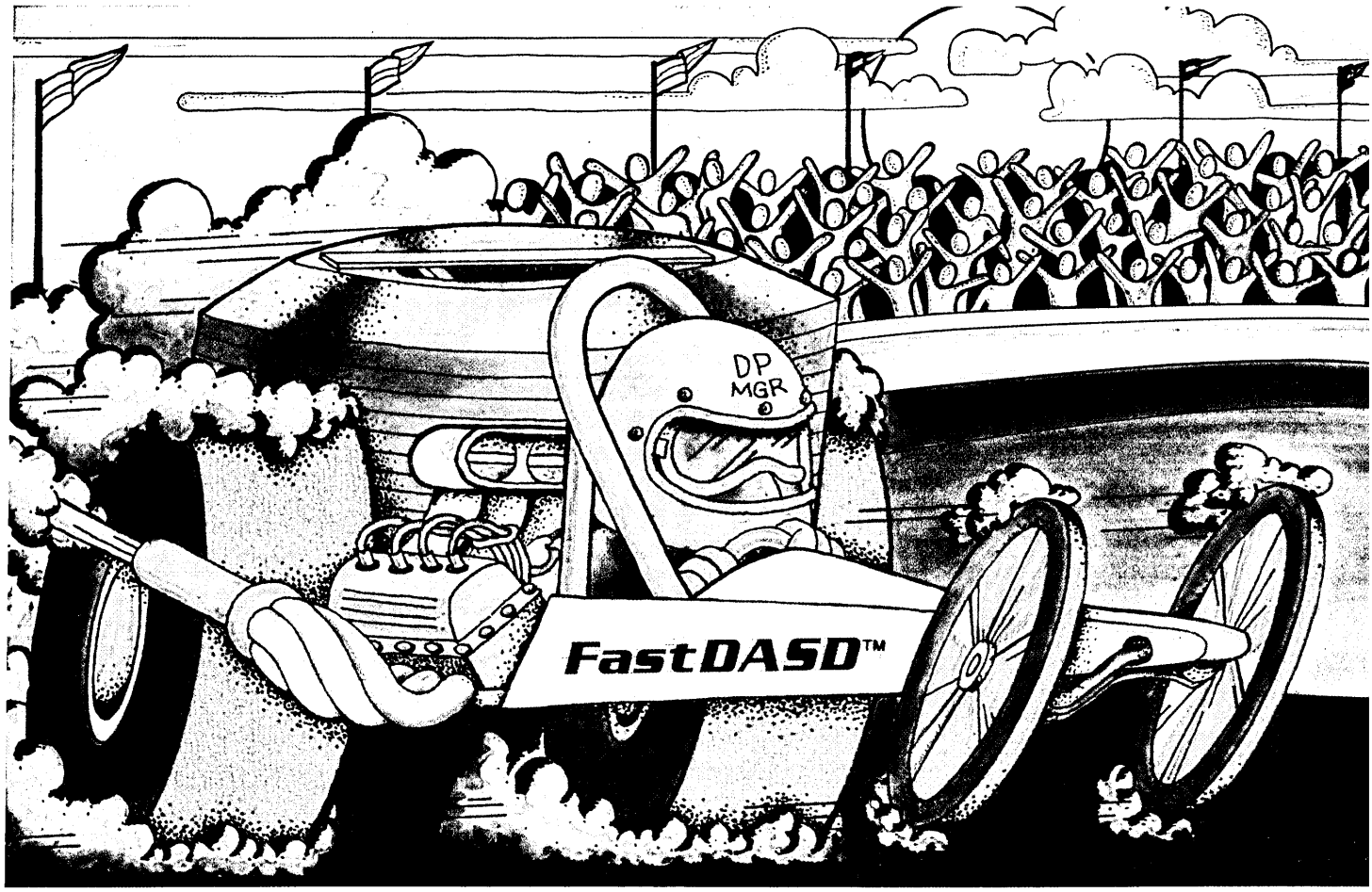
One of the earliest promises of IMS was that we would be able to put all corporate data on-line; eliminate redundancy; assure currency, consistency, and accuracy; and deliver management information when and where it was needed. This is the concept of the integrated database environment, where data are considered to be a corporate resource in the same sense as cash, inventory, and receivables.

Has this promise been realized? How successful have we been with the integrated database? The answer I feel forced to face is, not very. Most companies have implemented a few operational on-line systems, wherein the day-to-day transactional activities of the company have been automated. The databases for these systems hold information at the data item level. The problem is that this type of operational data is not very useful for management decision making at the tactical and strategic level. It must be summarized, aggregated, synthesized, and combined with information from other sources in order to be meaningful. It must be compared with historical data so that trends can be determined. It must be projected and extrapolated to explore "what if" situations. Our present database technology is not very good at this sort of thing.

Some companies have implemented tactical on-line support systems for second- and third-level management to control departments, territories, product lines, and so forth, but few, if any, companies use their database to assist upper management in strategic decision making.

Many companies do not even have a true database administration function, other than a technical service to install IMS releases, run DBD and PSB gens, and do database reorganizations and recoveries. Databases are merely on-line files that belong to individual applications and are designed and maintained by application programmers. Little or no attempt is made to coordinate data names and formats or to reduce redundancy. Data dictionaries are rare.

All of the database administrators, data administrators, information resource managers—call the job what you may—that I have met, regardless of whether they have



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The pure classic integrated database approach is not feasible with current technology and we should stop kidding ourselves that it is.

been using IMS or another DBMS, are frustrated, discouraged, and disappointed by their lack of success. They are understaffed, underbudgeted, and underappreciated.

WHY SO LITTLE SUCCESS?

College texts, technical journals, the trade press, and the seminar circuit abound with material about the integrated database. A casual observer could be forgiven for assuming that there is frenzied activity in the field. Yet very little of substance seems to be happening. Why? I think I know some of the reasons.

Management's perception is that the bill is too high for what you get. There is a high front-end cost to be eaten, and the benefits are seen as largely intangible. We evangelists of the database concept must do a better job of selling our product as a real financial benefit if we expect to change this. Managers are also put off by the long implementation lead time for the classic approach. They would love to have detailed information at their fingertips. The trouble is that they want it next week, not in five years.

The database approach is also tough to sell politically and organizationally. Plans for developing the integrated database environment require extensive cross-organizational cooperation and commitment of resources. Typically, the database project manager is new, at staff level, has a strange vocabulary, and sounds as if he wants to change overnight everything that the traditional line organizations have been doing comfortably for years. Another problem stems from the technology itself. The available information modeling methodologies and database design tools are inadequate, incomplete, overlapping, and labor intensive. The data dictionary does not support the methodology.

All these difficulties are exacerbated by a lack of enthusiasm in the data processing community. The traditional application development organizations have been slow to adopt the productivity tools that are available and seem content to muddle along with conventional files and COBOL. Databases, application generators, query facilities, and report writers are here, but the community has been slow to adopt them. Even after they do install database technology, many application shops continue to treat databases as though they were on-line tape files.

Finally, a company may not need or want everything on-line. Some application systems may be purchased packages whose data standards are incompatible with those of the master database plan. There may be dozens of applications in existence that work well but do not match the naming conventions or record formats of the database plan. There are probably dozens or hundreds more that should be converted to database, but must await funding and programming staff availability. Meanwhile, the integrated database concept remains a dream.

My feeling is that the pure classic integrated database approach is not feasible with current technology, and we should stop kidding ourselves that it is. There is an alternative approach, however, that will work. I call it the decoupled database concept. Database purists may call it heresy.

DECOUPLED DATABASE CONCEPT

In this concept, the firm is viewed not as a monolith, but rather as a set of decoupled functions that work together: manufacturing, engineering, financial, personnel, marketing, etc. The theory is that each of these functions is a mini-business, and that the information relationships between them tend to be relatively few, straightforward, predictable, and controllable when compared with relationships that exist within a function.

Each of these major business functions is viewed as a family of applications that share a common database. Thus there could be a people database, a money database, a product database, and so on.

The BSP and information modeling processes may now take place at the major business function level according to *functional* needs, policies, and economics. These individual functional information models may then be stitched together as they are completed, thus permitting the firm to converge on the classic *corporate* integrated database model over time. This technique permits incremental implementation of functions, databases, and applications, provides a certain amount of database damage isolation, and allows piecemeal database housekeeping. The resulting "converged" corporate model may be somewhat less pristine than one developed with the classic approach, but it is also much more likely to happen.

Controlled redundancy of data elements in different families should be considered, the better to decouple functional databases from each other. For example, some part number data might be kept in both the product and engineering databases. The control, coordination of multiple updating, and extra storage that this practice entails seems a small price to pay for the development flexibility options it provides. Logical connections between database application families should be kept as loose as performance considerations permit, preferably at the DBMS call level, rather than with DL/I logical or physical relationships. This practice also serves to decouple functions from each other.

Packages should be purchased not as individual applications but as families, with a common IMS database, from a common vendor (e.g., MSA, UCC). There is a caveat here, however. Some of the most popular "IMS database" packages are conversions from batch systems. These systems tend merely to use IMS DC as a terminal monitor, and IMS DB as a disk access method. They are not really adaptable to an integrated database environment, because their data formats have not been put in the IMS database definition but are embedded in the application code. It is difficult to access these databases from other applications (or from a query language or report writer) unless the programs are equipped to handle such a situation, and the vendor includes the formatting scheme with the package documentation.

Applications should be implemented as family units. Interfaces with yet-to-be-converted files should be written as though the interface were actually to a database, by means of the GSAM or SHISAM access methods, and/or a "throwaway" simulator module that traps application program database calls, converts them to whatever data access protocol is needed, and provides the proper database return codes to the program. When the file is converted, the simulator can be removed, and the program can then access the real database without change.

Operational-type applications should be written first. Later, tactical and strategic information may be developed from the operational database and made available to upper management—perhaps in a simple relational or other user-friendly database—for processing with an interactive query language, a report generator, personal computers, or in-house timesharing. This is a very important service an information center can provide.

The mass of old, second-generation tape systems can be given new utility while they await conversion to database. By converting the files to VSAM, and using a full function report facility with an IMS interface, the important tape master files can be loaded into a simple (e.g., SHISAM) database after each batch run for on-line access with an interactive query facility. This simple technique can make a hero out of the database administrator and can hasten the day when the integrated database becomes a reality. ✲

William P. Grafton has an MBA from the University of Southern California and was a member of the IBM-Rockwell-Caterpillar team that developed IMS. He implemented the first IMS production system, managed it for three years, and subsequently became Rockwell's corporate database administrator. He's currently a consultant specializing in database matters and based in Santa Monica, Calif.

15 pointed questions to ask MSA or any software supplier

Save this box. It can help you make an intelligent software decision.

1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online—so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using —and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure my people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will I have to pay a lot to revamp it? Or even regenerate it?

These questions will help you when you sit down with individual software companies.

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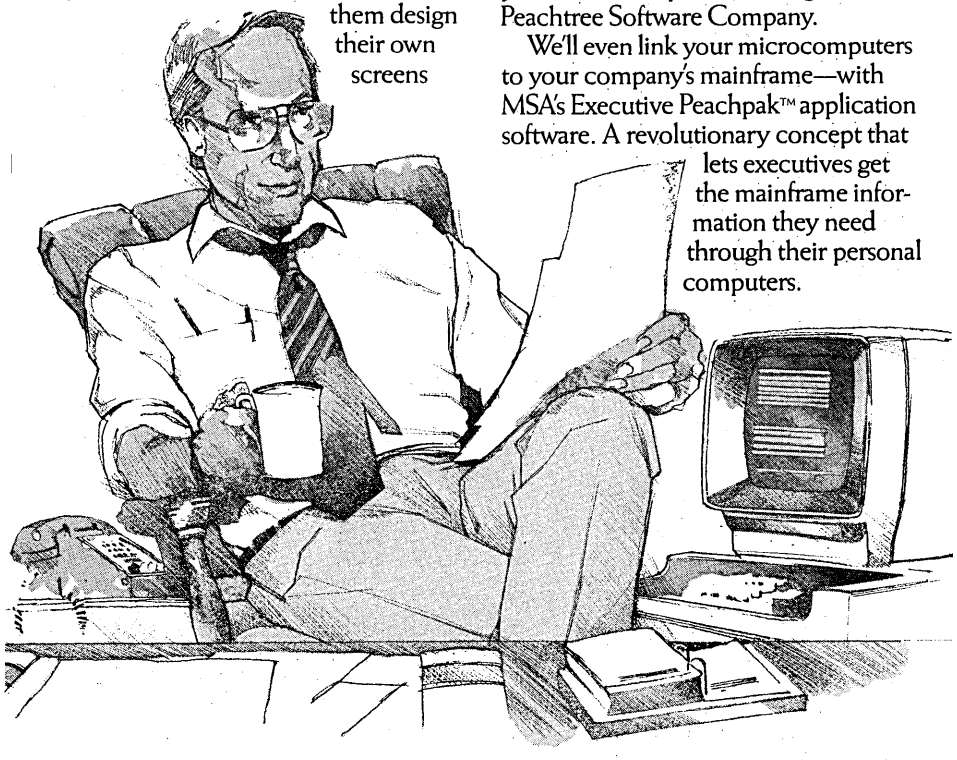

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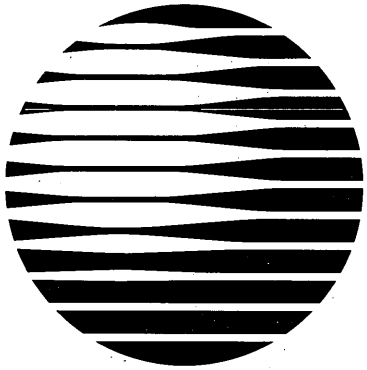

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CIRCLE 82 ON READER CARD

A strategy for bringing together the several components of information resource management.

THE INFORMATION CYCLE

by V. Venkatakrishnan

The information management business is in tumult. Everything seems to be happening at once—relational database systems, distributed data, personal computers, and so on. Vendors of database software claim to have established the "micro-mainframe link." The selection of a specific brand of micro seems to be a top corporate data processing priority. Practically all the commercial database management systems either offer an interface to a "relational" product or advertise that their original products themselves have become relational. Vendors of interactive application generators (IAGs) promise to boost programmer productivity.

But in this dynamic environment certain things remain static: application backlogs, substantial maintenance effort, user complaints about slow response, need for generating quality coding for batch and online programs, shortage of productive professionals, and end-user frustrations with long development times. Add to this the ubiquitious budget constraints and you have a pretty bleak picture.

The obvious questions are, why aren't end users armed with friendly languages and micros generating their own applications by accessing relational databases they themselves created? Whatever happened to programmerless programming?

To be sure, information centers do have considerable potential. The point is that the problems they're intended to address remain unsolved primarily because of the ineffective way in which they are approached, not for lack of good software and hardware tools. Activities in several domains are carried on in a disjointed way, and often nullify each other.

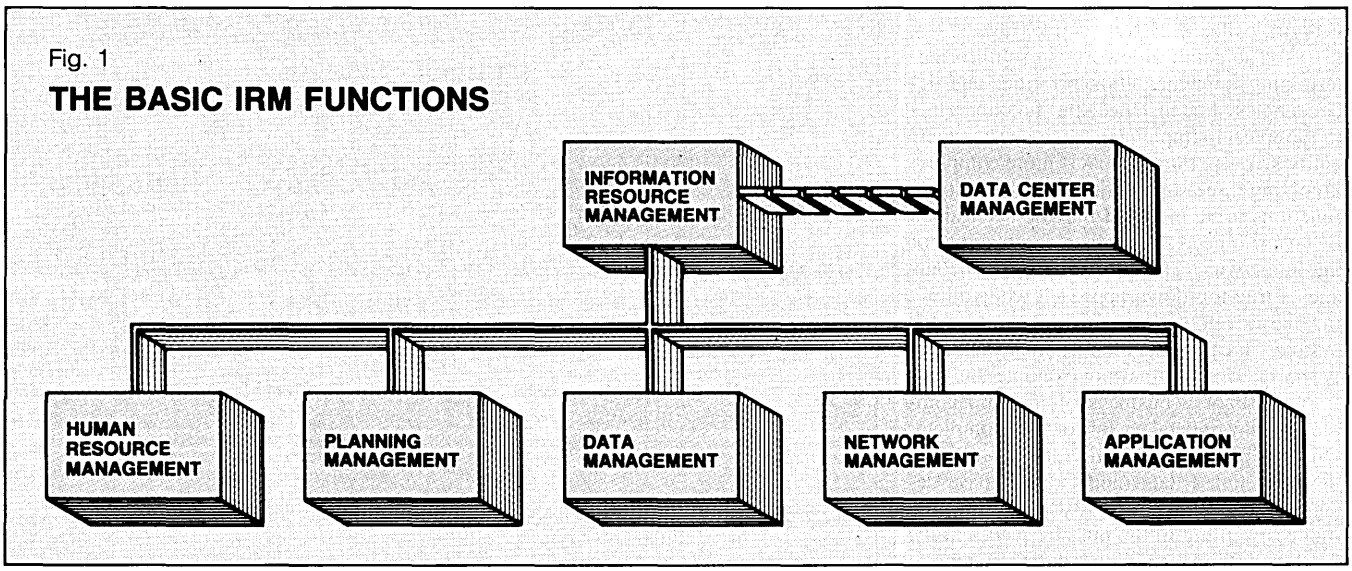
Data are widely touted as a corporate resource. Data dictionaries and data models are attracting management attention. Yet, old problems linger. Several solutions have been offered—long range planning, business systems planning (BSP), and information resource management (IRM). While the importance of planning is hard to dispute, the implementation of plans often leaves much to be desired. A plan must be translated into verifiable units of short-range actions that in turn must be implemented openly and deliberately. Otherwise, planning becomes just another ritual to be performed every four or five years while life goes on as usual. The functions of IRM are intended to make the planning and its implementation effective.

IRM is the discipline of comprehensively managing an enterprise's information requirements, using contemporary technology in the most profitable way. IRM has five distinct but interdependent management functions—human resources, planning, data, applications, and networks. Human resource management is responsible for recruiting, retaining, and motivating professionals in various disciplines. Planning management creates and administers the long-range plan. Data management consists of data administration, database administration, and information architecture. Application management is responsible for development, information centers, and decision support systems. Network management handles data communications administration and office automation, and controls the physical network. All these functions, of course, are served by administrative support units.

Data center management may or may

Fig. 1

THE BASIC IRM FUNCTIONS



CHARTS BY PAUL GOODFRIEND

IRM is the discipline of comprehensively managing an enterprise's information requirements.

not be a part of IRM, depending upon the size of the company. If it is separate, as is the case in most medium to large companies, it must be well coordinated with the basic IRM functions, shown in Fig. 1. Organizational charts for individual companies will vary widely.

The success of IRM depends on the degree of synergy among its functions. The information cycle strategy establishes and nurtures this synergy by formalizing what is intuitively pursued in successful IRM environments. The information cycle is a directed sequence of events in which the end user originates the business requirements and data definitions that are documented in the data dictionary. These definitions are used in building the data model which is then implemented as a physical database. The resulting "subject" database serves several applications using both batch and interactive development techniques. Fig. 2 shows the information cycle as it pertains to the IRM functions.

The information cycle may be viewed as a projection of IRM on the data plane because it deals with the data management function of IRM and at the same time provides the "hooks" for application and network management. The information cycle itself is driven by planning management. One of the results of planning is identification of major business types of the company, such as human resource management, investment, claims, etc.

Each business has distinct functions—payroll, recruiting, asset management, and so forth—that use large aggregates of data called superentities. Employee data, job data, asset data, and portfolio data are examples of superentities. A function may use more than one superentity and a superentity may be used by more than one function. This many-to-many relationship results in a network called data framework (Fig. 3).

The data framework is useful for determining implementation priorities and dependencies. For instance, the function FB is the simplest to implement since it uses superentity SD only. Function FA is more complex, involving three superentities. The priority of functions to be modeled may be determined by business needs rather than complexities of the framework. The data framework encourages a true top-down approach while allowing the development of modular integrated systems. It can be accomplished in a relatively short period of time. For example, the data framework of a business of medium complexity may only take a few days to complete. Once in place, it is highly stable, more so than a detailed data model or database design. It assures the integrity of the detailed model by filling in the missing pieces in the final model and by mapping the dependencies between the functions and superentities. The data framework must be documented in the data dictionary.

SUBJECT DATA MODEL

Once the functions to be modeled are determined, the superentities are exploded into entities and data elements. The modeling team consists of end users, systems analysts, database designers, a data librarian, and a moderator. The team defines each element and entity in an automated data dictionary so that their usage can be easily cross-referenced. It is vital that the data administration function administer this dictionary in such a way as to maintain enforceable naming standards. Otherwise, synonyms (several data names for the same data item) and homonyms (one data name denoting a number of often unrelated data items) will proliferate and defeat meaningful modeling effort.

Based on the data definitions, the entities are restructured to be in the third normal form by ensuring that 1. there are no repeating groups; 2. there is no partial key dependence of the attributes; and 3. there is no transitive dependence between the attributes, i.e., the attributes depend only on their keys and not on each other.

The process of normalization described above is becoming quite popular (see "Subject Data Modeling," April, p. 159). One result of normalization is the rather large number of entities, which poses a problem during the final phases of modeling because of the excessive number of relationships to be considered. The concept of pseudoentities considerably simplifies the process. No other data than the translation of a code (job code, department code, reason code, etc.) are to be defined by the pseudoentities. Because of this definition they exhibit some very useful properties:

- Pseudoentities are simple code translations, and usually result from normalization.
- A pseudoentity has only one primary key that is a foreign key in one or more true entities.
- Pseudoentities have only one nonkey attribute.
- There cannot be any association between

FIG. 2

THE INFORMATION CYCLE AND IRM FUNCTIONS

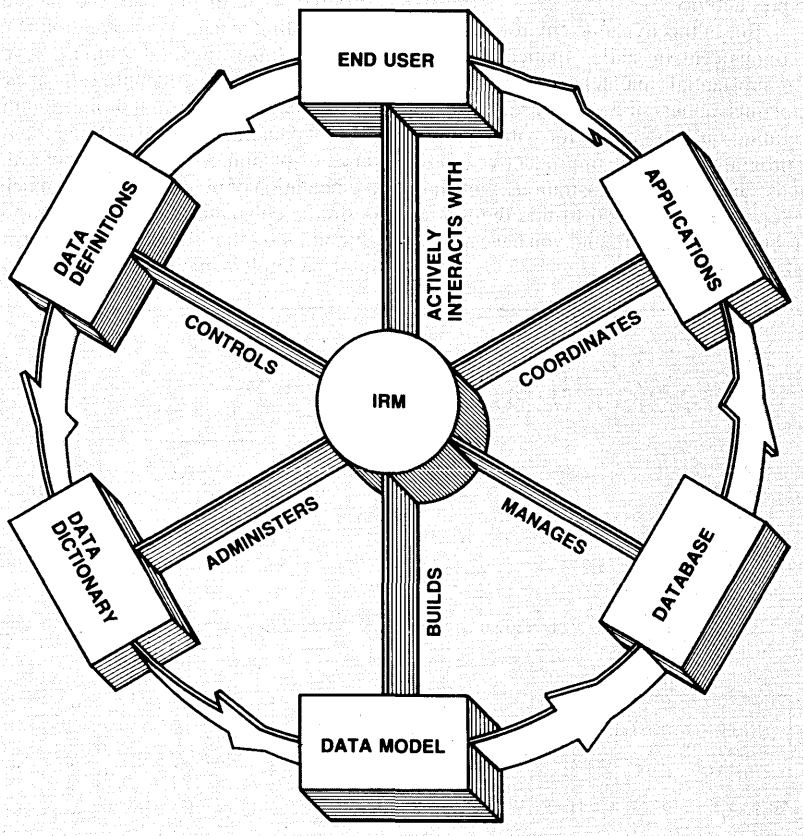
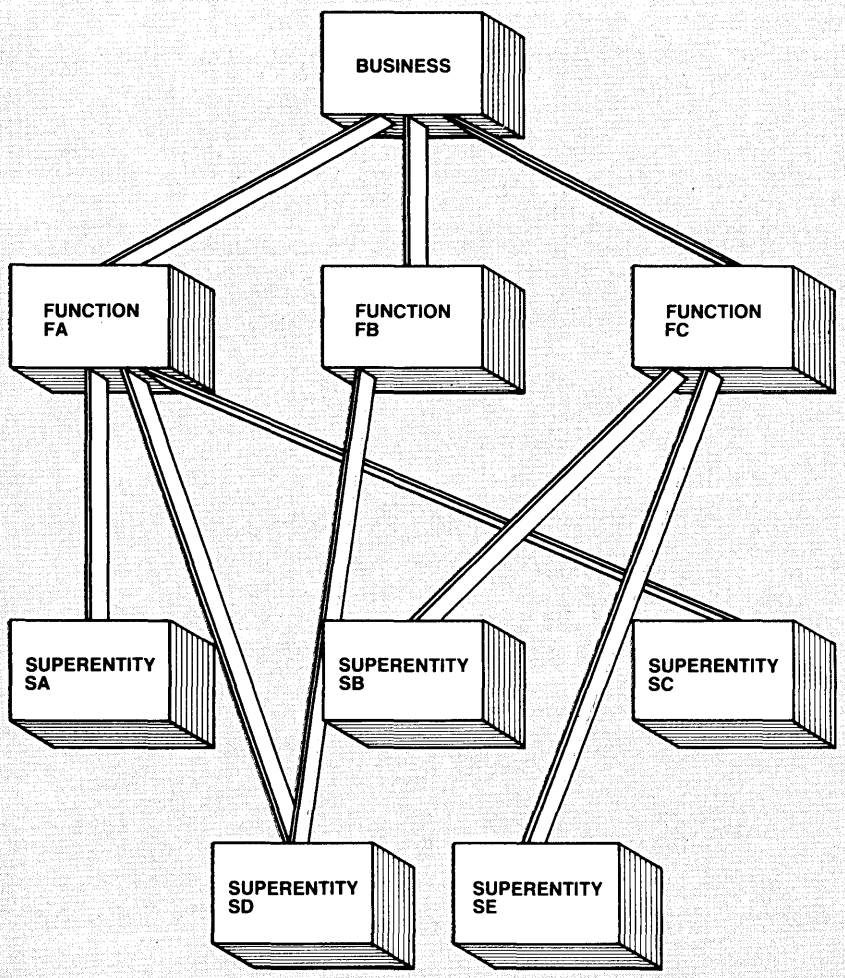


FIG. 3

DATA FRAMEWORK



pseudoentities.

- The possible general association between pseudoentity and true entity is one to many.

The benefits that result from recognizing pseudoentities include time savings, design efficiency, and flexibility. The number of pseudoentities often equals or exceeds that of true entities. If there are 40 true entities and 38 pseudoentities, the possible associations between the entities is 798. It is not necessary to consider associations between the entities and pseudoentities because they are predefined. If all the 78 objects are treated as true entities, then we must consider 3,003 possible associations. When these objects are divided into two groups, then the task becomes far more manageable. The total reduction in possible number of associations is about 74%. The separation between the true and pseudoentities has a tremendous impact on the ease with which integrated databases can be designed.

The key to database design is the optimal implementation of relationships or associations. As the number of implementable associations increases, so does the complexity, inflexibility, and performance degradation. The final database design is usually a compromise between flexibility and performance. Optimization of these critical factors is more easily accomplished with fewer trivial associations. Actually, it is not necessary to map into a diagram the relationships between entities and pseudoentities. This means that the number of mappable associations is drastically reduced (by 74% in the above example) when true entities are distinguished from pseudoentities.

In a hierarchical or network DBMS, one need only be concerned with the association between true entities. The pseudoentities are implemented as standalone segments, databases, owners, or sets. The logical design separating true entities from the pseudoentities contributes to flexibility because there is no confusion as to how a new or modified business object affects the logical or physical design.

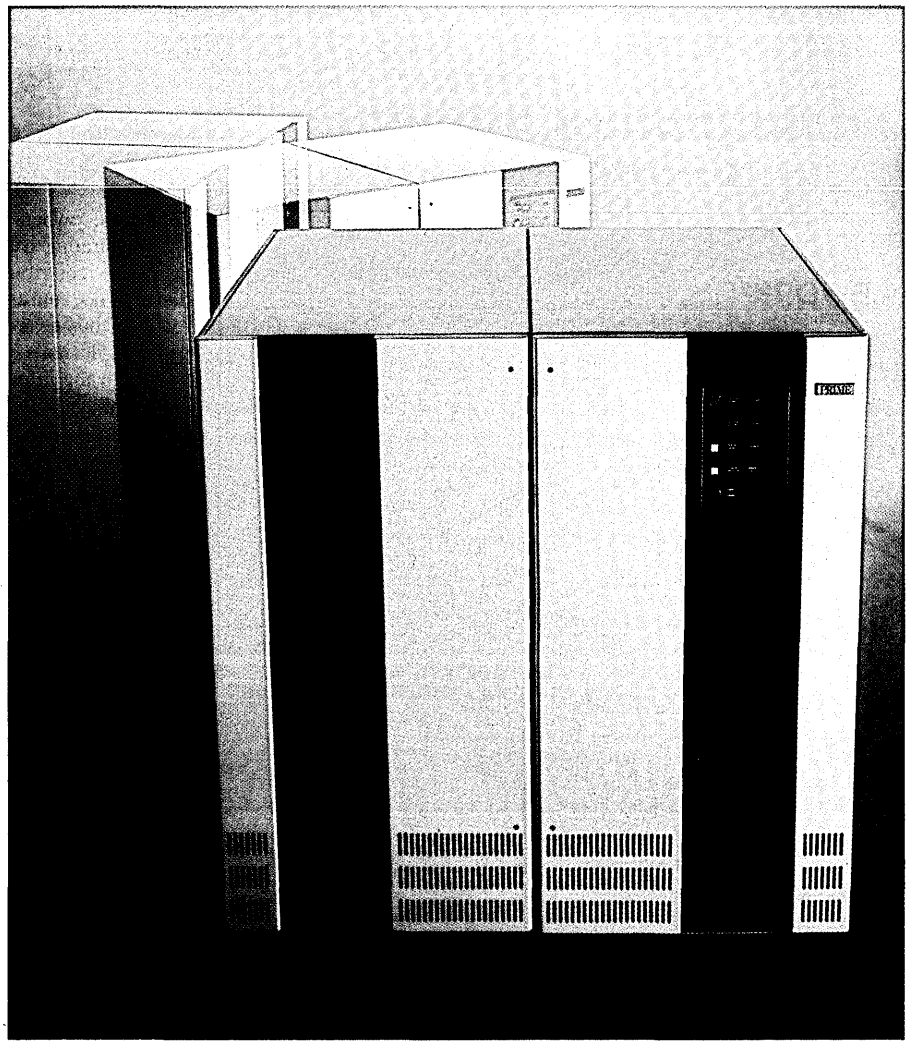
In the information cycle strategy the close linkage between the logical model and its physical implementation is crucial, the limitations of DBMS notwithstanding. Without this linkage the model becomes an end in itself and can never be cost justified. This is why the data administration function must manage both logical and physical design. There is a great deal of pressure in the business world to fragment the database design. If logical and physical designs are separately managed, however, it is temptingly easy to compromise the model to the point where it becomes irrelevant.

Another ingredient in establishing close linkage between logical and physical design is a sound change control procedure. Business is dynamic. Consequently data model and database changes are inevitable and occur more frequently than is realized. Such changes must be introduced only after concurrence between all the affected organizational units. The direction of movement along the information cycle must be strictly followed.

IAG AN IMPORTANT TOOL

The integrated database designed from the subject data model generally satisfies the needs of more than one application. These applications share data without the need for interfaces or dataflow. An important tool in contemporary application development is the interactive application generator, which enables a terminal operator to define a complete on-line application without any need to resort to batch techniques or to define data redundantly. Hardware advancements such as high-density disks, terminal devices, communication technology, and powerful processors have made on-line applications attractive and cost effective. The development of on-line applications, however, has been predominantly batch oriented. The programmer must use job control language (JCL) to compile the screens and procedures and link them properly to produce executable load modules. The drawback in this approach is that any change in screens or procedures involves submitting JCL and waiting for output. In an installation where there is intense development activity, too much time is spent waiting for output. This is the well-known turnaround problem that compromises the productivity gains from improved technology.

The obvious solution is to eliminate the intermediate step of batch processing.



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This is not as simple as it sounds and it has far-reaching operational and architectural implications. The traditional compile, link, and go sequence, resulting in a load module residing in a library or partitioned dataset (PDS), is not quite suitable for IAG. An active directory that can be changed on-line is needed. Software and machine cycle requirements for IAG are significantly higher than batch generation.

There have been several attempts by vendors to provide some form of IAG. Among the successful products are IBM's Development Management System/8100 (DMS/8100), Cullinet Software's Application Development System/Online (ADS/O), and Software AG's Natural.

It is a challenge to migrate a true IAG application from testing to production. In PDS-oriented systems this is simply done by moving appropriate members. In an IAG the directory components have to be moved as well. Complicating this environment is the fact that data are shared between applications, so moving "an application" into production implies a lot more than what is involved in nonsharing environments. But this combined challenge of IAG and data sharing must be faced if the benefits of the database technology are to be realized. Very soon there will be another complexity that will be talked about a lot—that posed by distributed data in microcomputers. While the combination of data sharing, IAG, and distributed data add up to an exciting scenario, it is very demanding on management and technical professionals because the opportunities for failure are many.

Often one hears about the need for top management commitment in order to succeed. What is this commitment, and how do we know it is there? Top management commitment exists when most of the following conditions are true:

- There is mutual trust between user management and information systems management. This trust must be based on the solid foundation of performance and openness and is evidenced by orderly system development, user participation in the data framework and data model, and consistent software package acquisition policies.
- There is a long-range plan, the contents of which are clearly understood and followed. Any change in the plan is published, and implementation of the plan is obvious to personnel at all levels. Staffing and budgeting functions relate to the implementation of the long-range plan.

The information cycle strategy will succeed only with this kind of management commitment. *

V. Venkatakrishnan is the data administrator in the financial division of Aetna Life & Casualty, Hartford, Conn. His responsibilities include building logical data models to satisfy a variety of business needs as well as integration of logical and physical designs in a multiple DBMS environment.

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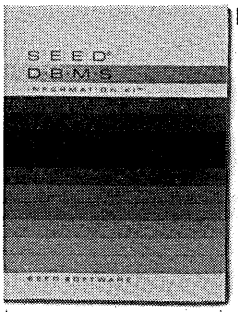

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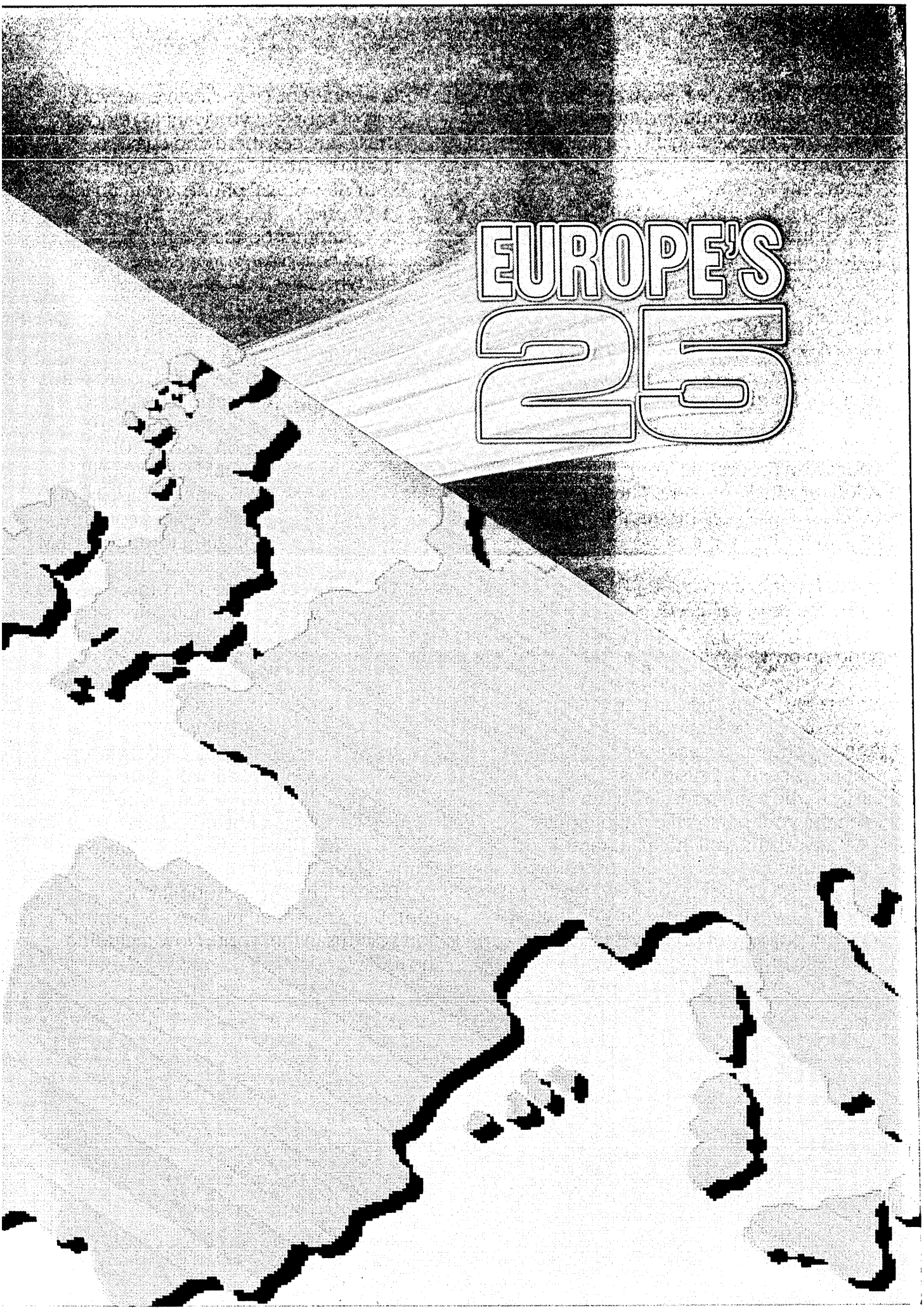
EUROPE'S
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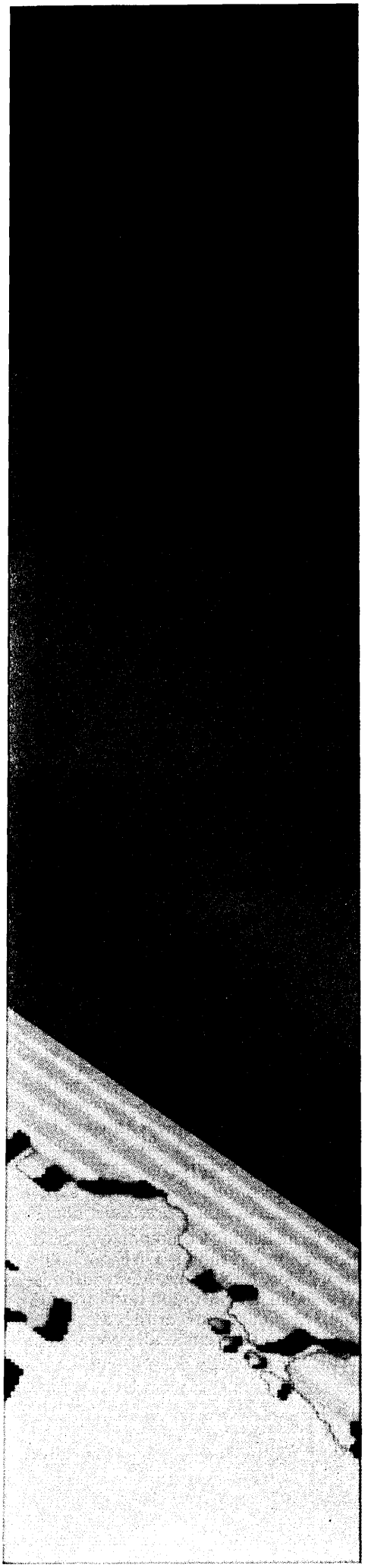

DATAMATION tracks the top European dp companies.

EUROPE'S LEADING LIGHTS

The leading lights in the European data processing industry began to shine again in 1982, albeit dimly. The Top 25 companies saw total revenues rise 6% over 1981, and early forecasts for this year are optimistic.

There is still room for improvement, however. Much of the growth came from acquisitions, rather than from any identifiable surge in business. The Top 25 companies suffered from static markets for traditional data processing products. The large companies on both sides of the Atlantic also missed out on much of the microcomputer boom in Europe that last year benefited small and middle-size suppliers.

The recession continues to take its toll and there was only scant evidence that Europe's long-awaited economic recovery had arrived. Financial indicators did twitch upwards, but this was erratic and overall performance remained generally flat.

European governments still blamed U.S. monetary policies for retarding the rebound. Economists, meanwhile, switched their obsessions from inflation and high interest rates, which were down to 9% across the ECC, to unemployment and the fall of European currencies against the dollar.

The Swedish and French currencies were hit the hardest during 1982, registering drops of 34% and 24%, respectively, against the dollar. Italy (20%) and the U.K. (17%) were less badly affected, while intervention by the Federal Bank in West Germany managed to hold the decline of the deutschemark to only 12%.

U.S. firms were also damaged by the exchange rates, but one American giant, IBM, still managed to pull in sizable profits. And needless to say, IBM's position as the number one data processing company in Europe is as rock solid as ever.

Six companies improved their rankings in the 1982 DATAMATION Top 25. The largest leap was made by office automation vendor Wang, up five places. Olivetti turned in impressive results during 1982, vaulting four rungs up the ladder into second place. The Italian company can now call itself Europe's leading dp company, having pushed CII-Honeywell Bull, Siemens, and ICL firmly out of the way last year. The merger of Datasaab and LM Ericsson also moved the Swedish company up four notches.

Burroughs and Nixdorf have both jumped three places but for rather different reasons. Burroughs's acquisition of Memorex was responsible for its advancement, whereas Nixdorf earned its number nine position entirely under its own steam. Two other German companies also turned in good performances during 1982—Kienzle and Triumph Adler. Kienzle inched up one place to the 19th slot, while Triumph Adler, strong in office equipment, made its debut in the Top 25, showing up in position 22.

Twelve companies lost ground in the Top 25 table. Ferranti and ITT slipped five and three places, respectively, and a lacklustre year for Rank Xerox in Europe meant that it was overtaken by Ericsson, Wang, and Kienzle. The eclipse of CII-Honeywell Bull, Siemens, Digital, and ICL was mostly attributable to Olivetti's rising star. Sperry, Control Data, NCR, and Data General all seem to have suffered from the malaise affecting most U.S. companies that have not adjusted fast enough to changing market conditions, especially in the field of microcomputers and office automation.

Figs. 1 and 2 show the top revenue earners. As was true last year, the fluctuating exchange rates make it appropriate to indicate growth rates in both U.S. dollars and accounting currencies. Ericsson, Burroughs, and Olivetti all achieved very impressive growth rates in both currency calculations (Burroughs's figures include African revenues).

For the first time DATAMATION has also produced a ranking of the top European-owned companies. Fig. 3 shows European revenues measured in U.S. dollars. Ranking at the bottom of the Top 15 table are two major French computer services companies—CISI and Cap Gemini Sogetti. Set up by the French government in 1972, CISI, an offshoot of the French Atomic Energy Agency, took in revenues of $143 million last year. Meanwhile, Cap Gemini Sogetti, which bought a 35% stake in the software services firm Société d'Etudes des Systemes d'Automation (SESA), reported 1982 dp revenues of $125 million.

In the main table there is one more European company (13 as opposed to 12) than in last year's table. The proportion of the

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Freed from its antitrust shackles, AT&T is now mulling over how to establish itself in Europe.

FIG. 1

TOP REVENUE GROWTH RATES IN U.S. $

RANK 1982		RANK 1981	DP% GROWTH RATE*
1	Ericsson Infor. Systems	7	41
2	Burroughs	8	31
3	Olivetti	4	30
4	Wang	3	25
5	ITT	1	22
6	Nixdorf	-	17
7	Hewlett-Packard	6	13
8	IBM	-	10
9	Philips	-	10
10	Digital Equipment	2	8

*European revenue, FY 1982

FIG. 2

TOP REVENUE GROWTH RATES IN ACTUAL ACCOUNTING CURRENCIES

RANK 1982		RANK 1981	DP% GROWTH RATE*
1	Ericsson Infor. Systems	7	76
2	Olivetti	1	55
3	Burroughs	-	31
4	Nixdorf	8	25
5	Wang	4	25
6	ITT	2	22
7	Philips	-	18
8	Kienzle	-	16
9	CIT Alcatel	5	13
10	Hewlett-Packard	-	13

*European revenue FY 1982

FIG. 3

EUROPE'S TOP 15*

	COUNTRY	1982 EUROPEAN DP REVENUE IN $ MIL.
1 Olivetti	Italy	1,310
2 Siemens	W. Germany	1,270
3 CII-Honeywell Bull	France	1,200
4 ICL	U.K.	994
5 Nixdorf	W. Germany	796
6 Philips	Netherlands	787
7 CIT Alcatel	France	517
8 Thompson-CSF	France	299
9 Ericsson Infor. Systems	Sweden	287
10 Kienzle	W. Germany	247
11 Triumph Adler	W. Germany	204
12 Plessey	U.K.	204
13 Ferranti	U.K.	197
14 CISI	France	143
15 CAP Gemini Sogeti	France	125

*Companies owned and headquartered in Europe

total revenue attributable to European-owned companies, however, is almost unchanged from 1981. Of the 13 European-owned companies, four are German, three each are from the U.K. and France, with one each from Italy, Sweden, and the Netherlands. This breakdown reflects the relative size of the major European markets in the dp industry.

Europe's share of the world market for information systems at all levels is only 15%, according to the European Commission. This decline is largely due to lower profits compared to U.S. and Japanese companies. The slippage is also the result of sluggish productivity and the difficulties of doing business within a nonhomogeneous domestic market.

None of these problems plague IBM, which once again appears to be virtually unassailable. Despite disappointing profits and European growth figures in 1981, Big Blue rebounded last year, with worldwide revenues up a respectable 18%.

IBM also increased its European market share, and the company's European revenues, measured against the total turnovers of the Top 25 vendors, inched up to 40% last year, compared to 38% in 1981. (IBM's figures include revenue from all its business activities.)

Meanwhile, another American giant, AT&T, has yet to make its marketing muscle felt in Europe. AT&T is in fact becoming one of the biggest ogres for the European press. Freed from its antitrust shackles, the technological titan is now mulling over how to establish itself in Europe. So far, the attempts appear fragmented and uncoordinated.

In Britain AT&T's Advanced Information System/Net One communications processing service will soon be started up. The company has also bought 45% of the Irish telecommunications outfit Telectron. Trouble, however, has been brewing ever since AT&T closed the operation's manufacturing plant.

A more worthwhile agreement with Philips promises joint development and marketing of public switching gear throughout Europe. AT&T clearly needs a European-wide distribution network—a network that Philips certainly has. The Dutch company, seemingly unabashed by criticism over its "un-European" behavior, may even opt to extend the AT&T pact to cover other product areas.

JAPAN HAS HIGH HOPES

Several continents away, Japan still has high hopes of scoring big sales on European soil. So far, those hopes have yet to become a reality. In-country collaborations, however, may indeed move it closer to those export goals. The Japanese have admittedly shown no lack of initiative and skill in forming cooperative deals with such major European and U.S. companies as ICL and Siemens (Fujitsu), Olivetti and BASF (Hitachi), IBM (Matsushita), Sperry (Mitsubishi), and Amdahl (Fujitsu).

Cooperation is also in the cards in Europe, if the EEC gets its way. Concerned about the European trade deficit in information technology goods and services, the commission has come up with Esprit, the poetic name for the European Strategic Program of Research in Information Technology. The program is a coordinated attempt to get research started on potentially high-risk, high-return projects. Larger, lower-risk projects will get 50% funding, with the remaining costs shared by participants.

More than $700 million will be spent on the ambitious program over the next five years. Research will be carried out on five "enabling technologies"—microelectronics, advanced software, advanced system engineering, office automation, and computer aided manufacturing.

Companies in the major European markets—U.K., France, and West Germany—hope to benefit from the EEC's Esprit effort. In the U.K., the liberalization of Brit-

DATAMATION'S EUROPEAN TOP 25

1982 RANK	COMPANY	1981 RANK	PARENT COMPANY HQ	EUROPEAN DP REV. CAL. YR. 1982 (IN $ MIL.)	% CHANGE EUROPEAN DP REV. FY 1981/2 (IN $)	% CHANGE EUROPEAN DP REV. FY 1981/2 (IN ACCOUNTING) CURRENCIES)	DP REV. DOMESTIC (PARENT CO.) FY 1982 (IN $ MIL.)
1	IBM[1,2]	1	U.S.	9,747	+10.1	+10.1	19,028
2	Olivetti	6	Italy	1,310	+30.2	+54.9	*
3	Siemens	3	W. Germany	1,270	− 2.0	+ 3.4	571
4	CII-Honeywell Bull	2	France	1,200	− 8.5	+10.7	*
5	Digital Equipment	4	U.S.	1,041	+ 7.5	+ 7.5	2,497
6	ICL	5	U.K.	994	− 8.0	+ 2.0	745
7	Burroughs[3]	10	U.S.	970	+30.7	+30.7	2,448
8	Sperry	7	U.S.	813	− 4.2	− 4.2	*
9	Nixdorf	12	W. Germany	796	+17.4	+24.9	*
10	Control Data	8	U.S.	794	+ 3.7	+ 3.7	2,717
11	Philips[1]	9	Netherlands	787	+10.0	+18.0	*
12	NCR	11	U.S.	702	− 3.5	− 3.5	1,487
13	Hewlett-Packard	13	U.S.	694	+13.3	+13.3	1,194
14	CIT Alcatel	14	France	517	− 7.0	+13.3	*
15	Honeywell	15	U.S.	478	− 3.9	− 3.9	1,223
16	Thompson-CSF[4]	16	France	299	− 5.1	+14.8	*
17	Ericsson Infor. Systems	21	Sweden	287	+41.3	+76.0	*
18	Wang	23	U.S.	282	+24.8	+24.8	801
19	Kienzle	20	W. Germany	247	+ 7.3	+15.6	*
20	ITT	17	U.S.	220	+22.0	+22.0	*
21	Rank Xerox[1]	18	U.S.	211	− 3.7	− 3.7	*
22	Triumph Adler	N/A	W. Germany	204	*	*	79
23	Plessey[1]	22	U.K.	204	+ 0.4	+16.0	180
24	Ferranti	19	U.K.	197	− 4.3	+ 7.5	161
25	Data General	24	U.S.	155	− 6.0	− 6.0	570

N/A Not applicable *Not available [1]Estimate [2]Dp revenues include all activities [3]Figures for Europe include African revenues
[4]Dp revenues include photocopiers

ish Telecom has sparked a number of changes in telecommunications and dp markets. BT itself has restructured to face the demands of new markets and competitive threats. Four new BT divisions have been created, two of which involve new technology. The Merlin group sells small telephone exchanges and office automation systems such as word processors and micros (from ICL). The Spectrum operation offers add-on services such as BT Gold, an electronic mail service.

Despite the overhaul, there are fears that BT's liberalization will open up the marketplace to foreign suppliers, who may undercut indigenous manufacturers and fail to offer adequate levels of post-sales support.

On the U.K. vendor front, ICL proved during 1982, to some observers' surprise, it could operate at a profit. Turning a £50 million loss into a £24 million profit, given the sorry state of the U.K. economy, seems to prove that ICL has changed more than its logo.

Last year was Information Technology Year in Britain. Putting its money where its mouth was, the U.K. government promised that $320 million will be spent over the next five years to support the local information technology industry.

BRITAIN'S OFFICE SCHEME

As part of the Information Technology Year, the U.K. Department of Industry launched its office automation pilot scheme. Under the setup, government offices and public services have joined forces with manufacturers, with some national funding, to develop experimental office automation systems. The project gives local vendors a good opportunity to put the finishing touches on their office automation products.

Across the Channel in France there are also extensive plans to fund R&D and restructure the currently confused nationalized computer industry. The French government expects to spend around $1.6 billion over the next five years to revitalize the local electronics sector. The French, however, have repeatedly shown that they can't follow through on their gift for planning. Their scheme to mass-produce cheap facsimile machines for the home market, for example, failed because none of the chosen manufacturers could come up with a prototype that was low enough in cost. The electronic telephone directory is also proving more expensive than originally planned and installations are way behind schedule. Only a fraction of the planned fiber optic network in Biarritz will now be laid and that too will be late. Nevertheless, the planning and restructuring continues.

The Compagnie des Machines Bull (CMB), created as a holding company for the new Bull marketing group, will be the focal point of the French dp industry. The holding company will be responsible for brainstorming strategy plans for the entire group. CII-Honeywell Bull will also exist in a new form. Peripherals and office automation subsidiaries will be set up and minicomputer-maker Société Europeene de Mini-Informatique et de Systemes (SEMS) is being moved over to CMB from Thomson-CSF.

France also wants to strengthen its telecommunications industry but the government and the PTT cannot agree on just how this should be done. The government would like the former ITT subsidiary Compagnie Générale de Constructions Telephoniques (CGCT) to join forces with CIT Alcatel. The PTT, however, favors a merger between CGCT and Thompson-CSF.

Whatever the outcome, it is clear that the French dp industry is in trouble. None of

DP REV. WORLDWIDE FY 1982 (IN $ MIL.)	TOTAL REV. EUROPE FY 1982 (IN $ MIL.)	TOTAL REV. WORLDWIDE FY 1982 (IN $ MIL.)	% CHANGE TOTAL REV. WORLDWIDE FY 1981/2	TOTAL NET INCOME WORLDWIDE FY 1982 (IN $ MIL.)	% CHANGE TOTAL NET INCOME WORLDWIDE FY 1981/2	TOTAL WORLDWIDE EMPLOYEES	YEAR ENDING
34,364	9,747	34,364	+18.2	4,409	+ 33	364,796	Dec.
1,616	1,836	2,469	− 2.8	*	*	49,763	Dec.
1,270	11,430	16,980	+ 7.1	312	+ 33	324,000	Sept.
1,238	1,200	1,238	− 8.5	−205	−259	21,864	Dec.
3,880	1,006	3,880	+21.3	417	+ 21	68,000	June
1,304	982	1,304	−13.8	29	+124	23,581	Sept.
3,848	970	4,186	+23.0	117	− 22	62,000	Dec.
2,800	1,500	5,571	+ 2.6	221	− 29	88,000	Mar.
942	796	942	+10.0	*	*	16,017	Dec.
3,302	794	4,292	+ 3.0	155	− 9	56,005	Dec.
1,047	9,026	16,104	− 5.1	162	+ 13	336,800	Dec.
3,173	865	3,526	+ 2.7	234	+ 13	63,000	Dec.
2,212	1,334	4,254	+18.8	383	+ 25	67,500	Oct.
554	1,415	1,894	− 4.2	*	*	40,000	Dec.
1,684	1,022	5,490	+ 2.5	273	+ 5	94,100	Dec.
320	*	4,139	− 9.5	−327	+2,224	81,300	Dec.
387	287	387	+50.0	*	*	3,857	Dec.
1,159	246	1,159	+35.0	107	+ 37	21,480	June
276	356	396	− 1.5	*	*	9,172	Dec.
600	7,718	15,958	−30.0	702	+ 4	283,000	Dec.
*	*	8,450	− 1.0	423	− 29	114,000	Dec.
443	289	809	+ 1.0	*	*	11,246	Dec.
296	1,263	1,838	− 6.9	139	+ 7	42,929	Mar.
218	501	589	− 7.1	41	+ 8	5,967	Mar.
806	158	806	+ 9.5	25	− 51	15,210	Sept.

the major French companies—CII-Honeywell Bull, CIT Alcatel, or Thompson-CSF—had a successful year in 1982. Their poor performance is mainly blamed on the dollar dilemma and the reorganization confusion.

France's neighbor, West Germany, found the going easier last year. Nevertheless, West Germany's flagship firm, Siemens, suffered an 8% drop in domestic revenue. The German giant, which has been in an extremely strong position in Europe for years, now seems to be under attack from its local rivals, namely, Nixdorf, Kienzle, and Triumph Adler—all of which had very good years in 1982. Part of their success was at the expense of Siemens, which has also been experiencing static sales worldwide.

While Siemens-watchers may be eyeing the future with caution, insiders at the German PTT are looking at the next few years with newfound optimism. One of the reasons for this optimism is Bigfon, the German PTT's broadband fiber optic network that's scheduled to be integrated into local telephone nets during the next three years.

Six German companies are involved in the seven-city network project, which will also provide videoconferencing and videotelephone facilities. Although the networks are being fully digitized, the Bundespost plans to use satellite links to meet the initial demand for broadband services.

While the Germans appear to be very active on the communications front, they seem to be more lackadaisical in the microcomputer realm. Across Europe, the micro made its mark in 1982. While some suppliers rushed to get their business systems into trade publications and onto show stands, others hurried to get their home computers into the stores by Christmas.

Britain, which is currently the largest European microcomputer market because of its strong contingent of Yankee vendors, will soon be overtaken by Germany, which is getting up to speed in the micro movement.

Only a handful of the largest companies in the DATAMATION Top 25 benefited from the microcomputer explosion during 1982. But this year, following the European introduction of the IBM and Digital Equipment personal computers, promises to be a very different story. IBM, for example, has already outsold Apple and Sirius to become the leading supplier of business micros.

The sales leaders in the European microcomputer market are still Commodore and Sinclair. So far, few indigenous European manufacturers have been successful in this market. The only possible exceptions may be Sinclair and Olivetti. So while the micro may be a sales opportunity that all the traditional dp vendors want to exploit, their ability to do just that is hampered by the fact that the competitive edge in this fledgling field can only be gained through marketing and not product ploys.

METHODOLOGY

Information for the European Top 25 was solicited through questionnaire. For the purposes of this survey, Europe was taken to include Austria, Belgium, Denmark, Finland, France, West Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the U.K. The following product areas were included in the definition of data processing:

- Mainframes, general purpose computers;
- Minis and Micros—computers with a minimum of system software—and small business systems and personal computers;
- Terminals and peripherals—all those con-

nected, either directly or via data communications links, to a dp system;

- Software and services, including bureau services, database services, software packages, etc.;
- Data communications equipment, including data connections (modems and equivalent) and communications processors (multiplexors, concentrators); and
- Word processing equipment and electronic typewriters.

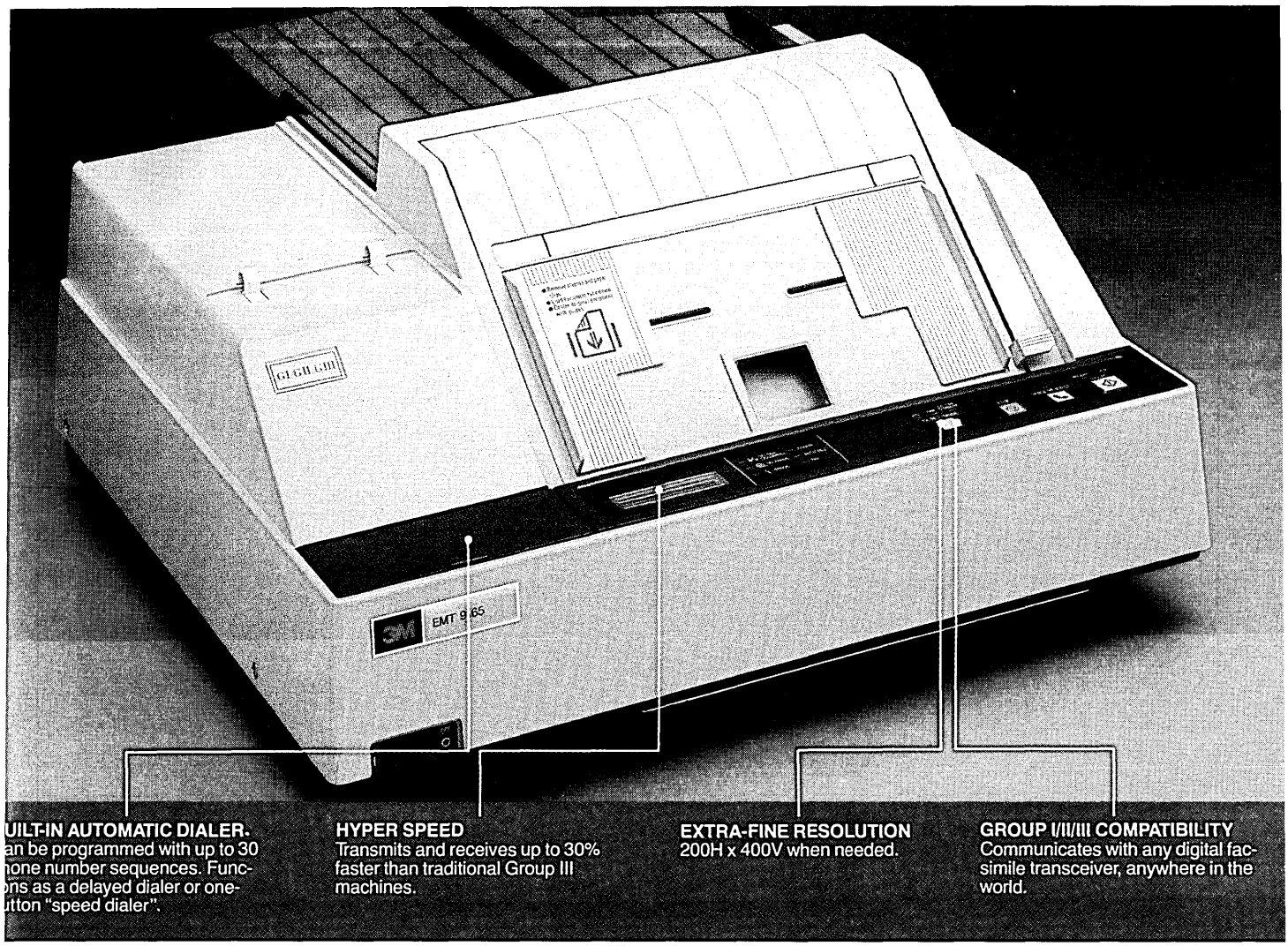
The following areas were not included: data transmission or basic services, specialized common carriers services, standalone magnetic card typewriters, standalone electronic cash registers, instrumentation equipment, semiconductors, printed circuit boards, automatic test equipment, and dp supplies (with the exception of magnetic media for disk and tape drives). All peripherals that attach to a dp system were included. For computer-based manufacturing systems such as computer-controlled machine tools, only the computer and hardcopy output devices were included, not the machine tool.

The main ranking was based on 1982 calendar year revenues (in U.S. dollars) from dp operations in Europe for each company. Figures for companies whose fiscal year did not end December 1982 were adjusted using published quarterly figures or estimates. All other figures appearing in this survey relate to the company's reported results of their fiscal year ending 1982. In the main table, all results have been converted to U.S. dollars, using OECD exchange rate statistics for the appropriate time period. An additional column showing growth rates in actual accounting currencies is included to compensate for the anomalies produced by fluctuating exchange rates.

The rank orders for 1981 are exactly the same as those published last year. Any inaccuracies in last year's table have been corrected and used for calculating the 1982 growth rates. Total revenue figures for Europe and worldwide refer to the parent company, where appropriate. When the parent company itself is not strongly involved in dp, the principal company has been considered as independent.

Inevitably, some of the figures in the table can only be estimates. In some cases the companies do not separate out their revenues into appropriate categories. Furthermore, while all companies were provided with the same definition for dp, it is impossible to verify the exact comparability of their calculations. Finally, three companies were either unable or unwilling to supply complete information for the survey, and estimates were therefore made on the basis of published information. These companies were Rank Xerox, Burroughs, and Plessey. *

DATAMATION's European Top 25 survey was prepared by Logica, a London-based company that provides international market studies and reports to computer and telecommunications suppliers.



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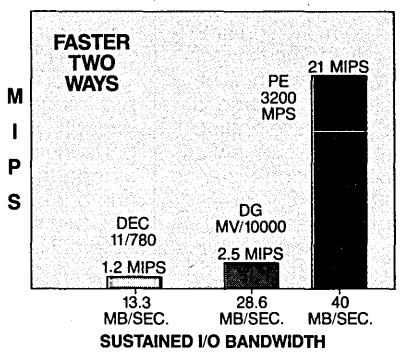

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PEOPLE

BACK IN THE SADDLE

There is more than a little show-biz glitz surrounding the press conference Kenneth G. Fisher has called to announce plans for his new company, Encore Computer Corp. The former head of Prime Computer Corp. is on stage the minute he emerges from the Palace Hotel's posh elevators to a blinding barrage of photographers' strobes. As if he were a politician or Hollywood star, he poses and smiles almost professionally. It is obvious that Fisher is a man who strives to impress his audience.

Like his smile, Fisher's ego is a mile wide, and his plans for Encore are no less ambitious. Teamed up with a number of industry veterans, Fisher plans for Encore to buy its way into the already crowded computer marketplace, exchanging its team's promise of experience for a piece of the action in small, high-growth startups.

So far, as of mid-July, the company has only $1 million to its name, but Fisher, whose success at Prime is almost legendary, is himself a strong draw. Perhaps it is the sheer chutzpah of his plan that has pulled such a big crowd of reporters and securities analysts to hear him talk about the venture in the grandest of terms but only the sketchiest of details.

"We're building this company to last a thousand years," he says, with an eye toward the future.

Right from the beginning, Fisher states that he will not discuss what companies Encore plans to acquire, nor what product areas it may be involved in. Yes, Encore is actively engaged in some acquisition talks, he says, but no details will be given yet.

Encore's raison d' être is to bring management discipline, especially in marketing, finance, and high-volume manufacturing, to the crowded marketplace where literally hundreds of companies compete with quite similar products.

DOING IT AGAIN: Henry Burkhardt III, Ken Fisher, and C. Gordon Bell field questions about their new company, Encore Computer Corp. Says Fisher: "We're building this company to last a thousand years."

"Many products are going to market in a disorganized manner, while product life cycles shorten," Fisher explains from his notes. "There's a constriction of time that is putting a squeeze on development budgets."

Moreover, Fisher says, many companies that achieve success with their first products find it hard to pull off a successful second act. Hence the new company's name. And, because the industry is growing so dependent on off-the-shelf hardware, it is hard for new companies to differentiate their products in the marketplace.

These trends, while obstacles to others, will be the very ones Encore intends to exploit to its advantage, making it a "multibillion dollar company over a several-year span," Fisher comments matter-of-factly.

"It is our underlying belief that the individual is important. He is the key factor in a company's success. Creative genius is best served by incentive based on achievement. Small groups do more, better and faster, than big groups," the confident entrepreneur says. "I've watched the stifling that goes on.

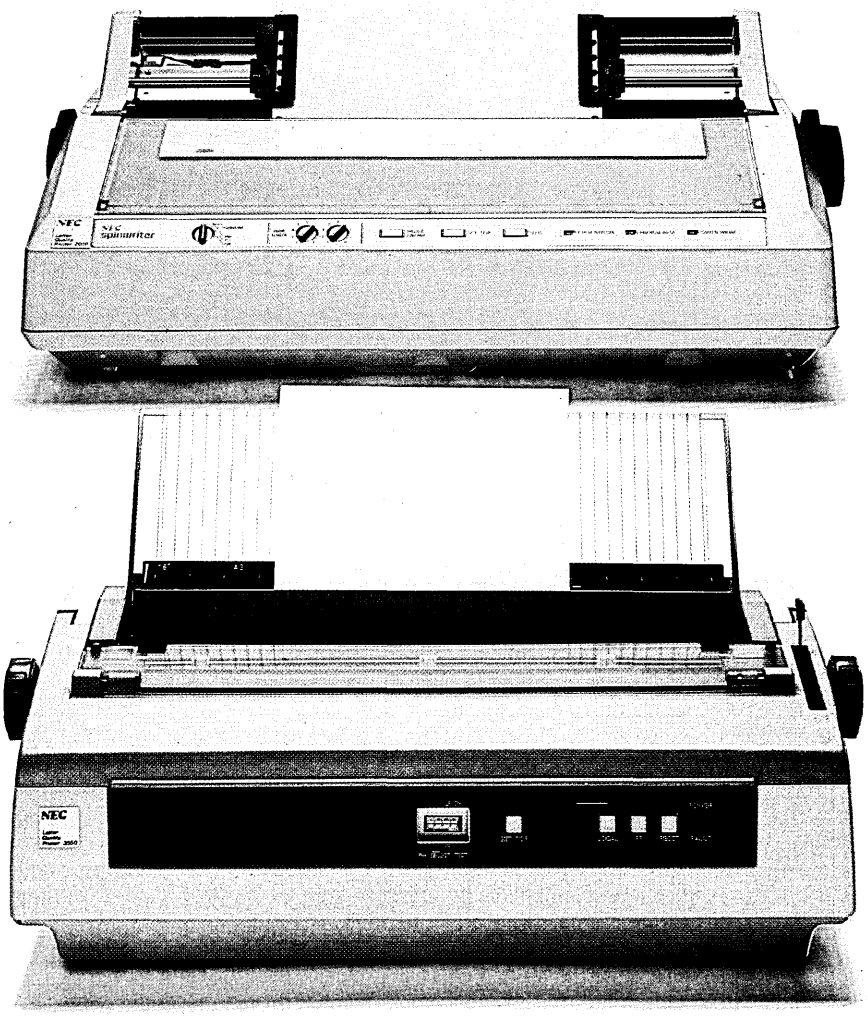
"We want to preserve and nurture the entrepreneurial spirit. We will have a small staff of very senior guys whose background and experience is strong in the skills small companies need," Fisher says. He compares Encore's corporate staff to a bank that sits on the internal boards of the small companies involved. "We'll fund the companies and come up with decisions that will help them."

Fisher puts no limits on the types of companies he wants to pursue, claiming he envisions Encore's product line eventually to stretch "across the pricing spectrum." Retail computers, personal machines, peripherals, software, and superminis—none will be ignored, he implies. "We're not ruling out any [market] niches," he says. "Our vision is broad and worldwide."

As for size, Fisher again sees no limit. "IBM has not stepped forward," he jokes. "But we will not rule out anybody. The relationship we would like is to acquire

SPINWRITER INTR

Now you have a choice of fully compatible Spinwriters for your IBM PC and XT.

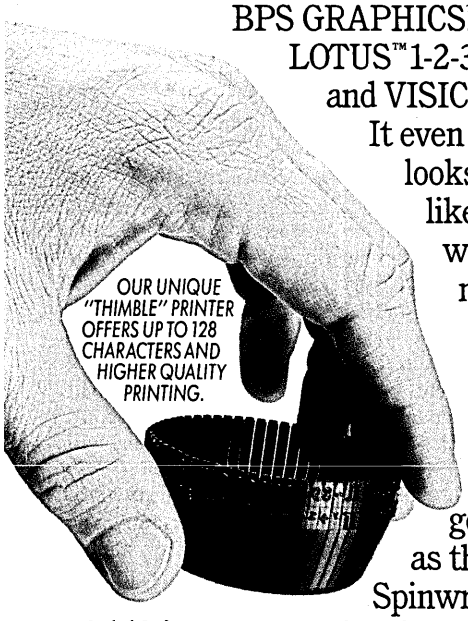


NEC MODELS OFFER SPEEDS OF 200 AND 350 WORDS PER MINUTE.

First, a few words about the original, the Spinwriter 3550.

It was the first and only totally compatible letter-quality printer for the IBM PC. It plugs directly into the IBM PC and works with every piece of IBM PC software, as well as all popular third-party application packages, such as WORDSTAR,™ WORDPLUS,™ VOLKSWRITER,™ VISIWORD,™ MULTIMATE,™ BPS GRAPHICS,™ LOTUS™ 1-2-3,™ and VISICALC.™

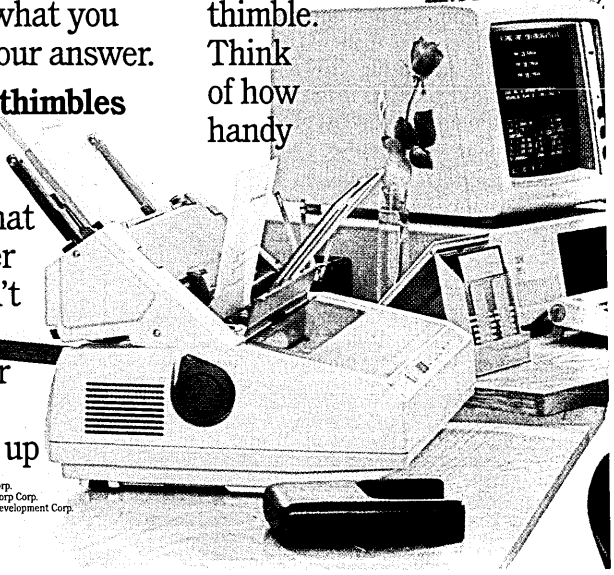
It even looks like it was made for the IBM. Now, as good as the Spinwriter 3550 is, we recognize that a single printer can't take care of every business or professional office need. So we've added another IBM PC compatible Spinwriter: The 2050.



The new 2050 has a printing speed of 200 words per minute. And while it costs less, the print quality is still impeccable. So if low-volume letter-quality printing is what you need, the 2050 is your answer.

60 different print thimbles let your IBM PC look its best.

One of the things that gives our Spinwriter capabilities you can't even get on other printers is our unique "thimble." Each thimble holds up to 128 characters. You can ev have two different type faces on one thimble or print multiple languages from a single thimble. Think of how handy



ODUCES A SPINOFF.

that would be if your business is international.

On the other hand if you have special printing needs, you can opt for a full alphabet plus numbers, sub- and superscripting and scientific and arithmetic symbols.

Incidentally, for all their versatility, our inexpensive

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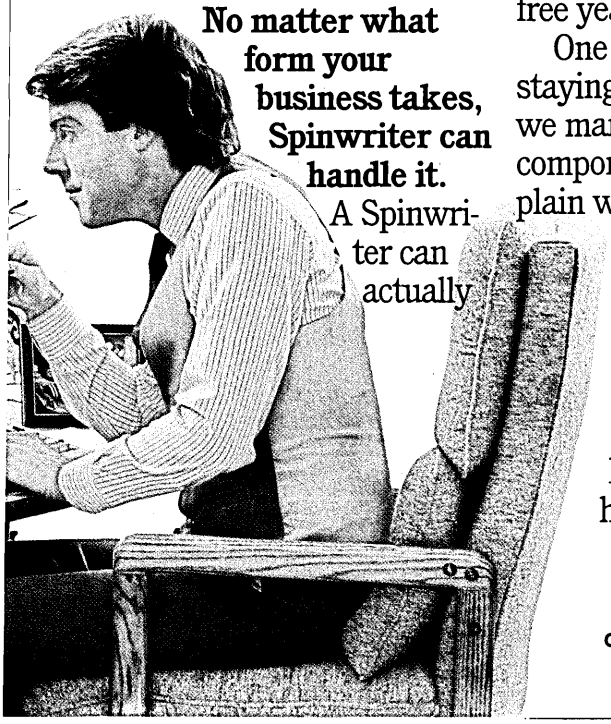
SPINWRITER OFFERS OVER 60 DIFFERENT TYPE FACES.

thimbles last for over 30 million impressions.

So it won't end up costing you a fortune to look like a million.



No matter what form your business takes, Spinwriter can handle it.

A Spinwriter can actually help you put your communications in better shape. It can use any of our nine interchangeable forms handling options. And they can all be easily installed and changed by the operator.

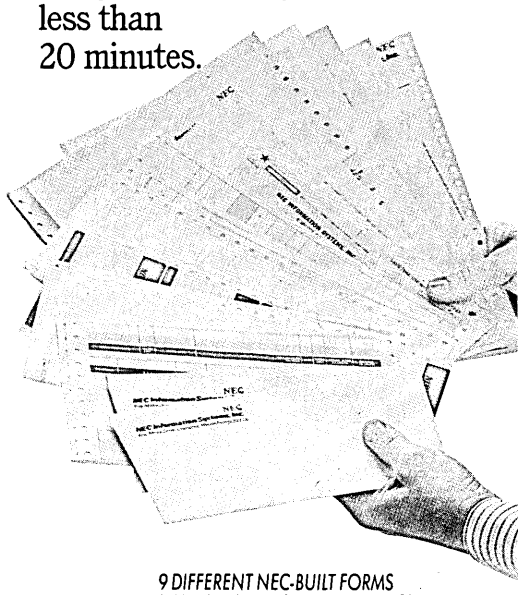
Want to dash off a few hundred original letters to your customers? Our sheet-feeder is just the ticket. It will print on your letterhead and second sheet or envelope.

Standard features include continuous forms handlers that take paper up to 16 inches wide, variable size forms, and multi-part forms.

Spinwriters have a hard-earned reputation for reliability.

Spinwriters hold the industry record for mean-time-between-failure. Over 3,000 hours. Which, in terms of average personal computer usage, adds up to more than two trouble-free years.

One reason for Spinwriters' staying power is the fact that we manufacture every major component. It also helps explain why NEC Information Systems is the number one supplier of letter-quality printers to PC users in America. Of course, someday you may need a little service. If you do, it's nearby. We have a large group of NEC-trained professionals all around the country. It's also quick. Because of our modular design, normal repairs take less than 20 minutes.



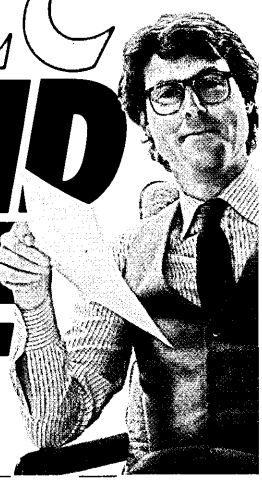
9 DIFFERENT NEC-BUILT FORMS HANDLERS AUTOMATICALLY FEED ANY OFFICE FORM YOU HAVE.

You'll find Spinwriters at participating ComputerLand stores, Sears Business Systems Centers, IBM Product Centers nationwide, Entré Computer Centers and authorized NEC Spinwriter distributors. Or call 800-343-4418 for more information. And find out why more and more IBM PC users are saying, "NEC and me."

SPINWRITER CAN OPTIMIZE YOUR IBM PC CAPABILITIES.

CIRCLE 101 ON READER CARD

NEC AND ME



NEC INFORMATION SYSTEMS, INC.

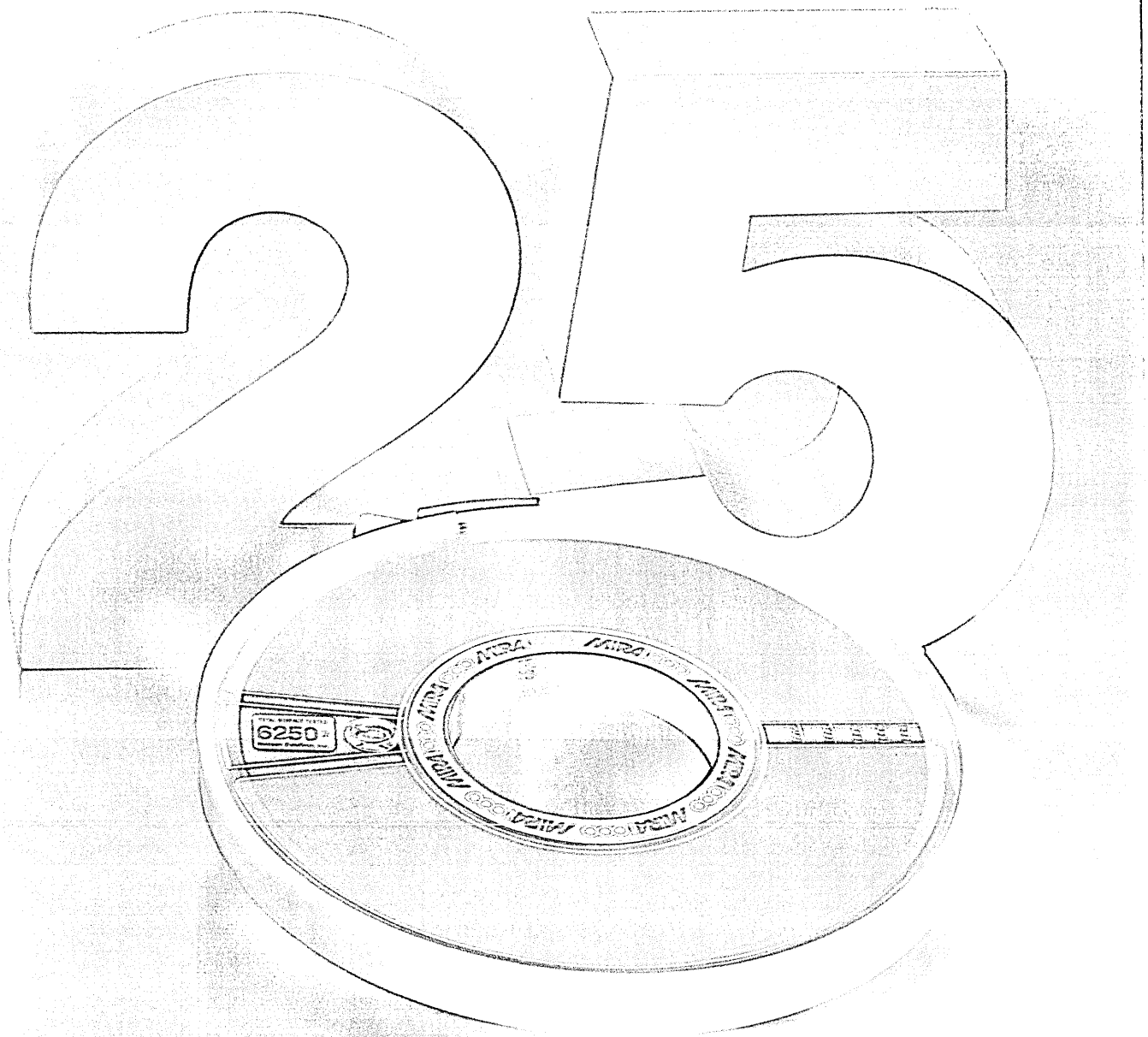
Now, Wabash DataTech Introduces MIRA-1000

Proven superior to any other tape for 6250 drives. Tests at a major university confirm it!

Chances are your 6250 drive isn't giving you maximum performance, but Wabash DataTech has the solution. MIRA-1000 is a miracle in magnetic media, backed by proof-positive from leading drive manufacturers and confirmed by a major American university in test after rigorous test. MIRA-1000 computer tape outclassed the competition in sharper signal output, increased reliability and head life longevity up to 10 times longer than conventional tape.

MIRA-1000 is the ultra smooth, ultra-high performance tape engineered for maximum integrity on your 6250 drives. Our proprietary oxide formulation was proven to be inherently smoother, so MIRA-1000 is... quite simply... consistently the cleanest running tape ever produced. That means low abrasion, improved head life and greater accuracy for your 6250 operations and all future higher recording densities as well.

Backed with our confident 25-Year Warranty, MIRA-1000 delivers the performance that other tapes only promise on today's high-speed, high-density equipment.



WABASH DATATECH™

CIRCLE 102 ON READER CARD

United States Wabash DataTech, Inc. Two Continental Towers, Suite 400, 1701 Golf Road, Rolling Meadows, IL 60008 (312) 593-6363, (800) 323-9868 TWX: 9106870361
Australia Wabash DataTech (Australia) Pty. Ltd., Unit 6, 25 George Street, Homebush, N.S.W. 2140 Tel. 61 2 736-3177
Canada Wabash DataTech (Canada) Inc., 5159 Bradco Blvd., Mississauga, Ontario, Canada L4W2A6 Tel. (416) 625-9533 Telex 06-961345
Europe Wabash DataTech (International), Ltd., 43 Redhills Road, South Woodham Ferrers, Chelmsford, Essex, England CM36JF Tel. (STD 0245) 322380 Telex 995455

and own the companies, but we won't rule out joint ventures. We will not be distributors, though."

Encore's kitty is admittedly low, a million dollars put up jointly by its founding employees, but Fisher states that the company will "tap what we see as appropriate" sources of funds. "We're not in the venture capital business but are an operating company. We'll work with the venture capital people from time to time."

As chairman, president, and chief executive officer, Fisher hopes to lead Encore into a market already shaken by an aggressive IBM, confronting a potential Japanese onslaught at the low end and waiting for semiconductor companies to more fully integrate their product lines into full-blown systems. Fisher's plan is bold, to say the least, and one that will be watched closely by Wall Street, users, and competitors alike.

Fisher's main claim to fame, of course, was his leadership of Prime Computer from 1975 to 1981, when the company grew at a compounded rate of 88% in revenues and 108% in net profits. Before joining Prime, he was vice president of central operations for Honeywell Information Systems, a company that supplied quite a few people to Prime. Fisher joined Honeywell from General Electric when GE sold out its computer operations to Honeywell.

To aid him in his quest for another success story of Prime quality (an encore, of sorts) Fisher has gathered about him a dozen executives whose backgrounds include much time at Prime Computer. Indeed, Fisher first made news for his new company by snagging six top-ranking Prime employees, a move that sent that company's stock down and prompted Wall Street analysts to knock the already suffering company down a few notches in their estimation.

It is said that Fisher is held in high esteem by his staff, several of whom have been with him off and on since General Electric days.

The two most notable men to join Encore, however, are ironically two whose employers, Digital Equipment and Data General, have fought viciously for many years. C. Gordon Bell was most recently vice president of engineering at DEC, where he worked on and off for 20 years, laying the groundwork for the highly successful VAX family of 32-bit processors. Henry Burkhardt III was a founder of Data General and is said to have been instrumental in keeping that DEC spin-out on-track through its first seven years of dizzying growth. Burkhardt left Data General in 1976 a wealthy man to pursue high-tech ventures in and out of the computer industry.

At Encore, Bell will be vice president of technology while Burkhardt will handle corporate development. Of the former, Fisher says, "People don't understand him but they like him," and the latter he calls "a winner."

Burkhardt worked closely with Fisher in planning Encore's emergence from concept to incorporation. Fisher left Prime in 1981, surprising observers and prompting speculation that he had had strong differences with Prime's founder, major backer, and chairman, David J. Dunn.

Bell says he is quite satisfied with what he accomplished at DEC, the guiding of VAX from paper to marketplace and the establishment of a 6,000-strong engineering force. He says he looks forward to Encore, where he'll be able to get away from administrative chores and back to designing computers. Engineering is his love, he notes, and he thinks that small teams can be particularly innovative in computer development. In fact, he suggests that the small-is-beautiful philosophy may be effective in warding off competition from the Japanese in the world marketplace.

Among the other executives on board at the time of Encore's curtain rise are Robert G. Claussen, vice president of marketing and former domestic sales vice president of Prime; George H. Dudley, president of the sales and service division and former Prime vice president for eastern operations; John D. Ludden, vice president, controller, who was vice president of marketing services at Prime; and Charles "Chuck" T. Casale, vice president of corporate affairs, who once worked as an engineer at Control Data but most recently consulted in the securities business.

Also joining Fisher are Paul Renner, who will handle Encore's leasing operations; Eugene Ringstad, former vice president of Prime's central operations; and Karl Wassmann, who will head up mergers and acquisitions activities after handling similar duties at Gould Inc.

Each of the Encore executives has signed a restrictive, three-year employment agreement and each has significant ownership positions in the company. It is understood that Fisher, Burkhardt, and Bell have the largest individual shares and are bound by even tighter employment agreements.

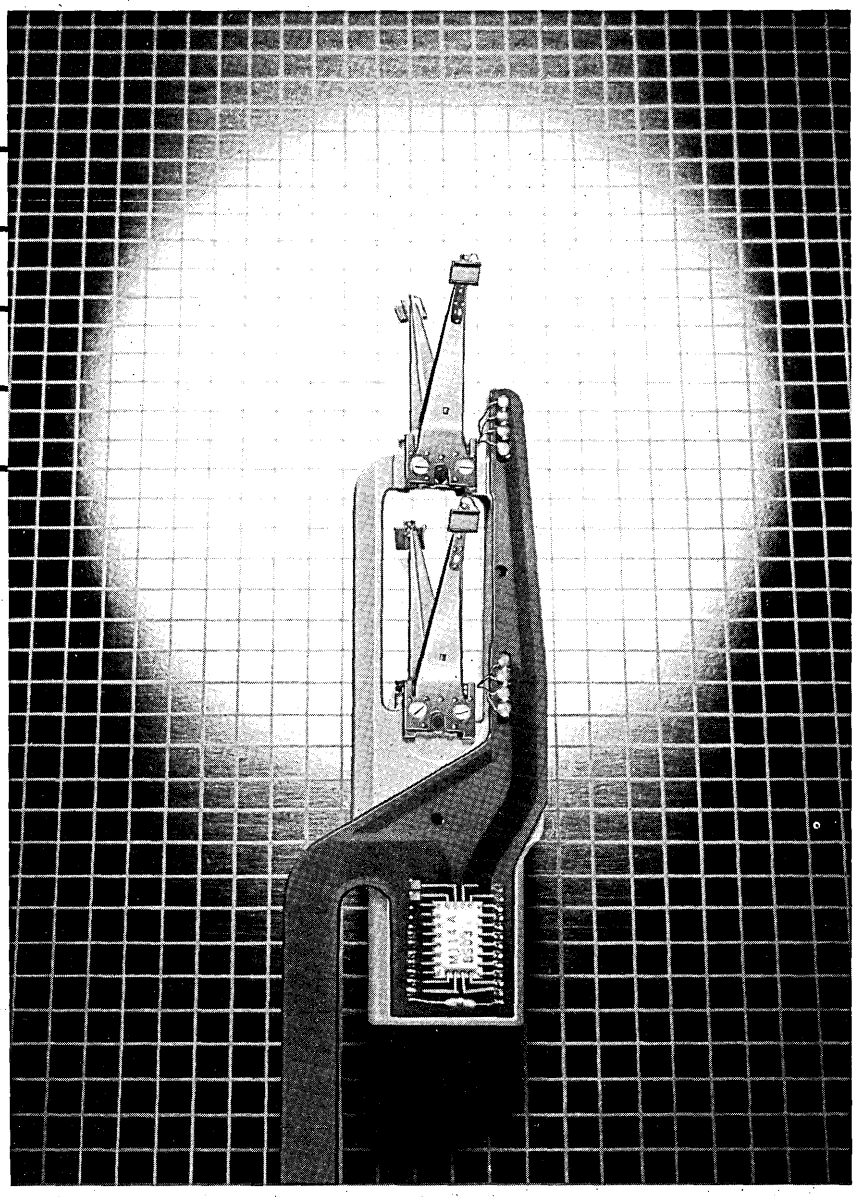
"We're aggressive folks with big appetites," concludes the chief executive. "We like earnings." And he's off to give an encore under the bright lights of television.

—John W. Verity

"Now this should clear up a lot of our problems. Let me have five of these signs."

CARTOON BY LEONARD TODD

WE PUT OUR THIN-FILM HEADS TOGETHER AND CAME UP WITH A BETTER STORAGE SYSTEM.



Actual size

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We took innovative technologies and built the most advanced DASD systems now on the market—the Control Data 33800 and 33750. Like our thin-film heads—shown above in a head/arm assembly. Like four separate and independent, sealed Head/Disk Assemblies (HDAs): sealed for protection from computer room air; independent for improved maintainability. Dual access and dynamic path selection mean greater throughput and better string availability. Like all our DASD systems, the 33800 and 33750 are fully compatible with IBM architecture. And they offer additional benefits like XA compatibility and floor space savings of up to 20%. The 33750 is even field upgradable to a 33800.

With the 33800 and the 33750, our PCM commitment pays off again. For more information, call 612/553-4311.

CONTROL DATA

CIRCLE 103 ON READER CARD

HARDWARE

OFF-LINE

For the traveler who thought he had everything, SuiteTalk personal computer provides hotel guests with complimentary information on hotel services, shopping, transportation, and events. And for a fee, guests can call their home or office computers, or check messages, airline schedules, or news. They can also run business programs and play video games. The computer, which resembles a TRS-80 Color Computer but is designed specifically for hotel rooms, comes from Hoteltech, in Belvedere, Calif.

Another new service of note is Data General's Express, which ships terminals and printers in less than 48 hours after a telephone order is taken, for users who absolutely, positively need their hardware in two days.

Another mini maker, Prime Computer, recently followed DG with a new top-of-the-line model. Prime's 9950 is said to offer 50% greater system level performance than the 850, which it supplants. The 9950's base price is $392,500.

Most of the time, a vendor can spew out reams of information if you ask how a product works. Not so the manufacturers of Eye-Guard, a crt screen that is said to reduce operator eye fatigue. Says Jerry Schneiderman, Langley-St. Clair's president, "We don't have the faintest idea how it works." The screen is made of the same lead-impregnated acrylic plastic that is used for windows in nuclear plants and hospital X-ray rooms.

From a vendor who probably has a better idea of how its new product works, we have the 5550 workstation just announced by IBM Japan. The 16-bit micro supports both kanji and alphanumeric characters.

NETWORK INTEGRATION

Advanced Network Integration (ANI) represents this vendor's approach to interconnecting multiple nodes, speeds, protocols, interfaces, and formats into a single communications network. The concept is based on the Master Executive Network Organizer (or Mentor), which provides real-time network status reporting and strategic analysis. Implemented on an IBM Personal Computer, Mentor can display most facets of network activity to the network center, at several levels of detail. Central operators can implement any necessary corrective measures, including network reconfiguration, via down-line loading from the central console.

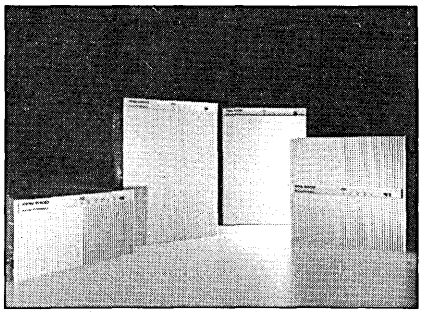
With the ANI system, a terminal device anywhere in the network can connect with computers or other terminals in the network on a local or global basis. ANI permits access to fundamentally different data communications resources, bridging public, private, and proprietary systems. Intelligent switching systems distribute communications access locally. The network concept combines statistical multiplexing technology with network concentrators, LAN switching systems, and high-speed communications links. All of the vendor's communications products are compatible with the system.

Specific functions performed by the Mentor program include multinode control, advanced statistics, diagnostics, and selectable event reporting. It can also trigger network alerts based on user-specified thresholds. INFOTRON SYSTEMS CORP., Cherry Hill, N.J.

FOR DATA CIRCLE 301 ON READER CARD

ARRAY PROCESSORS

The FPS-5000 series of array processors offers three to six times the performance of previous processors sold by this vendor, along with four times the previous memory capacity. The processors take advantage of a new distributed architecture and offer cost/performance ratios in the range of $2,000 per MFLOPS (million floating point operations per second). The processors are intended to appeal to the signal/image processing community for applications such as medical imaging, seismic data processing, flight simulation, image processing, and general signal processing. The units support all host computer interfaces that are supported by the vendor's FPS 38-bit array processor line, and can function either under the direct control of the host, as a "load and go," or as some combination.



The 5000 series is offered in a base configuration of 256K words of data memory, 12.5K words of table memory, a general purpose control processor, and a single floating point coprocessor. Depending on the model, program memory is upgradable to 16K or 32K and data memory is upgradable to 512K or 1M words. Several models in the line offer two or three coprocessors. The models range in peak performance from 26 MFLOPS ($60,000) to 62 MFLOPS ($100,000). Initial deliveries are slated for February. FLOATING POINT SYSTEMS INC., Beaverton, Ore.

FOR DATA CIRCLE 302 ON READER CARD

STORAGE SUBSYSTEM

The InfoCenter electronic filing and hard disk storage system functions as a mass storage and retrieval central file, supporting up to 14 terminals in this vendor's Integrated Office System. The InfoCenter also interfaces with this vendor's standard printers, the DictaScan optical character recognition reader, and microcomputers.

The system is available in 20, 50, 70, 84, 100, or 168 megabyte versions. It also includes a start/stop cartridge tape drive for backup and for facilitating archival storage of files from the Winchester hard disk. The larger storage capacities can

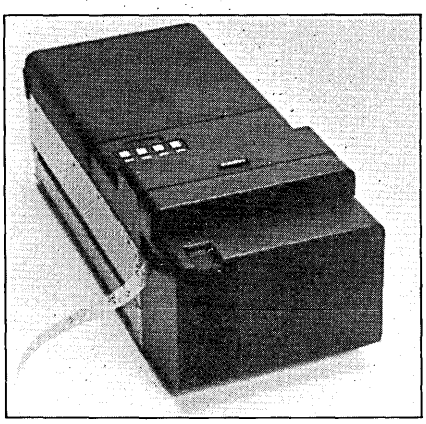
be upgraded in the field.

The InfoCenter is based on the Motorola 68000 microprocessor running Xenix. It provides up to four levels of security to prevent unauthorized access, but it also allows several operators to share document and information files where permitted by the user. Prices start at $10,000 for a 20MB version. DICTAPHONE CORP., Rye, N.Y.

FOR DATA CIRCLE 303 ON READER CARD

TELEX CONVERTER

The Telexpunch converts ASCII characters into Telex codes for transmission over Telex lines. The unit is designed so that messages can be prepared on a standard word processor or electronic typewriter and then be converted instantly into edited tape ready for transmission on a Telex terminal. Two word processors or electronic typewriters can be connected to the Telexpunch and work simultaneously through a serial RS232C interface or an optional current loop. The unit has a buffer memory for storing two messages.



Code conversion tables for translating from ASCII to Telex are available to meet different national standards. Characters on standard typewriters that differ from the Telex code are converted by the Telexpunch into expanded or control characters. The "$" of a standard keyboard, for example, is converted to "DLR." Tabulated text, such as price lists and financial reports, is also handled by the Telexpunch, which recalculates tab positions with regard to expanded characters and differing line lengths so that the Telex message is in accord with the editing of the word processor.

A paper tape reader added to the unit permits incoming as well as outgoing messages to be handled. Code translation is performed on the incoming tapes for input directly into a word processor or computer system. The Telexpunch costs $2,000 and is available for either five-track international Telex or eight-track TWX. FACIT/DATAROYAL, Nashua, N.H.

FOR DATA CIRCLE 304 ON READER CARD

GRAPHICS TERMINALS

This line of computer graphics terminals offers 14- or 19-inch raster monitors for use in business, scientific, and engineering applications. The terminals support ISSCO's business software Disspla and Tell-a-Graf, as well as Megatek's engineering software, Template. The terminals also support full Tektronix emulations.

The GR-1104 offers a 1,024 × 780 pixel resolution with eight colors displayable from a palette of 512. Its 14-inch tube uses a 60Hz noninterlaced display and includes a selectable color alphanumeric overlay capability for superimposing and scrolling independent file listings over existing graphic displays. The Multibus-based terminal has four RS232C ports for communication with tablets, cartridge tapes, hardcopy devices, and the host. It costs $4,950.

The GR-2414 provides 1,280 × 1,024 resolution on a 19-inch monitor with 1,024 displayable colors from a palette of 32,768. The terminal can write up to 25,000 vectors per second. It features local interactive processing that supports basic two-dimensional transformations for scale, rotation, and translation; clipping functions with window and viewport; zoom and scroll; positioning, rubber banding, drag; and hit test. The graphics processor can generate an array of primitives with built-in anti-aliasing. The unit costs $18,950. SEIKO INSTRUMENTS, Graphics Devices and Systems Division, Milpitas, Calif.

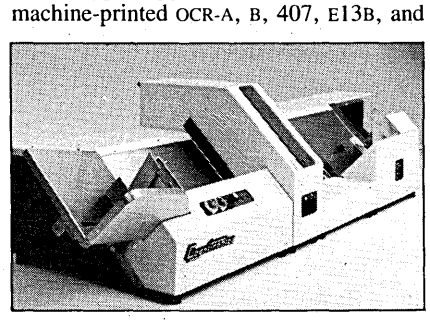
FOR DATA CIRCLE 305 ON READER CARD

DOCUMENT READER

The 566 document reader is intended primarily for turnaround document applications such as customer billing for insurance companies, utilities, publishers, and retail stores. The 566 can also be used to read optically the MICR line and other information from checks.

The unit uses matrix matching and topological recognition software to read a customer-selected 1-inch area across an 8½-inch document at speeds of up to 10,000 documents per hour. Documents can range from 2 to 8½ inches in length and 2 to 6 inches in height and can be printed in a variety of dropout colors. Up to 500 documents can be handled by the unit's hoppers.

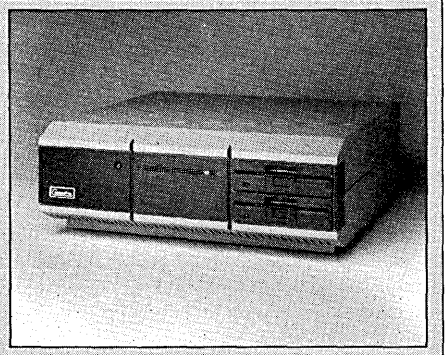
The 566 will read typed upper case OCR-A, typed upper and lower case OCR-B, machine-printed OCR-A, B, 407, E13B, and



HARDWARE SPOTLIGHT

MULTI-USER MICRO

This vendor, breaking from its traditional IEEE 696 orientation, is slated to announce its MultiPro MP 10 four-user microcomputer this month at CP/M '83 East. The computer system offers simultaneous execution of both 8-bit and 16-bit software, and supports word/data processing and communications functions through a shared database at speeds faster than personal computer network configurations.



Standard features on the system, which costs $5,000 excluding terminals, include an 8MHz 16-bit 8088 cpu with a megabyte of main memory, seven serial ports including modem port and Centronics printer port, 384KB of solid-state disk memory, and dual 5¼-inch floppy disk drives with a capacity of 1.6MB. In addition, four 8-bit Z-80B user processors, each with its own 64KB RAM, are included in the central unit.

The package allows simultaneous multitasking operation of both 8-bit and 16-bit programs under an enhanced version of the vendor's MP/M 8-16 operating system, a derivative of Digital Research's MP/M. The operating system is fully compatible with all MP/M software and comes bundled with a menu-driven electronic spreadsheet and word processor, as well as a DBMS.

In the standard MultiPro configuration, each user terminal has access to its own 8-bit processor and memory for running 8-bit applications. The 8088 cpu and its memory is dynamically allocated to each user for 16-bit applications, with the Z-80B performing the role of a terminal handler. The distinction between 8-bit and 16-bit software is transparent to the user under the MP/M 8-16 operating system.

Hardware options include an 8MHz math coprocessor for $500, and up to 4MB of the vendor's M-Drive/H solid-state disk emulator in megabyte increments of $2,500. Mass storage options include an external 2.4MB dual 8-inch floppy drive subsystem for $2,400 and an internal 40MB Winchester drive for $4,000. An optional network interface will be available by the end of the year; full production of the standard MultiPro MP 10 begins next month. COMPUPRO, Hayward, Calif.

FOR DATA CIRCLE 300 ON READER CARD

some hand-printed characters and digits. The system can read several fonts intermixed on the same line. Any reject, format error, or out-of-balance condition displays on the crt for on-line correction or other action. The unit costs $20,000. COGNITRONICS CORP., Stamford, Conn.

FOR DATA CIRCLE 306 ON READER CARD

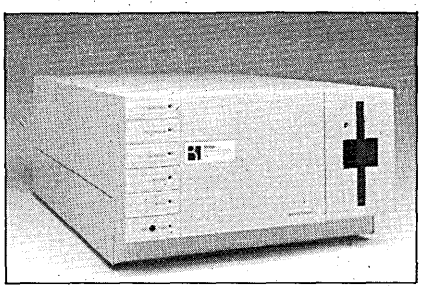
LINKING ETHERNETS

The GS/3 Internetwork Router links as many as eight remote Ethernet networks using common point-to-point connection media. The communications processing system supports from two to eight communication lines, with a maximum aggregate data rate of 304Kbps when fully configured. The product is a full implementation of the Ethernet transport protocols.

The unit can use any point-to-point connection method accessible via an RS232/423 or RS422 synchronous communications port, including leased lines, fiber optic links, broadband modems, microwave links, and switched lines. Interconnections can be made over dial-up low-speed lines or medium-speed dedicated lines for over a thousand miles.

The GS/3 uses the Xerox Network System Internetwork Datagram Protocol to route information packets across multiple Ethernets or communications links, and the XNS Routing Information Protocol to query and update internetwork routing tables. Internetwork packets are encapsulated using a full duplex framing protocol for 350-packet-per-second transmission. Multiple links may be established between Ethernets for increased throughput and redundancy.

The unit consists of three logical modules, each running a dedicated 68000 processor. The central communication pro-

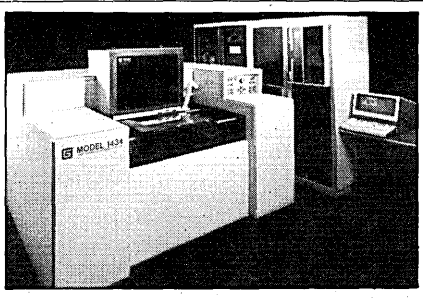


cessor contains the XNS protocol software; the Ethernet Interface Module interfaces to the Ethernet at the data link level; the serial interface module contains up to four dual port boards. The unit employs the Multibus backplane. With one I/O board, the GS/3 costs $9,900. Each additional board costs $1,900. A package including two GS/3 units and transceivers costs $17,000. BRIDGE COMMUNICATIONS INC., Cupertino, Calif.

FOR DATA CIRCLE 307 ON READER CARD

PHOTOPLOTTER

The model 1434 Ultra Precise photoplotter has been redesigned to meet industry requirements for larger tv screen shadow



mask masters and high-density artwork. The 18 × 22 inch active plotting surface accommodates film and precision glass plates of up to 20 × 24 inches.

An autofocus subsystem detects irregularities present on the surface of glass plates and dynamically maintains optimum distance between the plate and objective lens of the system, within a 50 micro-inch resolution. Using a laser interferometer to achieve its precision, the model 1434 produces images as fine as 0.00508mm, including complex straight and arc tapers. Accuracy over the full 18 × 22-inch plotting surface is ±40 micro-inches with accuracies of ±20 micro-inches over smaller areas.

The 1434 includes the series 1400 control, with 192KB of memory in its cpu. A cassette drive and program loader are also included. The 1434 can be operated on-line with a variety of computer systems and off-line from magnetic tapes. GERBER SCIENTIFIC INSTRUMENT CO., Hartford, Conn.

FOR DATA CIRCLE 308 ON READER CARD

STAT MUX

The DS1800 series of intelligent statistical multiplexors is designed to provide error-free transmission of nine EIA asynchronous channels over a single telephone or digital communications line. The multiplexors reduce the number of lines required by dynamically allocating space on the network link to active terminal ports only. Applications include front-end redundancy, high-speed line utilization, resource allocation, satellite link, and multipoint terminals.

Use of the X.25 (HDLC) Level II network link protocol assures error-free transmission at speeds of up to 19.2Kbps, even if the telephone lines are degraded or marginal, the vendor says. Data frames are validated by means of a cyclic redundancy check. When errors occur, automatic retransmission prevents loss of data integrity.

The multiplexors provide 16KB of dynamic RAM with 14KB reserved for buffering data during peak periods. Up to 64KB with 46KB reserved is available as an option. Different models support three, five, seven, or nine async devices. Models are field upgradable. Prices range from $1,550 for a three-channel model to $2,750 for a nine-channel model. DEVELCON ELECTRONICS INC., Doylestown, Pa.

FOR DATA CIRCLE 309 ON READER CARD

DRUM MEMORY

The VRC 4040 drum memory utilizes one head per track of memory and has a capacity of 9.6MB. The unit is a direct replacement for Control Data's CDC 9733-5 fixed head disk in current installations. Controllers for most minicomputers are available.

The use of a single head for each track of memory is intended to increase the reliability of the memory; mean time between failures is estimated at 25,000 hours. The unit has a recoverable error rate of one in a hundred billion bits and an unrecoverable error rate of one in a trillion bits, the vendor says. The unit is designed to tolerate extremes in environment, with a standard operating temperature range of 10° C to 45° C (50° F to 113° F). The vendor says that similar tolerance ranges exist for humidity, shock, and vibration.

Access time for the memory averages 8.5ms, with a data transfer rate of 1.1MB per second. Loading or unloading the entire memory takes under 10 seconds. The VRC 4040 includes all of the electronics necessary for data encoding and separation, as well as a provision for mounting adapter logic to emulate other memories. It can be formatted with 128, 256, 284, or 512 data tracks, each with 150KB capacity. VERMONT RESEARCH CORP., North Springfield, Vt.

FOR DATA CIRCLE 310 ON READER CARD

GRAPHICS SYSTEMS

Three new terminals round out the PS 300 family of self-contained interactive computer graphics systems. The product line, designed for the creation and manipulation of 2-D and 3-D data structures, offers rotation, translation, zooming, clipping, and other modification of images. The PS 320 dual-user station allows the capacity-one control unit to be shared by a pair of users. The two independent workstations are each supported with a set of optional interactive devices and enhancements, including upgrades to more powerful systems. A basic PS 320 system, including processor, a megabyte of memory, two monochrome displays, two data tablets, installation, and delivery, costs $81,890.

The PS 333 is a more powerful single-user system, available with up to four megabytes of memory and a variety of interactive devices and enhancements, including a color calligraphic display and an upgrade capability to the PS 340 system. A PS 330 configuration, including processor, a megabyte of memory, a monochrome display, a data tablet, installation, and warranty, costs $69,295.

The PS 340 provides the full capabilities of the PS 330, with the addition of special visualization features, including three-dimensional surfaces and solid objects that can be defined by polygons and displayed with hidden lines removed. Sectioned views of the images may be computed and displayed on the vector display. The

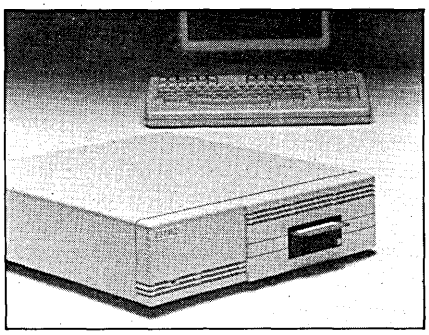
unit costs $74,300, which includes a control unit with a megabyte of memory, a monochrome display, data tablet, and warranty. EVANS & SUTHERLAND COMPUTER CORP., Salt Lake City, Utah.

FOR DATA CIRCLE 311 ON READER CARD

DISK DRIVES

The Series 3000 consists of 12 models of Winchester and floppy disk drives that are fully compatible with Hewlett-Packard computers. Each of the four model lines in the series can be configured with a Winchester drive of 5MB, 10MB, or 15MB of storage. The model 3000s are Winchester-only subsystems; the model 3300s each consist of a Winchester drive and a built-in 3½-inch floppy drive with formatted storage of 270KB and a 20.5KBps transfer rate; the model 3500s include a Winchester with a 5¼-inch floppy with 270KB storage and a 10.2KBps transfer rate; and the model 3800s include the Winchester with an 8-inch floppy with 1.2MB storage and 25.6KBps transfer rate. The 8-inch floppy supports the IBM 3740 format commonly used in data exchange and CP/M software distribution.

Each series 3000 subsystem supports disk sharing among two or three different HP computers. Each computer has exclusive access to its preset Winchester



storage area, while the use of the floppy drive is shared. Users may reconfigure or repartition the storage setup to meet changing demands. A load backup and restore option enables the user to back up data from the Winchester to the floppy without using the host cpu. The drives are fully compatible with HP 1000, 9000, Series 200, Series 100, Series 80, 98xx, 250, and 64000 computer systems. Connection to these systems is entirely through the HP-IB interface.

The model 3000s start at $2,860, the model 3300s at $3,490, the model 500s at $3,790, and the model 3800s at $4,260. The multiport disk sharing option costs $700, and the backup and restore option costs $300. BERING INDUSTRIES INC., San Jose, Calif.

FOR DATA CIRCLE 312 ON READER CARD

PRINTER

The DP-6500 Rapid/Scribe dot matrix printer can achieve speeds of 500 cps at 10 characters per inch, or 540 cps at 12 cpi. The printer's 18-needle printhead consists of two vertical columns of nine dots. Since the two columns are adjacent, two identical columns of dots may be printed simultaneously, doubling the printing speed of conventional nine-needle printheads.

The DP-6500 provides enhanced mode printing with proportional spacing or fixed spacing at 10, 12, 15, and 16.4 cpi at speeds of up to 410 cps. A dual-pass correspondence quality mode provides proportional spacing at 10 or 12 cpi at 100 or 120 cps. Seven ISO-standard character sets are available, including a full ASCII set. A graphics mode provides 72 or 144 dots per inch. Options include character font downloading from the host, alternate character fonts in PROM, and UPC and Code 39 bar codes. Standard buffer storage is 4.5KB, with an additional 16KB optional. The printer costs $3,000. ANADEX INC., Chatsworth, Calif.

FOR DATA CIRCLE 313 ON READER CARD

MEMORY FOR DG

The DR-240 megabyte add-in memory for Data General Nova 4 or Eclipse S/140 minicomputers comes standard with a 22-bit word (16 data and 6 ECC). The six bits of ECC allow single-bit error correction and double-bit error detection. The actual ECC generation and checking is handled either on the DR-240 or in an external ECC card in the host mini. Reliability is also improved with on-board error sniffing, in which memory locations not being used are refreshed, with single-bit errors being detected and corrected.

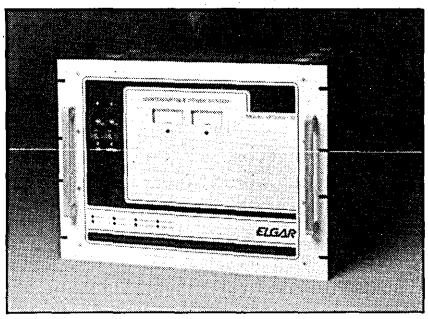
Read or write cycle time is 400 nanoseconds for the memory board. The refresh interval is 15.2 microseconds. Four-way interleaving, refresh, and battery backup operations are completely compatible with the comparable Data General memory modules. The starting address of the DR-240 can be set via an on-board dual-in-line package switch. The starting address can be set in 32KB increments throughout the entire address range of the minicomputer being expanded.

The unit is also available in smaller capacities of 128KB, 256KB, and 512KB. Single-quantity pricing is $1,315 for the 128KB model, $1,860 for the 256KB model, $3,165 for the 512KB model, and $5,385 for the megabyte version. DATARAM CORP., Cranbury, N.J.

FOR DATA CIRCLE 314 ON READER CARD

UPS

The B Series of uninterruptible power sources provides protection against blackouts, brownouts, and other forms of utility line perturbation. The UPS series is available in 1, 3, 5, 10, 15, and 25 kVA single-phase and 37.5 and 50 kVA three-phase models. The units come standard with 60Hz AC input, although all but the 50 kVA version will be available in 50Hz versions for international markets.



Models in the series come with a standard inverter synchronization frequency window of 60 ± Hz, a slow slew frequency feature—typically 1Hz per second slew rate—and automatic forward transfer of the bypass switch after an overload-induced reverse transfer has occurred. The three smallest units also include a transistorized pulse width modulated static inverter and a standard electromechanical type bypass switch. The units also have full diagnostic and annunciation packages and are designed to interface with and operate from an external nominal 72 VDC battery, 36 series connected lead acid cells or equivalent.

On the larger end of the B series, the 50 kVA UPS inverter efficiency at 25% of load is greater than 86%; at 50% of load it is greater than 90%, and at 100% of load it is 92%. ELGAR CORP., San Diego, Calif.

FOR DATA CIRCLE 315 ON READER CARD

ACCELERATOR

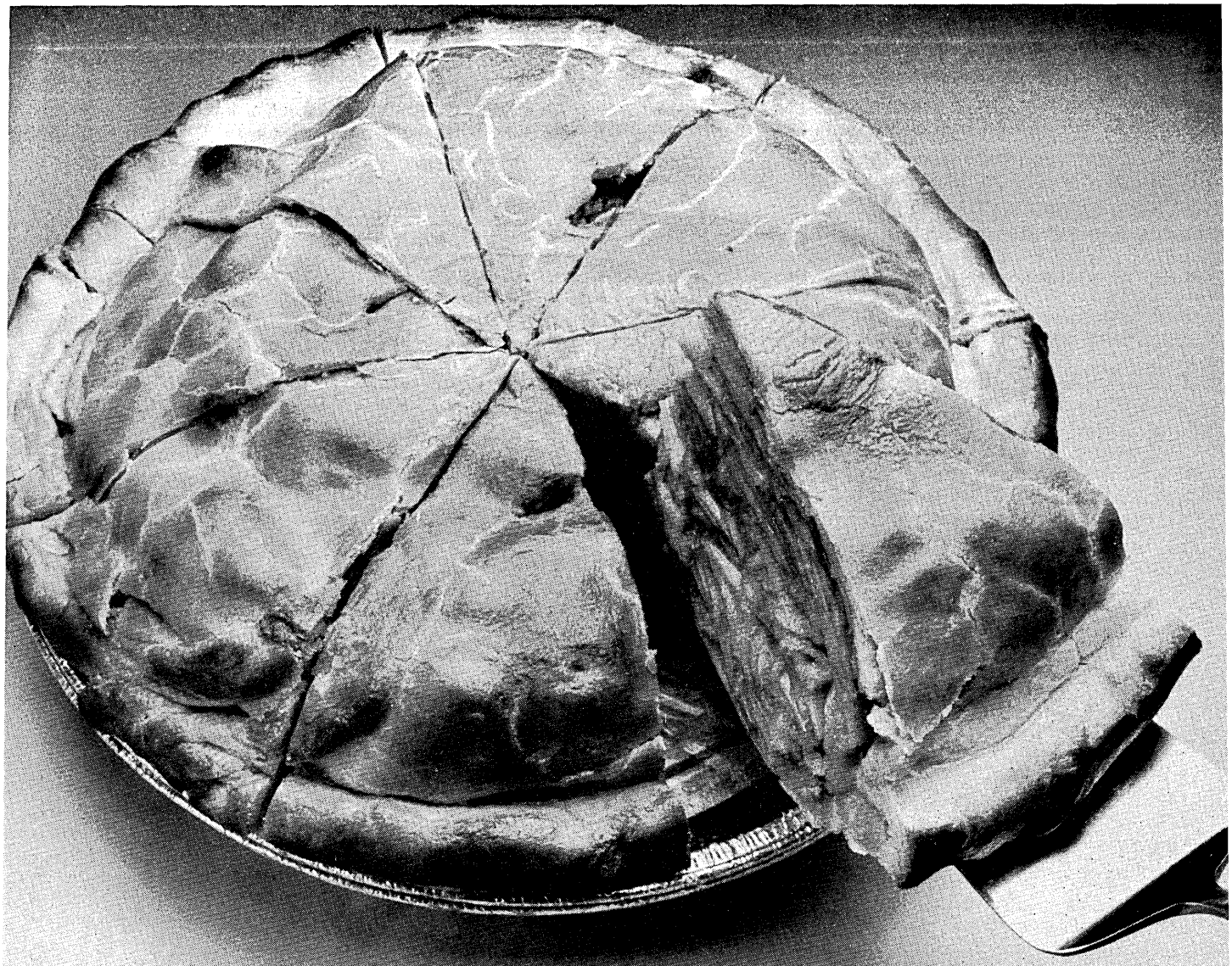
The SKYFFP-C is a single card that provides high-speed floating point arithmetic capability for the Chromatics CG-7900 graphics terminal. The processor is capable of a 3.0ms 32-bit floating point multiply, operating in single precision; it can also operate using a 64-bit double precision format. SKYFFP performs format conversions, square root, logarithmic and trigonometric functions, complex arithmetic, pivot operations, max/min functions, and user-programmed special functions. The board includes a writable control store for users who wish to speed up a special or frequently used algorithm.

The board requires no modification of existing FORTRAN, Pascal, or C programs. The vendor supplies a set of run-time modules that replaces existing software emulation subroutines. The board costs $2,700, with oem discounts available. SKY COMPUTERS INC., Lowell, Mass.

FOR DATA CIRCLE 316 ON READER CARD

GRAPHICS CONTROLLER

The Omega 500 display controller is designed for use with the 100MHz video bandwidth high-resolution color monitors recently introduced. The controller supports 1,280 × 1,024 pixel screen resolution and provides 60Hz noninterlaced refresh rates. A custom bit-slice microprocessor with a 167ns cycle time can draw random vectors at 1.5 million pixels/sec., and can flash fill



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CIRCLE 105 ON READER CARD

rectangles at 35 million pixels per second. An 8 × 24 color lookup table allows up to 16 million colors to be displayed.

For applications requiring greater depth of color and less emphasis on resolution, the unit can provide a 640 × 512 × 32 configuration, which lets the user configure the way the bit planes use the lookup table. The unit costs $16,950. METHEUS CORP., Hillsboro, Ore.

FOR DATA CIRCLE 317 ON READER CARD

CARTRIDGE DRIVE

Designed for high capacity full-function tape peripheral and Winchester backup applications, the 50MB Super Funnel cartridge tape drive is fully compatible with cartridges written on any Funnel ¼-inch drives currently in the field. The microprocessor-based drive provides bidirectional serpentine recording to eliminate rewind time between tracks.

The Super Funnel can read data written at 6,400 bpi on four tracks in order to maintain compatibility with older drives, but it can also write and read at 8,533 bpi on seven tracks to achieve the 50MB capacity. In the higher capacity mode, it requires the high capacity 555 cartridge manufactured by the vendor. Data transfer rate at 8,533 bpi is 40KBps.

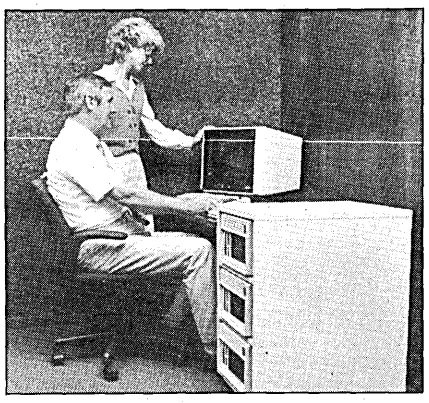
Standard features on the drive include a center-of-gravity mounting system for the capstan motor and a proprietary dual gap head for read-while-write data verification. A separate erase head helps ensure data reliability. The read/write head has full codec function; other components include interface logic with motion control and status reporting, EOT/BOT hole sensing and management, drive motor, and servo system controls. The drive has the capabilities of file search, rack select, and modification of existing records. A heavy duty cycle motor with continuous start/stop capability enables the Super Funnel to construct and read files with standard ANSI interblock gaps at 37.5 ips and locate these files at 37.5 or 90 ips in both directions.

Up to four drives can be connected together on a common bus. The drives cost $1,000 each in quantities over 1,000. DATA ELECTRONICS INC., San Diego, Calif.

FOR DATA CIRCLE 318 ON READER CARD

CAD SYSTEM

This computer aided design system includes the vendor's ICEM/120-40 desktop workstation, CD/2000 design and drafting software, Advanced Operating System, the HASP II communications protocol, and CalComp plotter software interface. The ICEM/120-40 costs $50,000. A more sophisticated version, supporting six workstations, costs $161,000. Each of these CAD systems can be linked to the vendor's Cyber 170 systems installed in user facilities or over the Cybernet data services network. Optional software for both models includes



BASIC, FORTRAN, and the Comprehensive Electronic Office set of word processing, electronic mail, and electronic filing programs. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 319 ON READER CARD

FIBER OPTIC MODEM

The model 4110 is a full duplex fiber optic modem for data communications among terminals and/or communications equipment. The unit converts standard RS232C data signals into optical pulses for transmission over dielectric fiber optic cables. The unit also provides local handshaking required for most terminal operations.

The fiber optic cables can be attached directly to the modem, without using optical connectors. The unit provides asynchronous communication at 100Kbps at distances up to one kilometer (0.62 mile). Great signal spans can be achieved by connecting a pair of modems as duplex repeaters. The data stream can also be tapped at these locations for local area networking.

Modems can be ordered premounted on customer-specified lengths of fiber optic cable, or they can be installed in the field. The 4110 costs $160. OPTELECOM, Gaithersburg, Md.

FOR DATA CIRCLE 320 ON READER CARD

LANGUAGE CONTROLLER

The CS105 high-level language controller is designed for industrial and process control applications. Operating in ROM-resident FORTH, the unit provides control system designers with the ability to perform program development directly on the controller. System memory is configured as a solid-state disk to provide high-speed handling of source code and high reliability in hostile environments where rotating memories are prone to failure. The unit services a variety of I/O devices and the STD, IEEE 488, and CAMAC buses. It acts as a master to existing systems utilizing these buses and provides for integration of peripheral devices and interfaces.

CS105 hardware includes the 8085A microprocessor, bus interface circuitry, RS232C port, a real-time clock and calendar, and 16KB of EPROM containing the BIOS and the FORTH nucleus. The unit can service up to three additional 16KB modules, for 2KB EPROMs for the patch area, 2KB system RAM, and 12KB RAM for the user dictionary or solid-state disk.

The unit is intended to operate in a FORTH environment and is supplied with 8085 fig-FORTH. Several tools have been provided for the CS105 user, including a FORTH decompiler, an 8085 assembler, and a screen-oriented editor. FORTH was chosen because it allows the user to save significant time in program development compared to assembler, while executing programs at about a 20% slower clip. CONTROLEX CORP., Van Nuys, Calif.

FOR DATA CIRCLE 321 ON READER CARD

GRAPHICS TERMINAL

The NJC-C1922 color graphics terminal, intended for a variety of applications in CAD, CAM, and CAE, is composed of a detached keyboard and a main unit, which holds a 19-inch color monitor, a crt controller, a graphics processor, and a communications processor and port. The terminal provides 1,024 × 780 pixel resolution, with 16 displayable colors from a palette of 27 colors. The unit can draw at 800ns/pixel.

Local intelligence includes plotting of vectors, rectangles, circles, and ellipses, as well as complete picture manipulation. Advanced text editing, including mixing text with graphics, comes standard. Optional equipment includes a graphics printer, video hardcopy unit, digitizer, light pen, and joystick. Zoom and pan functions are optional. The NJC-C1922 is compatible with the DEC VT100 and Tektronix 4010/4014 series of terminals, and costs $9,950 in single units. NIPPON COMPUTER CO. LTD., Tokyo, Japan.

FOR DATA CIRCLE 322 ON READER CARD

COMMUNICATIONS PROCESSOR

The Oz 228 is a Z-80 based communications processor with an integrated 212A intelligent modem. The unit is designed to improve operator productivity and network flexibility by allowing users or system integrators to develop their own applications programs for most storage, data entry, communications, or network applications.

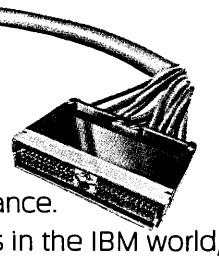
The Oz 228 can be programmed to store and validate locally entered data; provide prompted data entry formats; receive and store up to 55 pages of data; support screen formatting for terminal and protocol emulation; provide data encryption, error detection, and retransmission routines; and perform protocol conversions. The unit also includes the features of the vendor's Oz 225 intelligent network modem.

The Oz 228 contains 64KB of dynamic RAM, with another 64KB optional. Battery backup is provided. The unit costs $1,590 for 64KB or $2,060 for 128KB. TRIDATA, Mountain View, Calif.

FOR DATA CIRCLE 323 ON READER CARD

—Michael Tyler

A Plug for IBM



SSI printer system expertise gives you total IBM plug-and-go compatibility...

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We have other unique solutions in the IBM world, too, for System 34, System 38 and you name it. Such as driving four printers from one control box. Or generating remote output in parallel mode (our 9135 Converter) so that remote printers appear local to the processor. In serial communications, we offer full compatibility with 2780, 3780 and 3270 Type A&B protocols.

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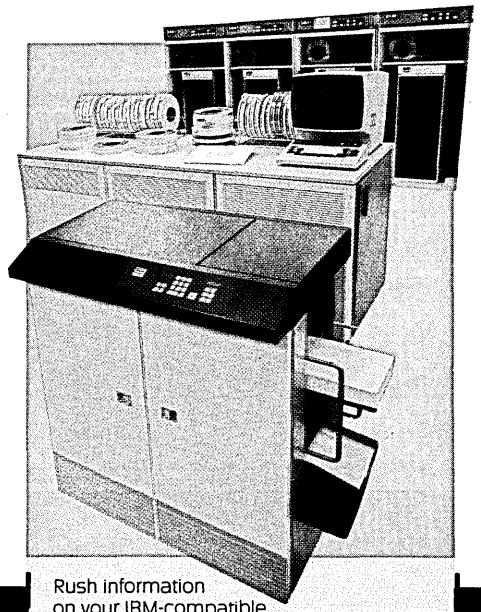

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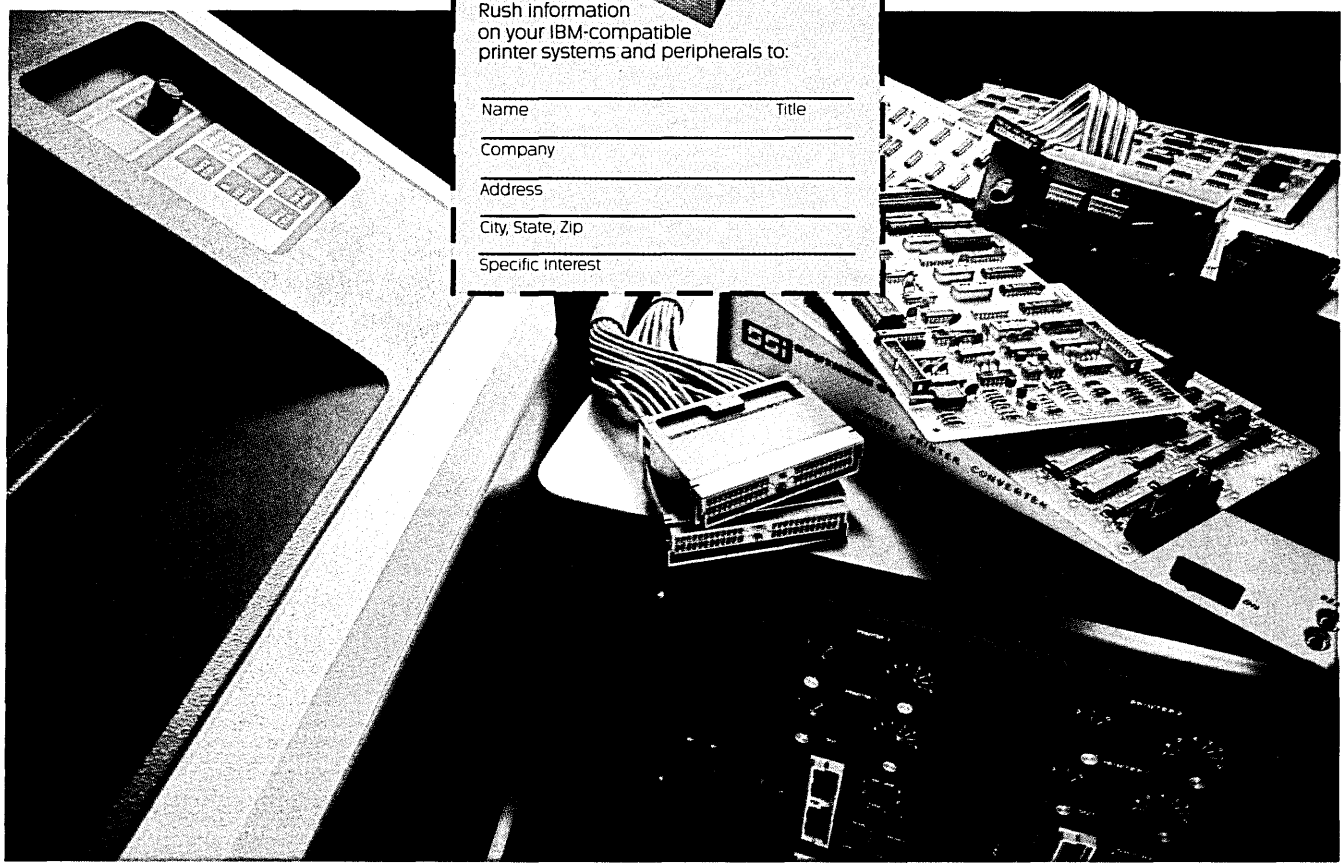

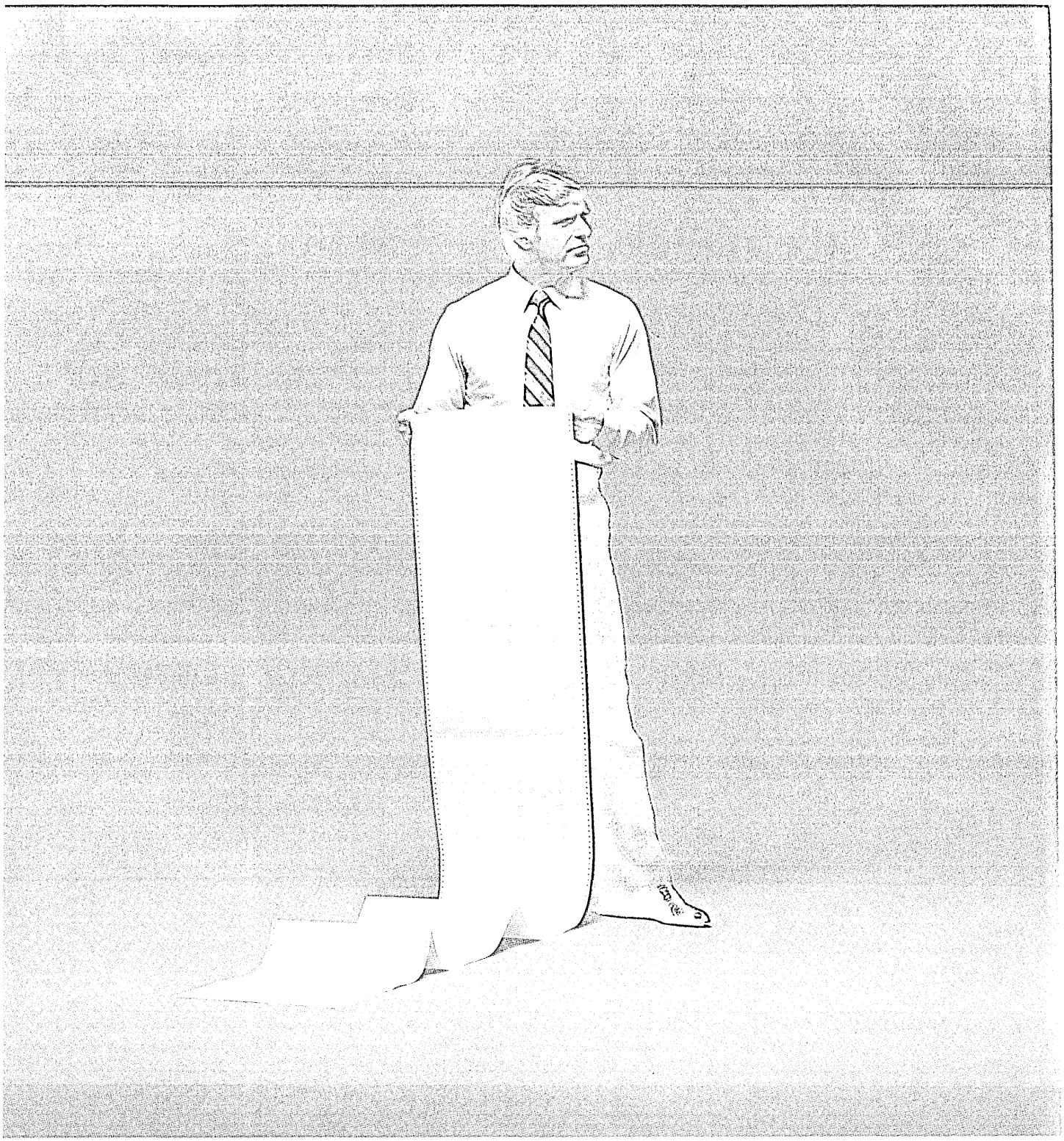

Figure $50 a line for programming.

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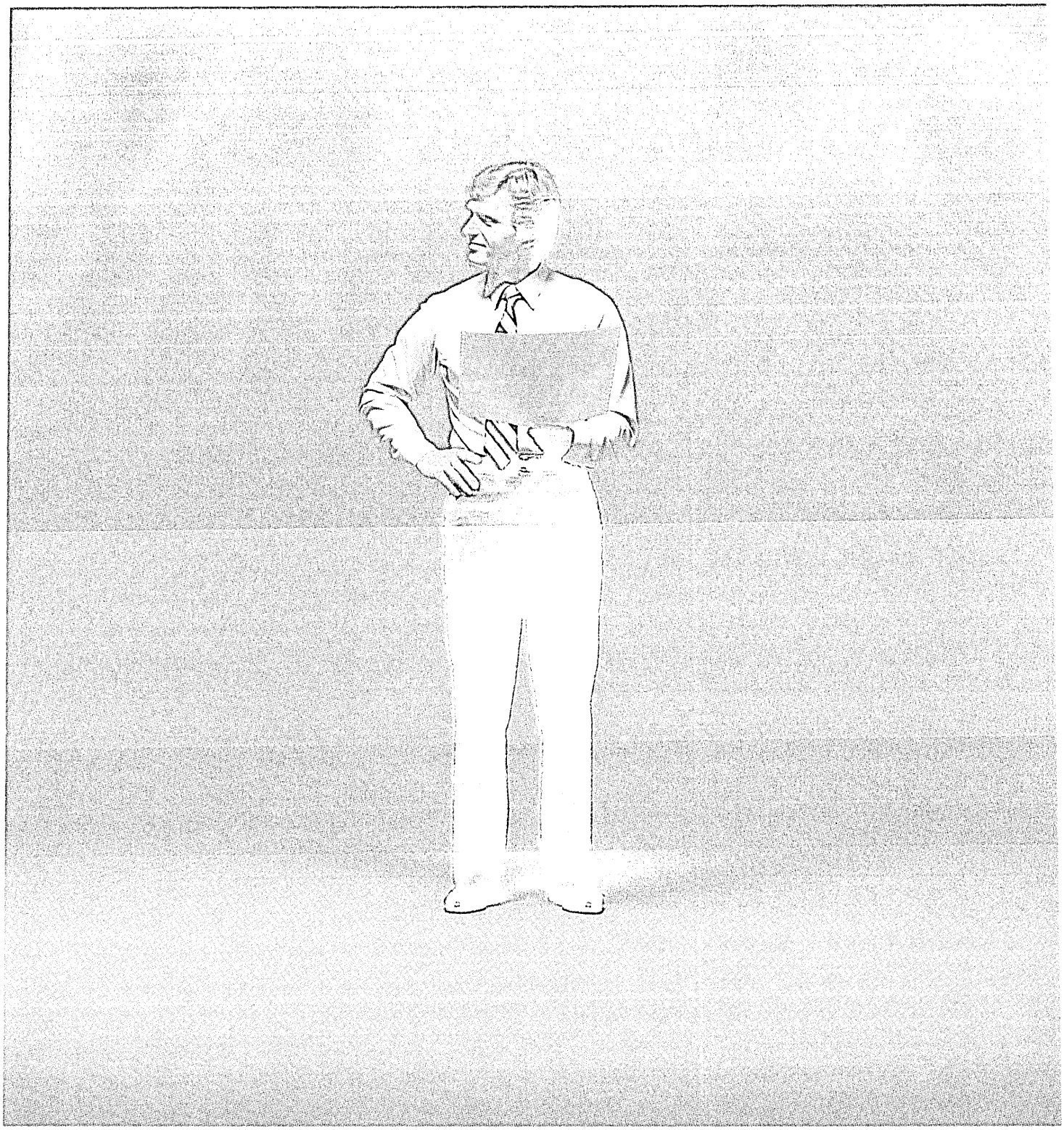

Now divide by five.

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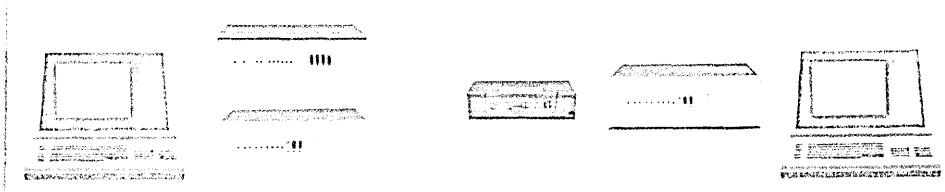

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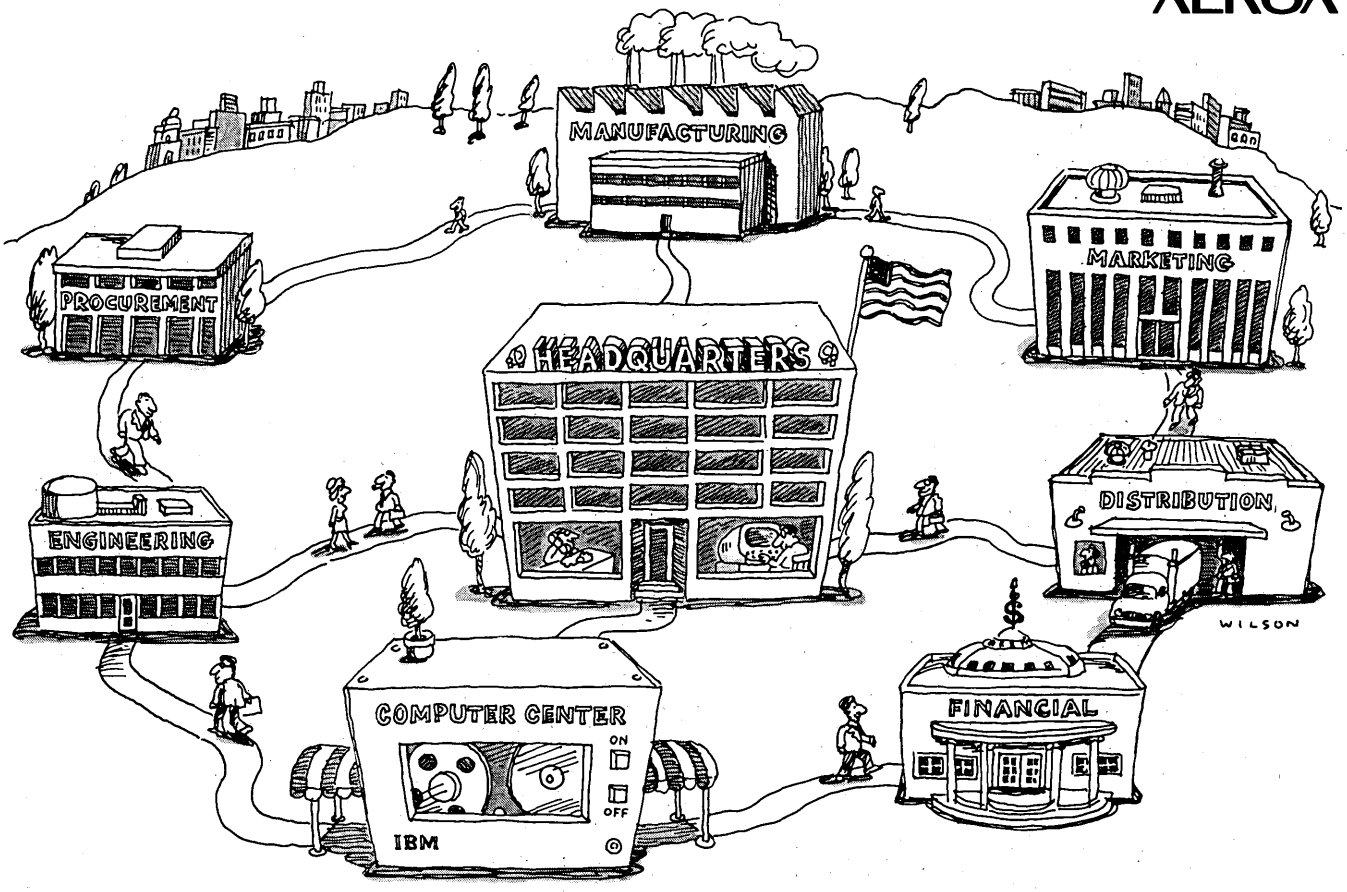

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CIRCLE 107 ON READER CARD

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With large volumes of textual material now available in computer-readable form, the indexing, storage, and retrieval of full text has become both an opportunity and a problem for managers of: corporate records, regulatory affairs, corporate libraries, research, and litigation support. IBM has recognized that text management is a critical part of overall information resource management.

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SOFTWARE AND SERVICES

UPDATES

The next step in the evolution of the coin-operated telephone may be the "Coin-Operated Computer Terminal Information Vending Machine," which will be installed in hotel lobbies, airline terminals, and other public spaces in the next year. Anyone with a $1 or $5 bill (coin-operated is a misleading term) can sit at the console and connect into any computerized information service to which he subscribes, and conduct research for three or 15 minutes.

IBM has finally announced Logo for its Personal Computer. The programming language is meant to introduce children and adults to programming concepts, as well as to mathematical and geometric relationships. The product comes courtesy of Logo Computer Systems, and costs $175 at IBM Product Centers.

Here are two more to add to your list of micro-to-mainframe connections. The first is an agreement between Lotus Development Corp. and Management Decision Systems Inc. to integrate Lotus's 1-2-3 program for microcomputers into Management Decision Systems' Express decision support system for mainframes and minis. The second is a technical exchange relationship between VisiCorp and Applied Data Research Inc. Under the arrangement, VisiCorp will help ADR integrate VisiOn into ADR's mainframe software. In both agreements, the idea is to allow PC users to access mainframe-resident data and manipulate them using microcomputer software.

Another agreement of note is between McGraw-Hill and Software Arts Inc. McGraw-Hill will produce and market TK!SolverPacks, which are application products for use with TK!Solver that are based on books published by McGraw-Hill.

SAS TO ADABAS

Extract/A is an interface between the SAS Institute's SAS statistical analysis system and Software AG's ADABAS database management system. The product combines the extensive analytic and graphic capabilities of SAS with the large-scale data storage and retrieval capabilities of ADABAS. The interface, developed in cooperation with Software AG, is an SAS procedure that enables users easily and efficiently to retrieve a subset or all of the data stored in an ADABAS file.

A few statements allow users to extract a subset of ADABAS records, a subset of fields, or a subset of records and fields. Record selection utilizes the inverted file access methods of ADABAS. ADABAS file security is maintained through passwords and cipher parameters. The product operates on IBM 370, 30xx, 43xx, and IBM-compatible cpus running the IBM OS operating system. It requires ADABAS release level 4.1 or later and SAS version 79.5 or later. A future release of Extract/A will be compatible with DOS operating systems, the vendor says, Extract/A costs $9,500, with multiple copy and early order discounts available. DECISION RESOURCES CORP., Washington, D.C.

FOR DATA CIRCLE 326 ON READER CARD

S/36 DBMS

DBA 34/36 is a database management system written for the IBM System/34 and System/36 minicomputers that is written in RPG II. The product gives users direct access to the data they need at the terminal. It allows users to define and get recurring reports, including simple user-defined calculations. Access paths can be maintained on-line as activity occurs, at the end of the terminal session, at the end of a job, or queued for batch, whichever is most appropriate for the file. All requisite support programs come with the package, including maintenance, query, report generator, and RPG II interface programs.

The program was written in RPG II to cut development time; the use of its calling subroutines displaces much applications code. Installation of DBA 34/36 does not change existing files. The vendor says that no training is required to use or install DBA 34/36, since the manual included with the package describes installation procedures and includes instructions for tailoring the product's functions to reference the files selected for installation. The package costs $4,300. FITS SYSTEMS INC., New York, N.Y.

FOR DATA CIRCLE 327 ON READER CARD

SUBROUTINE LIBRARY

MicroSub:Math is a library of FORTRAN subroutines for engineers and scientists that covers the field of numerical methods. Over 60 subroutines, supplied in both single and double precision, are included in the package. These include techniques in interpolation, integration, matrix/linear systems methods, polynomials/nonlinear systems functions, differential equations, and trigonometric functions. Some specific subroutines are Fresnel integral, Lagrange interpolations, Simpson's integration, matrix multiplication or inversion, eigen values, polynomial roots, and complex number operations.

MicroSub:Math, in being structured as a subroutine library, is intended to give the user flexibility in writing programs. Subroutines are supplied as relocatable object files ready to be linked with the user's program. Documentation is provided for the library as a whole and for each subroutine supplied. Use of the library, including program linkage and file structure, are explained. For each subroutine, documentation includes a subroutine header, which gives information needed to call the routine correctly, and a method section, which briefly explains the numerical method algorithms and supply references for each procedure.

The package is available for several CP/M FORTRAN compilers. The introductory price is $250. FOEHN CONSULTING, Klamath Falls, Ore.

FOR DATA CIRCLE 328 ON READER CARD

BERKELEY UNIX

The 4.1bsd version of the Unix operating system is available in object code for VAX minicomputers. The system is an enhanced

version of AT&T's Unix System V. Features not found on the AT&T version but included in this version include demand paged virtual memory support for the VAX; a C shell command interpreter; enhanced electronic mail; the *vi* text editor; the *me* package of text formatting macros; support for Versatec plotters and typesetters; support for Berkeley Pascal and franz lisp; and support of the Ingres relational database management system.

The virtual memory support, in contrast to the process swapping concept present in the AT&T Unix, allows transparent access to an address space large enough for any program that will run on the host machine. Process-swapping requires that the entire process must be resident in main memory, which limits the size of programs that can be handled and tends to degrade performance under heavy system loads.

The operating system can be configured for all devices currently supported by DEC on the VAX hardware, as well as nonstandard devices including DH11-emulating terminal multiplexors, TM11-emulating tape controllers, Emulex SC21 disk controllers on the Unibus, and DR11-C graphic systems C/A/T phototypesetter interfaces. The 4.1bsd Unix is available for purchase. Each purchase includes a binary license for the indicated number of users, a complete set of documentation, and a bootstrap tape and instructions configured to the particular hardware. License fees range from $1,375 to $17,000, depending on the number of users and the number of licenses. A $750 configuration charge is added to all purchases. MT XINU, Berkeley, Calif.

FOR DATA CIRCLE 329 ON READER CARD

QUALITY ASSURANCE

Q-Assure is a post-manufacturing quality assurance information software package that enables manufacturers to compile production, service, and warranty information. The menu-driven database system helps manufacturers identify problematic products and/or components, and assembles comprehensive timely information on performance ratings, failure statistics, warranty reports, and service time/cost data.

Developed for the Hewlett-Packard HP-1000, Q-Assure is written in Pascal and equipped with the Image database management system. An HP-3000 version is also available. Each of the two programs in the product—Update and Relay—displays prompts and messages to assist operators in utilizing the system. Its interactive capability is designed to maximize the efficiency of frequently used or time-critical functions while reducing the amount of redundant or dated information storage.

In the Update mode, operators can perform any of four functions related to such data items as customer, service representative, product name, report date, and quality rating. In the Report mode, Q-Assure maintains and prepares detailed reports on customer service information that falls into 20 categories, including installations, assembly performance, accelerated aging, customer warranty, product discrepancy, and service time details. The HP-1000 version costs $7,500, while the HP-3000 version costs $10,000. The price includes a one-year warranty and first-year software support. DATA BASE LOGIC INC., Wilmington, Del.

FOR DATA CIRCLE 330 ON READER CARD

MAINFRAME SECURITY

CA-Sentinel is a total security system for on-line and batch processing in DOS/VS(E) sites. The package can be controlled and maintained completely on-line using CICS/VS, CMS, or ICCF, and provides protection of computer resources and data files for both the CICS/VS partition and the DOS/VS(E) batch processing partition.

Resources protected for CICS/VS users include transactions, programs, files, records, transient data, and temporary storage. Batch resources protected include programs, data files, and system libraries; the procedure libraries, core image libraries, source statement libraries, and relocatable libraries are all covered. In addition, the package supports the IBM DL/1 database management system.

CA-Sentinel offers options that permit real-time notification of access violations. The user has the option to suspend processing at terminals or in partitions if severe violations are detected. All violations and unsuccessful log-on attempts are recorded in a log file, which is available for on-line query and reporting. Passwords for users of the system carry expiration dates, and new passwords can be automatically assigned. Time-of-day and day-of-week access authorization is also available.

The package interfaces with other software products sold by this vendor in its Operations Management Software series, as well as with the CA-Universe database management system. The package costs $10,000 for a three-year lease, including maintenance and support. COMPUTER ASSOCIATES INTERNATIONAL INC., Jericho, N.Y.

FOR DATA CIRCLE 331 ON READER CARD

REGIONAL DATABASE

The X/Region service allows companies operating on a nationwide basis to focus on the business activity and prospects in segmented geographical markets. It also enables companies whose markets are regional to assess the impact of external economic events. The database of regional economic and demographic data was developed and is maintained by Urban Systems Research and Engineering Inc.

The service provides annual economic and demographic data, both historical and forecast, for 266 standard metropol-

SOFTWARE SPOTLIGHT

DECISION SUPPORT

CPL/Tactix is a decision support system that operates on several varieties of mainframes as well as on the IBM Personal Computer. The product has a different orientation than other financial products, in that at its core is a table database structure that provides flexible set handling and the basic capabilities found in many relational database managers. The product includes a complete selection of commands, statements, and functions for financial analysis, and provides default displays of reports and graphs if no custom programming is required.

The product is designed for use by both data processing professionals and end users. The typical end user, who requires a visual orientation and the extensive spreadsheet capabilities found with many microcomputer packages, can use CPL/Tactix as an IBM P.C. spreadsheet package or can use it on any terminal by moving up to the mainframe-based product for networking or heavier processing loads. Dp professionals can use the mainframe version to enforce corporate standards for data security, program documentation, and consistency of analytic method.

In addition to its spreadsheet capabilities, CPL/Tactix operates as a database manager. Each user has his own table library where he can store and manipulate virtually unlimited numbers of tables, each of which can be custom edited to resemble previously used reports. The tables are subsets of the mainframe database, so that users have access to appropriate corporate data as established by the dp department. Reports from applications are displayed as tables that can be edited and printed for management presentations.

The product runs on any IBM 370, 30xx, and 43xx mainframes under VS1, VS2/MVS/TSO, VM/CMS, VSPC, or DOS/VSE-ICCF; on Sperry 1100 mainframes under OS 1100 level 37 or later; on Honeywell mainframes under GCOS; on the Nort 10/100 minicomputer under SINTRAN; and on any IBM Personal Computer under MS/DOS. All common tty mode terminals, 327x terminals, UTS 400/4000 terminals, and PC monitors are supported by the product.

CPL/Tactix is sold for a single license of $85,000 per mainframe cpu. The IBM P.C. version is available only to licensees of the mainframe version, and costs $2,000 per P.C. (The entire program is supplied on two diskettes and is fully compatible with the mainframe version.) Maintenance is free for the first year, $8,500 per year thereafter. Two days of training for up to 12 people costs $2,000. SEGRA INTERNATIONAL INC., Mountain View, Calif.

FOR DATA CIRCLE 325 ON READER CARD

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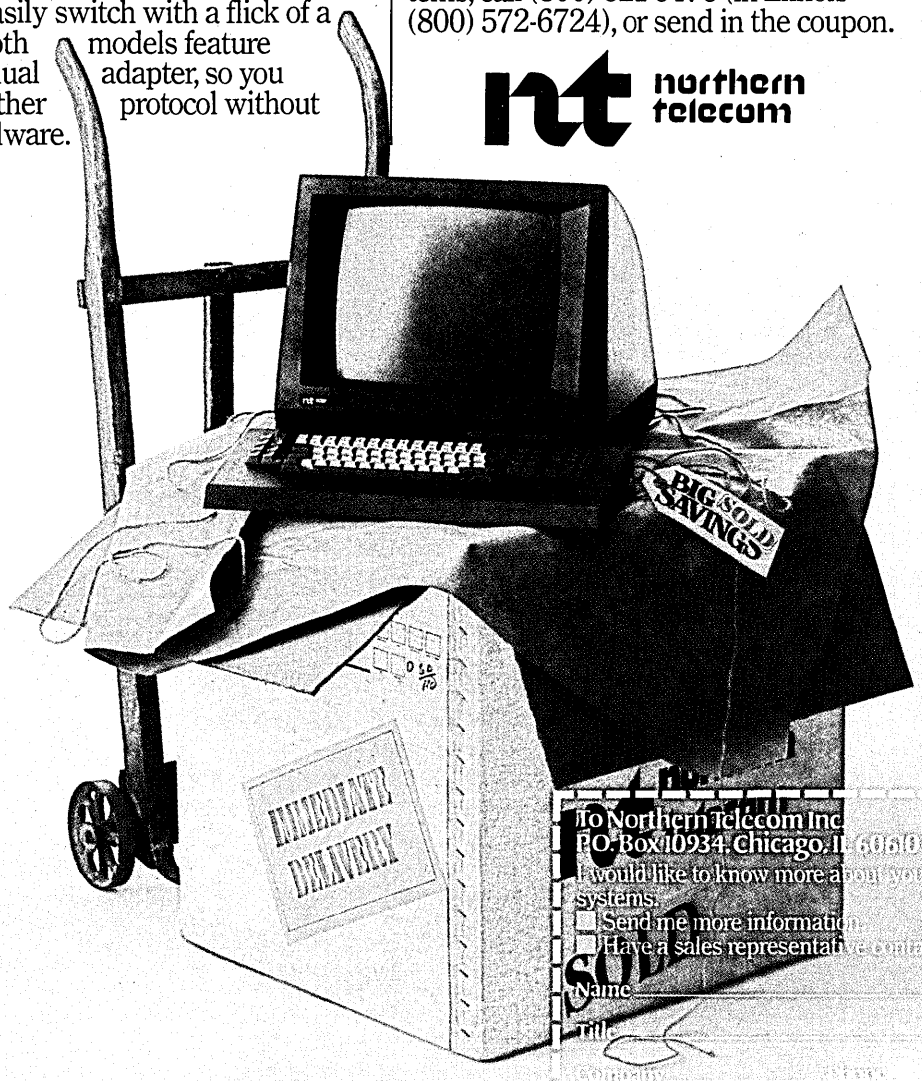

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☐ Send me more information.
☐ Have a sales representative contact me.
Name
Title

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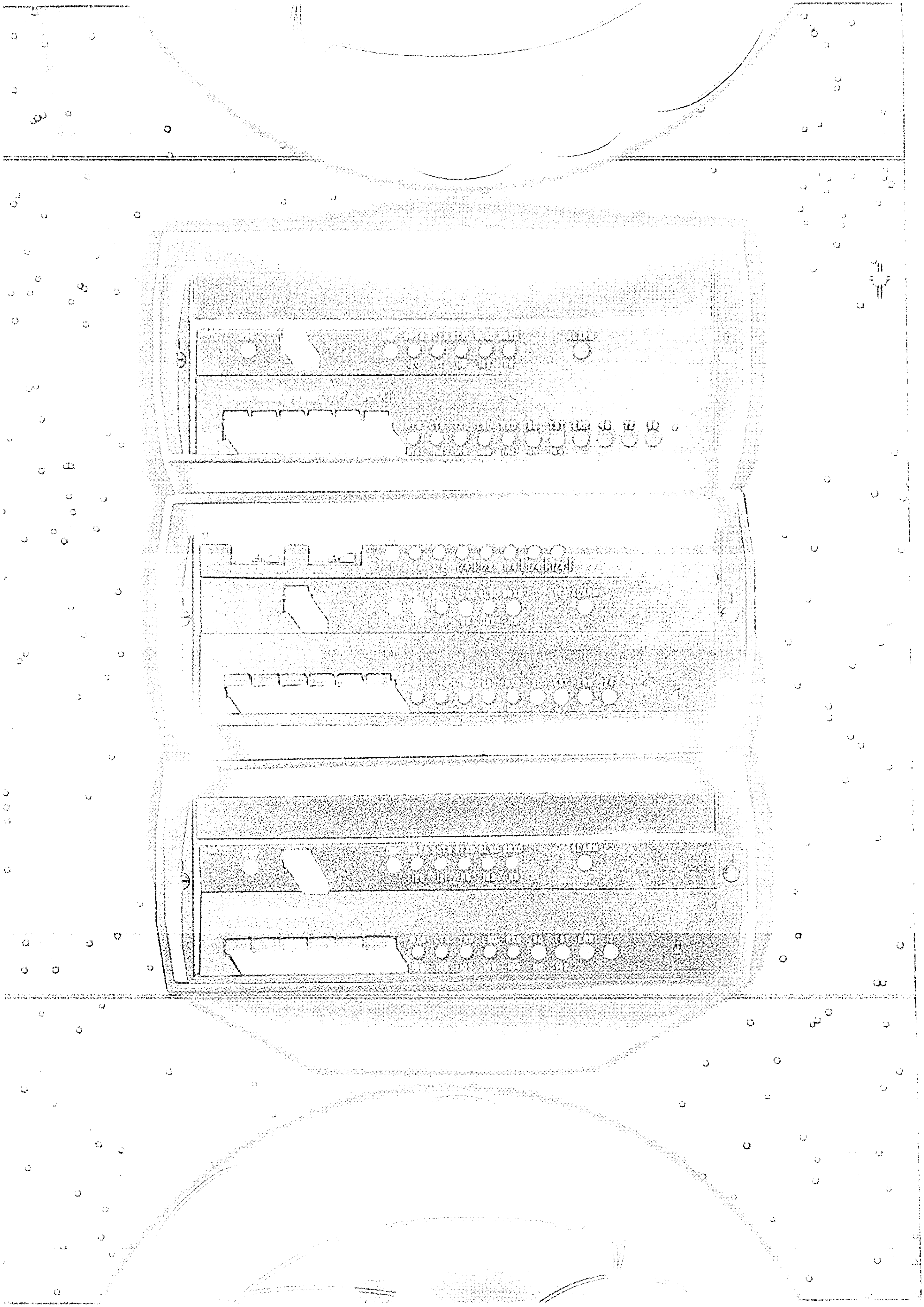

NEW

PARADYNE'S MPX MODEM FAMILY

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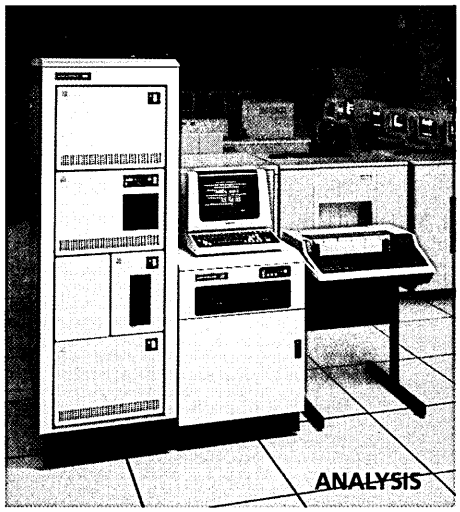
Announcing Paradyne's NEW MPX family of high speed, signal processing modems. They're quick to install – make three connections, push a few buttons for modem strapping – and they're user ready. Easy up, rarely down. **Modem speeds of 2400, 4800, 9600 bits per second,** operating point-to-point or multipoint, all with automatic adaptive equalization.

Lower power consumption and smaller size too! Only 3½ inches high, 8½ inches wide and weighing 5½ pounds.

You're in total control. Press a few keys on the **NEW ANALYSIS 5500 Series advanced network management system, and down-line load strapping** to the MPX modems. ANALYSIS constantly monitors a **wider range of phone line parameters than ever before.** Controlling your modem network is essential and it's at your fingertips.



Flexibility. The 5500 Series is modular in design for easy upgrade in capacity and features. It's distributed system design supports from a few – to hundreds of lines – in virtually any network architecture.

Business efficiency. Business expansion. Data networks today are the mainstream of business communications. Hundreds, perhaps thousands of your employees and customers, depend on your network to be up, not down.

ANALYSIS 5500, together with the new family of MPX high speed signal processing modems, can provide the most technologically advanced communication network available today. **Built with Paradyne's quality. Backed with Paradyne's service – around the world.**

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itan statistical areas, 183 bureaus of economic analysis, 50 states and the District of Columbia, and the nation as a whole. The information covers 104 industrial areas.

Eight categories of data are available for each region: domestic output by industry; payrolls by industry and income; population, deaths, and births; employment by industry, labor force, and unemployment; personal consumption expenditures by industry; equipment investment by industry; construction expenditure by type; and federal government expenditures by function, and total state and local government expenditures. CONTROL DATA CORP., BUSINESS INFORMATION SERVICES, Greenwich, Conn.

FOR DATA CIRCLE 332 ON READER CARD

SPELLER

This vendor's Spelling Verifier checks words as they are typed and checks documents after they are recorded. The product uses a 72,000-word electronic dictionary derived from the extensive word frequency research conducted by Houghton-Mifflin Co., publishers of the *American Heritage Dictionary*. The package provides better than 99% accuracy on all general applications, the vendor says.

The Spelling Verifier provides for additional customized word lists of up to 1,500 words each. These customized lists can be typed and recorded, or added directly from text as the text is being verified. The Spelling Verifier also recognizes and checks for capitalization and hyphenation, as specified by the operator on the customized word list. Other features include instant reverification of words after they are corrected, display and edit of the customized word lists, the ability to store and use consecutively any number of customized word lists, and optional storage of the dictionary on a hard disk unit.

The Spelling Verifier runs concurrently with all existing word processing features sold by the vendor, and is available on the vendor's 8100 and 8500 systems with 128KB of memory. CPT CORP., Minneapolis, Minn.

FOR DATA CIRCLE 333 ON READER CARD

ACCOUNTING

These integrated business accounting applications software modules for multi-user/multitasking systems are centered on a variety of microcomputers, including the Micro Five Series 1000, the Fortune 32:16, and the Apple Lisa. Written in SMC Business BASIC, the applications include general ledger, accounts receivable, accounts payable, and budget/financial reporting. These can be used as standalone applications or can be fully integrated.

Designated the SM Series (for super micro), the new packages allow the small business owner or a department in a larger business to move from a single-user to a multi-user system as needs grow, without losing the investment in hardware and without having to reenter data. The SM series incorporates the same principles as the vendor's single-user accounting and productivity applications written in UCSD Pascal, including full documentation for ease of installation and use. Each of the applications modules costs about $800 to $900. STATE OF THE ART INC., Costa Mesa, Calif.

FOR DATA CIRCLE 334 ON READER CARD

ARABIC WP

This vendor's Arabic Word Processing Package, previously available only in the Middle East, is currently available for use on any of the vendor's Office Information Systems in the U.S. or Europe. The Arabic Word Processor is a software/hardware combination that includes an Arabic workstation to support the reverse-direction writing and the different character set.

The package is designed to provide users with a complete Arabic language system. It includes Arabic language menus, complete bilingual Arabic/English functionality, and Automatic Character Shape Selection (ACSS), all of which comply with the rules for Arabic orthography and grammar. Arabic and English can be combined to produce bilingual documents.

The package uses an extended, software-generated character set containing over 200 Arabic forms, ligatures, and vowel points (tashkeel). A variety of Arabic vocalization and justification options are also offered.

The Arabic workstation has bilingual keys and can function with all standard English OIS software, including word processing, BASIC, and DOS functions. The vendor's 5577 high-density dot matrix printer is required to handle the extended Arabic character set. WANG LABORATORIES INC., Lowell, Mass.

FOR DATA CIRCLE 335 ON READER CARD

HIGH-SPEED COMMUNICATIONS

The HO15 software package supports channel-driven high-speed peripherals up to 10,000 feet locally and up to hundreds of miles remotely from the controlling computer. The product, which is designed for use with the IBM MVS/SP and MVS/XA operating systems, permits peripherals located at a distance to operate as if natively attached to the data channel of the associated computer.

The product is a successor to the vendor's current HO12 MVS-based cpu-to-device software. It adds XA support, other system enhancements, and expands the peripheral repertoire. The product supports I/O to all 327x controllers and attached terminals and printers, including 3277, 3278, and 3279 devices in both SNA and non-SNA environments. In addition, the product supports I/O to unit record devices that can be attached to a block multiplexor channel; these devices include the 2540, 2501, and 3505 card readers, the 2540 and 3535 card punches, and the 1403, 3203, 3211, 3800, and 9700 line printers. Also supported are I/O to 3250 graphic devices, 3088 and CTC adapters, all 3420 tape models, 370x devices, and 389x MICR devices. NETWORK SYSTEMS CORP., Minneapolis, Minn.

FOR DATA CIRCLE 336 ON READER CARD

EDUCATE

This vendor's interactive videodisk on computer literacy is designed for use in industrial training and public education. It teaches users fundamental microcomputer concepts that pertain to all microcomputers, rather than focusing on specific brands. The videodisk covers subject areas including microcomputer architecture, programming languages, telecommunications, networking, peripherals, and applications programs. The program also offers an executive summary that is designed to give managerial personnel a comprehensive overview of computer systems and their business applications. Other sections are dedicated to novice learners and to more knowledgeable users.

The videodisk provides random access to programmed information, two discrete audio tracks, full indexing, and the ability to modify the program to fulfill specific learner needs. The computer controlling the disk player will allow users access only to the material pertinent to their needs, and it allows the user to view the information at his own pace. The computer literacy course, which consists of two two-sided interactive videodisks, will be commercially available by the end of the year, the vendor says. JAM INTERACTIVE VIDEODISK DESIGN AND PRODUCTION GROUP, Rochester, N.Y.

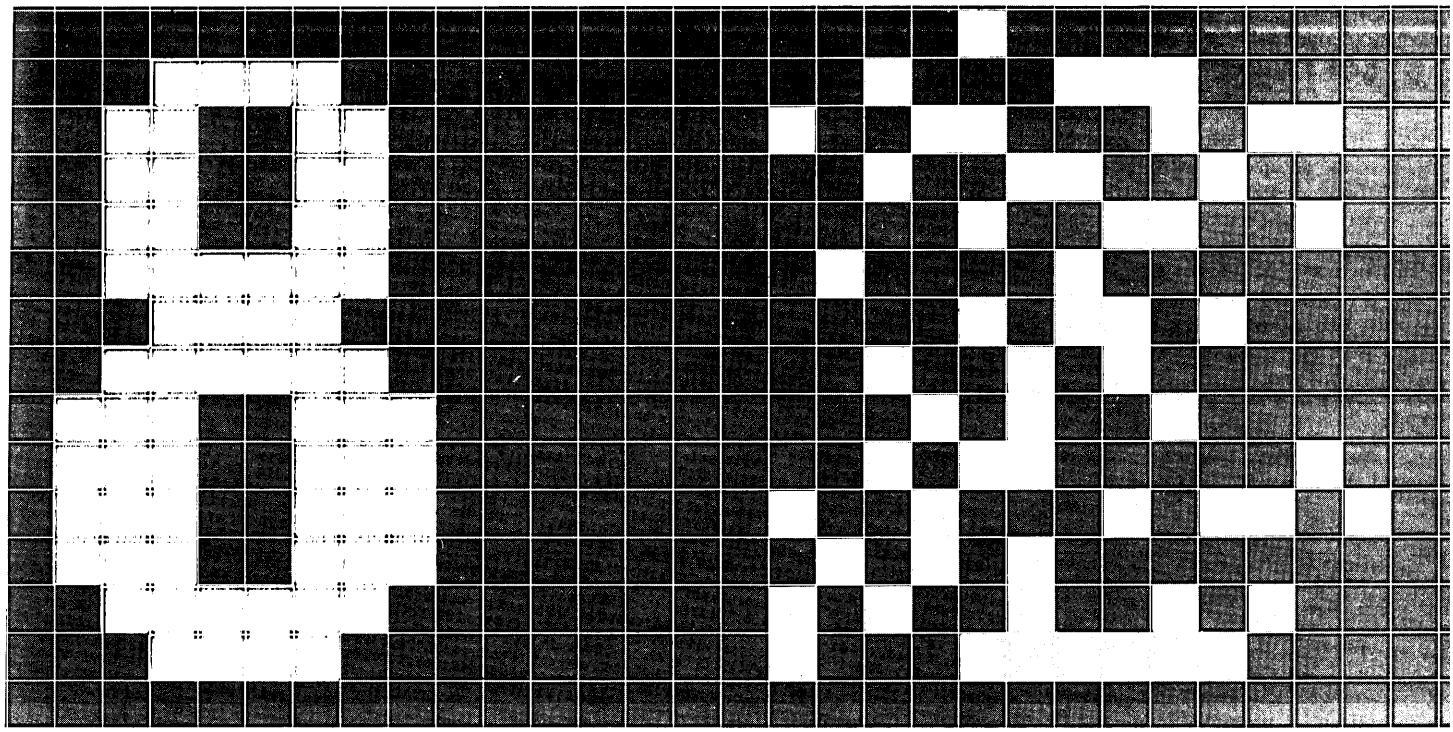
FOR DATA CIRCLE 337 ON READER CARD

CARD CATALOG

Bookends is a card catalog system that allows users to keep track of large numbers of article and book citations. The menu-driven product includes a text editor that supports upper and lower case entry and display. Information can be output in a variety of forms, ranging from notes to a formatted bibliography.

For each reference, the user can enter authors, title, journal, volume, page numbers, date, publisher, and up to 255 characters' worth of keywords. Individual reference databases containing hundreds of entries can be linked together to form searchable databases of unlimited size, but the size of each individual database is limited. For typical references, which contain 150 to 300 characters per reference, a 48KB Apple microcomputer could store 85 to 170 entries and a 64KB Apple could store 120 to 240 entries in main memory. A standard 5¼-inch floppy disk can hold 450 to 900 references.

References can be searched by au-



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New In Look . . . New with advanced operational features . . . new cost effective expansion flexibility . . . new with what hundreds of users have asked for.

Now for IBM 2914, 3814 and other present and future computer switch users, T-Bar's ready with a CRT controlled superstar computer switch — the new 3690 which scores ahead of its nearest competitor at least eight significant ways:

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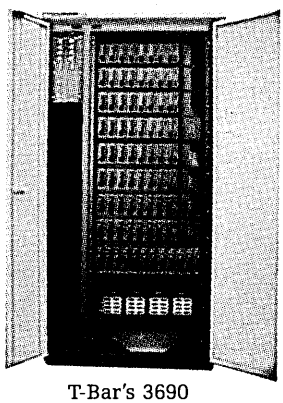
Today, as central host sites multiply, system capabilities expand, interfaces and peripherals increase, T-Bar's 3690 is ready to facilitate a variety of tasks: simplified service restoral, rotate peripherals, increase up-time, reduce capital costs, control and monitor countless connections and many other functions. If your data processing system is ready for a matrix switch, you're ready for a 3690. Call or write T-Bar Incorporated, 141 Danbury Road, P.O. Box T, Wilton, CT 06897 (203) 834-8368.



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thor, keywords, dates or titles. The program can provide an alphabetized list of all of the defined keywords and authors to facilitate a search for a particular article or book. The program runs on Apple IIe and Apple II Plus micros with at least 48KB memory, DOS 3.3, and one or more disk drives. The standard 40-column video screen is used for display. The package costs $125. SENSIBLE SOFTWARE INC., West Bloomfield, Mich.

FOR DATA CIRCLE 338 ON READER CARD

NETWORK DBMS

LAN:Datacore is designed to be a relational database development package for local area networks of personal computers. The package offers concurrent access, business size storage capability, and multi-user security. The package is intended to give oems and systems integrators a set of programmatic procedures to handle information storage and retrieval in development of applications programs.

Datacore handles the issue of simultaneous access by providing automatic passive record-locking and allowing several people to modify the database at the same time. The package also facilitates definition of user access by records or fields within records in such a way that a single database can contain information for several applications without jeopardizing security or privacy requirements. The program also allows the programmer to write a single applications program that can be used by a single user or upgraded to a local area network environment.

Keys are stored in a dynamic B+ tree structure, which minimizes disk traffic and maximizes network performance. Up to 16 key fields can be defined to allow fast retrieval in direct or keyed sequential order. Datacore handles up to 16MB of data. SOFTWARE CONNECTIONS, Santa Clara, Calif.

FOR DATA CIRCLE 339 ON READER CARD

CLIPPING SERVICE

Through this vendor's NewsFlash clipping service, subscribers can select up to 10 words or phrases for which the vendor will search continuously as new information enters its database. The database consists of the full text of 125 business newsletters, PR Newswire, and the UPI news service. The information searched by the NewsFlash service includes some sources that are not available in print, as well as many sources that are available in print and over the service network.

When the clipping service finds "matches" for words or phrases, the subscriber automatically gets the headlines. The subscriber then reads the full text of only those articles that look interesting. The words or phrases used by the search process can be changed with less than a one-day delay. The service is included with the basic $15 per month subscription to the vendor's database services. The charge to read the full text of an article found by the clipping service is about 50¢ per article.

The NewsFlash service can search for simple words or concepts or for complex phrases such as "IBM P.C.," "Tax + Loophole;" etc. An asterisk can be used to indicate that any suffix to a word is acceptable (e.g., "communicat*"). NEWSNET, Bryn Mawr, Pa.

FOR DATA CIRCLE 340 ON READER CARD

ENCRYPTION

Vault, a security package for minis and micros based on the vendor's Pro-Tec computer security and information encryption system for IBM, Sperry, HP, and DEC large systems, enables users to encrypt or scramble text, computer programs, or sensitive information on the disk. The vendor says that information is "locked in" even if the disks are stolen and force-read.

The package can be used only within the confines of the U.S., since National Security Agency regulations forbid selling the product overseas or to agents of foreign governments in this country. Similarly, telecommunication of information encrypted by Vault is restricted to use within the U.S.

Vault allows users to encrypt data and send in encrypted form across telephone lines, simulating a secure version of electronic mail. A "digital signature" option prevents the forgery of messages by a receiver or by a third party. The menu-driven system costs $400 and runs under the UCSD p-System on Sage II and Sage IV micros. The vendor says that the program will also be available on the IBM Personal Computer and other micros and low-end minis. MANAGEMENT ANALYTIC SUPPORT INC., McLean, Va.

FOR DATA CIRCLE 341 ON READER CARD

BANK MANAGEMENT

MicroFRS (Financial Results Simulator) is a microcomputer-based asset/liability software package designed for bank management that is capable of handling several complex functions. The program is written in the Plan80 language, and has extensive menus that lead users through financial modeling worksheets. Menus list single letter commands that allow users to enter data directly onto worksheets and to produce preformatted reports.

Capabilities of MicroFRS include input modeling for variable target balances, key rates, and base information that feed detail loan, investment, borrowing, and deposit models. Reports include income statements, balance sheets, call reports (Schedule J), performance ratios, and gap analysis. These can be generated for any number of hypothetical models and assumptions. Input and report categories are customized for each bank by the vendor.

The vendor also provides consulting services and custom programming for special adaptations of MicroFRS, and supports all customers with a telephone service. The initial version of MicroFRS was written for the IBM Personal Computer and runs on the Compaq and Victor 9000 machines as well. The package is derived from the vendor's mainframe FRS and FMS mainframe asset/liability management programs, which were acquired from Capex Corp. SENDERO CORP., Phoenix, Ariz.

FOR DATA CIRCLE 342 ON READER CARD

SALES HISTORY

This Sales History (S/H) package is written in COBOL specifically for the Wang VS series of computers. The package is intended to be a comprehensive management tool for planning sales strategies and tracking results. It automatically uses the data and results already generated by the vendor's Accounts Receivable (A/R) and Customer Order Processing (COP) packages to create 19 reports. These include analysis reports, which present sales volume percentages to provide easy location of major profit sources; comparison reports, which allow for comparison of data from selected current periods with data from corresponding periods of the previous year; and detail reports, which are presentations of COP invoice data.

S/H takes full advantage of the VS features, including the use of the PF keys to select options and the format for displaying reports. Reports may optionally be run in the background. Source code licenses cost $2,000 for the first computer, and decrease for additional cpus. Licenses include the program, a software reference manual, and a user's manual. MINI-COMPUTER BUSINESS APPLICATIONS INC., Montrose, Calif.

FOR DATA CIRCLE 343 ON READER CARD

FILE TRANSFER

FTP is a utility program that is designed to provide reliable file transfer between micro and mainframe computers. The product consists of two parts: the mainframe half runs under TSO or VM/CMS, and the micro program runs under MS/DOS on the IBM P.C., AppleDOS or CP/M on the Apple II, CP/M on Z-80-based machines, and CP/M-86 on 8086- or 8088-based machines.

FTP provides a layered protocol including full cyclic redundancy checking (CRC) and automatic retry to ensure data integrity at high line speeds. The micro program contains an asynchronous dumb terminal emulator that allows the user to dial the mainframe, connect to TSO or CMS, and issue either the Upload or Download command during the session.

FTP is supplied on tape and on the appropriate diskettes for desired micros. It costs $4,000, which includes up to 10 copies of the micro program. After that, each micro to be supported costs $50. OBS SOFTWARE, San Francisco, Calif.

FOR DATA CIRCLE 344 ON READER CARD

DB/DC DEVELOPMENT

Biblos is a DB/DC aid for the development of native CICS/COBOL applications. It includes a designer for analysis design and decomposition of complex systems; a screen painter; an emitter that produces CICS/COBOL; BMS maps and VSAM/DL1/ADABAS interfaces from Biblos/COBOL programs; and an interactive debugger operating in source mode.

In developing COBOL applications, the programmer handles only the detailed application logic. Biblos handles the communication between CICS and all screens, modules, and databases. The vendor says that 90% of the emitted COBOL code is automatically generated by Biblos. The program runs under OS and DOS and can include files from PDS, Panvalet, and Librarian.

Biblos is composed of three primary modules. The Designer module is a guide to the methodology of the preparation of system/program specifications. The Emitter module is a preprocessor that extends COBOL with Biblos syntax to facilitate programming directly from Designer specifications. It produces complete programs with all required codes for interfacing with CICS. The Debugger module can be invoked to provide facilities for run-time examination and modification of program data area contents by name, trapping of exceptional conditions, and breakpoint setting. BIBLOS TECHNOLOGY INC., New York, N.Y.

FOR DATA CIRCLE 345 ON READER CARD

WP SKILLS TEST

The Kelly Simulator Test for Word Processor Operators (KSTWPO) is intended to evaluate temporary employees in several areas, including overall word processing capability; skill levels on separate functions, such as input, formatting, and editing; and knowledge of different models of equipment. The test uses a word processing simulator developed by Kee Inc., which duplicates the keyboard functions of Wang, IBM, and Lanier word processors.

Score results are displayed on the simulator's crt by function, showing time, errors, and percent accuracy. An operator must achieve a minimum proficiency rate in each required function before being certified for employment in a customer installation. In addition to the basic functions, the system also provides advanced tests for those individuals who have experience in such word processing functions as statistical reporting, text editing, and printing. KELLY SERVICES INC., Troy, Mich.

FOR DATA CIRCLE 346 ON READER CARD

INSURANCE PACKAGES

Pro-Forma is a package for the IBM Personal Computer that enables credit insurers to prepare fully detailed pro forma five-year plans for prospects in a few minutes. The package allows prospects to optimize the five-year plan for minimum commissions, break even, or any other objective. It uses true mortality tables and permits the user to test the effects of changes in reserve ratios, taxes, cession levels, and other variables. The package requires a P.C. with 64KB main memory, a printer, and two disk drives. Complete documentation and BASIC source code are provided for a $1,500 license fee.

Clas-ic Credit provides mainframe users will all the information reporting necessary to manage a credit insurance operation while making critical information available on-line. The system integrates administration, actuarial, sales, claims, and accounting functions. Specific capabilities include preparation of commission billing and accounting reports; preparation of required state and NAIC reports; reporting of profitability of gross and reinsured business; and preparation of GAAP worksheets on all lines of business. Clas-ic Credit runs on the IBM mainframes under DOS or OS. Complete documentation, COBOL source listings, normal system maintenance, and service are provided as part of a $90,000 license fee. LOGIC INC., Dallas, Texas.

FOR DATA CIRCLE 347 ON READER CARD

DESIGN ANALYSIS

Crisp80 is a set of programs forming a software design and documentation tool that supports top-down, hierarchic, modular, structured design and program methodologies. The system permits flexible and facile alterations, additions, and deletions to the programmer's ideas as the application program evolves.

A program design using the Crisp80 system consists of short, English textual descriptions of data, interfaces, and procedures that are embedded in a structured, modular syntax. Output from the Crisp80 displays the program design as a set of modules hierarchically refined into algorithms, data structures, and interfaces. The display is formatted into two-dimensional flowchart-like segments for a graphic presentation of the design. In addition to being a text formatter, the system prepares material such as table of contents, module directory, structure (tier) chart, cross-references, and a statistics report on the characteristics of the design.

The Crisp80 system was developed at the Jet Propulsion Laboratory and is written in Microsoft BASIC-80 for interactive execution on a Z-80-based microcomputer running CP/M. The source code comes on an 8-inch diskette and costs $370. A supporting manual costs $24. COSMIC, Athens, Ga.

FOR DATA CIRCLE 348 ON READER CARD

STATISTICAL ANALYSIS

Statmaster model STMR is an interactive statistical system for microcomputers that supports many frequently used statistical techniques, including mean, standard deviation, median, t-test, analysis of variance, Chi-square, linear correlation and regression, and nonlinear correlation and regression. Data to be analyzed can be entered directly from the keyboard, or the analysis function can be instructed to read data from a file. The files can be created and maintained using the vendor's Writemaster word processing program, screen text editor, or database report generation system. The results of programs can be saved in files that can then be incorporated into Writemaster or screen editor text files.

The Statmaster program is menu driven and uses a conversational mode. Help functions in every menu provide brief reminders of how to use the package. The package runs on any of the vendor's microcomputers running the CDOS or Cromix operating systems. It costs $300. CROMEMCO INC., Mountain View, Calif.

FOR DATA CIRCLE 349 ON READER CARD

SPEECH RECOGNITION

This product is designed to be a high-performance multiple-speaker speech recognition system requiring no exotic hardware. The program runs on 6502-based microcomputers, and does require a handheld microphone, an analog to digital converter, and a microphone preamplifier, all of which can be purchased off the shelf. The product achieves a 99.3% correct performance rate on the Texas Instruments speaker dependent test. The $500 product uses dynamic programming and Markov type stochastic modeling techniques to achieve its performance levels. It is being licensed to oems, although first deliveries aren't scheduled until the first quarter of 1984. Support services include applications engineering and development for other microprocessors and computers. DRAGON SYSTEMS INC., West Newton, Mass.

FOR DATA CIRCLE 370 ON READER CARD

GENERAL LEDGER

Maps/GL is a general ledger package for use on the VAX superminicomputers. The software is an adaptation of Price Waterhouse's FM80 software and will be supported by Price Waterhouse. The package is designed to be flexible enough to deal with most complex accounting and organizational structures.

The package is structured around a centrally located database where financial, historical, budget, and statistical data reside. Other subsystems can be integrated with the general ledger package through the database. The user has direct control over the functions of the system and can determine who is allowed to access the data.

Maps/GL is designed to integrate decision support through the Maps/Model financial modeling package. The package costs $22,500 to $30,000, depending on the VAX configuration. ROSS SYSTEMS INC., Palo Alto, Calif.

FOR DATA CIRCLE 371 ON READER CARD

—Michael Tyler

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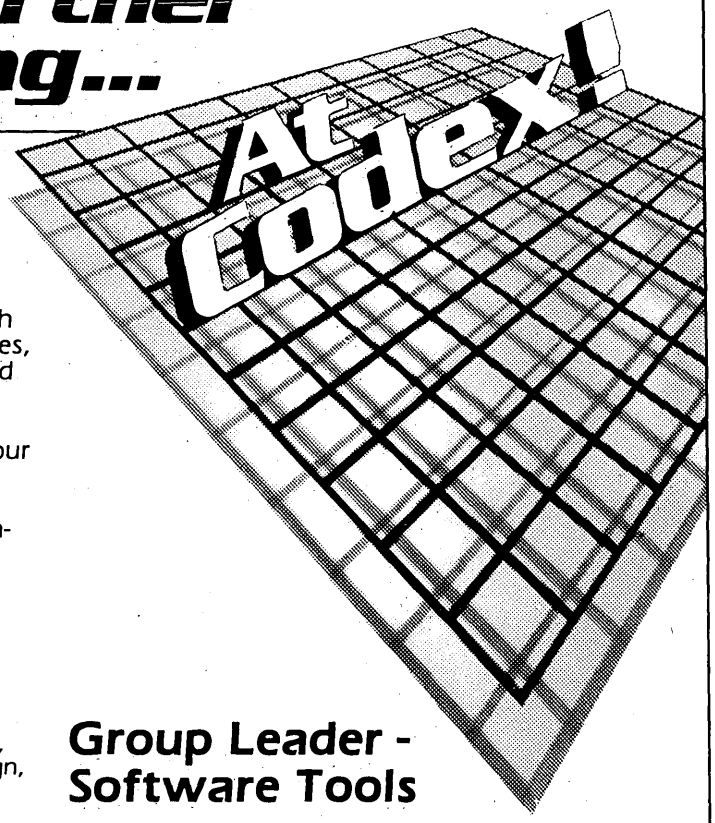

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CIRCLE 112 ON READER CARD

SOURCE DATA

BOOKS

A MANAGER'S GUIDE TO LOCAL NETWORKS by Frank Derfler Jr. and William Stallings

In their preface, Derfler and Stallings state that the purpose of their book is "to provide business managers and corporate decision makers with the vocabulary and principles of local network systems." They tell us their book should be read before the vendors come to call because "it gives the manager tools to evaluate proposals, determine needs, and ask appropriate questions." Well, it seems to this reviewer that they've done what they set out to do. This guide is a small book on a tough topic that covers the ground, teaches the vocabulary, and demystifies the technology to a satisfying degree.

The book is structured into nine chapters that average about 15 pages each. Every chapter is subdivided with major and minor headings, and the sections are well illustrated with appropriate graphics and photographs. This layout lends itself particularly well to business managers and corporate decision makers, who will probably read the book on the commuter train. Each chapter concludes with a bullet-point list of "things to think about" or "things to remember," which is particularly helpful if it's been a few days between chapters.

The book begins with a short chapter reminding us that communications has always been a basic need of business and, in fact, the historical methods of moving information—special point-to-point messengers, postal services that carry documents to a central point for distribution, and circuit riders—are the same patterns we have in use today. The change from horseback to electronics reflects not a new need, but better engineering.

Improvements in engineering have come particularly fast in recent years and one result is a proliferation of electronic communications machinery. The second chapter introduces the most important of these new devices: word processors, facsimile, telex and TWX, intelligent copiers, telephones, and video. The authors enliven what could have been a dull catalog with some good insights about the role of paper in the "paperless office" and about the practical problems inherent in having a lot of these electronic communicating devices around. By the time you finish chapter two you're convinced, if you weren't already, that getting these devices to work together gracefully is far from a trivial problem. In fact, the groundwork has been laid to consider the intercommunication mechanism as a system in its own right.

The next two chapters constitute about a third of the book and, frankly, this is the hard part. Chapter four shows the progression from straightforward telephone systems to PABXs, to CBXs, to CBXs that carry data as well as voice, and finally to digital CBXs that integrate voice and data switching. This chapter also teaches the basics of modems and introduces the ideas and vocabulary of signaling disciplines and speeds. The authors introduce telephone switch technology as the base case of a local network, an approach that seems valid from a historical development perspective. Chapter four is the first description of a local network system; chapter five explains that there are several other ways to accomplish the same thing. It covers media (twisted pair, coax, optical fiber), topology (star, ring, bus), and of course the famous band twins (base and broad). The entire exposition is couched in simple language with an absolute minimum of ego injected by the authors.

Derfler and Stallings tell us that chapter five, "Technical Fundamentals and Standards," is optional. For the book to achieve its purpose, however, the business manager or corporate decision maker has got to work at it. Tough going or not, the material in this chapter is necessary. The RS232C electrical protocol is introduced here, as well as the equivalent of international standards. It then goes on to explain ASCII and other coding schemes, the concepts of synchronous and asynchronous transmission, and the basic structure of bisync, HDLC, and SDLC. This is admittedly difficult subject matter, even though the authors handle it well. It seems worthwhile for the book's intended audience to struggle through these 10 pages to get an appreciation for the complexities of data communication, even if readers don't remember the details.

The next chapter—which, by the way, the authors don't consider optional—explains the International Standards Organization's Open System Interconnection Reference Model. In spite of a generally light and sometimes tongue-in-cheek tone throughout the book, the authors refrain from referring to this as the ISO OSI model. The presentation proceeds from the application layer downwards to the physical link layer. This technique seems to work a bit better than the more common bottom-up approach. After explaining the reference model, the authors manage in two pages to give the reader a pretty good idea of how X.25 and SNA fit (or don't quite fit) in the ideal picture.

The tight logic of this little book seems to waver a bit in chapter seven, "Managing the Data Base." It starts out with some helpful advice on how to figure out what information is used in an organization. The level of the advice would suggest the phrase "rule of thumb" rather than methodology, and after we get the advice we are told a couple of anecdotes about organizations that have applied it. The chapter concludes with a few items of useful, but seemingly anomolous, information on data security. It's hard to understand exactly what role this chapter plays in helping the audience understand local networks, but the information is valuable and the presentation is lively, so this reader just considered it a bonus.

At first glance, chapter eight seems a little out of place, too. It's called "Planning an Office Automation System." The author's main point in this section is that

you shouldn't go out and buy a local network without a very clear idea of what you're going to do with it. Derfler and Stallings display an assumption (probably harmless) that local nets are used in office automation. The book almost ignores the idea that you might want to put a local net in a factory for process control, or in a data center for interprocessor communications, and so on. The chapter gives a fairly straightforward planning approach to office automation, and comes to the inescapable conclusion that if you're going to do office automation, the pieces of the system will have to communicate. Voilà! Local networks.

The last chapter of the text, "Buying a Local Network," gives good, practical advice on what to think about when you're doing a procurement. I'm inclined to grumble, however, about the emphasis the authors place upon comparative pricing of CBX, baseband, and broadband networks. This is the kind of information that technology makes obsolete very rapidly, and one should hesitate to put fixed ideas about costs in managers' heads.

The book finishes up with an excellent glossary, three appendixes describing specific local networks, and a good index. The appendixes are a mixed bag. The description of a Rolm CBX as a local net is very good and so is the description of an AMDAX CableNet. These are both presented with application examples and they would probably be very helpful to a manager who made it this far in the book. The third appendix is an anemic presentation of Ethernet, which will probably be a mild embarrassment to the authors in the long run.

Summing up this book is easy: get it, read it, and give it to your boss. You'll both be glad you did. Prentice-Hall Inc., Englewood Cliffs, N.J. (1983, 124 pp., $14.95).

—Bruce W. Hasenyager

THE POLITICS OF PROJECTS
by Robert Block

Most books on projects address system methodologies or resource management. This one bluntly discusses the politics of a project. Furthermore, the author attempts to teach political processes to the reader. The book is refreshingly honest and useful because the author tells how best to deal with the politics surrounding any project.

If a successful system is defined as one that is "developed on time and within budget; is reliable, maintainable, meets its goals and specified requirements; and satisfies the users," most of us would agree with Block that the vast majority of systems we've worked on can in some way be classified as failures. This is a sad state of reality. The author believes that political problems are the major cause of failure in system development. This is partly because systems people are not trained in the art of politicking, nor do we have much inclination to deal with the politics of a situation. We don't know how to manipulate people, and we're not very good at understanding political situations. Running a successful project requires that we deal with the politics of an organization—and that is not something you learn from computer courses.

This book provides useful insight into the politics of system failure. The author's objective is to assist you in understanding basic political maneuvering as it relates to systems projects. For example, a project may fail because limited resources are available for it. Resource problems are due to external management decisions, and a project with too few resources has been politically set up to fail. The author shows you how to maneuver around such external political components.

The book is divided into 13 chapters, most of which conclude with exercises. Three chapters are devoted to a case study: the SCRIMP project at Smoot Inc. This case study describes a common organizational situation; however, the project leader became politically savvy very quickly and both the project and its leader were immediately successful. It seems a little too easy, but Smoot Inc. is an interesting example of a techie becoming a politically smart project leader.

Block describes the political process very well. The issues of control, communications, and goals are all knowledgeably discussed. The chapter on goals recalled familiar project problems, such as the way corporate goals can be outweighed by other, more personal ones.

The author tells of a project team that was directed to build the best system of its kind in the industry, with three years as a target date. The project members were intent on achieving the goal of building a state-of-the-art system, and the three-year target date was not considered very important. When the project was 18 months late, management canceled the entire effort. The project team did not understand that time was truly critical and could not be compromised. The team was blinded by the opportunity to work on a modern, challenging project and forgot about the important goal of completing the project on time.

Not all political problems are as clear cut as that. The author understands this, but maintains that approaching the political problems in a disciplined, organized manner will help you perceive reality as it is and not as you wish it were.

The author provides support for this view throughout the book. In chapter nine he discusses the formal and informal organization. Relationships of an informal nature are defined. An organization chart is annotated (to depict networking) and a formal process for understanding the players and their roles is provided. This is probably as close as we can get to a systems approach for project politics.

Block also provides some straightforward advice on developing fundamental skills for coping with politics. To be successful, you will need to understand and develop excellence in all forms of interaction—telephone calls, meetings, presentations, and written documents. The author asks you to list job interactions, types of people involved, and frequency of contact. Then you are asked to evaluate your performance in these forums.

The first time I was on a project that was canceled for political reasons, it was both devastating and incomprehensible. The second time around, I had gained a little more understanding. By the third time I was more politically adroit and could see it coming. By the fourth time, I was able to work within the politics to achieve success. If I had read this book, perhaps I could have been smarter a lot faster. If you are a project manager or director of projects, you'll find this book useful. It would also be interesting reading for a project team. With greater political skills we may be able to achieve greater success—both personally and on the project. Yourdon Inc. New York, N.Y. (1983, 131 pp., $18.50).

—Irene S. Nesbit

BOOK BRIEF

DRP: DISTRIBUTED RESOURCE PLANNING, DISTRIBUTION MANAGEMENT'S MOST POWERFUL TOOL
by Andre Martin

Oliver Wight Limited Publications and Prentice-Hall have copublished Martin's book. They say this 287-page work is the first book-length treatment of the subject. DRP is a logical extension of manufacturing resource planning (MRP II) the computer-based production and scheduling technique popularized in the '70s and currently in use by hundreds of U.S. manufacturing companies. Andre Martin pioneered the use of DRP for Abbott Laboratories, Canada, where he was director of material management and manufacturing.

The late Oliver Wight said, "The book's publication at this time is in the mainstream of the evolution of MRP systems, and will make it easier for users, whether they are major wholesalers, manufacturers, distributors, or retailers, to take advantage of the new developments in computer hardware and software. DRP will play an important part in making manufacturing distribution management more professional." The book can be purchased for $25 from Oliver Wight Limited Publications, 85 Allen Martin Dr., Essex Junction, VT 05452, (802) 878-8161 or Prentice-Hall Inc., Englewood Cliffs, N.J.

—L.D.

AMAPS / 3000: ADVANCED ON-LINE, INTEGRATED MANUFACTURING AND FINANCIAL SOFTWARE FOR HP 3000.

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Comserv, the acknowledged leader in manufacturing software systems, will assist you in every aspect of implementing and maintaining a state-of-the-art manufacturing control system. Our staff of professional consultants have the experience, expertise and proven track record to ensure your MRP success.

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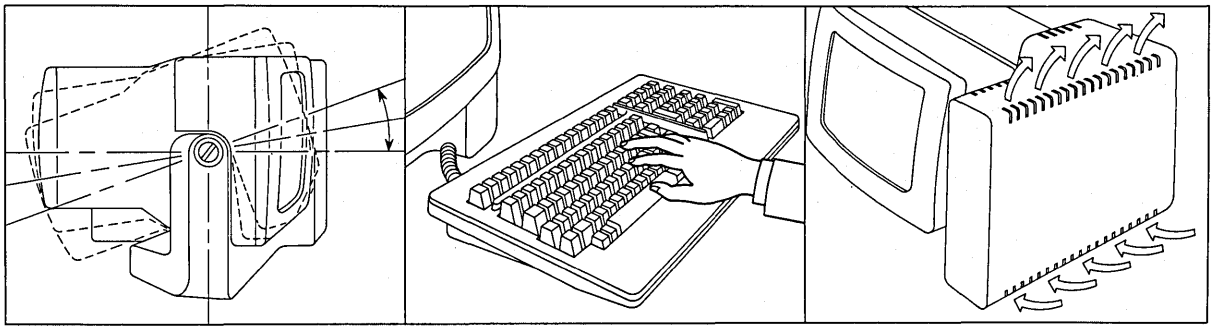

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CIRCLE 114 ON READER CARD

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REPORTS & REFERENCES

COMPUTER GRAPHICS

If you need the facts on where to buy and whom to contact for computer graphics, Technology & Business Communications Inc., publishers of the *S. Klein Newsletter on Computer Graphics*, have a directory for you. The 1982-'83 *S. Klein Directory of Computer Graphics Suppliers* provides the names, addresses, phone numbers, and persons to contact on 300 hard-core computer graphics companies. The directory also contains basic information on ownership, top management, company size, sales volume, and year of origin. Each listing gives a brief description of the products and services offered by each firm. A computer-generated cross-index provides quick reference to vendors by application of interest and specific technology desired. If you're interested in obtaining the 128-page report, send $47 to Technology & Business Communications Inc., 730 Boston Post Rd., Suite 27, Sudbury, MA 01776, (617) 443-4671.

SECURITY

"One of the key problems with security," says John C. O'Mara, executive director of the Computer Security Institute, "is the newness of the field and the lack of established standards and procedures." To help security professionals identify and organize the best information available, CSI developed a 500-page report, the *Computer Security Handbook*. "With it," said O'Mara, "security practitioners now have at their fingertips a wealth of highly distilled, practical information that will make their jobs a great deal easier."

The book is broken down into 10 sections: Introduction, Computer Security in Perspective, Starting & Managing Security, Protecting the Data Center, Software Management, Communications Security, Disaster Recovery Planning, Auditing, Contemporary Issues, and Information Sources. It provides checklists, case studies, product information, samples and extracts from actual security policies and job descriptions, magazine and newsletter articles, and a variety of hard-to-find material from government and other sources. The report is $95 and can be ordered by writing The Computer Security Institute, Dept. HP-6, 43 Boston Post Rd., Northborough, MA 01532, (617) 845-5050.

INTERNATIONAL SOFTWARE GUIDE

VNU Business Press Group, European publisher of computer and computer-related industry publications, is offering its 1983-'84 edition of the *International Directory of Software*. The single-volume guide contains 5,100 packages from over 1,500 vendors. It covers major U.S. products as well as the important international packages. Any product can be located by function, industry, name, acronym, or even supplier. The data supplied on each product include suppliers and their terms, configuration requirements, languages, date of origin, and a detailed description. The directory is available on a 30-day no-charge trial basis and costs $244. This price includes quarterly updates on systems software, accounting and financial applications packages, banking and insurance software, and a category for special applications software. The directory can be ordered from Computing Publications Inc., Princeton Forrestal Center, 101 College Rd. East, Princeton, NJ 08540, (609) 452-8090.

VIDEOTEX

The Manager's Guide to Videotex examines this information processing tool in a worldwide context. It is the second book in a series designed to "familiarize business managers with developments in telecommunications technology" while it helps them assess the role of these new services in their own work situation. Three European countries—West Germany, Sweden, and the U.K.—already have public services in operation and there are plans throughout most of Europe to go on-line in the near future. The book's emphasis is on how the service works and its relevance to modern business's increasing demands for information. This volume covers public videotex as well as private, videotex applications, standards, and videotex systems in Europe and the rest of the world. *The Manager's Guide to Videotex* concentrates on wired videotex as opposed to broadcast videotex (teletext), which is the consumer system provided by television companies. To receive a copy of the book, send $17 (postage included) to the Eurodata Foundation, Broad Street House, 55 Old Broad St., London EC2M 1RX England.

HAND IN HAND

Venture Development Corp. has done a study on the future of the office calculator market. The report is available for $2,750, and it includes the results of a national survey of dealers who currently carry calculators. The Wellesley, Mass., firm was particularly interested in whether or not dealers expected handheld computers to cut into their calculator sales. VDC's study confirmed manufacturers' opinions that the impact of handheld computers will primarily be on programmable calculator sales. The research showed that price points are critical to determine when calculator users will switch, and that as long as calculator prices stay below computer prices and fulfill user needs, there is no reason to expect a switch to more expensive equipment. As more users implement office automation systems, however, the calculator manufacturers may find their markets dwindling. In addition to the survey, VDC's study forecasts shipments by product category, and includes the results of a mail survey to 5,000 office calculator owners. The report also lists strategic options for manufacturers and other potential entrants to the market. For more information, contact Leone Nancy Pease, Market Research Analyst, Venture Development Corp., One Washington St., Wellesley, MA 02181, (617) 237-3000.

LASER PRINTING

Determining when—and whether—to make the move into laser printing is not easy. Professionals in printing, edp, and other industries who are contemplating this change can find help in *Laser Printing: The Hard-Copy Revolution* ($59.95 per volume) by Dr. William White. As author of the book and a consultant involved in helping both private and governmental organizations introduce and manage laser printing operations, White claims that "laser printing is the most radical and far-reaching revolution in hardcopy production of words, numbers, graphics, and symbols in 400 years. The laser printer is a computer-based system that takes the characters directly from an electronically stored memory, typesets them, performs all page layout and makeup functions, and prints out a full complete, offset-quality original in a matter of seconds." The fully indexed and illustrated volume is a practical guide to determining the costs of laser printing and assessing the personnel and space requirements. Other topics include managing the operation, life-cycle costs, purchasing or leasing, and cost-effective applications. For more information, contact T. Jess Seiple, Carnegie Press, 100 Kings Rd., Madison, NJ 07940, (201) 822-1240.

PERIODICALS

BUSINESS UPDATES

Business Systems Update and *Product Update*, first marketed in the Midwest, are now available nationwide. The publications are presently sold in over 800 computer and bookstores. *Business Systems Update* includes brief (one to three paragraphs) summaries of more than 180 computer articles selected from about 50 computer and business publications. Its objective, said managing editor Kenneth Derus, is "to provide broad coverage of all the important feature articles, buyer guides, and product reviews of interest to business owners and managers and computer professionals."

Product Update is devoted to new software and hardware products of interest to business users. The product summaries are derived from literature provided by manufacturers. Derus said the magazine is consumer oriented, contains no advertising, and does not charge manufacturers for inclusion of their products. The publications are put out by PrimeStar Research Inc. The first issues are free to new subscribers;

A coloring book for your computer.

This is no children's toy. This is no-nonsense quality, yet affordable. It's the Panasonic Digital Plotter—the high-speed peripheral that turns business computer graphics into high resolution full color hard copy.

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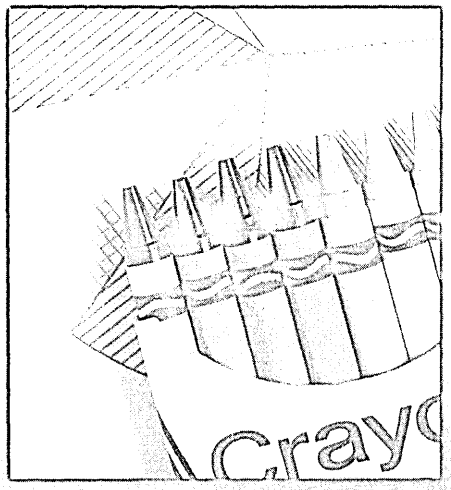
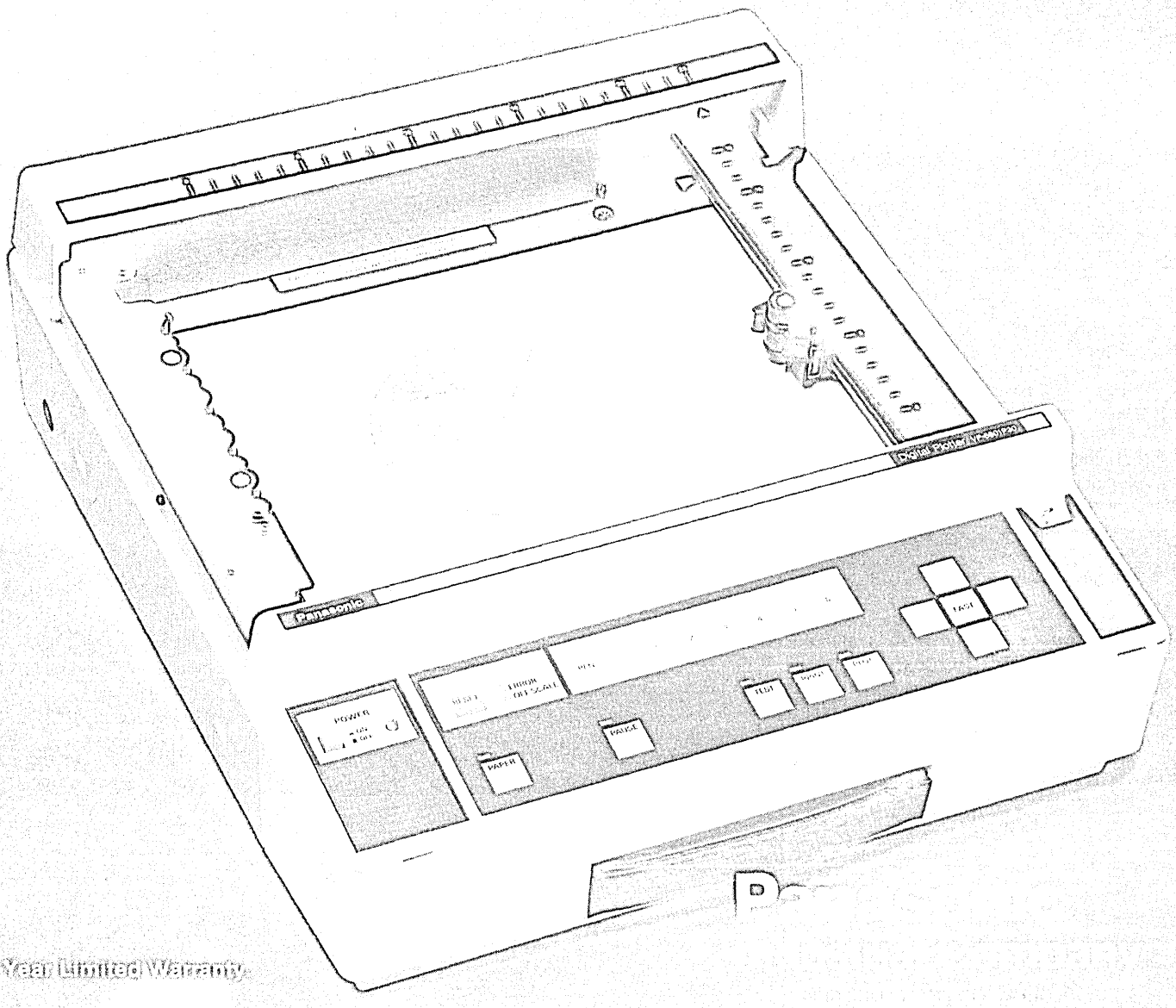


ful grids, bar graphs and pie sections. All as easy as pie!

It features an electrostatic paper-holding system for secure, high-stability plotting. An Automatic Chart Advance option for continuous, un-attended plotting. And three available interfaces — 8-bit parallel, RS232C serial and GP-IB — for compatability with most common minis and micros, as well as for instrumentation graphics.

For complete details, write or call today: Panasonic Industrial Company, Information Systems Group, One Panasonic Way, Secaucus, NJ 07094; (201) 348-5337. In Chicago call (312) 981-4824.

The Panasonic intelligent plotter.



1 Year Limited Warranty

SOURCE DATA

12 issues of *Business Systems Update* go for $39 (its cover price is $3.95) and a dozen copies of *Product Update* (cover price $2.95) cost $31. For more information, contact Stephen R. Castle, Director of Marketing, PrimeStar Research Inc., 701 East Irving Park Rd., Roselle, IL 60172, (312) 980-3110 or toll-free (800) 762-6800 outside Illinois.

A ROBOT IN EVERY HOME

The people at *Personal Robotics News* claim that the age of the personal robot is here. To help you stay on top of the progress in the field, they are offering a monthly newsletter on developments in hardware and software, market trends, applications, government legislation, and news concerning people and companies in the personal robotics industry. The cost of a one-year subscription is $125 for the U.S., Canada, and Mexico, $145 overseas. For more information contact *Personal Robotics News*, P.O. Box 10058, Berkeley, CA 94709, (415) 524-7115.

JUST PEACHY

Peachtree Software Inc., an MSA company, puts out a magazine called *Peachtree Quarterly*. It contains various articles and case histories and reports on Peachtree's products. Every issue has a special pullout section called "Unlimited Editions" which catalogs their software for quick reference. The price of a single issue is $3 and a year's subscription goes for $9 in the U.S., Canada, and Mexico; all other countries should include $5 extra for postage. You can order the magazine from Peachtree Software Inc., MSA, 3445 Peachtree Road NE, Atlanta, GA 30326, (404) 239-3000.

PUBLIC INTEREST

The Public Interest Computer Association put out its first issue of *Nexus* (May-June 1983) with the hope that it would "provide information about computer applications to the public interest community." The issue contains features such as an interview with John Shattuck, legislative director of the ACLU, on the recent activities of its newly formed Privacy Group; articles on electronic libraries, and computer purchasing organizations; a review of Joseph Weizenbaum's *Computer Power and Human Reason*; and various news briefs. Membership in PICA costs $8 for students, $15 for individuals, and $50 for organizations. For more information contact the Public Interest Computer Association, 122 Maryland Avenue NE, Washington, DC 20002, (202) 544-4171.

SEMINARS

HELLO MR. CHIPS

The first annual FutureTeach, a three-day conference and exhibit, will focus on the impact of technology on education and industrial training. Held at the Cathedral Hill Hotel (formerly the Jack Tar) in San Francisco, the show will run Oct. 14-16. Topics to be covered include the educational and training potential of computer networks, interactive cable, and public television; videotape recording and other audio-visual developments; and teleconferencing. The show will also explore the classroom potential of general purpose personal computers, dedicated computers, and advanced multilevel processing computer chips. In addition to the exhibit and general conference sessions, FutureTeach will have a number of workshop sessions designed to teach educators and trainers how to evaluate technology, including educational software, and integrate it into their work. For exhibitor and attendee information, contact Westley Enterprises, 3697 South Court, Palo Alto, CA 94306, (415) 494-7115.

FACILITY MANAGEMENT

A one-day management seminar will be held at the Ambassador Hotel in Los Angeles on Oct. 25. Peter Drucker, management theorist and author, will speak on two timely subjects: "Fundamental Changes in Society and the Economy" and "Managing the White Collar Sector: the Challenge of the '80s." At this forum ceos and their management teams will have the opportunity to discuss the managed work place and the office of the future with Drucker, other corporate leaders, and the directors of the staff of the Facility Management Institute (FMI). Presentations will also explore the long-range facility planning and facilities that contribute a return on investment. Seminar attendance is by invitation or referral only. The registration fee is $250. For further information call Jinx Andrews, FMI Program Coordinator, Facility Management Institute, 3971 South Research Park Dr., Ann Arbor, MI 48104, (313) 994-0200.

FEDS TELL US HOW

"Federal Software Procurement" is the subject of a three-day workshop to be held in Washington, D.C., Oct. 24-26 at the Sheraton National Hotel. Presented by the National Institute for Management Research in cooperation with key federal government agencies, the workshop concentrates on the most successful tools and techniques to develop on-time, within-budget software that meets the users needs. Brochures are available from: Dept. PR, NIMR Seminars, P.O. Box 3727, Santa Monica, CA 90403, (213) 450-0500.

ALL FIRED UP

Carrying the theme of "Information on the Firing Line," DPMA Baltimore '83 boasts six tracks of seminars, workshops, general sessions, as well as a keynote address on artificial intelligence, and the association's annual Distinguished Information Sciences award presentation. The conference will be held at the Baltimore Convention Center and Hyatt Regency Hotel Oct. 30-Nov. 2. For more information about the event, contact the Conference Manager, DPMA International Headquarters, 505 Busse Highway, Park Ridge, IL 60068, (312) 825-8124.

VERTICAL ISSUES

Sponsored by Frost & Sullivan, the first annual Computer Vertical Market Conference will address vertical marketing issues from the perspective of the user, vendor, and industry analyst. The show will be held at the Meadowlands Hilton in New Jersey Nov. 2-4. Topics on the agenda include the impact of the new integrated software approaches and the growing importance of maintenance and support functions. For further details contact: Carol Sapchin, Marketing Representative, Frost & Sullivan, 106 Fulton St., New York, NY 10038, (212) 233-1080.

FUN CITY

The New York Coliseum will be the site of the Electronic Fun Expo, Nov. 3-6. The first high-tech show sponsored by a magazine is expected to attract 60,000 consumers and all the major East Coast retailers. The show promises to bring the largest array of state-of-the-art consumer electronics products ever seen on the East Coast. Contact Jim Noonan of the Electronic Fun Expo at 350 East 81st St., New York, NY 10028, (212) 947-9544.

SPACE CASE

The ninth annual Satellite Communications Symposium sponsored by Scientific-Atlanta Inc. will be held Nov. 7-9 at the Hyatt Regency-Atlanta Hotel. In addition to a variety of technical sessions, S-A personnel and industry leaders will conduct panel discussions to include such topics as programming via satellite, high-speed digital transmission, earth station design, teleconferencing, and future industry developments. To obtain registration information, contact Betsey Crawley, Symposium Coordinator, Scientific-Atlantic Inc., 3845 Pleasantdale Rd., Atlanta, GA 30340, (404) 449-2274.

EDUCATION IMPLEMENTATION

The Minnesota Educational Computing Consortium (MECC) is sponsoring its second national conference, MECC '83, "In the Land of 10,000 Computers," Nov. 18-22 at the Radisson South Hotel in Bloomington (Minneapolis), Minn. The main segments of the conference will be on Nov. 21 and 22 and will include more than 120 practical sessions directed at educators involved in promoting the use of computers in schools. Sessions will cover courseware and hardware demonstrations, classroom teaching strategies and activities, K-12 curriculum

planning, and computer programming techniques. In addition to the main program, preconference workshops will be held Nov. 18-20 on district computer planning, developing in-service programs, classroom computer use, Logo in the classroom, and courseware development. For information, contact MECC '83, 2520 Broadway Dr., St. Paul, MN 55113, (612) 638-0683.

DBMS

Integrated Computer Systems will be offering a four-day course entitled "Database Management Systems—Mini, Micro, & Distributed Applications." The course will emphasize the practical utilization of DBMSs for computer aided engineering, scheduling, graphics, and real-time applications. Priced at $895, the course will be held throughout the U.S. The schedule is: Oct. 25-28, Los Angeles; Nov. 29-Dec. 2, Boston; Dec 6-9, Washington, D.C.; Dec. 13-16, San Diego. For more information contact Ruth Dordick, Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, CA 90405, (213) 450-2060.

HUMAN FACTORS

CHI 83, Conference on Human Factors in Computing Systems, is cosponsored by ACM SIGCHI (Association for Computing Machinery Special Interest Group on Computer and Human Interaction) and the Human Factors Society, in cooperation with other societies interested in the impact of human factors on computer system design. It will be held at the Park Plaza Hotel in Boston, Mass., Dec. 12-15, and will focus on system usability. There will also be professional development seminars on general methodology in human factors design. Special emphasis will be placed on studying the effects of interactive systems on organization behavior, the impact on the user of various input and output modes, cognitive models of users, human factors studies of intelligent systems, and human factor issues in programming and documentation. For further information, contact the CHI '83 general chairman, Raoul N. Smith, GTE Laboratories, 40 Sylvan Rd., Waltham, MA 02254, (617) 466-4044, or (617) 890-8460.

VENDOR LITERATURE

ROBOT CATALOG

Prab Robots Inc. is offering a brochure highlighting over 25 of Prab's robot installations, detailing the company's experience with robot applications, full robot systems and standard and custom-designed hand tooling. It contains information on all 13 Prab robot models, including the newest additions, models 6200 and 6800. PRAB ROBOTS INC., Kalamazoo, Mich.

FOR DATA CIRCLE 350 ON READER CARD

HIGH-PERFORMANCE MODEMS

A booklet explaining the design and technology behind the advanced features and options of the firmware-based Omnimode Series of modems is available from Racal-Milgo. Illustrations of typical network applications are included with the text. RACAL-MILGO, Miami, Fla.

FOR DATA CIRCLE 351 ON READER CARD

MICRO PRODUCTS

Unitronix Corp. is offering a 28-page brochure describing its line of terminals, microcomputer hardware, supplies, accessories, and software. A brief description highlighting the features and capabilities of the firm's products is provided in the complimentary brochure. UNITRONIX CORP., Somerville, N.J.

FOR DATA CIRCLE 352 ON READER CARD

NETWORK COST ANALYSIS

RCA Cyclix Communications Network Inc. has released an updated version of its brochure that analyzes the costs involved in setting up and maintaining private data communications networks. The brochure also provides a formula enabling managers to determine their total monthly costs for each remote location on the network. RCA CYCLIX COMMUNICATIONS NETWORK, Memphis, Tenn.

FOR DATA CIRCLE 353 ON READER CARD

Employment Scene

ON THE JOB

SELF-HELP

"Leadership means leading people," said Navy Captain Grace Hopper on nationwide tv earlier this year. She claimed that we in industry seem to have forgotten this important point. The folks at Xerox Learning Systems, Stamford, Conn., agree, and add that "the crucial difference between an executive and a truly successful executive is not necessarily intelligence, technical training, education, clothes, accent, life-style, or background. The critical factor that determines an executive's success is the executive's ability to deal with people." Xerox is selling a tool it claims will help people become better leaders. It is called the Advanced Executive Leadership Skills learning system (AELS). For $79.95, they'll send you the entire package—two tapes, (audio, not visual), a 95-page workbook, a 49-page diary, and a 25-page answer key. Here's a sampling of the skills Xerox says you will have learned by the time you finish using AELS: how to accomplish more in less time during meetings and work sessions, how to get people to work for you even when they don't report to you, how to settle disputes, how to inspire your people and keep them "pumped up," and how to effectively and constructively criticize. "Graduation" takes place after some six to eight hours of study (you advance at your own pace, so give or take a few hours), and there's a money-back guarantee if you're not satisfied with the results.

If you don't particularly like fooling with tape recorders, Research Institute Management Reports Inc., New York, N.Y., has another way for you to develop your interpersonal skills, but you have to be willing to read. "Cultivating Executive Stature" is a report that teaches many of the same skills as the Xerox package. It is free to subscribers to the company's *Personal Report for the Executive*, a biweekly publication (priced at $36 per year). *Personal Report* touches on all types of managerial concerns, as well as some personal ones like how to deal more effectively with your family.

SOFT ADVICE

Quest System Inc., Bethesda, Md., is a personal recruiting firm that deals strictly with computer software professionals. During the summer of '82, the company began publishing *The Advisory*, which it touts as a "fully documented, fact-filled bulletin for computer systems and software specialists who may be too busy in their jobs to take proper care of their careers." The company, founded in March 1968 by David Samuelson, president, sends out this publication quarterly to a list of qualified software professionals his company has worked with. This four-page newsletter is also available free to any software professional with over one year of experience. Each publication has one technical article, focusing on current events in the software industry and various "hot spots" in the field, and an article on career planning.

In addition to publishing *The Advisory*, Quest offers a "salary model." This is a statistical model of salaries, developed during two years of field testing with over 10,000 users. Those interested in finding the salary norm for someone in their job category, with similar experience and education and in their geographical area, must fill out a questionnaire (it takes about 15 minutes, says Samuelson). The results are then computed against in-house information to come up with the salary norm. This service will take to the road when Quest attends conferences this year and begins offering the questionnaire to attendees.

EASING RETIREMENT WORRIES

The Commerce Clearing House, Chicago, Ill., is a 55-year-old company with approximately 5,000 employees worldwide that reports on tax and business law and other related developments in the U.S. and abroad. It produces "Topical Law Reports" on over 150 tax and business law subjects. A recent report, "On Your Retirement—Tax and Benefit Considerations," is aimed at simplifying the financial changes that take place when a person retires. When pension benefits and Medicare replace salaries and employer-sponsored medical expense plans, new income tax rules go into effect. This 104-page guide tries to answer the many questions that arise when these changes occur. Problems such as how your social security benefits are computed are discussed, and the "retirement test" (a group of requirements one must meet or pass to qualify for certain retirement benefits) portion of social security law is explained. Private pension and annuity income and the special federal tax rules that apply to both are also covered, along with the ever-so-popular IRAs. Single copies of "On Your Retirement" are available for $3.50.

—Deborah Sojka

ADVERTISERS' INDEX

*OEM Edition

The Marketplace... SOFTWARE SERVICES

ADVERTISERS' INDEX

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JOB MARKETPLACE

COMPUTER PROGRAMMERS FOR PROJECT ATHENA

Massachusetts Institute of Technology has just launched Project Athena, a $70 million educational effort based on some 3,000 new DEC and IBM computers and on the key notion of coherence which makes possible the interchange of data and programs among different programming environments and machines. Several positions are now available for Computer Programmers to assist in the development of educational software which achieves the dual purpose of curriculum enrichment and technical coherence. Individuals will work closely with MIT faculty members and students and with the DEC/IBM staff members assigned to Project Athena.

Candidates with three to five years of professional experience in UNIX, graphics, local area networks, LISP, Fortran, and C are urged to apply. MIT offers competitive salaries and excellent benefits.

Please send 2 copies of resume, referencing PA-100 to: Ms. Sally Hansen
MIT Personnel Office
E19-239
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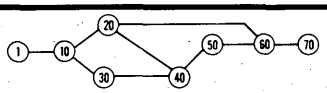

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ALFASKOP SYSTEM 41

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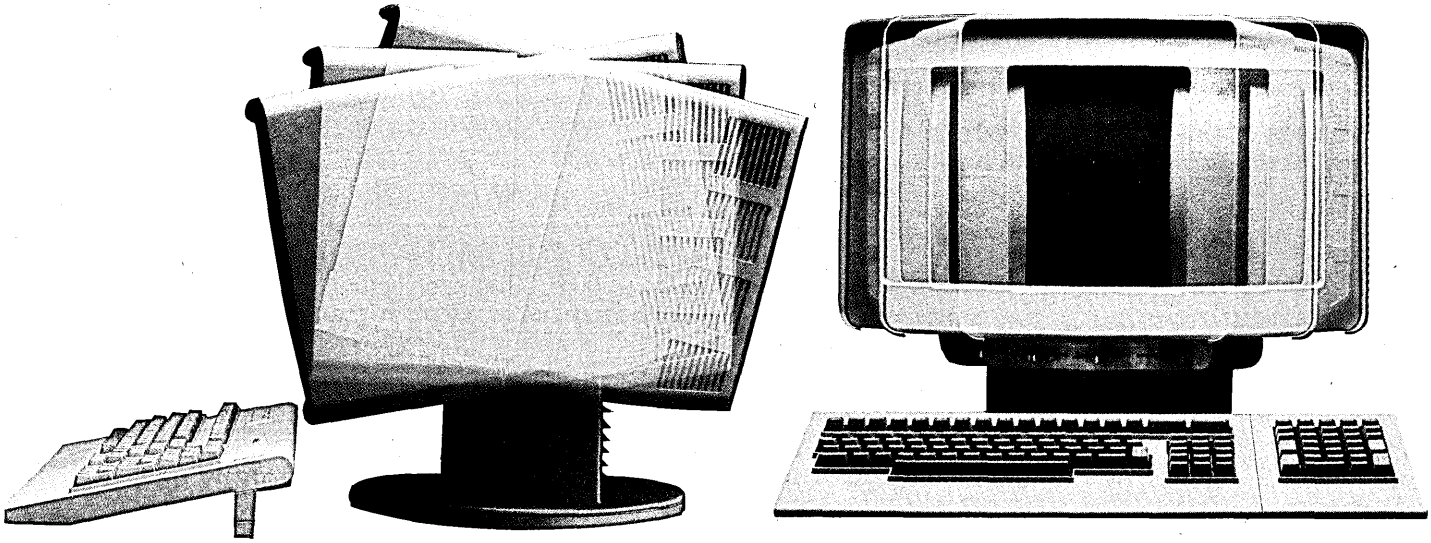
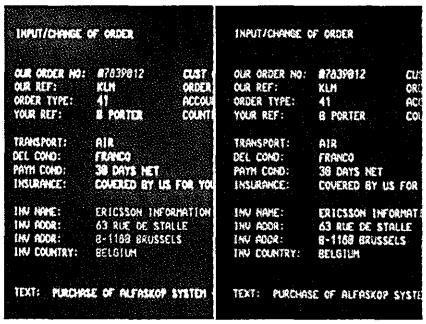
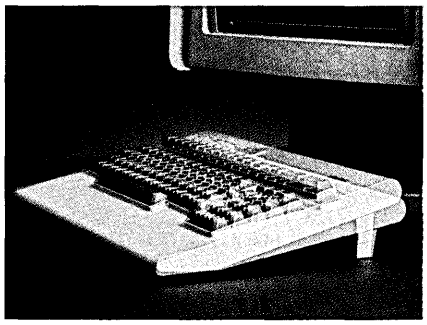




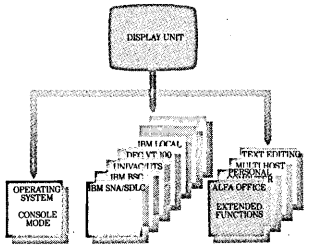


IT MEETS SYSTEM NEEDS.

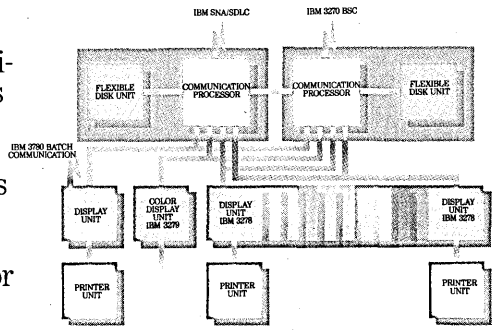
Above all, Alfaskop System 41 meets *your* needs... for flexibility, distributed intelligence, expandability and ergonomics in a simple, integrated package.

On the system side, Alfaskop terminal, disk and printer modules let you design any configuration from a single dedicated workstation to a multi-terminal, multi-tasking network. The system is compatible with most hosts, offers a choice of communications processors and protocols (BSC and SNA/SDLC included), and is available with a comprehensive collection of emulations and local software programs.

On the human side, the system is easily tailored to operator preferences. The non-reflecting screen turns, tilts and swivels to suit any personal style.



Alfaskop comes with operating system and emulation software, plus a choice of application programs.



With multi-host communication, mainframe selection is handled via keyboard commands.

The freestanding keyboard and its detachable numeric pad can be individually positioned and angled.

From both system and human viewpoints, Alfaskop fits your plans perfectly. For more information, contact Ericsson Information Systems, The Meadows Office Complex, 301 Route 17 North, Rutherford, NJ 07070. Telephone (201) 939-5300. Or Ericsson Information Systems Marketing Operations, 7465 Lampson Avenue, P.O. Box 938, Garden Grove, CA 92642. Telephone (714) 895-3962.

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CIRCLE 124 ON READER CARD

An exchange of readers' ideas and experiences. Your contributions are invited.

READERS' FORUM

LIBRARIANS: THE UNTAPPED RESOURCE

Data processing has been, and by all accounts will continue to be, a growth area. Consequently, the shortage of good applications programmers will also continue in the foreseeable future.

Until recently, a major drawback to database management systems (DBMSs) was that implementation required using those scarce programmers as analysts to develop user views, aggregate them into subschemas and then into schemas, and finally to devise appropriate storage strategies. The dependency of schema representations upon the underlying construction of the DBMS (particularly in hierarchical systems) required that the analyst possess a detailed knowledge of DBMS storage conventions. This knowledge was readily acquired only by persons with extensive dp familiarity, i.e., programmers. Since the development of more sophisticated DBMSs based upon more sophisticated data structures—such as network and relational—the development of schemas is no longer tied so directly to data storage. The result is that the DBMS or data administration analyst, while still requiring a degree of dp expertise, need no longer be recruited from the ranks of experienced programmers.

What are the requirements for a good data administration analyst, and where can such a person be found? There are three basic requirements, and one very nice optional capability. But, before proceeding further, it may be useful to discuss the definition of data administration. In explaining DBMSs, it is customary to draw a form of the diagram shown in Fig. 1.

In some contexts, data administration refers to the entire range of this process, from developing user views to creating the physical records (equivalent to the bracket on the left). In other contexts, it means the more limited process of developing logical schemas from user views or subschemas (equivalent to the bracket on the right), with the balance of the process considered a dp responsibility. We shall use the term in both ways. Initially, when speaking of librarians as potential data administration analysts, the narrow view will be used. Later, when discussing the symbiosis of data processing and librarianship, the broader definition will be used.

The requirements of the data administration analyst are:

- A skill at eliciting what the customers' information needs are, what information they use in conducting their operations and making decisions, and what information they would find useful if it were available. This process of determining the users' needs is quickly becoming very important to business systems planning. A variety of techniques has been developed to help in the systematic determinations of information requirements, such as strategy set transformation, critical factor analysis, process analysis, decision analysis, input/process/output analysis, and stage assessment. These systems have a common need for the people using them to be sensitive to the dynamics of information systems and the human factors involved.
- The skills to make optimal use of the data dictionary/directory (DD/D), which is increasingly recognized as the central tool of data administration. Indeed, the DD/D is being promoted as an important tool for business systems planning for enterprise analysis, not only in the specific sense of informations systems planning, but in the larger sense of corporate strategic planning.
- An adequate knowledge of dp operations, particularly the on-line operations, upon which the DBMS and the data administration functions are based.

These three criteria are all directly addressed by modern library education.

The first factor, that of eliciting user needs, is precisely the skill that reference and user service librarians have been honing for years. The phrase that librarians use, the "reference interview," is perhaps not as descriptive as it might be, but the skill taught is exactly the task of the data administration analyst. Users are notorious (to librarians at least) for not being able to describe the information they really want or need.

The reference interview process is far broader than simply responding to a specific reference request. One of the librarian's major functions is to provide current information or an SDI (selective dissemination of information) service. Librarians, particularly those in industry, had long been accustomed to providing alerting or "current awareness services," but this function increased dramatically in the 1960s with the advent of computer-based services. In those days, dp capabilities did not economically permit large-scale, on-demand, retrospective literature searching. SDI was practical—the periodic matching of a batch of user profiles against a tape of newly processed items. In the way of analysis, however, this requires the creation and maintenance of a profile of the user's broad information needs, i.e., what information the user requires on a sustained basis, not merely the item of information that is needed at a particular moment.

This process of information-needs-elucidation is one where skills in interpersonal relations are of great importance. The perception of the programmer-analyst as not very user oriented—"Tell me what you want done and leave me alone to do it"—is exaggerated, but it contains a kernel of truth about the self-selection of the hackers who become, and remain, programmers. Librarians, by contrast, tend to be user oriented. It is no accident that the graduate library program at Columbia University, (the world's oldest, which perhaps explains Columbia's reluctance to adopt a more modern name) is called the School of Library Service. Not only is there a

large measure of initial self-selection by service-oriented persons, but library schools clearly and deliberately foster a user/service orientation. In addition to reference courses that heavily emphasize the process of identification of information needs, library schools offer courses, such as Human Factors in Information Systems, that focus on themes like the design of user (cordial) systems, information use styles and requirements, and different environmental and cultural attitudes toward information and its use. These are topics that should be, but typically are not, taught in dp programs or business schools. The result is that librarians are particularly well suited to the task of interfacing with users to assess their information requirements.

The second factor, making optimal use of the data dictionary/directory, is absolutely central to the librarian's bag of tricks. The central purpose of a DD/D is to keep track of what data are available, to avoid data redundancy, and to make sure that if data have been entered and described under one name, they can be found by someone searching for them under an entirely different name. The solution to that problem is, without any exaggeration, the very essence of librarianship. It is no happenstance that most of the tools and techniques used for controlling and administering a DD/D, such as KWIC (keyword in context) and indexes, have been taken from the librarian's armamentarium. There are still some untapped techniques, such as more sophisticated vocabulary control and syndetic structure, that could profitably be used to enhance the use of DD/Ds.

Lastly, an adequate knowledge of dp is also well covered in library schools. For practically all library programs, training in the techniques of on-line database searching is de rigueur, as is some exposure to the principles of dp, including file design and the impact of file design and storage techniques on system performance. The hot topics of the day in librarianship—competition among on-line database vendors, for example, or bibliographic utilities, and the development of on-line catalogs—simply cannot be discussed without considering storage design decisions, the choice of systems software, telecommunications systems, etc. The result is that most librarians are receiving substantial dp training, even though many of them entered library school with no such thought in mind. This is not to say that all library school graduates are heavily dp oriented. Topics such as the history of printing and bibliography will continue to be the primary interest of some students. But, a large number of library school graduates, particularly the more recent ones, are learning enough about dp to interact at a relatively high level with systems and programming staff.

As a result, there is a substantial pool of librarians (or information scientists and technologists) who are more than adequately qualified to be data administration analysts. One can argue in fact that because of their skills and user orientation they may be far better qualified than the typical applications programmer.

One very useful optional capability a data administration analyst should have is familiarity with the parent organization and its uses of information. Librarians already employed by the organization are in an ideal position to have achieved such an overview. They have typically had to respond to information needs across the board and, in the process, have acquired a rather comprehensive view of what the organization and its information needs are like. The best candidates for DBMS information analysts may already be working in the corporate library.

The situation I've described is a result of current events, and, therefore, not yet widely recognized. It is only recently that librarians acquired significant dp knowledge, since electronic storage costs only recently declined to a point where they were viable for library-size files. And with the increasing sophistication of DBMSs, we are approaching true data independence. Now, we're seeing software capabilities that will soon make extensive programming experience quite optional. At least one package is already commercially available that will meld subschemas into schemas. This sort of capability clearly shifts the data administration analyst's priority from the systems interface to the user interface.

The problem is that people in dp don't automatically associate data administration with librarianship. This is quite understandable because the data administration/DBMS environment grew organically out of the computer room. It is logical that data administrators who came from the dp ranks look to that background for their personnel needs. Logical and predictable it may be, but it is no longer appropriate. Data administration is now approaching the stage where it might more appropriately be called information administration, making the librarian's repertoire of information administrative skills an appropriate fit. The complicating factor is the image of the librarian as book conservator, instead of computer user and information administrator.

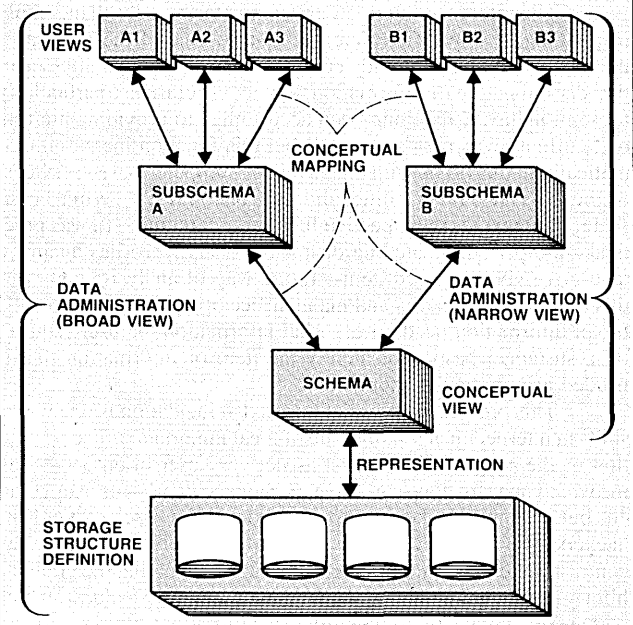
This lack of awareness is the problem that must be addressed. Data processing and librarianship are forming a symbiotic relationship that is inevitable. There are two ways to accomplish this symbiosis. Dp can recognize the librarian as a partner in data administration or can laboriously and inefficiently reinvent the same skills. The former will of course be more efficient, but to accomplish it, dp and data administration management must be aware of that symbiotic relationship. Data administration should advertise employment opportunities in library/information science journals. In turn, librarians must learn to sell their skills to data administrators.

The preceding argument is a logical and predictable consequence of dp's development. This development is the evolution of data or, more accurately, information processing from an accounting-like function to a library-like function. As has been pointed out, the computer is indeed the successor to the printing press (not that the printing press is disappearing, nor will it, but it is simply becoming a computer I/O device), and it therefore must assume the same role in relation to the librarian that the printing press had—just as in its day, the printing press replaced the scriptorium. This phenomenon is most evident in the DBMS environment, and it is here that the symbiotic relationship between dp and librarianship should be encouraged and capitalized upon.

—Michael E.D. Koenig
New York, New York

FIG. 1

THE DBMS AND DATA ADMINISTRATION ENVIRONMENT



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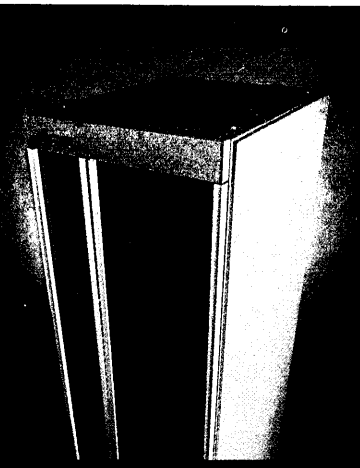

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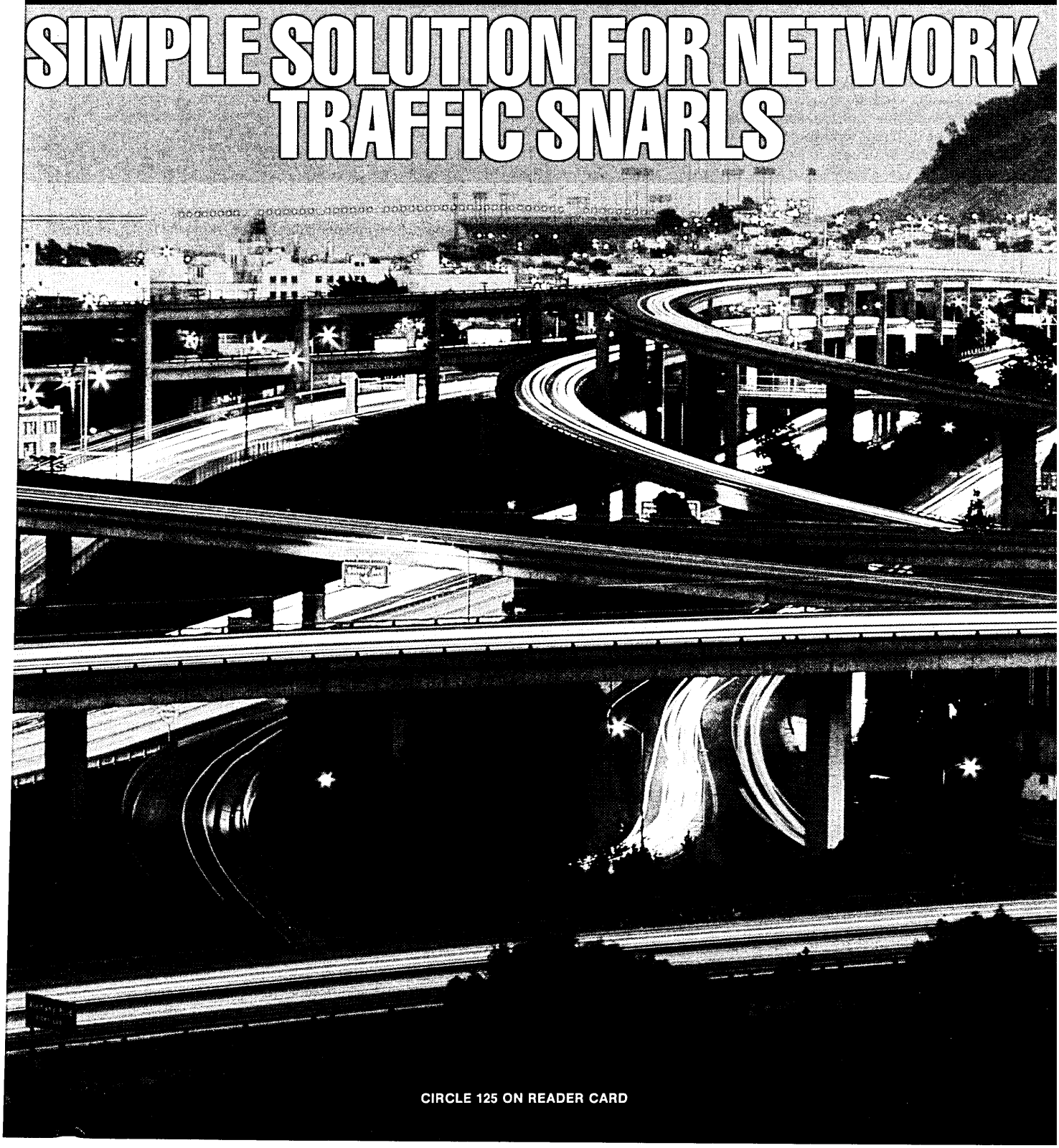


CIRCLE 125 ON READER CARD

THE OA HOAX

Office automation is a hoax. It sounds so much like an idea whose time has come that users and vendors alike accept its validity without a shred of objective evidence. After all, there is automation in plants and factories, commerce and banking, transportation and communication, even livings rooms and kitchens. Why not the office?

We are so far from questioning the grand design of office automation that no one has bothered to scrutinize the gritty details. For instance, some nontypist decided it would be clever to put special buttons on a keyboard to move the blinking little cursor around the screen. Likewise, the latest wrinkle in executive terminals seems to be little pictures showing stuff filed in in-baskets, out-baskets, and wastebaskets. Nobody seems to have determined whether these approaches have any merit other than sales sizzle.

The office automation concept survived the onslaught of embarrassing questions when seminars on the topic were still the rage. At every such session, someone was bound to ask how office automation differed from word processing. The answer was always that there were distinctions . . . although word processing was certainly a part, yes, a key part, of office automation. If the questioner persisted, there would be intimidating jargon about words being the codification of information and information being the blood flowing through the arteries of the corporate body. For a less sanguine audience, the jargon included gems like the office as an information—not a data—processing engine. The disclaimer, of course, anticipated the heckler who wanted to know how all of this differed from data processing. To clinch the argument, there were mumbled incantations about store-and-forward electronic mail, optimized appointment scheduling, and custom reports and proposals.

Some executives have terminals on their credenzas for jobs like reviewing reports, dialing up Dow Jones, and balancing budgets. These cases show that the technology can improve personal performance or productivity, but none of it automates the office. Instead, it eliminates the need for an office by allowing individuals to accomplish objectives outside the traditional organizational structure. An article in the January 1983 *Computer Decisions* affords a few examples.

- A bank vice president creates slides, almost instantaneously, for 30 cents each. The old, traditional approach took several days and cost $35 per slide. She now uses slides for routine presentations, rather than only on special occasions.
- An executive in an educational testing organization uses a spreadsheet accounting system on a microcomputer. He has eliminated a costly service center and gets results when he wants them.
- A publishing company president plays with data from budgeting, forecasting, and planning. He finds relationships among operations that nobody could have investigated, let alone uncovered, using the established analytical resources.

Even more spectacular success stories have come from professional writers, college professors, individual consultants, and former U.S. presidents. Such folks often use machines originally designed for hobbyists, yet they manage correspondence, billing, documentation, and other major tasks without the office structures that others need to do comparable jobs. Again, the technology has proved beneficial by eliminating the need for automation rather than automating an office.

With a control computer, you can automate your paper mill, but you still need a mill to make paper. With a microprocessor-controlled microwave oven or dishwasher, you can automate your kitchen, but you still need a kitchen to prepare meals. With a new coffee machine, copying machine, mailing machine, or dictating machine you can automate an office, but you still have the office. If you get a computer to collect, assimilate, and disseminate information, however, you no longer need an office. The portable systems that let you work at home, in a plane, or on the beach make this abundantly clear.

The difference between automating a structure and eliminating it is more than just semantics. By masking the real point, the vacuous verbiage about office automation has retarded the appropriate use of technology—such as solving personal productivity problems.

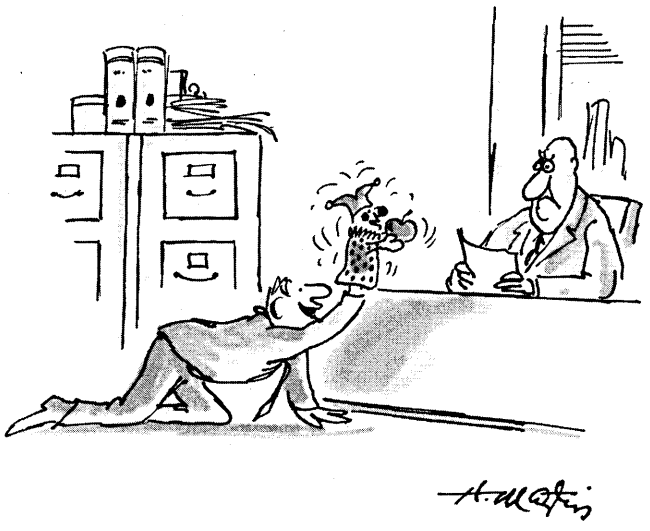
Executives considering introduction of advanced technologies into an office should evaluate the trade-off between real or perceived needs for traditional organizational support and the practical constraints associated with such structures. Decide informally if you want and can afford the trappings of an office. If you are more comfortable and proficient managing people than pecking out your own letters and digging out your own data, stay away from the technology. If you're inclined to do the work yourself, get a computer right away. Use the same reasoning when you are evaluating advanced technology for your staff. The only additional factor is to make sure that the new machines help people do their jobs, rather than eliminate those jobs. For instance, if you have a competent private secretary, a letter-writing system designed for an idiot is likely to cost you the services of the only person who has ever understood how to screen your callers. Likewise, a system that gives your marketing people direct access to econometric data might save them the trouble of going to the library—and eliminate the ancillary browsing that has often helped you uncover potential new markets.

Let's assume that you understand the implications of eliminating part or all of your office, and you've decided to take the plunge. The only rule to follow is to throw away all the rules you've been collecting about how to make the big decision and prepare your staff for it.

Most likely, here's what will actually happen. You'll buy a computer on whim, with no more competitive analysis than asking the salesperson what's popular these days. You'll sit down with documentation written by an illiterate who thinks everybody knows what a bootstrap does to a disk, but you'll quickly figure out how to use it anyway. You'll wonder how you ever got along without it, will be convinced that whatever software you're running is the best thing available to do the job, will write a program in BASIC to store telephone numbers, and will bore your friends by talking about nothing other than your computer for months.

Unless you are the only one in your company with any intelligence, personal pride, interest in career advancement, and natural curiosity, you'll find that the rest of the staff has similar experiences.

—Alan Krigman
Philadelphia, Pennsylvania



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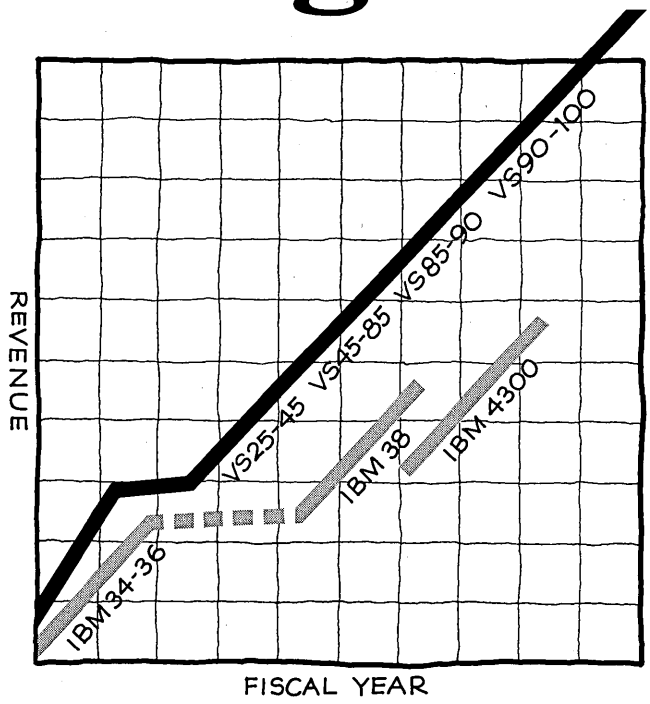

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DATA PURITY

Picture this. The Widget Manufacturing Co. has 400 employees and makes four models of widgets, each available in six colors. It sets up an inventory management system using a two-character part number. The first character identifies the model, the second is a digit that represents color. MIS writes programs that process and report by model, color, and the full part number. Management is happy. Customers are happy. The company grows.

One day an engineer designs a better widget, model E. It functions like model A but is faster and quieter. Moreover, it uses fewer parts and costs less to make. Unfortunately, model E cannot be painted black. There are still back orders and in process inventory for model A, but inventory control knows it can substitute model E for model A (unless they are black) so they hire a clerk to keep track of the situation. At the same time, MIS alters its programs to treat A and E the same except when costing, buying raw materials, or if the widgets are to be black.

Meanwhile, the marketing group discovers that their market share would increase if they made widgets in custom colors. Engineering works on it for months (no one tells MIS) and invents a machine that will mix pigments and paint the widgets any color desired. Business booms. Customer service hires two clerks and three expediters to track custom orders and check that the colors are correct while MIS completes the model A/E snafu so they can begin work on the new part number scheme.

Marketing and production control begin using a scheme in which the model designation remains unchanged, the original color number becomes the color family (red, yellow, blue, green, white, or black), and two digits are used for the custom color code. Some colors are a bit difficult to classify but the plan works, more or less. Inventory control can order the pigments easily by remembering that greens are really one part blue plus two to six parts yellow. They hire a clerk to manage the pigment inventory.

The new widgets are very popular, particularly the shades of blue. Warehousing's scheme of storing and locating the widgets by part number breaks down because the color families are so unevenly populated. They begin using a scheme of storing by color and within it by model when customer service runs out of custom color codes for blue widgets. Everybody is mad at MIS.

Sound familiar? MIS is spending its time playing catch-up. People all over the company are working around inadequate computer reports. The users are angry at MIS because they aren't getting the information they need to do their jobs. MIS workers are angry because no one ever tells them anything, and when users do talk, they are shortsighted and stubborn.

Widget Manufacturing is a successful, forward-looking company. It owns a DBMS, uses structured code, report-writers, and end-user query languages. So why aren't the tools working? The tools aren't working because the data in the field called part number are confusing. The part number is being used to encode revisions, options, physical locations, bill of materials, etc. Thus, over time the originally well-structured programs are becoming riddled with except-in-the-case-of code. The MIS department has forgotten that, to a computer, the contents of a field are meaningless except to distinguish and order the instances. At the same time the user's relationship to the data is complex and flexible and depends upon present needs.

Users are not likely to recognize or understand that data can be meaningless to a computer although they are meaningful to the users. We in MIS forget this at our peril. The systems we write place the data in a context that, with any luck, is significant to the users. Still, ignoring number crunching, all processing done in a computer rests on decisions of identity or ordering. Confused identities and ordering lead to confused systems. Therefore, the key to success is to keep data identities pure. Three simple rules help:

1. Never use a single field to mean more than one thing. A part number field is just a part number field. It is not made up of a model number and a color code, it does not tell you where the parts are in the warehouse, and it does not define the bill of materials. Remember that the contents of a field are meaningless except to distinguish and order the instances.

2. Don't write code that depends on a particular value of a field. If you have to process the data differently for a particular case, define a table describing when the special processing applies. It may have one entry today; it will have more later.

3. Never write code that depends on the position of a value within a field. All coding written to use the fact that the third digit of the part number is the color of the product fails when there are more than 36 colors. (It fails earlier if you violated a corollary to these rules: if the data item is not a quantity, make the field alphanumeric.) It also fails when whatever the first two digits stand for needs more space. Add a field for color and relate it to the part number.

It is not always easy to stick to these rules. They use more computer resources for processing and storage. The pressure for quick and dirty code remains, but users benefit by having flexible systems that are under their control. MIS is unaffected by the vice president's new part numbering scheme, or the addition of a product line, or how warehousing orders its shelves. Change the tables and go.

—Linda M. Tashker
Mountain View, California

MODEL SYSTEMS

"Prototyping" a business information processing system is a buzzword heard among management services directorates these days. Not surprisingly, prototyping offers as good a system, at a minimum cost of money and personal resources, as larger corporate information models.

A definition of prototyping is the trial and error simulation of computer systems based on question and answer techniques. This is accomplished by the generation of streams of code input to compilers and database packages that quickly produce a workable system. The outputs and reports of prototyped systems are displayed to the users and modified to meet any criticism or adverse reaction.

Prototyping became popular in industry because of people who couldn't wait for results. Departments with both limited applications and data were tempted to bypass the feasibility-approval-implementation cycle to save time, with or without dp assistance.

This urgency stems from project backlogs and a shortage of capable design staff. These problems are exacerbated by management's inability to make decisions on projects that lack an obvious payoff. People who couldn't wait were faced with alternatives: either buy a microprocessor, a Winchester disk, and a database package, or find a sympathetic database specialist from the dp department who could put together a quick implementation in FORTRAN to yield a prototyped system. For want of a better job title, this person might be called a prototyper.

To be successfully prototyped, a system should have all or most of the following characteristics: 1. a well-defined area of investigation; 2. limited user objectives; 3. an available data dictionary; 4. a well-documented technique for generating standard database syntax together with the installation's standard language, usually COBOL; 5. users who are willing to cooperate with the prototyper in answering questions about the application; and 6. user-recipients who will accept the prototyped product as an adequate and temporarily satisfactory solution to their needs. The whole process may be considered user driven.

Complete honesty is an absolute requirement for prototyping success. Each user and prototyper must recognize that the prototyped system is a temporary solution. If the user is unhappy with the results, the prototyper must accept that a quick system

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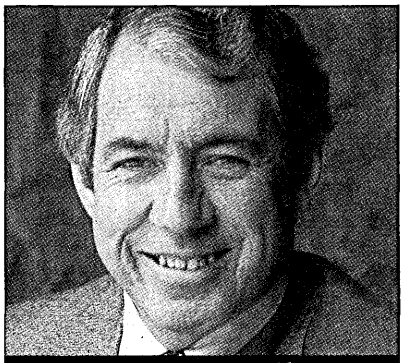

JOHN GILLIGAN, President
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CIRCLE 130 ON READER CARD

doesn't meet the user's needs. Similarly, during the step-by-step refinement process the user must be able to say, "no, this isn't what I had in mind," and terminate the exercise or begin again.

Two separate things happen when a company begins prototyping activities. First, by adopting this technique, the firm preserves its current hardware strategy. Secondly, a subculture tends to emerge that is against building larger, more encompassing management information systems.

In giving users access to a prototyper, the firm will still need its large or distributed processing mainframes. There is a general spirit of reeducation and a desire for hands-on experimentation and experience in database management.

There is also a desire to retain the existing computer staffs, including a group sometimes termed team leaders. They must keep existing systems running, as well as examining, sifting, deciding, justifying, designing, coding, producing, and testing systems using databases. Much of their knowledge is based on part-time education that pushes to the outer limits of their understanding.

One or more prototypers always emerge from within the firm's personnel. Usually their responsibility is closer to keeping the database software patched and operating than to working with any one application area. The prototyper candidate is generally one whom programmers turn to when they need an answer that cannot be found in the manuals or in their peer group.

Usually, there is substantial pressure within the firm to clear the backlog of systems in conventional jobs or database. It is not surprising to find an applications backlog of nearly four years.

In addition, most users are pushing to get micros. Some firms will let departments buy micros, but others require approval or standardization as part of an unfulfilled and unspecified grand design.

Typically, protoytpe applications will seldom fit onto a basic micro that costs less than $3,000 or so, and those purchasing smaller ones with less capability (in terms of storage, file space, printers, and graphics) are condemned to suffer for a local management decision made in haste and ignorant overenthusiasm.

File structures and organizations on micros are frequently crude, and earlier DBMSs have been poor products. In some cases, micro users of these systems have been unable to recover from their first disk read error. The problems that occur when a company first gets involved with micros is often the sole basis for choosing the prototyping alternative.

A subculture emerges in the firm with prototyping. Much of the spirit and enthusiasm held by dp and management can be channeled into this area with little reduction of the applications backlog, despite the fact that smaller projects receive almost immediate attention by the prototyper. If prototyping did not exist, however, another application project would be added to the backlog.

During the initial stages of development, the prototyper will experiment with existing software and determine that the most cost-effective solution to a backlog in an application area is a system that can bypass, in some aspect, a portion of data analysis and design. This will shift the responsibility of information analysis back to the user.

The same data dictionary that is obtained to complete an information analysis (in particular the ICL Data Dictionary System) is a two-edged sword. It can become both the source and receptacle for the prototyping. Without a data dictionary of some type, preferably one that can be used as an adjunct to a COBOL or FORTRAN library, the task is impossible.

Invariably, the dictionary will be used as a receptacle of all information necessary for prototyping since it will define entities, attributes, and relationships at a conceptual level. The fact that this terminology is meaningful is evidence of management's willingness to abstract the data within the firm and make them independent of the hardware and software they use.

These dictionaries can hold the output of a prototyping exercise in an entity-type implementation quadrant containing the schema, subschema, and all its details. (The mapping between

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conceptual and implementation levels is assumed to exist.)

The subculture that arises from this configuration and the need to produce "quick systems" will be unexpected. The quick decision for a home-grown product to generate databases from data dictionaries probably stems from frustration at the slowness of gaining database implementation experience. Permission to do this prototype software will be justifiable in the sense that prototyping binds existing hardware and software to the working reality of the firm; delivers the goods to the user quickly and without too much effort or inconvenience; and covers for the longer process of current and subsequent data analysis and design.

The accomplishment of the prototyping technique on a standard mainframe with a good dictionary and support for commonly understood languages can be trivial. Most time will probably be spent in the dialog between the user and prototyper/analyst. It is not unusual for the first prototyper to be "prototyped," obviously an extended learning process.

The generation of navigation paths will probably be a by-product of the designing of the schema and subschema. The generation of such protocol as division, section headers, and all fundamentals of the data division are normally a bare minimum.

The generation of other program code for the procedural aspects of the program can be imaginative. It will probably lead to less coding and more simple tables or statements that may or may not draw from a data dictionary for support. These are marketed as applications program generators. But, once having developed a generator of some sort, the availability of the facility then precedes the need and is subject to flights of fancy.

Indeed, some firms have limited their preprocessor output to a COBOL-like dialect that will meet the scrutiny of the prescribed standards groups.

Developers of the corporate subculture will be able to gain the power, prestige, and acceptance of their firm through their ability to eliminate person-years of dp and user effort through prototyping.

Prototyping has proved so successful that computer service consultancies have been developing packages to provide prototyping off the shelf. Most of these packages assume the existence of a fully descriptive data dictionary or else require the establishment of one. COBOL data division entries can usually provide the source material for operation of a conversion utility.

As the emphasis on data dictionaries progresses from passive to active, the contents no longer contain only the base for compilation of programs, but also for the validation, update, reporting, and calculation over the data fields.

Computer entrepreneurs have realized that the same kind of businesses have identical business problems. What cannot be solved with a series of separate micro packages for general ledger, stock control, and payroll can be solved by complete corporate or business management packages with only slight modification.

There is a third phase in this development, in the form of dynamic dictionaries: network systems receive data on the spot, transsmitting them to a microprocessor or mainframe, making decisions about the system in accordance with user requirements, and then producing an end-user system.

From now on, the computer manufacturer who can quickly produce a system with prototyping and demonstrate its capabilities will be the successful submitter of a tender. This is an extension of what is sometimes called an application development system.

How long will it take to develop the means to cut the prototyped system, according to the same prototype, into a ROM, that is, prototyping by dedicated chip rather than by software?

—Ken Meyer and Almos Kovacs
Northwood, Middlesex, England

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