

DATA MATION ⁸² [®]

JANUARY/4.00 U.S.A.



MIS: A STARRING ROLE AT LAST?

ALSO:
COPING WITH COMPUTER CRIMINALS
JAPAN'S FIFTH GENERATION

When you ask some people about backup — they back off.

And for good reason. Ask any other supplier of peripheral products for system backup, and you'll find that some can supply a disk, some can supply a cartridge recorder, others a streaming transport. But none can supply the choice which Kennedy can offer.

Kennedy is the only company that can offer an SMD compatible, 8" 40 MByte disk drive (Model 7300) and an 80 MByte 14" Winchester disk drive (Model 5380). To back them up, Kennedy has a 1/4" cartridge recorder (Model 6450), and Model 6809, 1/2" Data Streamer Tape Transport.

Kennedy was the first to utilize the 1/4" 8M cartridge for disk backup; Kennedy was the pioneer in Winchester disk technology, and was a leader in developing a low cost streaming tape drive.

All of these products were conceived and designed to meet the need for reliable, low cost backup — for our systems or for any other system.

Kennedy has always backed its products. That's why we're No. 1. Call or write us about your problem.

We won't back off.

KENNEDY INTERNATIONAL INC.

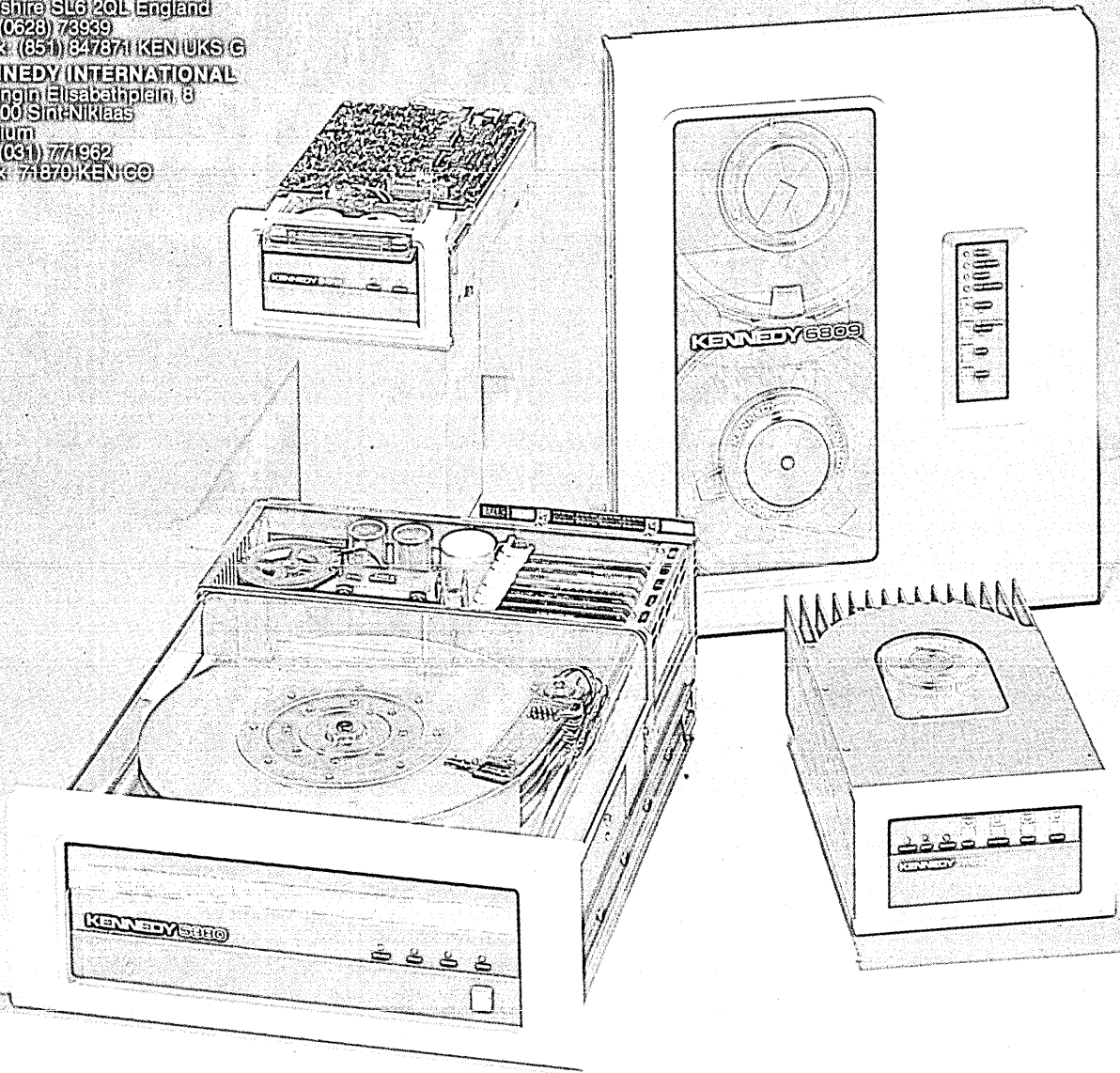
UK and Scandinavia
McGraw-Hill House
Shoppers Road
Maldenhead
Berkshire SL6 2QL England
Tel: (0628) 73939
Telex: (851) 847871 KEN UKS G

KENNEDY INTERNATIONAL

Koningin Elisabethplein 8
B-2700 Sint-Niklaas
Belgium
Tel: (031) 771932
Telex: 74870 KEN BE

KENNEDY

An Allegheny International Company
1600 Shamrock Ave., Monrovia, CA 91016
(213) 857-8331 TELEX 472-0116 KENNEDY
TWX 910-585-3249



AM Jacquard Systems

The AM Jacquard J121 entry level computer system does two things for your office: word and data processing.

And it does a whole lot more. It interfaces to AM varityper phototypesetters, can easily communicate with mainframes, and can handle electronic mail and a multitude of tasks that other systems can't. And all for about \$13,500 per screen.

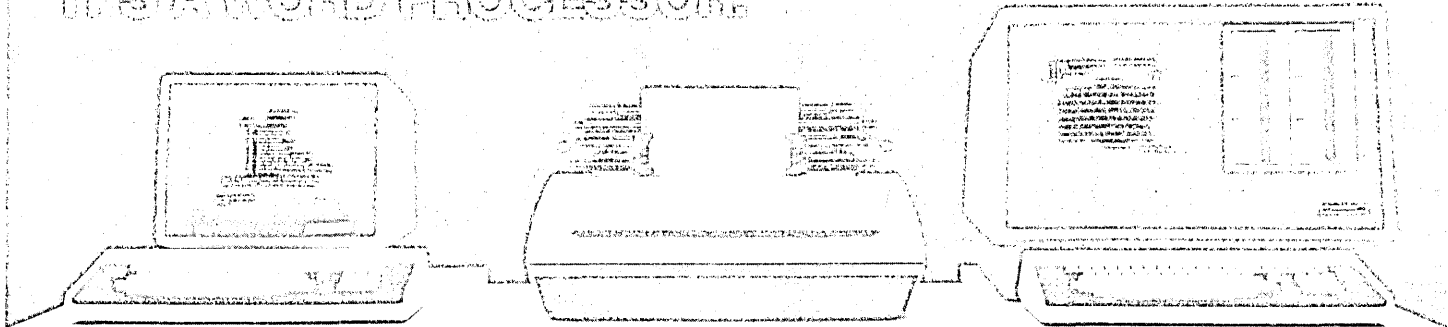
This efficient office automation system can grow with your business, too. Buy it now with only two workstations and add more for under \$5,000 per screen, as you need them. The J121 offers ease of operation, expandable on-line storage, high speed throughput, and comes with

a choice of two letter quality printers.

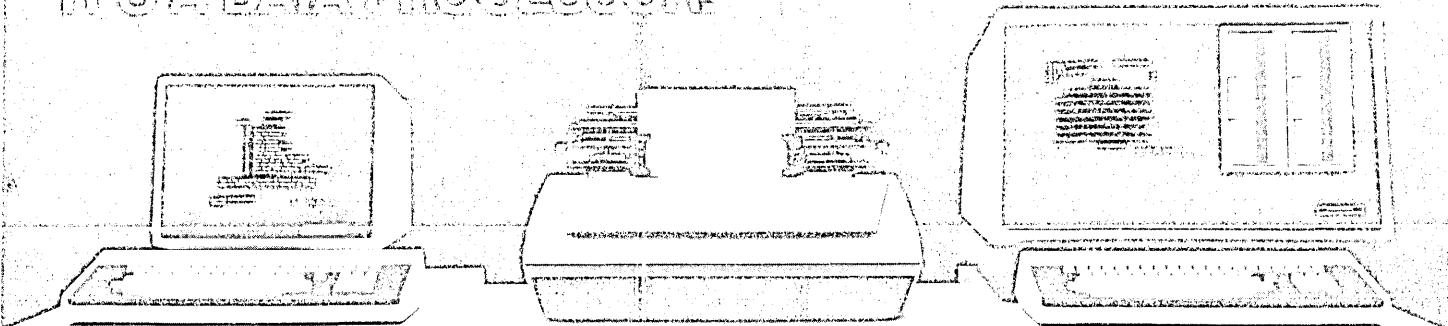
The AM Jacquard J121 is designed to boost your office's productivity and profitability. No one but no one offers so much versatility and flexibility for the money. And we know what we're talking about. Our parent company, AM International, Inc., has been designing products to modernize offices for more than 30 years.

If you want to know more—and you should—about our Datapro award-winning line, contact AM Jacquard Systems, the information systems division of AM International, Inc., Dept. 117, 3540 Ocean Park Blvd., Santa Monica, CA 90405. (213) 450-1242, Ext. 777.

IT'S A WORD PROCESSOR.

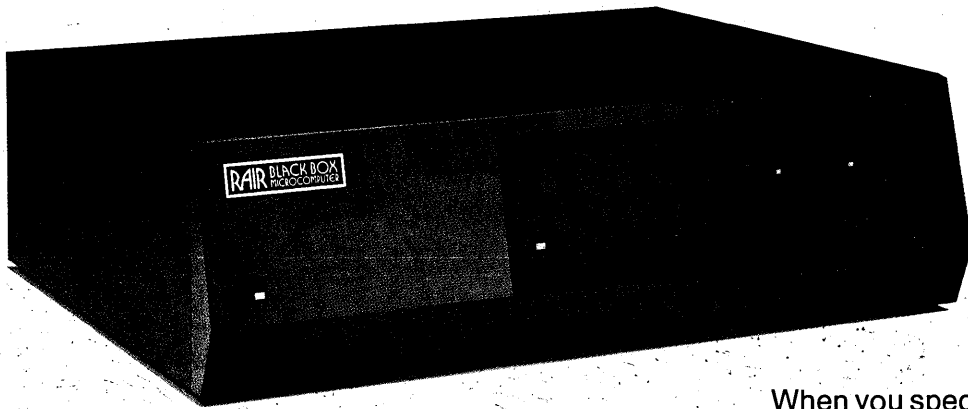


IT'S A DATA PROCESSOR.



IT'S A STEAL AT THE PRICE.

A Multi-User Hard Disk Small Computer for Only \$4,875.*



At RAIR, we have been building advanced microcomputer systems for more than four years. That's why our line of Black Box microcomputers offers such unbeatable price/performance.

We've been consistently at the forefront of compact computer technology, with 8" Winchester disks and multi-user software. And now, we've added, integral 5 1/4" hard disks—plus state-of-the-art 64k RAMs.

When you specify our latest Black Box microcomputers, you get 5 1/4" Winchester hard disks for high speed, high capacity storage and 64k dynamic RAMs for expanded memory. Plus an advanced MP/M operating system for multi-user, multi-tasking operation.

So if you're searching for compact computer systems with real price/performance, evaluate our Black Box microcomputer today. For details, contact the RAIR office nearest you.

*Single-unit price for Black Box Model 3/30 evaluation system.

United States: RAIR Microcomputer Corporation
4101 Burton Drive, Santa Clara, CA 95050, Telephone: (408) 988-1790 Telex: 677038

West Germany: RAIR Computer GmbH
Clemensstrasse 5-7, 5000 Köln 1, Telephone: (0221) 219811 Telex: 8881915

United Kingdom: RAIR Ltd., Wellington House,
6-9 Upper St Martins Lane, London WC2H 9EQ Telephone: (01) 836 6921 Telex: 298452

CIRCLE 5 ON READER CARD

RAIR

DATA MATION®

JANUARY 1982/\$4.00 U.S.A.
VOLUME 28 NUMBER 1
This issue, 160,820 copies

FEATURES

34 IN FOCUS

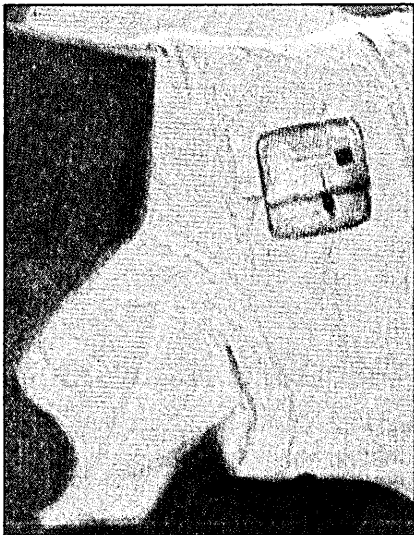
Edward K. Yasaki

A look at a classic, the 1961 Stretch computer, which had a phenomenal list of "firsts." Developed by IBM and NSA, the machine never quite reached the heights anticipated for it, but the project attracted many bright young people to IBM.

96 THE CHANGING ROLE OF THE DP MANAGER

Janet Crane

The changes are seen by some MIS managers as the opportunity to play a starring role in corporate management, by others as a threat to their authority that will ultimately render them obsolete.



110 TOKYO LOOKS TO THE '90S

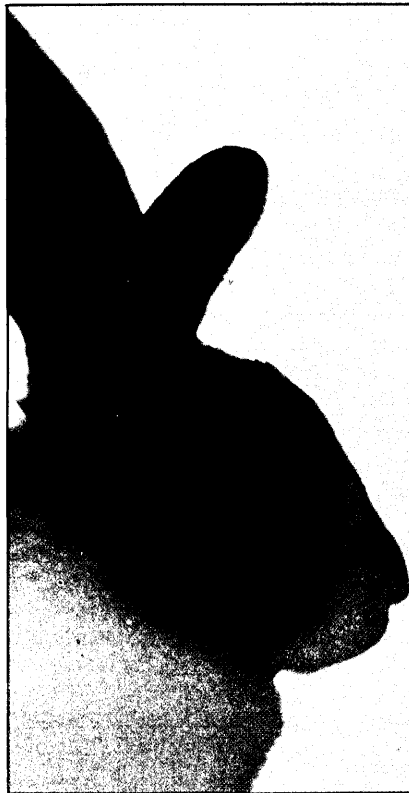
Edward K. Yasaki

Japan is beginning a 10-year research and development effort which it anticipates will produce a fifth generation computer system.

118 COPING WITH COMPUTER CRIMINALS

Charles L. Howe

Dp types are too unsophisticated and trusting when it comes to human relations, say experts. These qualities permit computer crime to occur.



130 THE FUTURE OF RABBITS

Everett T. (Bill) Meserve

In a sequel to September's "A History of Rabbits," the author analyzes two strategic segments of the personal computer industry—the business/professional and the consumer—and how they may be approached.

140 PROGRAM PORTABILITY

**Michael G. Walker and
Richard G. Harrison**

Have your programs been converted successfully from one host computer to another? Here's a methodology to verify that transportation automatically.

187 READERS' FORUM

With "The Toll of a New Machine," Tim McGinnis jovially rings in the New Year. Donald A. Norman, who described "The Trouble with Unix" in a November feature, now tells us about "The Trouble with Networks."

NEWS IN PERSPECTIVE

50 **STRATEGIES**
IBM to bite the bullet?

52 **SUPERCOMPUTERS**
Seymour leaves Cray.

61 **MAINFRAMES**
Mid-life kicker for the 4300s.

65 **COMMUNICATIONS**
Merging voice and data.
Phone of the future.

72 **EDUCATION**
"Secrets" on campus.

77 **SOFTWARE**
Unix: a standard now?

80 **ELECTRONIC MAIL**
Battle over ECOM.

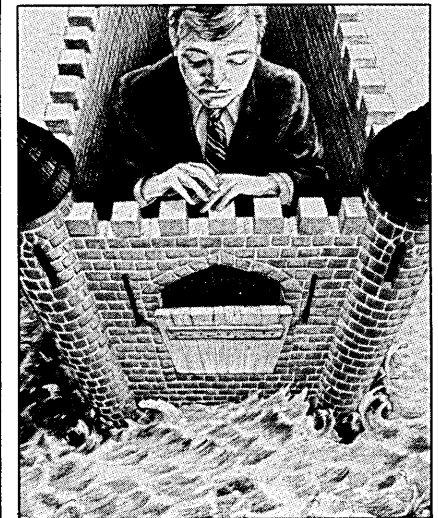
80-H **POLICY**
U.K. hits telecom monopoly.

88 **PRODUCTIVITY**
Let the users program.

90 **BENCHMARKS**

DEPARTMENTS

- 8 **LOOKING BACK**
- 13 **LOOK AHEAD**
- 18 **CALENDAR**
- 23 **LETTERS**
- 31 **EDITOR'S READOUT**



- 151 **PEOPLE**
- 155 **HARDWARE**
- 163 **SOFTWARE & SERVICES**
- 167 **SOURCE DATA**
- 176 **MARKETPLACE**
- 184 **ADVERTISERS' INDEX**

COVER ILLUSTRATION BY RICHARD WILLIAMS

With PACS, everyone will love your VAX!

As we all know, DEC's[®] VAX-11 is a system of remarkable performance capabilities... a joy to engineers and scientists. But, wonderful as they are, the people at DEC don't provide VAX users with a comprehensive resource monitoring software package. And, there are people in your company who like to keep track of things.

So, we developed PACS (Process Accounting and Chargeback System) to monitor your VAX system. PACS summarizes the use of computer resources on a per user, per project and per facility basis, and charges back resource usage to system users.

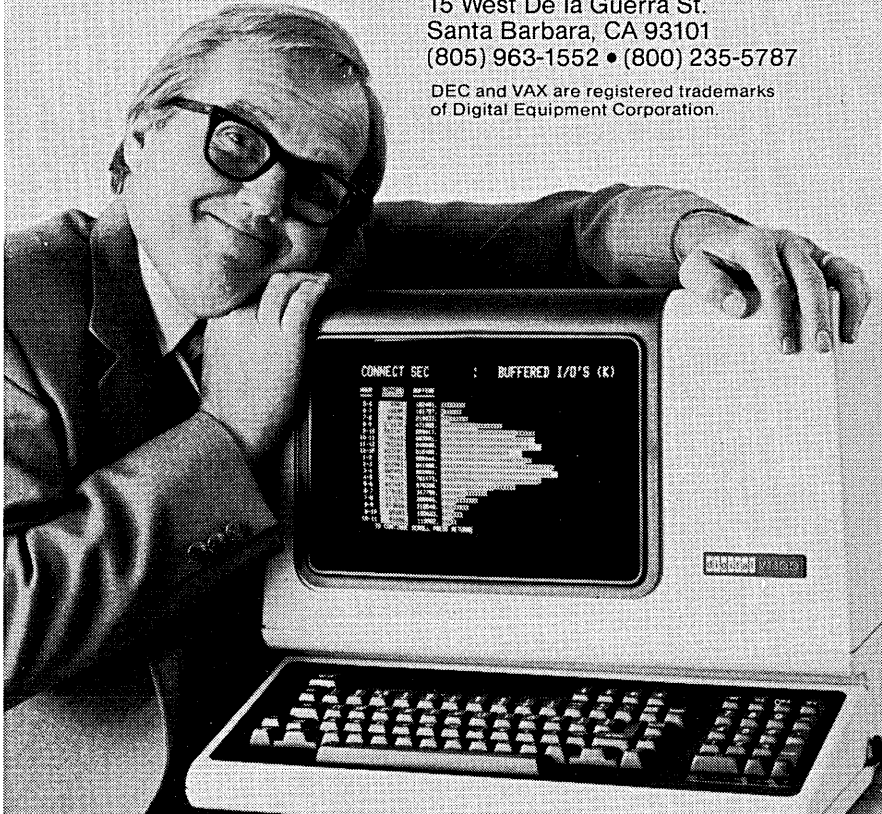
PACS makes your VAX not only the most advanced system of its kind, but one that can be tracked, monitored and properly accounted for... a system loved not only by the technical people, but by the people who take care of the technical people (and often sign their paychecks). We'll be happy to demonstrate PACS by telephone on your terminal today. Or, write for complete documentation.

SIGNAL TECHNOLOGY, INC.



15 West De la Guerra St.
Santa Barbara, CA 93101
(805) 963-1552 • (800) 235-5787

DEC and VAX are registered trademarks
of Digital Equipment Corporation.



CIRCLE 6 ON READER CARD

DATAMATION

Editor John L. Kirkley
Managing Editor Laton McCartney
News Editor Becky Barna
International Editor Linda Runyan
Managing Editor, Europe Andrew Lloyd
Products Editor Bill Musgrave
Copy Editor Florence Lazar
Associate Editor Kenneth Klee
Assistant Editor Deborah Sojka
Editorial Assistant Lauren D'Attilo
Bureau Managers
San Francisco Edward K. Yasaki
Los Angeles Edith D. Myers
Minneapolis Jan Johnson
Boston Ralph Emmett
New York John W. Verity

Technology Editor, Europe Fred Lamond

Correspondents

Washington Willie Schatz
London Malcolm Peltu
Sydney, Australia Norman Kemp
Telecommunications Editor Ronald Frank
Editorial Advisor Robert L. Patrick
Technical Advisor Lowell Amdahl
Contributing Editors Ralph G. Berglund,
Howard Bromberg, Philip H. Dorn, David
Hebditch, John Imlay, Angeline Pantages,
Russell Pipe, Carl Reynolds, F. G. Withington,
Amy Wohl.

Art Director Kenneth Surabian
Assistant Art Director Susan M. Rasco
Production Manager Kathleen Monaghan

EDITORIAL OFFICES

Headquarters: 666 Fifth Ave., New York, NY 10103. Phone (212) 489-2588. **New England:** 1 Chaucer St., RFD 2, Sandwich, MA 02563, (617) 888-6312. **Midwestern:** 3607 Garfield Ave. S., Minneapolis, MN 55409, (612) 827-4664. **Western:** 1801 S. La Cienega Blvd., Los Angeles, CA 90035, (213) 559-5111; 2680 Bayshore Frontage Rd., Suite 401, Mountain View, CA 94043, (415) 965-8222. **International:** 6605 Burlington Pl., Springfield, VA 22152, (703) 569-3383. **European:** 221 Blvd. Raspail, 75014 Paris, France, (331) 322-7956. **New York, N.Y. TELEX 640-229.**

CIRCULATION

666 Fifth Avenue, New York, NY 10103

Circulation Manager Joseph J. Zaccaria
Director of Mktg. Deborah Dwellley Gamber
Business Manager Charles J. Johnsmeyer
Publisher James M. Morris


Technical Publishing

DBB a company of
The Dun & Bradstreet Corporation

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, with the exception of August, which is semi-monthly. Published by Technical Publishing, a company of the Dun and Bradstreet Corp., 1301 South Grove Ave., Barrington, IL 60010, James B. Tafel, Chairman, John K. Abely, President, Executive, advertising, editorial offices, and subscription department, 666 Fifth Ave., New York, NY 10103. Published at East Greenville, Pa. Annual subscription rates: U.S. and possessions: \$40; Canada: \$55; Europe: £48 air freight, £90 air mail; Japan, Australia, New Zealand: £52. All other foreign countries: £48 surface, £90 air mail. Reduced rate for qualified U.S. students, public and school libraries: \$30. 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. (01422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Second-class postage paid at New York, NY 10001 and at additional mailing office. Copyright 1982 by Technical Publishing Company, a Division of Dun-Donnelley Publishing Corporation. All rights reserved. "Datamation" registered trademark of Technical Publishing Company. Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Brown Printing Co., Inc. POSTMASTER: Form 3579 to be sent to Technical Publishing Company Circulation Office: 666 Fifth Avenue, New York, NY 10103. Single copy: \$4.00 in U.S.A.



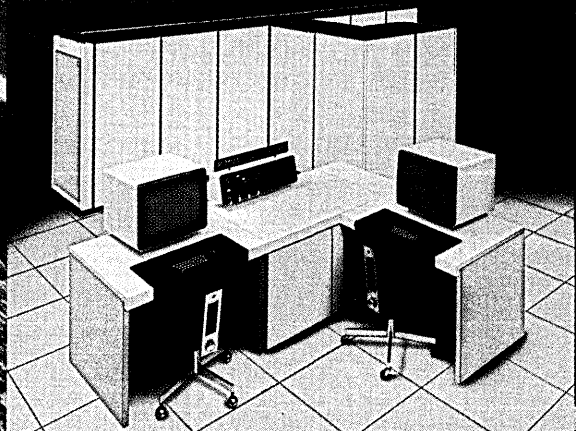
**"Before you tell me about
the IBM 3081 you've got on order,
let me tell you about
the Advanced System/9000
I've already got installed."**

Quite honestly, our AS/9000 is the fastest, most reliable compatible computer that anyone has ever delivered—even IBM.

After having installed a large number of our large-scale AS/9000s, we've found them to outperform their original specifications. In fact, their reliability, availability, and serviceability have proven to be the best in the industry.

We offer a broad line of compatible computers, peripherals, memory, and software. The advanced technology and ultra-high performance essential to any advanced system. Worldwide service and support. And, naturally, complete compatibility.

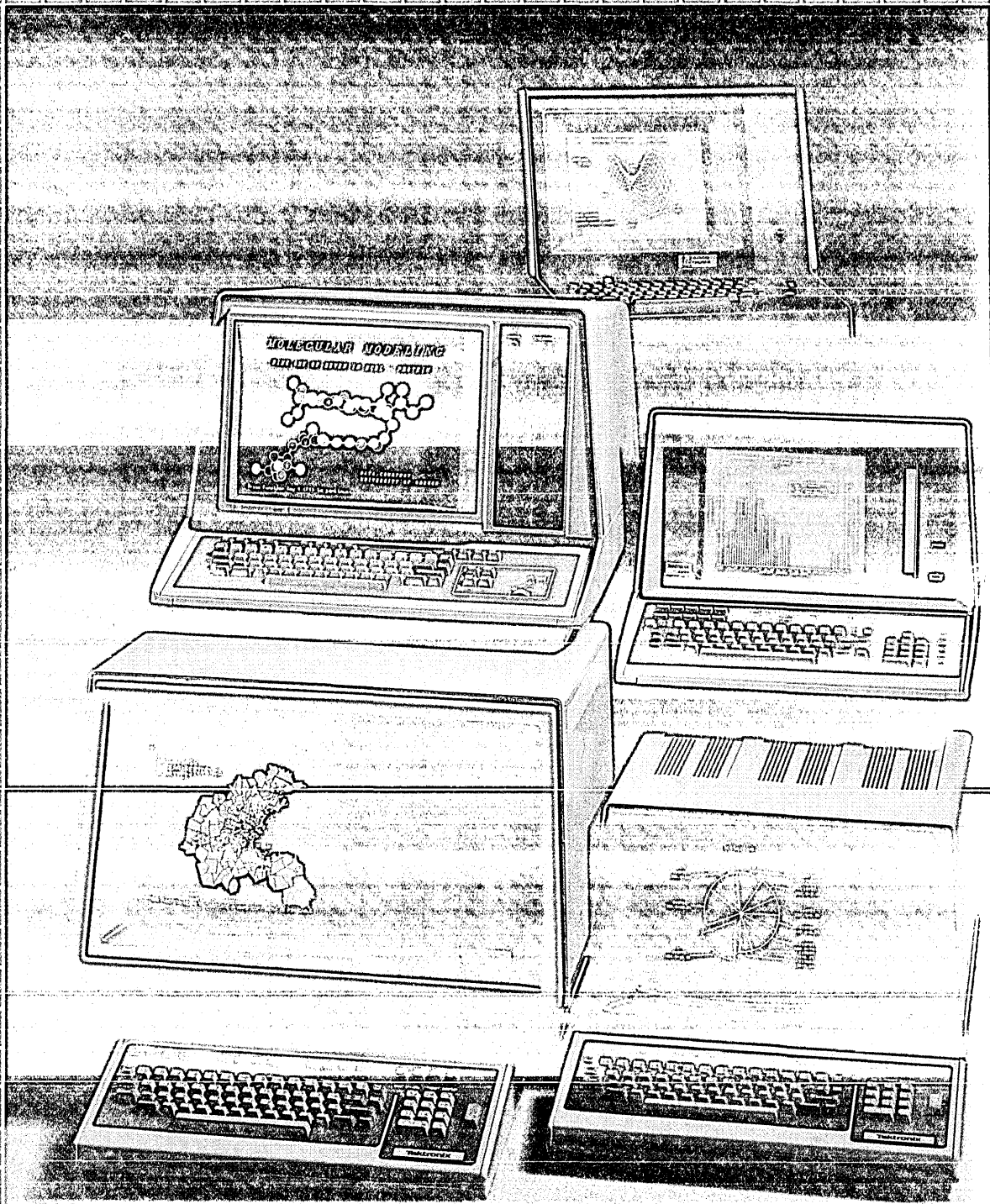
Unsurpassed performance is yet another reward for selecting the Complete Computer Company.



 **National Advanced Systems**

For further information, write to National Advanced Systems, 800 East Middlefield Road, Mountain View, CA 94043. Or call 415/962-6000. In Europe call 44 1 570 2323.

CIRCLE 7 ON READER CARD



Behind the world's widest range of graphics: a world of system interfaces.

If you're a systems manager, you look for graphics products that fit your system. If you're a systems user, you look for graphics that fit your job. And if you look to Tektronix, manufacturer of the world's broadest and best-supported line of graphics, you can expect the best fit for all.

Tektronix has set the world's graphics standards for more than a decade. In user considerations: precision, versatility, software, ease of use. And in system management considerations: easy interface to virtually any mainframe or minicomputer. A commitment to updating, not outdating, products. Exceptional reliability and worldwide service support.

In the field of data analysis alone, Tektronix offers a complete range of mutually compatible tools. The Tektronix 4020A Series, for example is a one-of-a-kind combination of text handling and graphics capabilities in color or monochrome terminals. Intelligent, programmable and supported by Tektronix PLOT 10 Easy Graphing, the terminals are as equally

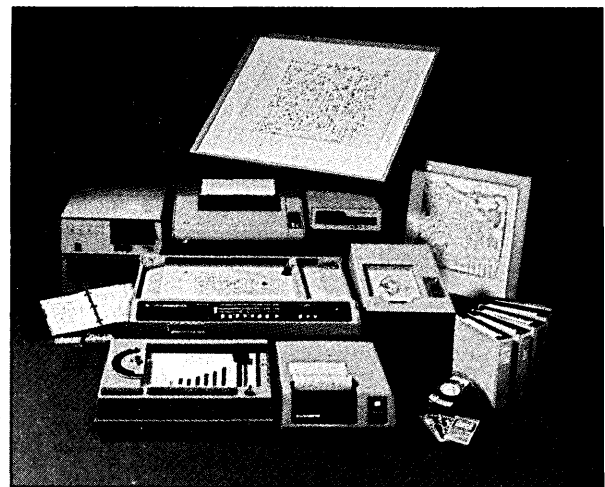
at home with basic data entry and retrieval as with forms construction and friendly graphics interaction.

For more technical analysis, users may choose the unprecedented local intelligence and high information capacity of the 4112, the state-of-the-art in raster graphics. They may choose the independence of the 4052 high-speed desktop computer, with optional data communications interface. Or select the 4012, the most affordable alternative in high-resolution graphics.

With our PLOT 10 Interactive Graphics Library, (IGL) you enjoy fast start-up, easy maintenance, CPU and terminal independence. IGL is the world's most popular implementation of the 1979 ANSI proposal for a computer graphics standard.

No mainframe vendor or other supplier can begin to offer so many standard-setting graphics products—including plotters, copiers and file managers—so immediately compatible with your system and so completely compatible with each other. For additional literature, or the

address and phone number of the Tektronix Sales Office nearest you, contact:



U.S.A., Asia, Australia, Central & South America, Japan
Tektronix, Inc.

P.O. Box 4828
Portland, OR 97208
Phone: 800/547-1512
Oregon only: 800/644-9051
Telex: 910-467-8708
Cable: TEKTRONIX

Europe, Africa, Middle East
Tektronix Europe B.V.
Post Box 827
1180 AV Amstelveen
The Netherlands
Telex: 18312

Canada
Tektronix Canada, Inc.
P.O. Box 6500
Barrie, Ontario L4M4V3
Phone: 705/737-2700

Tektronix®
COMMITTED TO EXCELLENCE

CIRCLE 8 ON READER CARD

The buck starts here.

Making a start

is probably the most important step toward saving. For those who find saving difficult, it's too easy to say, "I'll start tomorrow... or maybe next payday... or next month."

Then, if you finally do save something three or four paydays in a row, it seems OK to skip one or two, since you've been doing so well. And soon you're right back where you started.

There is a way to take that initial step and know you're on the right track toward a regular, scheduled savings. Just join the Payroll Savings Plan at work. A little is taken out of each paycheck toward the purchase of U.S. Savings Bonds. You never see that little extra. You never miss it. You don't have to worry about making a special effort to put something aside each payday. It's all done for you. Automatically.

The bucks start piling up, the interest grows, and you realize you've found one sure-fire way to save. You finally have a plan for the future.

And when the bucks stop coming in, you'll have something to show for all those years of hard work.

Take stock in America.



When you put part of your savings into U.S. Savings Bonds you're helping to build a brighter future for your country and for yourself.

Ad Council A public service of this publication and The Advertising Council.

Twenty Years Ago/Ten Years Ago

LOOKING BACK

THE OUTLOOK

January 1962: President Kennedy had declined to deliver the keynote at the Eastern Joint Computer Conference, which took place in Washington a fortnight before Christmas, but Dause L. Bibby, president of RemRand Univac, struck a theme JFK might have liked. He warned his audience that although the Russians were generally behind the U.S. in computing, they could take the lead if Americans failed to keep up the good work.

Since it was the start of a new year, DATAMATION asked 14 experts to speculate about what 1962 held in store for the industry. Topics included the university (which had "largely abdicated its leadership in the development of computation science"), the population problem ("Where will 20,000 new programmers come from?"), the standards outlook ("No industry has ever had greater need for standardization . . ."), and the military market (a likely R&D project: a "new type of space computer," characterized by slow speed, low power consumption, and high reliability).

Burton Grad, in his projections for business data processing, said that 1962 marked a crossroads for the industry. He noted that while business computing had moved cautiously in the 1950s (owing to management's awe of "giant brains"), by 1960 the bosses were beginning to wonder whether computers were being used to their full potential. Grad argued that 1962 was a "threshold of new systems concepts." He predicted that process control systems, automated design engineering, and airline reservation systems—all of which were then in their infancy—would blossom in '62 and point the way for future developments.

Harold Bergstein offered a market forecast for the new year. He noted that manufacturers were shifting investment from R&D to applications, and anticipated an increasing emphasis on fulfilling prior commitments rather than extending mainframe developments without comparable advances in software. He also predicted that hardware manufacturers would be developing their own peripherals and reducing their reliance on suppliers. In general, Bergstein cited a reappraisal of marketing strategies that could be termed a "cautious, internal retrenchment."

This new strategy, he said, would produce five major changes: 1. Hardware announcements and delivery dates would start coming closer together—probably nine months apart or less. 2. Manufacturers would begin to specialize, selling to vertical markets rather than horizontal ones. 3. Application studies and various peripherals would start to be sold with "the lonely mainframe." 4. Less emphasis would be placed on "breakthrough announcements" to capture a market; "conservative and competitive jockeying for position" would predominate. 5. Prices would come down because of more liberal lease arrangements and heavily discounted machines for certain "prestige" installations.

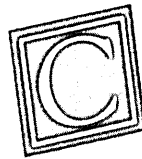
EQUITABLE ARRANGEMENT

January 1972: After two unsuccessful attempts to "corner specific industry markets for software and services" (airline reservations and advertising), it seemed Informatics had finally found fertile ground in the insurance world.

The company coventured with Equitable Life Insurance Company to form Equimatics, which offered "a wide range of computer services to customers in insurance, health care, and other industries." Informatics' own Werner Frank (one of the three original Informatics founders, along with Walter Bauer and Dick Hill) headed Equimatics as president, and Equitable's senior vice president David H. Harris was appointed the new company's chairman of the board. Equitable provided most of the initial capital for the startup by purchasing \$6.2 million worth of convertible stock in the new firm.

One of Equimatics' first projects was to develop a nationwide data communications network to improve the coordination of administrative and policyholder services between insurance company home offices and field organizations. Frank anticipated a "modest" first year for Equimatics—approximately \$600,000 in sales, beginning with a contract for the Home Life Insurance Company valued at just under \$500,000. Under this contract, Equimatics would design and write specifications for a consolidated system of Home Life's individual life insurance policyholders' records.

—Deborah Sojka



Database
Systems

Happy IDMS-1982



The coming year will be an extremely successful one for you if your plans include attending a free seminar on IDMS-1982. IDMS-1982 is the most comprehensive and integrated database management system ever developed, with an array of new products, new features and new applications—all totally integrated, all dictionary-driven.

To learn about the benefits of this fully integrated approach to managing your data resource, send for our all new 1982 seminar schedule. The results will ensure a successful 1982 for you and your organization.

Name/Title _____

Company/Department _____

Address _____

City _____

State _____ Zip _____

Phone () _____

My computer is _____

Mail to: Rosalie Cope, Cullinane Database Systems, Inc.
400 Blue Hill Drive, Westwood, MA 02090
Phone (617) 329-7700

DM/1-82

Database: Cullinane

CIRCLE 10 ON READER CARD



Intel would like to give

With light-speed paging and swapping, Intel's new FAST-3815 intelligent memory system frees your 3350s (and 3380s) for the task they were meant to perform: data storage.

Priced at only \$6K a megabyte, the FAST-3815 is an intelligent Random Access Memory (RAM) system. And because it handles paging and swapping faster and more economically than anything else in the market, the FAST-3815 releases your large capacity disk drives for productive use.

When compared to conventional disks, Intel's FAST-3815 offers many cost-effective advantages for IBM 4300, 158, 168, 303x and PCM users. These include:

- Improving paging and swapping up to 300 percent,
- Enhancing systems performance by reducing page service time up to 67 percent (vs. a 3350),

- Reducing users' response time and/or increasing the number of users with no degradation in response time, and
- Providing environmental savings—cooling, power and space.

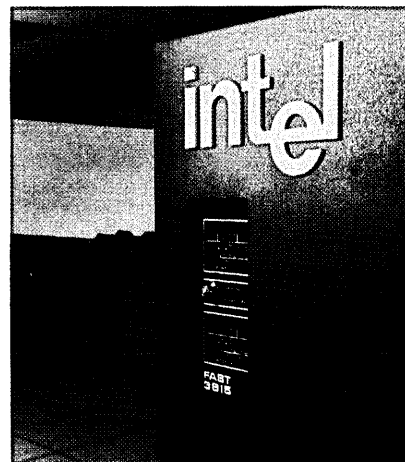
Intelligent memory priced at \$6K a megabyte

You won't find RAM memory anywhere priced as low as \$6K a megabyte... especially *intelligent* RAM memory. Intel's advanced iSBC 86/12™ single-board computer equips the FAST-3815 with unparalleled intelligence that, among other functions, handles channel protocol and performs

sophisticated self-healing diagnostics.

Self-healing procedures which make the FAST-3815 virtually fail-safe include:

- The first commercial application of 'hot' spares and double-bit error correction with multiple-bit detection,





you free 3350s. Now.

- A unique software sweep that 'scrubs' soft errors and reallocates spare memory in place of hard errors, and
- An automatic recording—in its own battery backed-up memory—of the board and device location of any errors to provide maximum service efficiency.

The FAST-3815's microcomputer also ensures complete IBM compatibility and the ability to emulate numerous direct access storage devices.

Fast access

The FAST-3815's extremely fast paging and swapping performance can release 3350s (and 3380s) to perform the function they handle best—normal data storage. The FAST-3815's 0.8 milliseconds access time is considerably faster than any IBM alternative.

By moving the paging data sets of swap files onto a single FAST-3815, you can free *multiple* 3350s (and 3380s) to handle your growing data storage requirements. And, Intel's FAST-3815 is available for delivery *now*.

The FAST-3800 family

The new FAST-3815 is an entry-level version of the Intel FAST-3805 semiconductor disk. Both devices in the FAST-3800 family offer impressive environmental savings. Power costs, cooling costs and space requirements are at least half of those of conventional disks.

Intel's FAST-3815 releases your disks for more productive use, offers increased systems performance, and is available *now*. Interested? Contact Intel's Market Information Office at 512/258-5171. Or mail the attached coupon today.

- Send details on the FAST-3815 semiconductor disk.
- Have a salesman call immediately.

Name _____

Organization _____

City, State, Zip _____

Phone (____) _____

CPU _____ Operating system _____

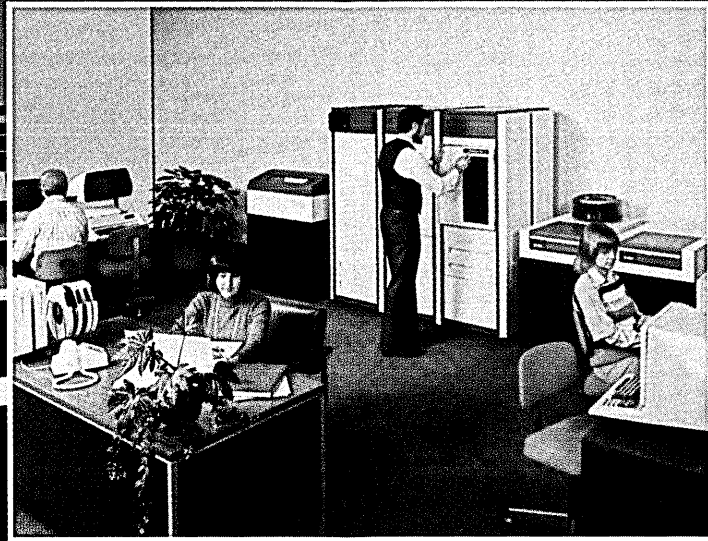
Return to Intel Market Information Office, P.O. Box 9968, Austin, Texas 78766.

Europe: Intel Corporation S.A., Systems Group, Rue du Moulin a Papier 51, Boite 1, B1160 Brussels, Belgium, 322-660-30-10, TLX 846-24814. Canada: Intel Semiconductor of Canada, Ltd., 201 Consumers Road, Suite 200, Willowdale, Ontario M2J 4G8, 416/494-6831.

CIRCLE 11 ON READER CARD

intel delivers solutions

200 reasons to buy the BTI 8000



BTI 8000 32-bit multiprocessor system

With one BTI 8000, you use up to 200 terminals simultaneously running programs in COBOL, FORTRAN, BASIC and PASCAL. What's more, you can run interactive and batch jobs at the same time — in any mix!

The key is BTI's exclusive Variable Resource Architecture. Starting with an entry level system, you can increase processing power by a factor of ten, by just plugging in modules — up to 8 CPUs, up to 16 Mbytes of memory and up to 8 Gbytes of mass storage. All without rewriting any software.

The BTI 8000 also features a virtual memory environment, fail-soft architecture, built-in security and privacy, and remote diagnostics. And, if

all that's not enough, consider this: the base system price for the BTI 8000 is 30% lower than that for comparable systems from other "supermini" manufacturers.

As for reliability and support, they're an established BTI tradition, thanks to more than 10 years' experience with service via remote diagnostics. BTI currently supports over 3000 systems in the U.S., Canada and the United Kingdom. For even more reasons to buy the BTI 8000, contact your nearest BTI sales office.



Corporate Offices: 870 West Maude Avenue, Sunnyvale, CA (408) 733-1122; Regional Offices: Piscataway, NJ (201) 457-0600; Palatine, IL (312) 397-9190; Atlanta, GA (404) 396-1630; Sunnyvale, CA (408) 749-0500. Sales Offices in major U.S. cities. In the United Kingdom: Birmingham (021)-477-3846.

BTI is a registered trademark of BTI Computer Systems

CIRCLE 12 ON READER CARD

LOOK AHEAD

CDC SET TO ROLL
OUT SOFTWARE

A bundle of software will be rolling out of Control Data this quarter for its 110 small business system. On the list will be Magic Wand, Supercalc, and an integrated general business package. They join the company's first application package, a real estate industry program introduced last month. Also in the pipeline is networking capabilities, but CDC says it won't have more to say on that subject till midyear. Declining to comment on units sold, CDC did say it now has 110s in all 30 of its Business Centers (18 cities).

OS TO WED
HYPERCHANNEL?

IBM's growing dependence on its VM/370 OS is now noticeable across another sector of its business, namely, satellites. Sources claim that a new project at IBM's San Jose, Calif., research lab is the marrying of OS to Network Systems Corp.'s Hyperchannel to act as a fast, local network delivery mechanism for satellite services from IBM's SBS affiliate. Maybe Big Blue will find a place in the scheme of things for all the CATV bandwidths it's been buying up as well?

ZENITH ZEROS IN
ON EM SERVICE

An electronic mail service called ZGRAM will be available on Zenith Data Systems Z90 micros this April. ZGRAM software was written in-house and is entirely menu-driven. It handles data, programs, and text, and has message checking and encryption features. Systems software costs \$10,000 and interfaces to 3780-like host computers and GTE Telenet's Telemail. Workstations go for \$7,500, which includes a Z90 micro, ZGRAM program for getting on Telemail, an auto-dial/answer modem, printer, and Z37 disk drive, plus Supercalc, Magic Wand, and BASIC.

INTEL EYES CDC,
UNIVAC USERS

Intel in Austin begins the New Year by offering QueX -- an update-by-example feature for its System 2000 -- to Univac users. Sometime second quarter, Intel will offer its Genius report writer to Univac and CDC users for \$10,000. Both features have been available only to IBM users.

OH YEAH?

It's no news that bad news sells better than good news, at least not to Strategic Inc. of San Jose, which is loudly hawking a \$1,200 study purporting to show how Xerox will fail spectacularly in its bid for the office automation market. Strategic president Michael Killen won't give any free peeks, but claims vehemently that his "data" show "fundamental flaws" in Ethernet, the backbone of Xerox's strategy. He's so sure of his "facts"

LOOK AHEAD

CACHING IN

that he's "betting (his) company" on the Xerox report. Obviously stung, Xerox shelled out the \$1,200 and found little more than two out of 190 pages referring directly to Ethernet, and much of that data were "technically incorrect." Most of the rest is a history of Xerox's undeniable trip-ups in selling mainframes and broadband communications, it claims.

With battle plans drawn, Amperif is preparing for its latest foray against IBM. The California firm plans an April 1 beta test, at a site to be chosen later, of its 8870C IBM-compatible cache disk subsystem. Production of the fixed record length disk was delayed a few months, but it's now expected to be available by NCC time. The company will introduce its 8880C variable record length disk in the fourth quarter. Both products are aimed at IBM's 3350 and above customer base.

JOL SURFACES FROM DOWN UNDER

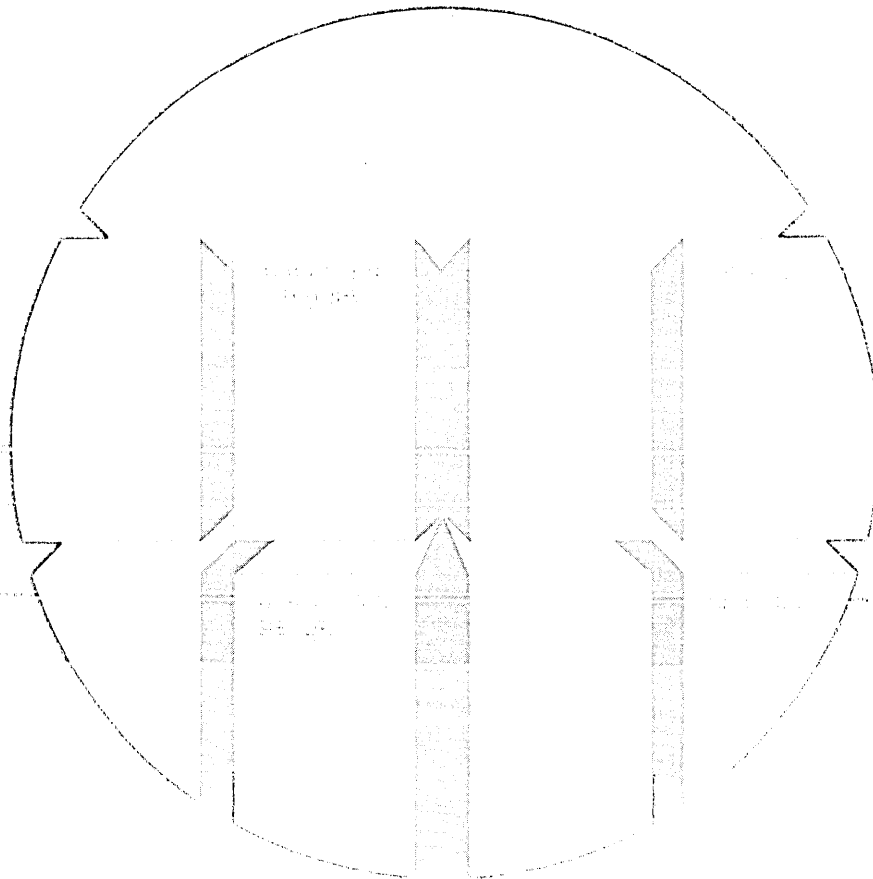
Watch for a new software package this month from Software Module Marketing, Sacramento. The firm has acquired U.S. marketing rights to the Job Organization Language (JOL), a high-level language developed in Australia to serve as an interface between users and IBM's MVS operating system; JOL eliminates the need to know JCL. Offered exclusively by Fujitsu in Australia, New Zealand, and Indonesia, the packages sold in those countries are bundled into Fujitsu's IBM-compatible mainframes.

FOUNTAINHEAD FINALLY?

When Data General started its so-called project "Fountainhead" around 1974, it was to provide the company with a new and largely incompatible high-level architecture. Developed mostly in North Carolina, Fountainhead has continued in stop/start fashion ever since. While DG is still tight-lipped on the matter, it is rumored to have spent an estimated \$20 million so far. Word has it that Fountainhead will greet the light of day this year. And it's believed by one insider that the company will ensure at least some level of compatibility through an attached front-end processor.

RUMORS AND RAW RANDOM DATA

Not to be left in the dust, Univac is working out the bugs on a small business system, which is at the beta test stage of development....The word on Wall Street is that IBM World Trade's price cuts on large mainframes, combined with the strong dollar, will reduce its European revenues for '82 by as much as 40%....Storage Technology shortly will enhance its disk controllers with an "intelligent" cache memory. IBM's woes with the 3380 makes sales of 3350-type disk drives a cinch, ST says.



Together, we can implement solutions to your most pressing DP problems:

- o An expanding application backlog.
- o Scarcity of IMS and CICS expertise.
- o A trend toward more complex on-line applications.
- o Escalating maintenance.
- o Demands on the part of management for increased efficiency and a higher return on DP investment.

Informatics' Implementation Systems address every one of these concerns. Programmer productivity can be increased by an order of magnitude. Your application backlog can be further reduced because end users can generate their own reports, answer their own inquiries, releasing your programmers for more important tasks. Without any loss of

**Why not have it all?
Increased programmer productivity,
faster response times,
more satisfied users—
all within budget!**

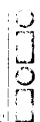
Together, we can manage it.

IMPLEMENTATION SYSTEMS from Informatics®

Informatics Inc., 21050 Vanowen Street, Canoga Park, CA 91304
(213) 887-9121

Send me complete details on Implementation Systems.
Have a sales representative call me.

Name _____ Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Telephone _____
Computer _____ Operating System _____



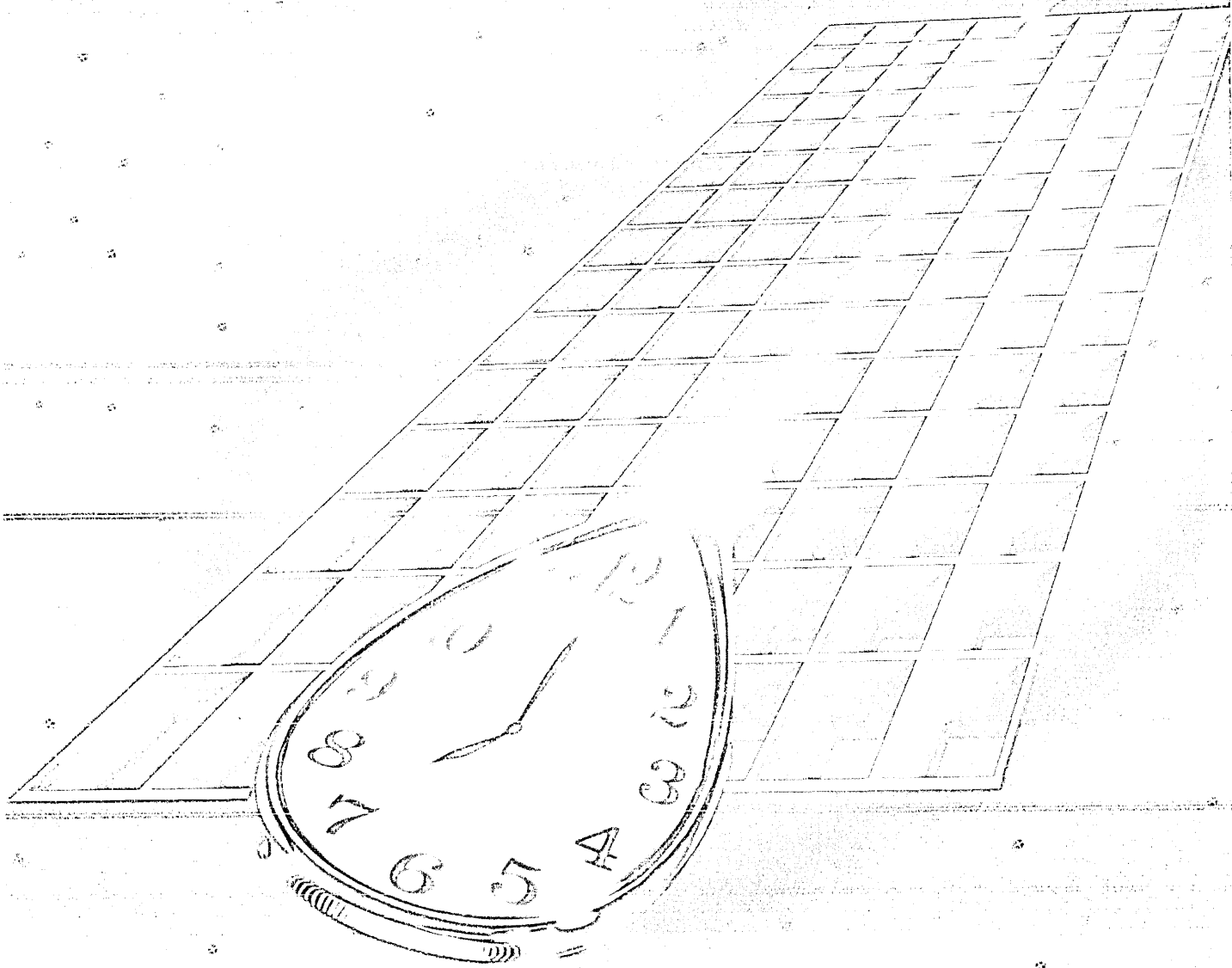
informatics inc

Your Information Management Partner

security or resource control. Implementation Systems are essentially transparent to IBM environments and data bases. Even less-experienced programmers can write error-free programs in a fraction of the time required by conventional techniques.

Most important, you can now have a complete choice of Informatics productivity tools, each designed to provide a cost-effective solution to your application requirements: IVANS IV™ for generating batch applications; TRANS IV™ for on-line CICS applications; Answer™/DB, Answer2™ and INQUIRY IV/IMS™ for supplemental reports or ad hoc inquiries.

**Why waste another hour?
Implement your own Implementa-
tion Systems inquiry by giving
us a call. Or fill out the coupon
and mail it today.**



Introducing, for PDP-11 RSX, RSTS/E, and RT-11 users

Pascal-2TM

The Time Machine

The First Dimension: Performance

Pascal-2 performs.

Pascal-2 programs run as fast as FORTRAN IV-PLUS programs—or faster. (FORTRAN IV-PLUS is Digital's fastest PDP-11 high-level language.) Pascal-2 code is as small as code generated by any Digital PDP-11 compiler or interpreter—or smaller. And Pascal-2 typically compiles at 1000 lines per minute.

The Second Dimension: Structure and Portability

As a programmer, you can write in a language close to your thoughts. With Pascal's structured methods, you can do the job right the first time. It's easier to *design* in Pascal than it is to *debug* in FORTRAN, assembler, BASIC, or COBOL.

As a software manager, you will see the value of Pascal in improved communication among team members: they can understand one another's code. Pascal's portability will protect your software investment: your programs will outlive your current hardware.

The Third Dimension: Tools, Tools, Tools

The compiler precisely reports typographic or syntactic errors. The interactive, source-level debugger helps detect deep-rooted logical errors. The profiler helps identify code that can be rewritten to speed program

execution. Also included are formatters, index generators, and documentation aids—a total of 70,000 lines of Pascal code.

Our 2,000 customers use Pascal for such diverse applications as general ledger and payroll, integrated circuit design graphics, word processing, typesetting, and off-track betting; for trimming integrated circuits, monitoring particle accelerators, real-time ballistics modeling, and controlling saws in a lumber mill.

The Fourth Dimension: Our Past and Future

The core of our technical group has been together more than a decade. Our Pascal-1 compiler entered commercial use in 1975. Before releasing our PDP-11 product, we delivered Pascal-2 under contract to two major computer manufacturers for three different processors. Now we're moving Pascal-2 to Motorola's MC68000, to Digital's VAX-11, and to the UNIX operating system. We're committed to Pascal for the long term.

Call or write. We'll send benchmark details, a product description, and a free copy of the Pascal-2 manual (specify RSX, RT-11, RSTS/E).

PDP, VAX, RSX, RSTS/E, RT-11, and FORTRAN IV-PLUS are trademarks of Digital Equipment Corporation. MC68000 is a trademark of Motorola Inc. UNIX is a trademark of Bell Laboratories.

Pascal-2: The Dimensions of Performance

Ask for a free 18" x 24" poster of this photograph.

Network Computer Services
6 Cunningham Street
Sydney 2000, Australia
Telephone: 211-2322
TLX: 25523

Valley Software, Inc.
6400 Roberts Street, #390
Burnaby, BC Canada V5G 4G2
Telephone: 604-291-0651

Hours Computing, Ltd.
7-8 Mill Street
Stafford ST16 2AJ, England
Telephone: 0785-44221
TLX: 36540

Real Time Products
1 Paul Street
London EC2A 4JJ, England
Telephone: 01-588-0667
TLX: 884971

Rikei Corporation
1-26-2 Nishi Shinjuku
4316 Shinjuku-ku
Tokyo 160, Japan
TLX: 24208

AC Copy
Kurbrunnenstrasse 30
D-5100 Aachen
W. Germany
Telephone: 0241-506096
TLX: 832368

Periphere Computer Systems GmbH
Pfalzer-Wald-Strasse 36
D-8000 Munchen 90
W. Germany
Telephone: 089/681021
TLX: 523271

Oregon Software

2340 S.W. Canyon Road
Portland, Oregon 97201
(503) 226-7760
TWX: 910-464-4779

CIRCLE 14 ON READER CARD

CALENDAR

JANUARY

Pacific Telecommunications Conference, January 17-20, Honolulu, Hawaii.

PTC will provide a broad outlook on telecommunications in the Pacific area. It is sponsored by the Pacific Telecommunications Council. Contact Richard J. Barber, Conference Director, 1110 University Ave., Honolulu, HI 96826, (808) 949-5772.

Data & Telecommunications/Japan, January 20-23, Tokyo, Japan.

Suppliers of PABX equipment, modems, cables, etc., from all over the world will be exhibiting at the Tokyo exposition and conference. Contact Industrial & Scientific Conference Management, Inc., 222 West Adams St., Chicago, IL 60606, (312) 263-4866.

EDINFO '82, January 20-22, Madras, India.

The International Symposium on Education in Informatics is sponsored by the Computer Society of India. Topics will include new instructional techniques and employee and user training. Contact T. V. Natarajan, Organizing Committee, Computronics India, 11, Kasturi Ranga, 2nd St., Madras 600 018, India.

ASEE '82, January 26-28, San Jose, California.

The Advanced Semiconductor Equipment Exposition is the fourth annual expo of semiconductor processing, production, and test equipment and materials suppliers. Contact Cartledge & Associates, Inc., 491 Macara Ave., Sunnyvale, CA 94086, (408) 245-6870.

FEBRUARY

IWP Spring Symposium, February 2-4, Anaheim, California.

There will be educational sessions backed by a manufacturers' exhibit at this year's spring meeting, held by the International Information/Word Processing Association (formerly the International Word Processing Association, still known as IWP). Contact IWP Conference Services, 1015 North York Rd., Willow Grove, PA 19090, (215) 657-6300.

ISSCC, February 10-12, San Francisco.

The International Solid-State Circuits Conference, in its 29th year, is sponsored by the IEEE Solid-State Circuits Council, the IEEE San Francisco Section and Bay Area Council, and the University of Pennsylvania. Contact Lewis Winner, 301 Almeria, Box 343788, Coral Gables, FL 33134, (305) 446-8193.

Industrial Productivity Conference and Exposition, February 16-18, Memphis, Tennessee.

The Society of Manufacturing Engineers (SME) is sponsoring this show, which will emphasize plant maintenance and cost-efficient plant operations. Contact SME, PR Dept., One SME Drive, P.O. Box 930, Dearborn, MI 48128, (313) 271-1500.

Federal DP Expo, February 22-24, Washington, D.C.

This is the eighth annual conference and exposition for computer

systems users in the U.S. government. Hardware and software products, and systems and services will be included in the show. Contact The Interface Group, 160 Speen St., Framingham, MA 01701, (617) 879-4502.

Compcon Spring, February 26-28, San Francisco.

Sponsored by the IEEE Computer Society, this season's theme is "High Technology in the Information Industry." Contact IEEE Computer Society, 1109 Spring St., Silver Spring, MD 20901, (301) 589-3386.

MARCH

Robots VI, March 1-4, Detroit.

Leading industrial robot manufacturers from the U.S., Europe, and Japan will be exhibiting at the conference sponsored by Robotics International of the Society of Manufacturing Engineers. Contact R/SME, One SME Drive, P.O. Box 930, Dearborn, MI 48128, (313) 271-1500.

Computers/Graphics in the Building Process, March 22-26, Washington, D.C.

The conference is cohosted by the National Academy of Sciences and the World Computer Graphics Association. Contact WCGA, 2033 M Street N.W., Suite 250, Washington, DC 20036, (202) 775-9556.

Interface '82, March 22-25, Dallas.

This is Interface's 10th annual appearance, and once again the conference will be devoted to data communications, ddp, and networking. Contact the Interface Group, 160 Speen St., P.O. Box 927, Framingham, MA 01701, (617) 879-4502.

National Conference on Information Systems Education, March 22-24, Chicago.

The conference is sponsored by the Education Foundation of the Data Processing Management Association (DPMAEF), an organization established in 1975 to "expand the educational opportunities for system professionals and to conduct research and programs to benefit dp industry, educators, government, and the public." Contact the Conference Manager, USPDI, 12611 Davan Dr., Silver Spring, MD 20904, (301) 622-0066.

CAD '82 March 30-April 1, Sussex, England.

The entire project development cycle, from concept to manufacture, will be discussed at this international conference and exhibition on computers in design engineering. Contact Alan Pipes, Conference Organizer, IPC Science and Technology Press, P.O. Box 63, Westbury House, Bury St., Guildford GU25BH, England.

APRIL

Info/Manufacturing '82, April 27-29, Chicago.

Called the "Information Management Exposition and Conference for Manufacturing," this show is billed as the only event devoted exclusively to manufacturing corporations. Contact Clapp & Poliak, Inc., 245 Park Ave., New York, NY 10017, (212) 661-8410.



1. Superior reliability—1 year failure rate under 1%.
2. Synthetic ruby print head ensures highest print quality during its entire 100-million plus character life.
3. Heavy-duty castings and high-quality metal parts throughout. Plastic parts are all high stress.
4. 100 cps print speed combined with logic seeking, bidirectional and quick-cancel printing provide higher throughput than many printers spec'd at higher print speeds.
5. Precision 9 x N matrix produces consistent, correspondence-quality printing.
6. Five unique alphabets, eight character sizes (two proportionately spaced).
7. Built-in, high-resolution graphics mode (144 x 160 positions per inch) delivers better resolution than many graphics plotters.
8. True incremental printing allows intermixed fonts on one line during one pass.
9. Variable form length and 6-channel vertical format unit for maximum flexibility.
10. Automatic vertical and horizontal tabbing.
11. Built-in bidirectional tractor and roll feed.
12. Paper cutoff less than one inch from print line.
13. 1.3K-byte buffer is standard for high-speed data transfers and more efficient utilization of computer time.
14. Easy-load cartridge ribbon.
15. Dual-axis step motors for quiet operation.
16. Industry-standard parallel or serial (RS 232C) interfacing includes popular X/ON, X/OFF protocols.
17. "Microcomputer-on-a-board" technology and operator-replaceable print head provide ease of maintenance.

C. Itoh's low-profile Series 8500 Pro/Writer printer gives you all these features as standard equipment. And if you think that's shocking, wait'll you see our low price.

Pro/Writer is fully backed by C. Itoh's warranty and complete support organization. And we're delivering now, so contact C. Itoh today and get the biggest value in little printers. C. Itoh Electronics, Inc. 5301 Beethoven St., Los Angeles, CA 90066 (213) 306-6700.

 **C. ITOH
ELECTRONICS, INC.**
One World of Quality

FEATURE SHOCK

CIRCLE 15 ON READER CARD

It only takes a little

$\frac{1}{n} \sum_{i=1}^n x_i = \frac{1}{n} (\sum_{i=1}^n x_i) + \dots$
 $= \sum_{i=1}^n x_i \cdot \frac{1}{n}$



Prime.
**One line of compatible
systems. A whole spectrum
of powerful solutions.**

Just a few years ago, advanced technology and system compatibility were mutually exclusive. But when Prime began making computers, technology and compatibility became one.

Big. Better. Best. The Prime 50 Series includes the Prime 250-II, 550-II, 750, and the new Prime 850. The Series is so flexible, it can handle virtually any application you have. And so powerful, it can meet your most demanding needs.

If you're in a start-up mode, the perfect way to begin building your system is with the Prime 250-II. If you need more power, you'll find the solution in the Prime 550-II or the Prime 750. And if you're looking for maximum performance, the Prime 850 is the most powerful mini available today.

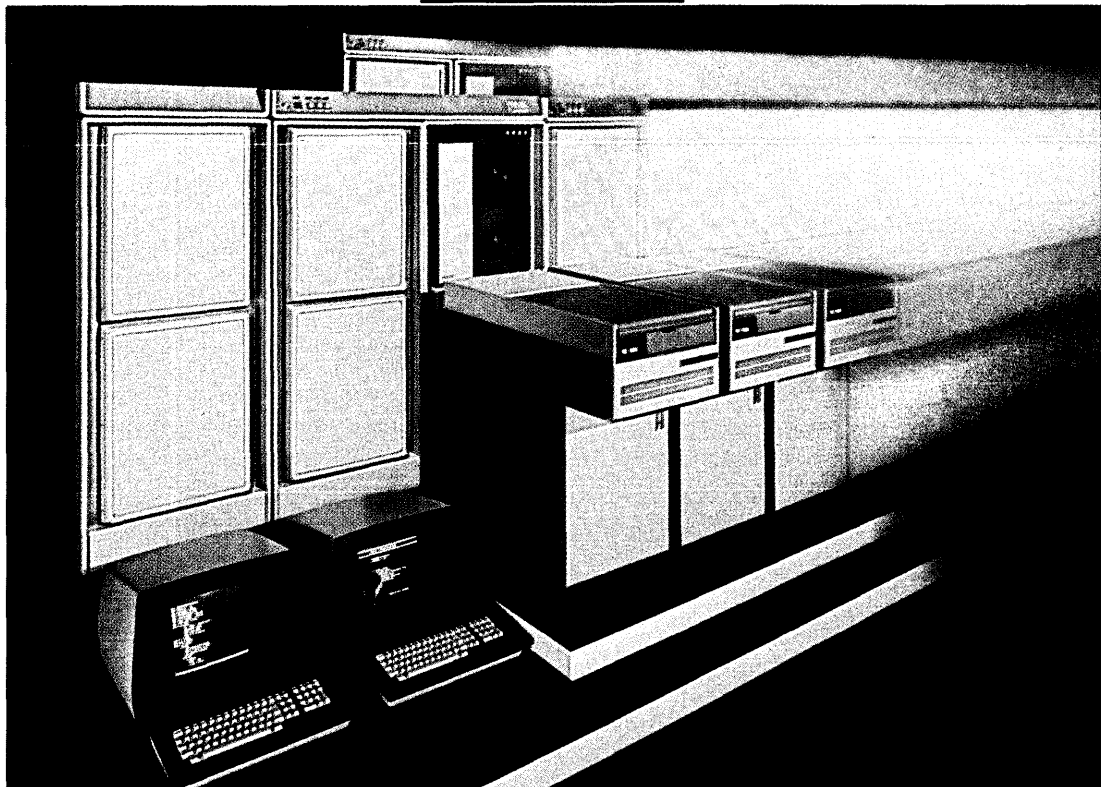
You should know too that any 50 Series system can be networked with any other. They can also communicate directly with mainframes. And all Prime systems support a broad band of industry-standard languages.

The economy of compatibility. The Prime 50 Series is designed around a single operating system, which makes all systems compatible with each other. So you can easily and economically move up to a larger system, or expand to any number of small, remote systems. And you'll have nothing new to learn because the same software goes with you.

A spectrum of solutions. The 50 Series was designed to provide a broad spectrum of solutions for just about any application you might have, including manufacturing, financial, education, utilities, engineering, energy, automated office, you name it.

Consider Prime first. Today, more than ever before, you need the compatibility and the spectrum of solutions that only Prime can offer. For more information, write to us at Prime Park, MS 15-60, Natick, Massachusetts 01760. In Europe, write Prime Europe, 6 Lampton Rd., Hounslow, Middlesex, TW3 1JL, England. Telephone: 01-570-8555.

PRIME
Computer



LETTERS

ROUTE 128 REVISITED

Re: "Route 128: Boston's Hotbed of Technology" (Nov., p. 110), the article is evidence enough of why 128 eventually became known as the Golden Circle.

Initially viewed as an extravagance, its original two lanes were soon choked with commuters—so unexpected was the attraction of hi-tech industry. Highway construction has been in fact unending, continuing into the present with roadway widening and stories emerge from time to time of highway engineers who spent all of their careers on the 128 project.

PETER KUSHKOWSKI
Haddam, Connecticut

Your article was excellent. Your cover pictorial had an error that was quickly apparent. MIT and Harvard are mislocated. Harvard is north and west of MIT and not on the banks of the Charles River.

ARNOLD J. SAVITT
Manufacturing Manager
Sylvania Systems Div.
GTE Products Corp.
Needham, Massachusetts

Your article conveyed the excitement and dynamics present in the high technology industry around Boston.

There was only one problem. You surely know that most engineers are adamant about details. Your cover shows MIT located west of Harvard. Anyone in the area knows that MIT is located east of Harvard.

Otherwise, keep up the good work.
EDWIN G. BROHM
Product Manager, Network Products
Codex Corp.
Mansfield, Massachusetts

All right, already.—Ed.

PUTTING MICROS TO WORK

Re: "You Mean I Can't Just Plug It In?" (Sept., p. 153), I was very disappointed in the article that is headlined as being about

personal computers. In reality it is about relational databases, on-line access, and the data processing departments protection of its "turf," with some oblique references to personal computers and "private databases." It is not until the end of the article that the usefulness of microcomputers within an organization is shown in the commentary on Merrell's "island situations."

A middle manager does not require a mainframe computer to add a column of figures—he uses a calculator. Likewise, he does not need a mainframe computer to store name and address lists or provide accounting worksheet modeling or store personal work data—he uses a microcomputer.

Since microcomputers have the potential for substantially increasing a manager's productivity, it would be most helpful if we could read articles on their successful implementation. We don't want to keep them out—we want to put them to work.

EUGENE L. TALBOT
Assistant Vice President
Data Processing
People's Savings Bank
Bridgeport, Connecticut

Hear, hear!—Ed.

IMPROVING OS

Re: Editor's Readout (Oct., p. 25), I read with much interest and some measure of amusement your editorial comments on cumbersome and inadequate computer operating systems. I read also the additional discussions provided by the four individuals whom you asked to analyze existing computer operating software in light of the existing computer hardware environment.

Whether these operating systems are in fact dinosaurs may be a moot question, but there is no question that more efficient systems can be designed and developed if users as a group become sufficiently alarmed about the inadequacies in existing operating software.

A sure way for the business commu-

nity to obtain the quality of systems operating software that it clearly needs is for top user managers to stop underwriting the staggering and rapidly escalating costs of running their computer operations. Your example of automobile makers finally beginning to listen to car owners (at least to a limited extent) who are becoming more vocal about their need for economical personal transportation illustrates what can happen when users become sufficiently alarmed about high costs. Another example is the new generation commercial aircraft now entering the production stage. In this case, the major airlines exercised an unusual amount of influence concerning the overall configuration (including size) and operating efficiencies of the new airplanes.

Economic necessity, I am confident, can bring about similar results for improving the quality of computer operating software.

NEAL SEAGO
Atlanta, Georgia

UNIX ETYMOLOGY

Re: "The Trouble With UNIX" (Nov., p. 139), I may be able to shed a little light on the "amusing etymology" of the UNIX command to remove a file whose name contains an unprintable character—"dsw."

DSW is a Morse code abbreviation for a common salutation used by amateur radio operators in the U.S.S.R., and by amateur radio operators in other countries who are in communication with those in the U.S.S.R. It stands for "Do Swedanya," the Russian equivalent of "goodbye."

JOSEPH W. LARSON
Senior Systems Programmer
Sentry Insurance
Stevens Point, Wisconsin

EVEN MORE DBMS

Re: "The DBMS Market is Booming" (Sept., p. 153), our Relational DBMS, RELATE/3000, was incorrectly named CREATE/

SEMINAR CALENDAR

FEBRUARY

February 1-2, The DP Executive as Manager, New York City, The Harvard Club
February 4, Business Graphics, Denver, The Fairmont
February 4-5, Improving Your Leadership and Management Skills, New York City, The Harvard Club
February 8-9, Data Communications: Concepts and Overviews, San Francisco, Hilton Hotel & Tower
February 8-9, Project Management, Atlanta, Southern Conference Center
February 8-9, Office Automation, Washington, DC, Arlington Hyatt House
February 8-9, Computer Graphics, New York City, The Harvard Club
February 9, Financial Management's Use of Computer Graphics, Scottsdale, Doubletree Inn
February 10, Electronic Communications: Mail, Message, Data, Washington, DC, Washington Hilton
February 10-11, Data Base Management, Anaheim, Hyatt Anaheim
February 11-12, DP Project Management, Cambridge, MA, Faculty Club
February 11-12, The CAD/CAM Revolution, New York City, Sheraton Russell
February 11-12, DP Fundamentals for Management and Users, Washington, DC, Sheraton Carleton
February 16-17, Reducing DP Turnover, New York City, The Harvard Club
February 16-17, Demonstrating DP Performance to non-DP Management, San Francisco, Holiday Inn on Union Square
February 18-19, Data Dictionary/Directory Systems, Cambridge, MA, Faculty Club
February 18-19, Management Skills for First-Line DP Supervisors, New York City, The Harvard Club
February 18-19, Writing Skills for DP Professionals, Washington, DC, Washington Sheraton
February 22, Computer Mapping, Anaheim, Hyatt Anaheim
February 22, Management's Use of Computer Graphics, Cambridge, MA, Faculty Club

February 22-23, Distributed Systems: Concepts, Management Overview, Chicago, Chicago Hyatt
February 22-23, Management of Software Engineering, Scottsdale, Doubletree Inn
February 22-23, Systems Analysis, Washington, DC, Washington Sheraton
February 22-23, Strategic Planning for Information Systems, New York City, The Harvard Club
February 22-23, Slashing Telecommunication Costs and Improving Service, Washington, DC, Arlington Hyatt House
February 24-25, DP Security, Audit, and Control, New York City, The Harvard Club
February 24-25, Systems Design, Washington, DC, Washington Sheraton
February 24, Digital Image Processing, Anaheim, Hyatt Anaheim
February 25-26, Data Communications: Regulation, Analysis, Design, Cambridge, MA, Faculty Club
February 26, Decision Support Systems, Houston, Hotel Meridien

MARCH

March 1-2, Structured Programming, Analysis, Design, and Testing, New York City, Halloran House
March 1-2, Data Base Management Systems, Cambridge, MA, Faculty Club
March 1-2, Office Automation, New York City, The Harvard Club
March 3, Financial Management's Use of Computer Graphics, New York City, Halloran House
March 3, Electronic Communications, New York City, The Harvard Club
March 4-5, DP Fundamentals for Management and Users, New York City, The Harvard Club
March 4-5, Improving Your Leadership and Management Skills, Cambridge, MA, Faculty Club
March 4-5, Data Communications: Regulation, Analysis, Design, San Francisco, Hilton Hotel & Tower
To receive further information, contact the Datamation Seminar Center at 850 Boylston Street, Suite 415, Chestnut Hill, Massachusetts 02167; 617-738-5020.

LETTERS

3000. The description about RELATE was correct. However, the single payment license fee is \$18,500, which includes the first year of maintenance, documentation, and customer support.

RICHARD F. DUMAS
 President, CRI
 Mountain View, California

NOMAD has been available from National CSS since 1975. It is a heavily used (4,000-5,000 current users across the United States and Europe), user-oriented database management system. Furthermore, the notion (currently widespread) that there is no commercially available relational DBMS today ignores fact.

NOMAD and NOMAD2 users have (since 1977) been implementing and running successfully (in a commercial environment) relational databases.

BRAD WHITLOCK
 Product Manager
 National CSS, Inc.
 Santa Clara, California

INTAC, an integrated database management software package, was inadvertently left out of the list of DBMS products. INTAC was developed and is marketed exclusively by Ross Systems, Inc.

INTAC is an integrated database management system in use today by major organizations in such areas as accounting, project tracking, capital budgeting, lease equipment tracking and personnel data.

INTAC can be used on Digital Equipment Corp.'s PDP-11 computer systems running RSTS/E and VAX computers running VMS. A perpetual license costs \$20,000 for the first cpu, which includes training and the first year's maintenance. INTAC is also available through Ross Systems' worldwide timesharing services.

Today there are approximately 20 user sites, with hundreds of user sites accessing INTAC-based systems daily.

BRUCE T. POWELL
 Director, Corporate Marketing
 Ross Systems, Inc.
 Palo Alto, California

In view of your claim to provide a complete list of DBMS products and the rather unsubstantial commercial reputation (as in number of installations) of some of the products that were included, we felt particularly slighted in this matter.

RFILE is a mature, interactive, relational DBMS for users of small DEC computers (PDP-11s and LSI-11s). We have approximately 100 installations representing several hundred satisfied users at universities, in factories, in government, and in commercial environments.

ROBERT C. NATALE
 Product Manager
 International Computing Co.
 Bethesda, Maryland

VAX* 11/750-780 PDP* 11/24-44-70



Bring them alive with more terminals, increased power, efficiency and application productivity with **SYSTEL.**

Add SYSTEL to VAX* 11/750-780 or PDP* 11/24-44-70 and you'll not only bring new life to your system, but put a lot more life into your application productivity.

SYSTEL is a data-dictionary driven, high volume transaction processing monitor designed to take specific advantage of the power of the VAX*.

Written by Systime, Britain's largest manufacturer of turnkey systems, SYSTEL embodies all the major features found in systems costing many times its price. Particular features of the system being its extensive productivity aids and programmer development facilities.

Apart from dramatically *increasing* processing and terminal capability - several hundred terminals per system, depending upon application, are possible with SYSTEL - it will equally dramatically *decrease* application development and

implementation and facilitate maximum system management control.

SYSTEL will also give transaction processing concurrent with other applications and a distributive network under a standard DEC* VMS or RSX-11M* operating system.

Other features include:

- Processor independence. SYSTEL is transportable between PDP* 11 and VAX* computer systems.
- Extensive access security on individual terminal locations, files and records.
- File journaling and recovery.

- Efficient memory management. All transactions employ multi-threading.
- Interactive forms generation.
- High level transaction control language.
- On-line program development.
- On-line training mode.

If you have a DEC* VAX* 11/750-780 or a PDP* 11/24-44-70 and want to increase its capability, let Systime demonstrate SYSTEL's features, benefits, and total capabilities.

Contact:
John Ward, SYSTIME, INC.
8980k, Route 108,
COLUMBIA, Maryland 21045, USA.
Telephone 301/730 4424

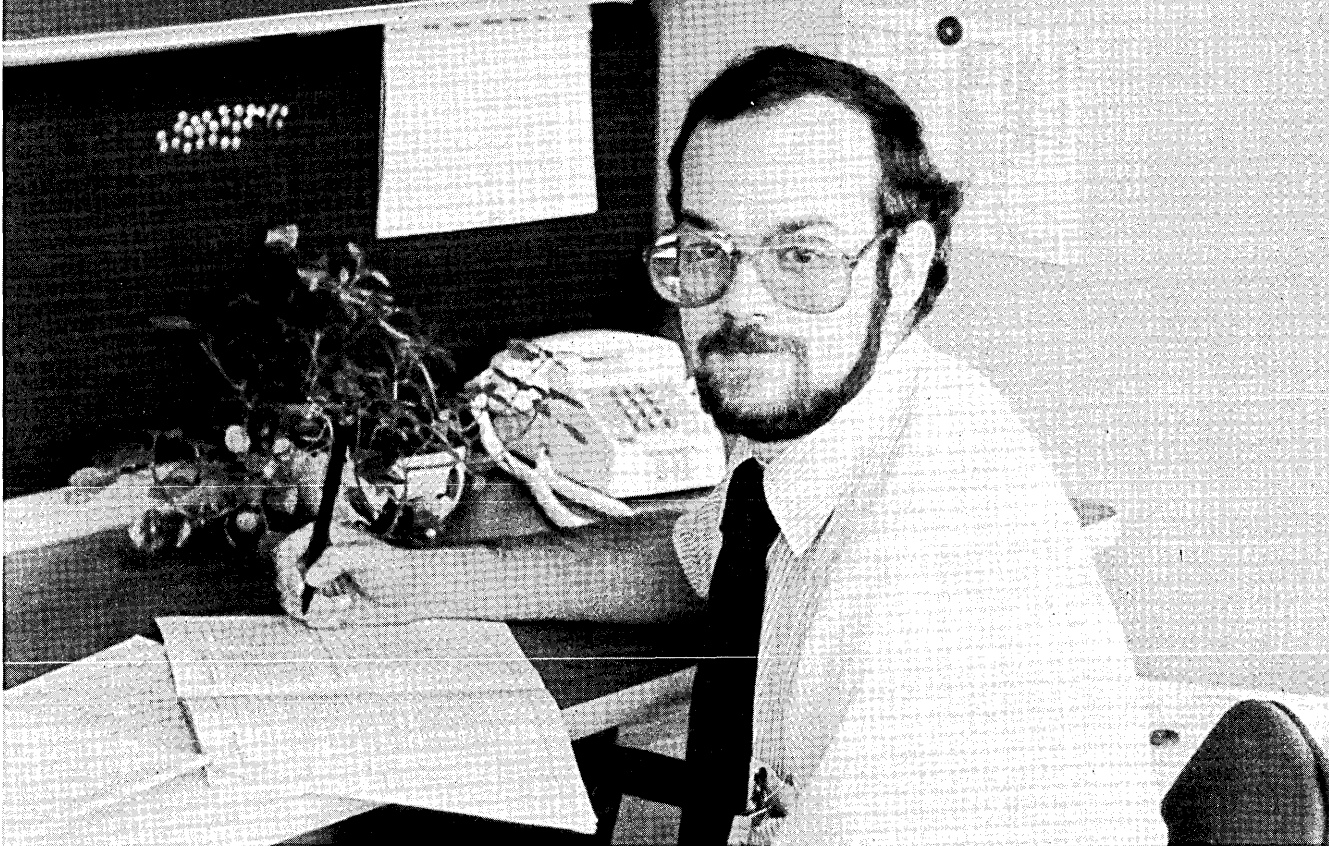
VAX* PDP* DEC* RSX-11M* are all trademarks of the Digital Equipment Corporation.
SYSTEL is a registered trade mark in the U.K.
Systime Inc., a wholly-owned subsidiary of Systime Ltd(U.K.)

SYSTIME

CIRCLE 19 ON READER CARD

**“Over a period of two years,
we looked at almost every
security package on the market.
And we chose TOP SECRET™.”**

*Larry Dempsey,
Supervisor,
Systems Software,
USAir.*



“Over the past two years, we looked at several of the major security packages and have decided on TOP SECRET from CGA/Allen.

“CGA/Allen claimed TOP SECRET would be easy to install and would not require any operating system modifications, they were right on both statements. The product was installed within ten minutes. We installed it on MVS/SP1 without having to modify any part of our operating system.

“In relocating USAir’s entire data center to a newly constructed facility, we had frozen all new system software implementations. We were confident that TOP SECRET was stable and independent enough for our operating systems that we felt comfortable in making an exception to our freeze. During a period of potential



Security for the Eighties

system instability because of a move, installing a security package is saying a lot for the package.

“We are implementing security gradually — it might take as long as a year. We are confident that it will go smoothly with TOP SECRET. It is a very straightforward system and has facilities to secure our entire MVS/IMS/TSO operations. In our opinion, TOP SECRET is the best package on the market.”

Other users say: “...Good, stable product...Very happy with support ...Absolutely no operating system modifications... Superior in every way.”

TOP SECRET — total resource protection, complete access control, comprehensive auditing, easy installation, no maintenance, user friendly. The MVS security system for the eighties.

For more information on TOP SECRET or CGA/Allen’s other products — Super MSI, MSM, GCD, DCD II, PAC/MASTER — contact:

ega/allen

Software Products Group, Inc.

212 West National Road
Vandalia, OH 45377

Phone: 800/543-7583

In Ohio, call collect: 513/890-1200

CIRCLE 20 ON READER CARD

Introducing NCR's user-friendly family of general purpose terminals.

Meet a new family of quality general purpose terminals featuring increased operator convenience. A new family from NCR, already a leading supplier of special purpose terminals around the world.

The whole family is ergonomic. From non-glare screens to detach-

able keyboards, these terminals are designed to accommodate every operator. Even the soft neutral colors are selected to resist soil and please the observer.

Ease of operation means more productivity from your system. Compact size and light weight assure adaptability to limited work areas. Rigorous testing eliminates problems due to RF interference and static discharge. And, like all NCR

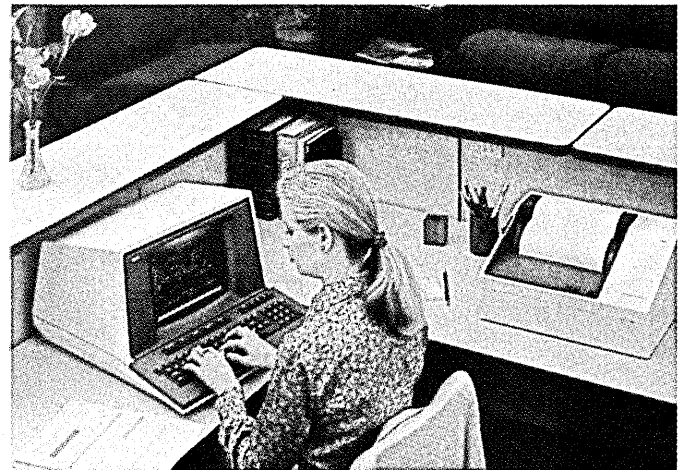
equipment, they are backed by NCR's quality service available almost everywhere.

For a personal introduction, just call your local NCR office, or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

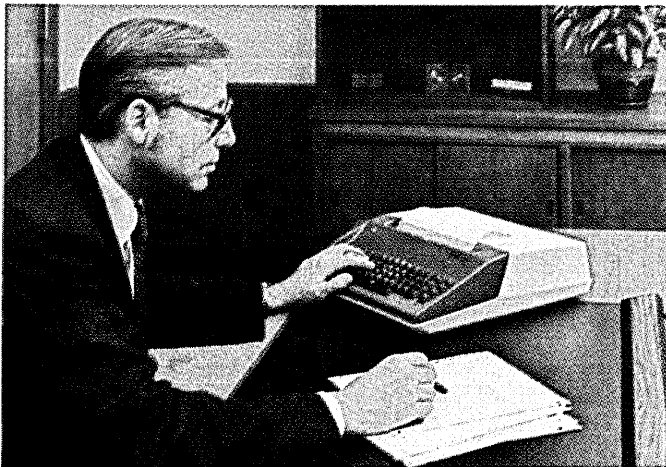
NCR
Complete Computer Systems



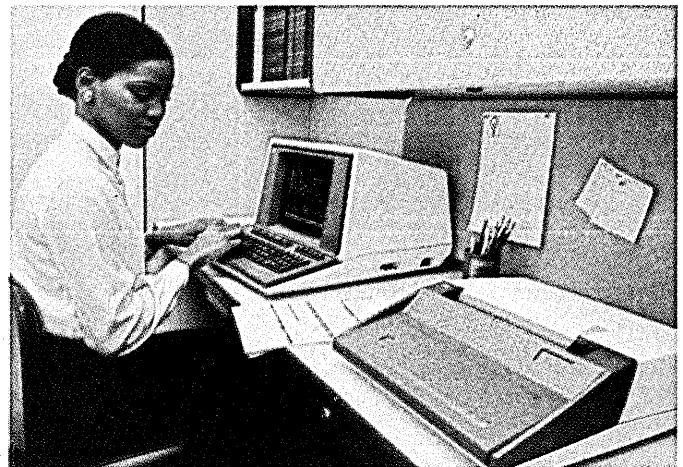
Compact 6410 matrix printers, that print at a constant 90 LPM, are available with either tractor or friction feed. The 7900 CRTs, with models that operate in block, page or character mode, are also available with either fixed or detachable keyboards.



7900 display terminals weigh less than 25 lbs. Their versatile keyboards and non-glare green displays assure easy use and readability. 6425 non-impact printers silently produce hard copy at a steady 240 LPM and can print up to 99 copies under software control.

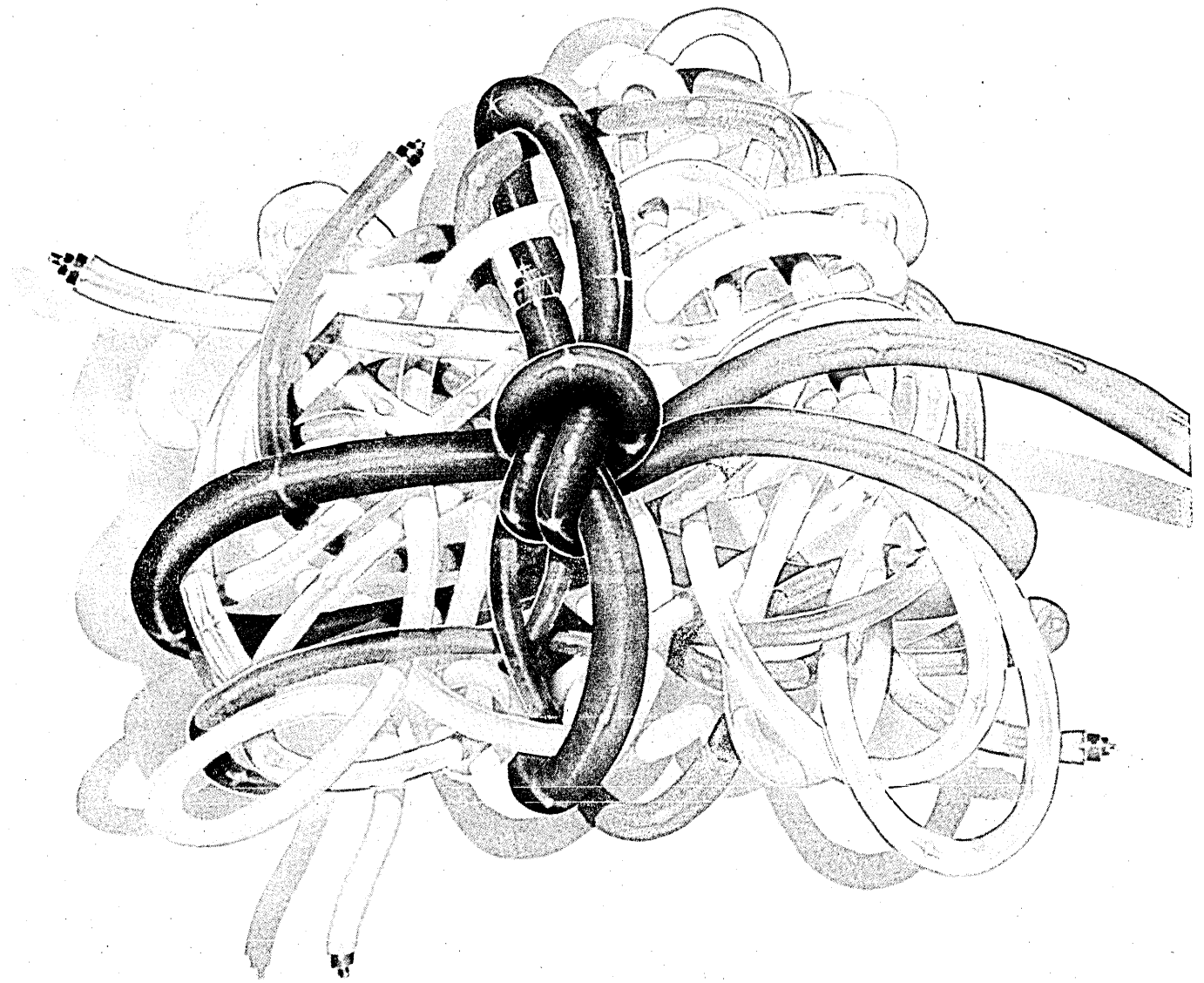


Open the door to your data base with our 2600 KSR terminals. Weighing less than 13 lbs., their compact size and quiet non-impact printing allow use in almost any office environment.



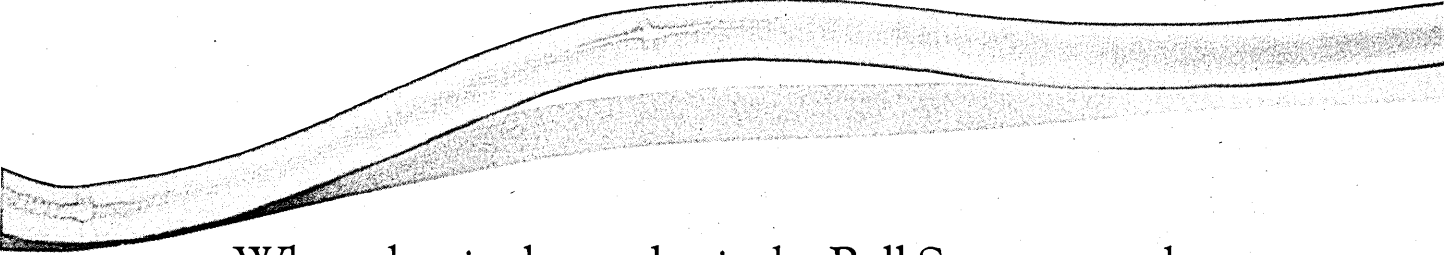
Our versatile CRT/printer workstation packages are available in TTY compatible models adaptable for use on a wide variety of systems or applications.

CIRCLE 21 ON READER CARD



Unite and conquer.

Unite under a single vendor and help conquer the threat to productivity posed by troubles, faults and interruptions in your data communications system.



When the single vendor is the Bell System, you have one supplier with a universal presence responsible for your entire network—modems, terminals and data communications lines. This saves costly time.

Bell reliability extends to such data products and services as the state-of-the-art, 3270-compatible Dataspeed® 4540 terminal. It extends to the high-performance 43 teleprinter, and to COMM-STOR* II communications storage devices. It extends to Dataphone® II service, the self-diagnostic data communications system, and to Dataphone® digital service, a digital network that speeds transmission and virtually eliminates errors.

Bell Account Executives provide you with complete communications systems that can change shape to meet your moment-to-moment needs. These same systems can be modified easily, or accept new components to keep pace with the growth of your business and with changes in technology. And your service agreement with Bell protects your system against obsolescence.

Put our knowledge to work for your future.

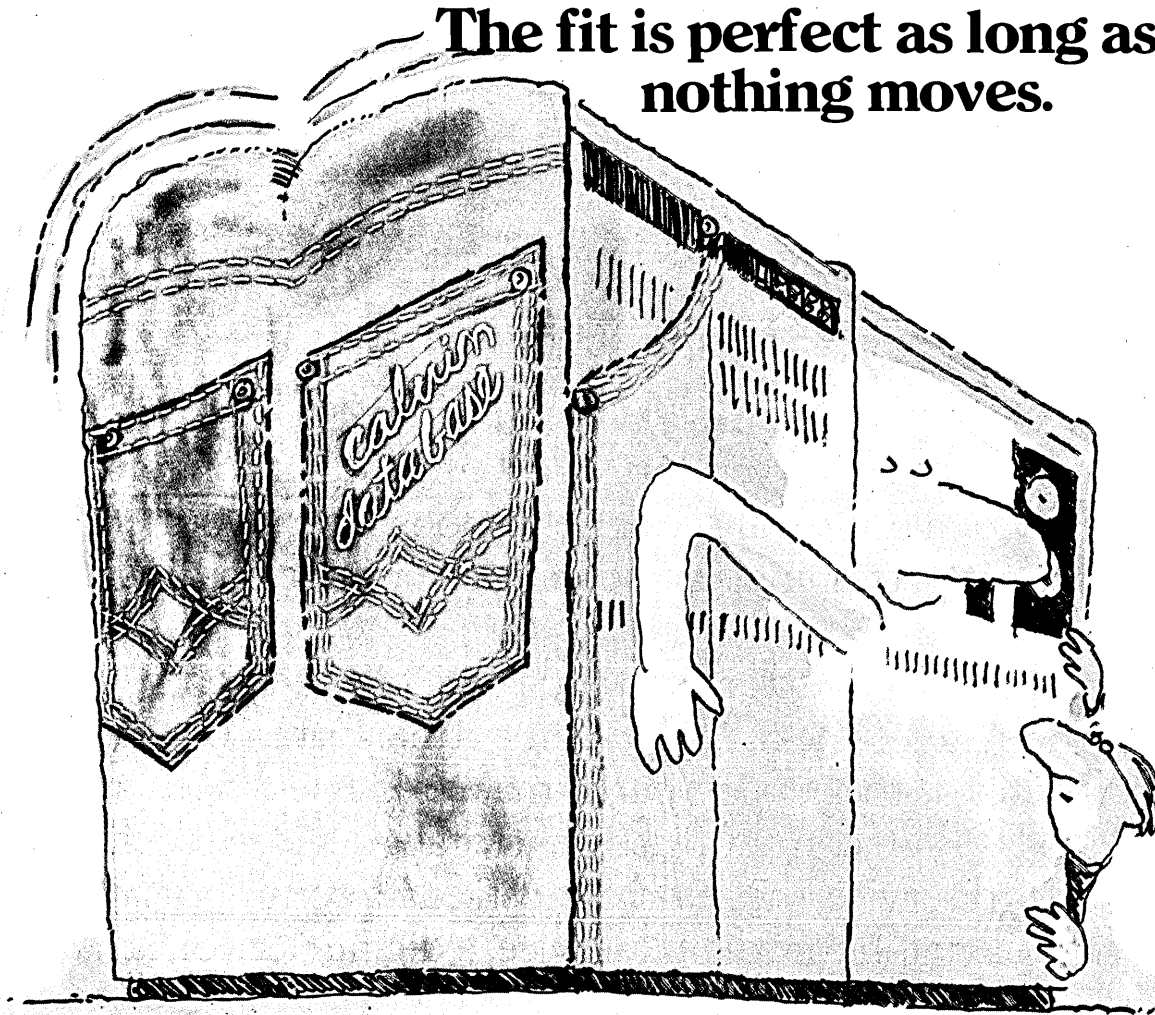
The knowledge business

*Registered trademark of Sykes Datatronics, Inc.



Some data base management systems are like designer jeans.

The fit is perfect as long as nothing moves.



Not ADABAS. ADABAS is the data base management system designed for organizations that don't stand still. The ones whose corporate growth profiles reflect their ability to respond quickly and decisively to changing market needs.

Responding to change is what ADABAS from Software AG is all about. ADABAS is a relational-like DBMS that maintains a perfect fit to your application requirements no matter how often or how much they change. New requirements are easy to handle because they never force you to redesign the data base or reprogram application systems.

ADABAS gives you complete freedom to move from one data structure to another. You can use relational, hierarchical, network — whichever fits your needs best. And since ADABAS keeps data and access methods in separate pockets, a diverse group of users can access the same data, each using a completely different data model perspective.

If a data base management system is part of your data processing plans, you owe it to yourself to take a close look at ADABAS for your IBM processor or ADABAS-M for VAX/PDP systems. Use the coupon to arrange for a fitting, or to attend one of our free seminars.

Software AG, Reston International Center
11800 Sunrise Valley Drive, Reston, Virginia 22091
(703) 860-5050

- I would like to arrange for an ADABAS fitting.
 Please send me information on your free seminars.

Name _____
Title _____
Company _____
Address _____
City _____ State _____
Zip Code _____ Telephone (____) _____

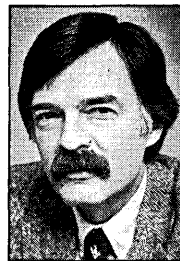
DO182

SOFTWARE AG
OF NORTH AMERICA, INC

Affiliates: Adabas Software Ltd., Derby, England (0332-372535) • APOYO Computacional, S.A., Mexico City, Mexico (573-3922) • A.P.S., Caracas, Venezuela (58-2-329205) • Arabian Data Systems, Jeddah, Saudi Arabia (669-3866) • Automation Centre Volmac B.V., Utrecht, Netherlands (30-334421) • CONSIST, Sao Paulo, Brazil (11-289-4445) • DataAnalysis Sverige AB, Stockholm, Sweden (08-616500) • Fraser Espanola, S.A., Madrid, Spain (456-1350) • R.D. Nickel & Associates, Inc., Ontario, Canada (519-653-6142) • Pan American Computer Systems, Buenos Aires, Argentina (349705) • Selestia Sistemi, S.P.A., Milan, Italy (02-873129) • Software AG, Darmstadt, West Germany (06151-84072) • Software AG of Far East, Tokyo, Japan (03-278-1258) • SPL (Australia) Pty. Ltd., North Sydney, Australia (922-3268) • SPL (Israel) Ltd., Tel-Aviv, Israel (03-777-860) • Systems Programming (PTY) Ltd., Sandton, Republic of South Africa (783-4250) • TECSI, Paris, France (296-1570)

CIRCLE 23 ON READER CARD

EDITOR'S READOUT



DROP THE DRAW-BRIDGE

Dp's once inviolate stronghold is under siege. Are the changes an attack or an opportunity for the dp manager?

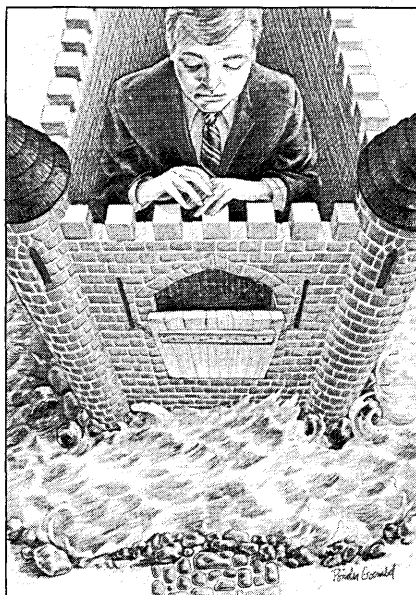
The honeymoon is over.

Here it is, 1982, and almost overnight it seems that the good old days of data processing are kaput, finished, a fond and fading memory.

It was great while it lasted despite the fire fighting and the hassles with the machines. Remember the days when doing your budget simply meant adding 15% to 20% to last year's figures? And when some shiny new machine with a tad more throughput appeared on the market, you just went out and bought it? No fuss, no bother. Justifications were easy. Nobody else in the corporation knew what the hell you were doing down there in that room full of whirring tape reels, glowing crts, and blinking consoles. Nobody else knew the language, especially when the buzzwords were further encrypted into wondrous and arcane acronyms like JCL, VTAM, DBMS, and MVS. All the vendors had their alphabet soups, but IBM was an especially rich source of increasingly obscure initializations. The term "user friendly" hadn't been invented yet.

It didn't make any difference if your company was into meat packing or insurance; you and your team of systems analysts and programmers and your room full of operators had your own little fiefdom, surrounded by vast moats filled with the dark, murky waters of technology.

But alas, one day, not too long



ago, you looked up and there were the users on the opposite shore, furiously building bridges and uncrating siege machines. The times, as they say, are changing.

Just look at what's going on today. Your top management is demanding that you become part of the business. Not only do you have to know something about meat packing or insurance, you must identify with the company's short- and long-term goals. They also want you to sit in on corporate planning and strategy meetings. (You know how those go: half the time is spent on such burning issues as canceling the outside coffee service and installing vending machines.)

What's more, they want a real budget. What's worse, they want you to cost justify your operation, muttering darkly about difficult economic times and keeping an eye on the bottom line.

The users have changed too. Suddenly there's a whole rash of young middle managers who not only have no awe of computers, but actually programmed them in school. Try and slip a little harmless jargon past these people

and they give you a cold eye, short shrift, and let you know they damn well don't buy it.

And the vendors . . . those guys used to be your pals. Today they're selling distributed computing like it's the greatest thing since sliced bread . . . which is okay, except that they're selling it to the users, not to you.

And those users! They are making subversive purchases at their local computer stores and sneaking Apples, TRS-80s, and God knows what else into their departments. It makes you want to get three of your biggest systems analysts and a metal detector and frisk every department manager as he arrives in the morning. Trouble is that the next thing you know they'll be smuggling in *pocket computers* complete with communications capability and enough auxiliary memory to really screw up the integrity of the corporate database.

In addition to all this you still have to keep up with the technology, learn all about office automation and communications, and face a growing shortage of programmers. Ah yes, the days of wine and roses are indeed past.

But don't despair: problems can be turned into opportunities.

We recommend you read the article on p. 96 of this issue. It takes a comprehensive look at the changing role of the information processing professional and examines the problems and the opportunities. And the opportunities are many, including the road to the top. As DATAMATION advisor John Imlay says in the article, "In the '80s the well-rounded MIS person will take a place among the professionals from finance, manufacturing, and marketing. The MIS route to the chief executive officer, if properly developed, will be as strong as any in the business."

So crank down the drawbridge and go mingle with management and the users; handled correctly, the new era can be beneficial to everybody. *

Ask a manager about his

We did. And whether it's a 30-computer installation like the one at Quaker Oats or a single-computer, first-time installation like the one at Maeward, Inc., the response was almost universal: satisfaction. Satisfied users, like those listed here, are one of the strengths of Burroughs.

Read for yourself...

"The B6800 data communications features made it possible for Keebler to implement a nationwide sales force order entry system of over 1000 terminals in less than one year."

William D. Dierkes, V.P.
Management Information Systems
Keebler Co.
Elmhurst, Illinois

"Having been a user of several computer systems, we feel diversified enough to judge the Burroughs equipment and staff to be superior in the product they deliver and the follow-up service and growth of the equipment."

Denise Luukkonen
Controller
Cameron Tool Corporation
Lansing, Michigan

"Five years after our first use of Burroughs equipment, we continue to benefit from superior operating performance and system flexibility. Burroughs technical support and knowledge of our practical business requirements have made Burroughs an integral part of our company and far more than a processing machine."

Fred D. Clarke III, V.P.
Allegheny Beverage Company
Baltimore, Maryland

"Our B1855 is easy to operate and program. With the use of DMS II, we have been able to develop real time systems that have been beneficial to our production, inventory and shipping departments without being a strain on our programmer."

Bredt J. Wilhelmsen
Data Processing Manager
Sargento Cheese Company
Plymouth, Wisconsin

"All of the benefits Burroughs promised me if I converted to a B1855 turned out to be true. The hardware was delivered when I scheduled it and the conversion was completed in less than eight hours. Since the installation of the B1855, we were able to convert from a card-oriented, batch system to an on-line real time, data base system on our major applications. Currently, over 60% of our data input now originates in the user department. We were able to accomplish this primarily because of the software provided with the B1855, such as ODESYS, CANDE, and Data Base."

Robert Toth
Data Processing Manager
Sorgel Transformers
Square D Company
Milwaukee, Wisconsin

"We believe DMS (Data Base) software is a superior program product and it played a large part in our choosing Burroughs as our vendor. Burroughs has been an important factor in Inmont's success in data processing. We made the right decision in selecting Burroughs."

Michael C. Freeman, V.P.
Information & Systems
United Technologies
Inmont
Clifton, New Jersey

"The upward compatibility of our applications programs allowed us to be operational on Friday with the B1700; and the following Monday on our B1900, without any adverse impact on the business. Burroughs did an outstanding job in supporting us during the conversion of eight sites from a B1700 to a B1900 environment. Burroughs environmental software, specifically CANDE, not only increased our productivity but programmer morale as well. The SYCOM program has allowed us to achieve significant results in the area of telecommunications. Field Engineering support on the B1900 consistently meets the requirements of our Division."

John Dixon Pittman
Director, Administrative Services
Battery Products Division
Union Carbide Corporation
New York, New York

"The family concept of Burroughs computers has allowed us to upgrade our system three times when additional computer power was needed; without the usual non-productive and costly ordeal of program conversions."

"The sophistication of the MCP operating system with its automatic self-regulation concepts has provided us with a system that is easy to program and operate. This translates into manpower savings."

William A. Kamman
Corporate Manager
Computer Systems
Laclede Steel Company
St. Louis, Missouri

"The performance and Burroughs responsive support of our distributed network of thirty B800s have met all our expectations. The B800s' average uptime of over 99% has allowed us to effectively extend the power of our B7800 mainframe to our remote plants, distribution centers and sales offices."

Donald K. Stunoff, V.P.
Corporate Information Services
The Quaker Oats Company
Chicago, Illinois

"The selection of the Burroughs B92 for our first in-house computer has proven to be an excellent choice. The cost-effectiveness of the hardware is exceptional. We have experienced an excellent response by Burroughs service personnel to the only two hardware problems we have encountered since the equipment was installed over a year ago."

Ryan A. Holt
President and
Chief Executive Officer
Maeward, Inc.
Olivet, Michigan

"Our Burroughs hardware is amazingly easy to operate. We feel Burroughs operating system can't be beat. We have taken high school graduates without formal training and made them productive within a short period of time."

Bob Schmitz
Data Processing Manager
New York Twist Drill Corporation
Melville, New York

Manufacturer Burroughs.

"Mirrex, Incorporated, has been a Burroughs user since 1977. We installed a B1700 system and ran satisfactorily until we upgraded to a B1855 system. The conversion from one system to another was made without interruption of service to our plant by the close cooperation of the Burroughs Team, including Field Engineers, Sales Account Representatives, Field Technical Personnel and the Mirrex Operations Personnel. There is no question that Burroughs has earned a strong position in our future data processing needs."

William H. Vedder, Jr., V.P.
Material Control
Mirrex, Inc.
Mount Clemens, Michigan

"We at Jockey feel that the two areas in which Burroughs is ahead of the other mainframe manufacturers are: ease of use through their operating systems and the outstanding field engineering service we receive."

Vernon Koch
Director of M.I.S.
Jockey International
Kenosha, Wisconsin

We'd like to tell you more about the strengths of Burroughs. Burroughs Corporation, Dept. D-36, Burroughs Place, Detroit, MI 48232. For an update on what's happening at Burroughs, call 1-800/521-4866. (In Michigan, call 1-800/482-2402.)



Announcing the new Burroughs B3955. This medium-scale computer system offers manufacturers a high-performance means of controlling production and inventory. Its processor occupies 47% less floor space than its predecessor, and requires 25% less power and air conditioning.

Burroughs Building on strength.

NEFOOS

FASTEST IN ITS TIME

by Edward K. Yasaki

The 1961 Stretch computer had a phenomenal list of "firsts." But the benefits to IBM extended far beyond that Ferrari of a machine.

Things just aren't the same anymore. It used to be that at this time of year there was a certain excitement as one anticipated seeing what the new cars from Detroit looked like. They would undoubtedly be longer and lower and certainly much sleeker. But the curiosity that once drew people to showrooms has passed.

And so it is with computers. For some reason, the computers of old stirred one's emotions more than the new ones do today. Maybe it's because they didn't make as many of any one model as they do today, and one could conceivably read about an exciting new mainframe and have it become obsolete before ever laying eyes on the real machine. How many people ever saw an Atlas computer, or a Univac Larc? Have you ever seen an Illiac?

One such classic is the IBM Stretch computer, in its time the world's fastest, the Ferrari of the computing scene. Some five years in gestation, Stretch's first customer shipment was in May 1961. That same month, IBM took no more orders for this sleek new computer. But more than sleekness, Stretch had a list of firsts that extended beyond one's reach. They pulled out all the stops on this one, entertaining any and every idea that young Turks just out of college could dream up. It was a sort of test bed for new features, the best of which were to appear in succeeding machines like the System/360s.

But perhaps most significantly it attracted bright young people to IBM, many of whom went on to design the 360s and 370s and their software; several were to attain management positions in the company. Some, like Frederick P. Brooks Jr. and Gerit A. Blaauw, went into teaching, Brooks heading the computer science department at the University of North Carolina and Blaauw doing the same at Twente University in the Netherlands. An impressive number of them became IBM Fellows, among them Stephen W. Dunwell, Harwood G. Kolsky, John Cocke, James H. Pomerene, Robert A. Henle, and Edgar F. Codd.

One little-known first on the Stretch was its use of a Selectric typewriter as a

console printer. The golf ball typewriter was not officially announced as an IBM product until 1961. As a result, whenever a visitor came to the machine room at Poughkeepsie, N.Y., where a Stretch had been set up, measures had to be taken to conceal or disguise this unannounced typewriter with its odd-looking typing element. IBMers did this by devising a piece of cardboard that fit over the slot on top of the typewriter. Harwood G. Kolsky recounts an amusing incident.

"I remember one time hosting some visitors at the Poughkeepsie lab and standing around giving the standard talk. One of the visitors walked over and picked up this piece of cardboard and looked inside. I thought everybody would die!" Fortunately the visitor didn't appear to have noticed anything new or different under the make-shift lid. "I looked around at the other IBMers and they were all turning pale."

People associated with the machine, either as designers, implementers, or users, had their own list of favorite firsts in the Stretch. When recalling some of those, they start with such features as the instruction look-ahead (four levels deep) or interleaved memories, the 8-bit byte and variable byte size. But Fred Brooks retrieves a list he has filed away and begins to read from it. There

Perhaps most significantly, Stretch attracted bright young people to IBM, many of whom went on to design 360s and 370s and their software.

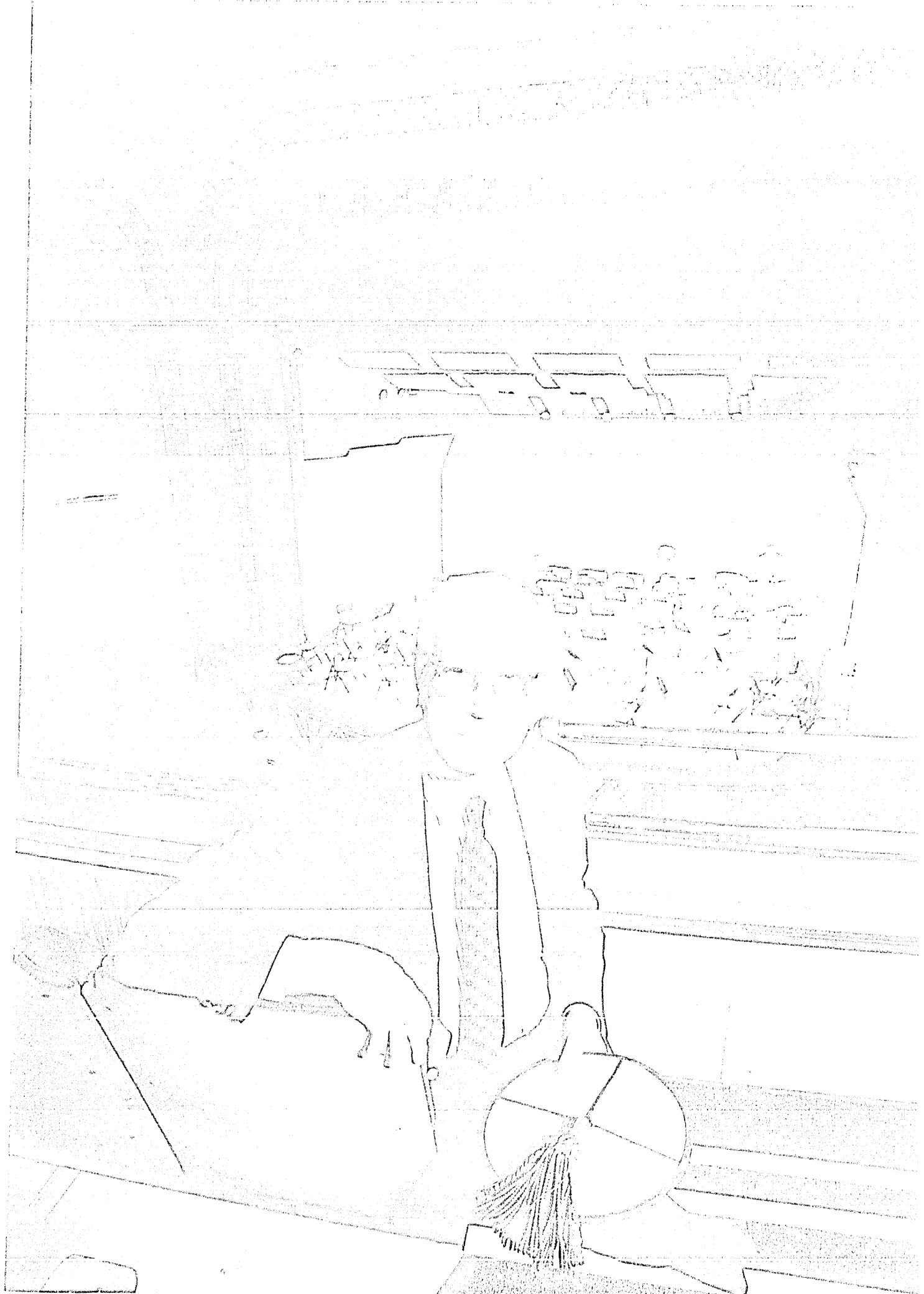
are the supervisory facilities, memory protection, the maskable interruption system, the concept of having the console program interpreted, rather than hardware defined. There was a separate input/output computer, the Exchange. The Stretch had bit addressing, boundary-free alignment, in the fashion of the 370s, and relative branching.

A significant feature, of course, was the use of error correction codes. The machine used 64-bit words plus eight bits of Hamming code to form a 72-bit word in memory. It had single-bit error correction, double-bit error detection. It had provisions for upper and lower case character sets, and could perform decimal, binary, and floating point arithmetic. The concept of a standard interface for I/O equipment was a first for IBM; before 1956 its computers had a different interface for each kind of I/O gear.

Of course, Stretch came originally with an oil-cooled core memory system.

Stephen W. (Red) Dunwell (at right) became IBM's scapegoat for Stretch, but was later apologized to and named an IBM Fellow. After 41 years with the company, he left to save from demolition Poughkeepsie's 110-year-old Bardavon Opera House.

PHOTOGRAPH BY JAMES JOERN



IN FOCUS

Jack Worlton of the Los Alamos Scientific Laboratory (LASL) recalls a problem experienced during the acceptance test phase, when there was a transient memory error in the cores. The engineers worked for days to remedy the error but were unable to figure out what was going wrong. They finally hit upon the problem. As Worlton explains it, there was a piece of solder loose in the oil bath, and because the oil was constantly in circulation the solder would move and attach itself onto a core and cause an error. Then it would move and lodge onto a different core and cause an error there.

"It was the only error I know of that was corrected in a machine by giving it an oil change," Worlton quips.

In a paper presented at the 1959 Eastern Joint Computer Conference in Boston, Erich Bloch said the objective with Stretch was to achieve an improvement in performance over the 704 by a factor of 100. Bloch, up who heads the corporate technical personnel development staff, said they could see a possible sixfold improvement in memory performance over the 704 and a tenfold improvement in basic circuit speed. In his paper, he even notes that "Simulation of Stretch programs on the 704 proved a performance of 100 times 704 speed in mesh-type calculations. Higher performance figures are achieved where double- or triple-precision calculations are required."

In the question-and-answer period at that '59 confab, Bloch was asked how much of the speed improvement could be credited to the use of faster components and how much to changes in the system organization. He replied: "I think one order of magnitude of improvement is due to faster devices and faster circuits. The other order of magnitude of improvement is due to system organization, multiplexing, and so forth. . . ."

From this paper, too, we learn that 169,100 transistors were to be used in the machine, mounted on two types of circuit boards or cards. There were 18,747 so-called single cards and 4,025 double cards, the latter being twice as large and packing four times the capacity of the former. There were 24 different single card types and 18 different double cards.

But Jack Worlton, who joined the Stretch design team about a year after its formation, recalls that the machine's performance never reached the heights anticipated. "The expectation was that it would run faster than it did," he says now. Even up to a few months before delivery, people who had been modeling the Stretch were forecasting that it would run 75 times faster than a 704. "In fact, to my knowledge it never ran more than 25 times faster than a 704," he says.

Harwood Kolsky of IBM, who was a physicist at Los Alamos when discussions on the Stretch began with IBM, says the initial projections of a performance 100 times that of a 704 was merely a ball park

figure. But as time went on, it became an unrealistic target in the minds of the people involved. "This was one of the reasons the machine was later considered not to be successful."

He continues: "I should quickly add that it would be very easy to pick a problem" that ran on Stretch and transfer it to the 704, where it could take a thousand times longer—because the problem would overflow the memory. The Stretch had more than 100K words of memory, versus something like 32K for the 704.

Worlton explains that Stretch was one of the first machines with a broad performance spectrum. Anyone who took advantage of some of the machine's features

One little-known first on the Stretch was its use of a Selectric typewriter as a console printer.

could get it to run fast, but if the job were programmed ineptly, the performance improvement might be only five or six times greater than the 704. He says the 704, 7090, and 7094, for example, didn't fluctuate in performance that much. But the Stretch made it possible for programmers to take advantage of its features to gain the speed that was inherent in the machine.

Ed Voorhees, who was assistant to group leader Bengt Carlson of the Los Alamos team, recalls that a performance up time of at least 90% was demanded by the Atomic Energy Commission (AEC), which was to be the first customer for the Stretch. He guesses that in actual fact the up time percentage averaged in the low 90s. "Not as good as today's machines, certainly," he

STRETCH'S INHERITANCE FROM THE 709

In the midst of the Stretch development project, after many of the component subassemblies had been built but before they could be assembled into a workable whole, the federal government issued an RFP for a solid-state computer system to be used in the ballistic missile early warning system (BMEWS), part of the nation's defense setup. IBM proposed a transistorized version of the 709 computer, offering to supply a 709 for program development until the solid-state version could be built.

The new computer, which came to be called the 7090, inherited its system design from the 709 and its hardware from the Stretch, including the emitter-coupled logic circuits, the packaging, frames, covers, power supplies, and memories. Those pieces came directly out of the supply of parts collected to produce the first Stretch. Recalls Frederick P. Brooks Jr., "Even though Philco announced a transistorized computer first, IBM delivered one first—the 7090. And George Monroe's team did that thing in six months from start to first customer delivery." Later IBM was to similarly

says. But there's no doubting where Voorhees' heart is. Like so many of the LASL user community who ran jobs on the Stretch, he thought highly of the machine.

Worlton recalls the sum paid by the AEC as \$4.2 million, considerably below the price tag later set on the Stretch. But he said no one paid the list price. Ed Lafferty of the Mitre Corp. in Bedford, Mass., recalls that his organization acquired a new Stretch on a lease-purchase plan. He doesn't remember how long they had it on a lease, but says when the decision was made to buy the machine the final payment was for \$6 million, the first and only time he held such a sum in his hands.

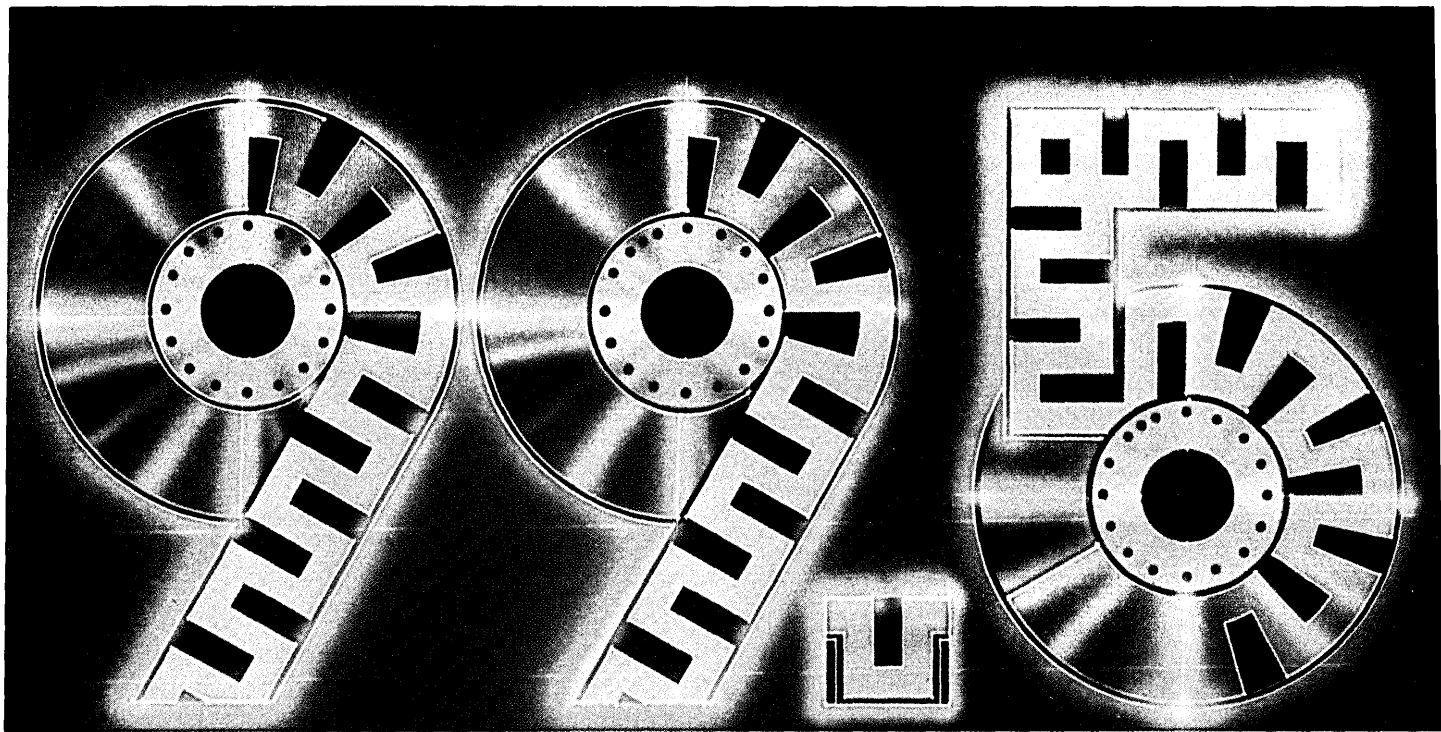
The need to lower the price of a Stretch and the financial drubbing being taken by the vendor with each order received were disclosed by IBM's chairman, Thomas J. Watson Jr., at the Western Joint Computer Conference in 1961. The chairman, using the occasion to convene a press conference at the Ambassador Hotel in Los Angeles, set a cutoff date of May 15, 1961, after which no more orders were going to be taken. At that time, DATAMATION reported the price reduction was to some \$8 million from an original \$13.5 million, saying this was proportional to the shortfall in performance of the machine. As reported by DATAMATION, Watson said:

"We undertook the Stretch contract for the Atomic Energy Commission some years ago. They asked us for certain specifications that they wanted met. We said we could meet them within a certain time and then we went about doing it. The cost of building a computer was completely underestimated so that the government funds we have in Stretch are minor compared to IBM

develop the 7080 from the vacuum tube 705 III, using Stretch componentry.

Harwood G. Kolsky, now at the IBM Palo Alto Scientific Center, recalls sitting in meetings with Monroe and suggesting that some of the weaknesses of the 709 be corrected in the new version. But Monroe, a stern engineer from the old school, was adamant in retaining the same features. Kolsky says now that Monroe was probably wise in not budging because if he had started making changes, everyone would have descended on him with their pet design features for incorporation in the new machine.

Kolsky observes, too, that the 7090 had "one tremendous advantage, which we now understand very well but didn't at that time. The new computer already had its software written." It came from the 704 and 709 and would run on the new machine unchanged. By contrast, developers of the Stretch were still struggling with a compiler, for example. So the new 7090 was able to leapfrog the software issues, says Kolsky, "which turned out to be much larger on Stretch than anyone had anticipated."



Data 99.5% pure.

○ Now digital data communication of guaranteed accuracy and unprecedented reliability is available in more than 350 cities.

It is DATAPHONE® Digital Service, a major development of the Bell network, the world's largest and most advanced information management system.

With DATAPHONE Digital Service, your data system handles more data, clean data, day in and day out. Bell guarantees better than 99.5% error-free seconds transmitting at 56,000 bps and even greater accuracy at slower rates. Reliability is designed in. If needed, troubleshooting and service are handled quickly by the Bell System from a central location. You get more use from your system without adding costly hardware.

When your system is digital from end to end, there are no losses of quality due to signal conversion or amplification. Re-transmission is virtually eliminated.

You'll find that when your data system is more efficient, accurate and reliable, you can respond faster, serve your customers and users better, manage better.

◇ Discuss with Bell how DATAPHONE Digital Service can serve your needs. All you have to do is call toll free 1-800-821-2121. In Missouri, call 1-800-892-2121. **1-800-821-2121**

Put our knowledge to work for your business. ○ Bell System.

The knowledge business



The Art and Science of Better Communications.

GROUP DYNAMICS AND THE 3270-COMPATIBLE MARKETPLACE.

There is an art—and a considerable amount of science—to designing and delivering data communications products that meet the rigorous demands of today's 3270-compatible marketplace. Products such as display stations, printers and controllers that more dynamically and productively interact with each other, with compatible system equipment and with the people who use them. Products that save more energy, space and money. Products that perform more reliably. Products that are more readily available and more fully supported. These three products, for instance.

Product Set: Memorex 2078 Display Station; Memorex 2087 Matrix Printer; Memorex 2076 Remote Cluster Controller.

System Interfaces: IBM Systems 360, 370, 303X and 43XX.

Compatibility: IBM 327X plug compatible; Bisynchronous; SNA/SDLC (2078/2087).

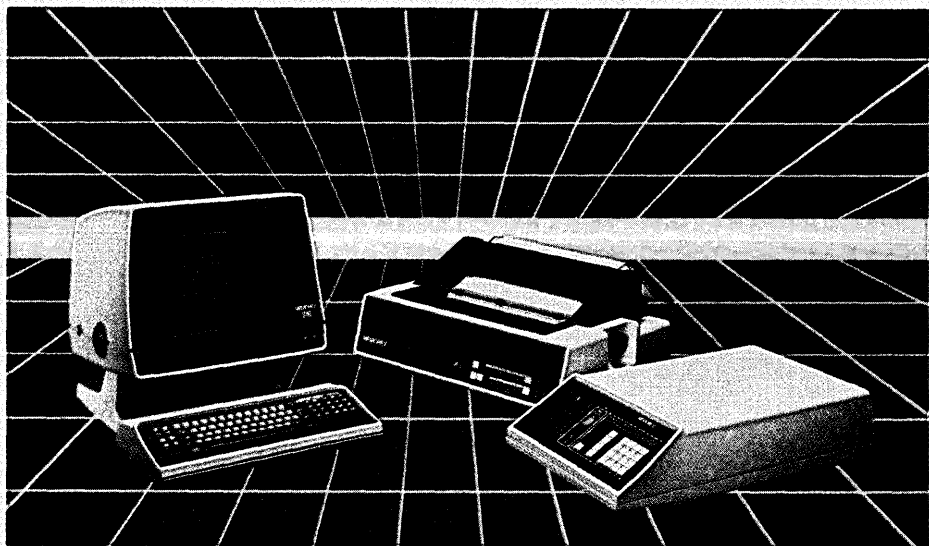
Product Specifics: The 2078 Display Station is built for flexibility, operating in bisynchronous as well as SNA/SDLC environments. It is built compactly to conserve space and even features a monitor that detaches for shelf placement. It is built to conserve energy, with efficiency features that allow the 2078 to operate on 58% less power while generating 47% less heat than its IBM equivalent. It weighs just 55 pounds, some 41% lighter than the IBM competition. And above all, the 2078 is built for people. The monitor is tiltable and the screen recessed. That screen, the keytops and all moldings are non-glare. The keyboard is movable for comfortable positioning.

The 2087 Matrix Printer also features SNA/SDLC protocol compatibility in addition to bisynchronous operation. It is both fast and quiet. A microprocessor-controlled print mechanism delivers high quality printouts at speeds up to 50% faster than the IBM equivalent. A bidirectional matrix print head seeks the shortest path to the next line, backwards and forwards, maximizing throughput. Acoustical engineering reduces noise levels, while a membrane switch panel, controls and LED indicators, all located on the front panel, provide the operator with local control and printer status.

The 2076 Remote Cluster Controller is a lightweight 30-pound package that accommodates up to eight printers and/or terminals in a bisynchronous environment. It measures a streamlined 6.5" high x 14" wide x 26" deep. While the 2076 can be located as far away as 4920 feet from its attachments, its dimensions allow for convenient placement just about anywhere, singly or stacked. Standard power-on, off-line and on-line diagnostics contribute to increased uptime.

Memorex. The Communications Group. For more information, contact Laurie Schuler at 18922 Forge Drive, Cupertino, CA 95014. Or call (800) 538-9303. In California, call (408) 996-9000, Ext. 222.

Better data communications begin with better tools. The best of these reflect a balance of art and science. In their engineering, manufacture and test. In the way they are designed for the environment, for the eye of the beholder, for the comfort and productivity of the operator. In the marriage of form with function, feature with benefit. These are the components that define data communications excellence. And excellence is the goal that defines Memorex.



MEMOREX

A Burroughs Company

CIRCLE 30 ON READER CARD

IN FOCUS

funds. At the end of the period [of the original contract], we were late on delivery date. And when we finally began to assemble the computer we found that though we had the world's fastest and most capable computer, the specifications were not met. . . .

"We will make delivery of the machines because we do not want to break our promise to our customers. We are going to take a good, fat loss on Stretch, but we hope that it will be the fastest and most capable computer on the market. . . . If we get enough orders at this price, we could go out of business. . . ."

Not to worry. According to one report, IBM's total loss on Stretch was a mere \$20 million. While that may have seemed like a significant amount of money for IBM in the early 1960s, in retrospect the benefits that accrued to the company far outweighed any damage that may have been inflicted.

Indeed, the one damaged most may have been the man responsible for the Stretch development task, Stephen W. (Red) Dunwell, who became the scapegoat and, after the first customer shipment in May '61, was banished to a research position at Yorktown Heights. It wasn't until five years later that his contributions to the company came to be recognized. Thomas Watson Jr. made a public apology to Dunwell and awarded him the prestigious IBM Fellowship. But at the age of 62, after 41 years with IBM, Dunwell took early retirement.

Along with his wife, he took over Poughkeepsie's 110-year-old Bardavon Opera House, which was about to be demolished to make room for a parking lot. They breathed new life into the theater, made it a nonprofit, year-round operation, and turned it over to a full-time manager and staff. Now, Dunwell says, he and his wife have

The machine's performance never reached the heights anticipated.

begun something they know a little more about—a timesharing business.

Dunwell recalls that IBM made eight Stretch computers, all in Poughkeepsie, but he could account for the whereabouts of only three or four. Most sources confirm that in addition to shipments to Los Alamos and its sister lab in Livermore, one went to the National Security Agency, one to the Atomic Energy Authority in the U.K., one to the Weather Bureau, and one to Mitre. Other sources believe the Dahlgren Naval Base got one and that the eighth went to the Argonne National Laboratory in Illinois.

When told that Fred Brooks credits him for the Stretch and calls him "the hero of the piece," Dunwell replies, "There were lots of heroes." Then he adds, "It was a heroic effort, I might say."

For the record, it must also be noted that some people at Control Data Corp. had

different ideas about Stretch. In years past, they have said that the mainframe was really designed to keep CDC out of the super-scale, scientific computer market. Perhaps one could call it a "knockout" machine, not so much Stretch as Smash.

GENESIS OF STRETCH

IBM alone could not afford to develop Stretch, so it asked the NSA to share the costs.

The genesis of the Stretch project, as can best be determined, seems to trace back to the National Security Agency and its need for more computing power than was available. It was easily determinable that such power could not be developed at an affordable price by using vacuum tubes, and yet it was equally obvious that an enormous investment would be required to develop the infant transistor technology. Unfortunately, IBM's policy was that the cost of such technology development had to be borne by the product for which it was incurred.

"In 1954 I believed that the only solution to that dilemma was to obtain support for early development work from an organization which could afford the new technology," recalls Stephen W. Dunwell. "Two of those organizations were the National Security Agency and the Atomic Energy Commission." In testimony presented at the IBM-Justice Dept. antitrust trial in New York City, Dunwell related how a group of engineers brainstormed the problem of overcoming the inadequacies of transistors and of manufacturing the types of solid-state devices required to build new and better computers. IBM management, including Dunwell, was then able to inform the NSA of what the company could do.

"That delegation," he recalls, "made it clear to NSA that IBM alone could not afford to do what was required and asked NSA to share in the cost of developing the necessary components. Dr. Solomon Kullback, on behalf of NSA, agreed to do so."

It was late in 1954 or early in '55, he continues, that the folks at the Lawrence Livermore Laboratory in California asked for a proposal for the fastest computer IBM could build. A similar request also went to the makers of Univac computers, with Remington Rand winning that development contract. Disheartened but not deterred, IBM turned to Livermore's sister lab in Los Alamos, New Mexico, which expressed an interest in sharing the cost of developing the

necessary technology.

"In January 1956 that computer became known as Stretch," Dunwell said in his testimony at the trial "and sometime thereafter was called the IBM 7030." The computer was designed jointly by engineers at IBM and senior scientists at Los Alamos.

The timing on this development project was very fortuitous. Had it been considered two or three years later, circumstances would have ruled against it, for it was a time when government procurement procedures were getting stricter. Harwood G. Kolsky, now at the IBM Palo Alto Scientific Center, says, "At the time the Stretch project was getting started, it was still possible for a major laboratory like Los Alamos to just enter into a contract," saying this is what we want and if you'll build it we'll buy it. "Two or three years later, they would never have been able to do something like that."

Ed Voorhees of Los Alamos, who was on the Stretch design team, would agree with that. "I always felt [the Stretch] was one of the best bargains the government ever got," says Voorhees. "But for some reason, efforts at Livermore and Los Alamos to undertake later development-type activities like this just got the cold shoulder from the AEC."

Kolsky, who was also on the Los Alamos design team before joining IBM,

"A lot of the things that were discussed would best be classified as harebrained schemes."

recalls that day when a group from IBM went to Los Alamos to make a presentation on the state of the computer art and the type of computer they thought they could build. It was Sept. 20, 1955, and the delegation was headed by Cuthbert Hurd. "They talked in terms of a 10-megapulse machine," he says, referring to the speed of the underlying transistors. Lloyd Hunter gave a presentation on magnetic cores. Dunwell spoke on machine organization, of the idea of having interlaced memories to compensate for the fact that the logic was much faster than the memory. They were talking about a two-microsecond memory and the final product ran at something like 2.25 usec, so the IBMers were very accurate on that technology forecast.

"Their estimate on the transistors turned out to be optimistic," Kolsky recalls, "not because the transistors didn't switch in the times they thought," but because the long lines that ran from one frame to the next tended to slow the clock time. But he says one must understand that they were talking about something (the transistors) just out of the research stage and destined for a giant machine. "It takes a real act of faith to do something like that," he chuckles.

IN FOCUS

In January 1956 Dunwell was appointed manager of the Stretch development program, and the following November the contract was signed by IBM and the AEC/Los Alamos. It called for delivery in 42 months, which made it May 1960. Kolsky recalls the planning meetings. "A lot of the things that were discussed would best be classified as harebrained schemes," he says. "Somebody would come in and say, 'Why can't we do the following,' and they would spell out something or other, but it would have completely undermined the whole structure of the machine if you did something like that."

He adds: "The Stretch project attracted large numbers of fresh young graduates coming out of schools who had heard about the project and wanted to work on the biggest computer in the world. This is the sort of benefit to IBM that is hard to measure. I keep running into those people over the years. They slowly drift up into high positions in the company. They probably would not have joined IBM if it hadn't been for the Stretch project."

Among them, of course, was Frederick P. Brooks Jr., who says, "I went straight from Aiken's lab to work as an architect on Stretch." That was his first job at IBM; he went on to become principal architect of the System/360 and now heads the computer science department at the University of North Carolina. Of his experiences on the Stretch project, he says, "It was an exciting project. You had a chance to try everything you could dream up." He pauses momentarily and then adds, "And we did."

This apparently was true, for Kolsky says if he had to criticize the project at all it would be for the ease with which people were able to put features into the machine. Some of the features were later removed for the 360s, which Kolsky calls "a cleaned-up version of the Stretch." He says a look at the instruction sets on the Stretch and the 360 will show the strong family resemblance.

Recalls Jack Worlton of Los Alamos, who joined the design team about a year after its formation, "One of the beautiful instructions we put in there that we finally had to give up because it was so slow was branch-on-bit. You could pick out any bit in memory, examine it, and branch if it was a one or if it was a zero. But the trouble was that it took about five multiply times to accomplish this.

"Conceptually it was just a beautiful instruction," he continues, "but absolutely worthless. There are still computer designers who haven't learned that: you don't put too much complexity into the order set because it's difficult to build and maintain. If it's too complex, it'll never be used."

But Kolsky, like Brooks, is quick to heap praise on Dunwell for his management of the project. "His real genius was the fact that he saw where [IBM] should be five

THE STRETCH CLUB: IT NEVER CAME TO PASS

A nonprofit, cooperative venture by which a number of aerospace companies in Southern California could own and share in the use of an IBM Stretch system was given serious consideration, but never came to pass. The job of studying the economic feasibility of such a plan was assigned to DATAMATION editorial advisor Robert L. Patrick, who was just starting out as an independent consultant. It was given to him by Paul Armer, who was head of computer sciences at Rand Corp., the prestigious Santa Monica, Calif., think tank. Armer, of course, was until recently the executive secretary of the Charles Babbage Institute.

"Southern California was the hotbed of cooperative ventures in the early days of computing," explains Patrick. Many space companies could not justify getting their own Stretch, but it was thought that they could all use a piece of one. These were companies such as Lockheed, Northrup, Douglas, and North American, as well as Rand. About that same time, Herb Grosch was working for a large consulting company called CEIR Inc., which also announced its intention to install a Stretch in a

Los Angeles service center. Both would have accomplished the same thing, allowing those same users to subscribe for some time on the machine, except that one was a commercial venture, the other a nonprofit arrangement. Neither plan was fulfilled.

In his study, with pages dated from January 1960 to June 1960, Patrick reported that the Stretch did not look attractive as a straight out-and-out computing engine, that it might cost the users more to run their workloads on the Stretch than on the machines they were then using.

"That wasn't necessarily negative as far as the Stretch was concerned," Patrick now explains. "It was just a phenomenon of the workload"—mostly short jobs. If the jobs had been weather analyses or forecasts involving massive partial differential equations, then the evaluation would likely have swung the opposite way, in favor of the Stretch. That, says Patrick, was the problem with sales of Stretch, as well as the superscale Control Data 6600 and its ilk. Everyone had shorts jobs. Only the atomic energy community had jobs massive enough to require a big number cruncher.

years hence and put together a project over the endless objections of everybody," Kolsky says. And when people came to him with technical problems, which they did daily, Dunwell would "turn them around and send them back out with the idea that 'yes, it can be solved.'" Until this project, IBM had moved cautiously, making evolutionary advances. But it was Dunwell who sought to make a factor-of-100 improvement in mainframe performance in one giant step.

Dunwell, of course, wasn't concerned only with the design features of the

For Frederick P. Brooks Jr., the Stretch project was what enticed him to join IBM.

new computer, for engineers at IBM were also tackling the basic hardware technology on which the entire design would rest. The substitution of transistors for vacuum tubes was to reshape the system design of computers. It was like a new ball game.

It was necessary to design transistors suitable for use in computers. The solid-state devices of that time, Dunwell said in his testimony, "were neither fast enough nor had they the current-carrying capabilities necessary to control the ferrite core memories which would be needed." As in any pioneering role, it was also necessary for them to figure out how to manufacture such devices.

It was found, too, that some engineers just could not think in terms of the new solid-state technology, having been brought up on vacuum-tube devices. In an attempt to get them to redirect their thinking, Dunwell

recalls, "for a time the laboratory expressly forbade anyone to have a piece of vacuum-tube equipment visible within his work area."

The design team under Dunwell tackled other problems. They had to come up with a new design for a power supply system, abandoning a 60-cycle system with transformers to go instead to a 400-cycle system with a motor generator. The back panel wiring, it was determined, was too complex to expect anyone to do the job correctly, so they got the Gardner-Denver Co. to make an automated wire-wrap machine. This device was driven by a punched card reader. And they went to Texas Instruments for the initial lot of transistors, IBM in 1956 having no such manufacturing capabilities. Burndy Corp. was the supplier for the tens of thousands of specially designed connectors needed for each computer.

"Up to that time," Dunwell said in his testimony, "all logical design had been recorded by draftsmen, but it was clearly out of the question to record the design of a machine of such complexity by manual means. A computer-generated design was necessary and a process for that purpose was developed."

When reached at his home in Poughkeepsie, where he retired in 1965, Dunwell said, "One of the fundamental things we were up against, having to do with manufacture and design, was that this machine was big enough and complex enough so we knew we would never get it together if we didn't automate the design and the manufacture." He explained that there would be so much wiring in the machine and it would involve so many drawings that they knew

SPERRY UNIVAC MINICOMPUTERS KEEP ACCIDENTS FROM TURNING INTO PILEUPS.



At Sperry Univac Mini-Computer Operations, we realize the problems of managing a large organization. We know that administrative and clerical costs have to be kept to a minimum. And we know how important it is to maintain effective communications throughout the company.

For example, we've solved transaction bottlenecks for a number of large insurance companies around the world. In fact, a major property and casualty insurance firm recently installed a network of V77 minicomputers to handle claims processing. Each mini now processes over 3,000 claims per 6-hour day in conjunction with the company's mainframe.

Our distributed data processing (DDP) expertise can make a big difference in your company's efficiency, by putting information processing resources at remote sites. Our V77 mini-computer family offers a wide variety of configura-

tions that are ideal for DDP applications. For insurance companies, for example, we can handle information entry and retrieval, draft issuance, claims processing, rating assistance, and interactive communications with your Sperry Univac or IBM mainframe installation, to mention just a few.

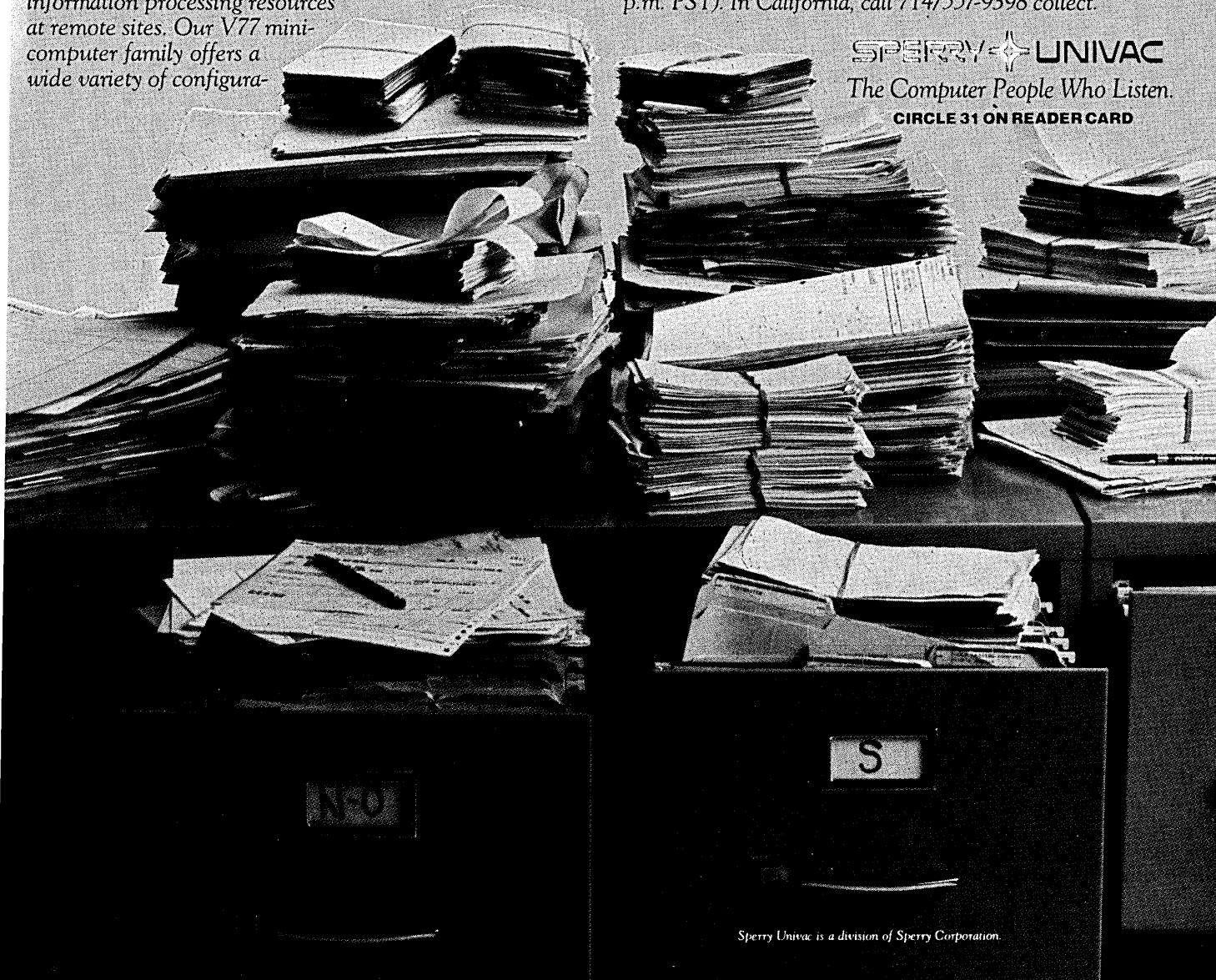
Each remote location in your company has its own unique needs. And a truly efficient network must handle them all. With the V77, distributed processing lets you provide better, faster service for your employees—and your customers. Because you get instantaneous response on any type of information retrieval.

So if you think your company has gone without the benefits of DDP long enough, contact us. We'll tell you how your information needs don't have to turn into paperwork pileups. Write to Sperry Univac Mini-Computer Operations, Marketing Communications, 17900 Von Karman Avenue, Irvine, CA 92714. Or call toll-free 800/854-7517 (8:00 a.m. to 4:30 p.m. PST). In California, call 714/557-9398 collect.

SPERRY  UNIVAC

The Computer People Who Listen.

CIRCLE 31 ON READER CARD



IN FOCUS

they would be forever changing drawings, correcting mistakes, and would get into a mad loop from which there would be no escape—unless things were automated.

When reminded of the book on Project Stretch, *Planning a Computer System*, Dunwell said, "One of the rules we had on that project was that nothing was done without first documenting carefully why it was done . . . so there was a great deal of documentation done, justifying the particular choices made, as we went along. And then abstracts were made from that for the Stretch book."

Fred Brooks remembers the book and especially a review of it by Lytton Strachey in the *Computer Journal*. In that review, Strachey said in part, "I get the impression that Stretch is in some way the end of one line of development. Like some early computer programs, it is immensely ingenious, immensely complicated, and extremely effective. But somehow at the same time crude, wasteful, and inelegant. And one feels there must be a better way of doing things."

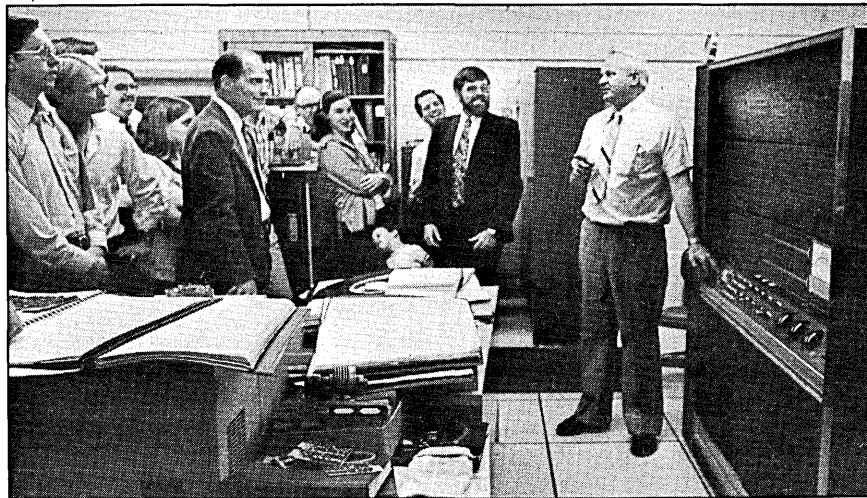
Brooks, who used that quote in his own book, *The Mythical Man-Month*, says of Strachey's words, "I think that's an accurate assessment."

STRETCH MARKS AT BYU

"A lot of people were betting money that we would never get [Stretch] operational."

"The prophets of doom were legion," says Gary Carlson, former director of computer services at Brigham Young University. Here was a small university nestled in the western foothills of the American Rockies, and it's about to take title to a 10-year-old Stretch computer installed near Boston. The intention is to dismantle it, move it to Provo, Utah, put it back together again, which would be no small feat, and get usable work out of it. No way.

"A lot of people were betting money that we would never get it operational," Carlson recalls. There was so much negative comment from his friends in the industry that he began to question his own decision. He figured it would cost the university about \$50,000 to get into the game, just to see if it could be done. "So there was at least that much of a clear gamble on my part." But there appeared to be no alternative. It was 1970 and there clearly was a growing need for scientific computing capabilities on campus. "And we, like all uni-



STRETCH OUT: Bill Ivie tried to get others to pull the switch on Stretch for the final time at BYU's September 1980 shutdown of the system. To the left with coat and tie is computer services manager Willard Gardner, and the bearded gentleman in the center is Joe Wise, who first found the Stretch listed in a government surplus inventory and campaigned for its acquisition.

versities, were always broke."

BYU had installed an IBM 7040 in 1963, and in 1968 installed a 360/50 that opened up computing on campus. It not only made it possible to provide computing services all over the campus but also got people interested in its applications. So, by 1970, two years after acquiring the mod 50, there was a growing demand for computing capabilities, and the Stretch would satisfy that need "at a price we could afford."

Carlson, of course, looked around to see what was commercially available, but found "the numbers were just mind-boggling." They looked into a 360/65, a Univac 1108, and a Burroughs 5700. He recalls all the prices were in the \$3 million to \$4 million range, and they couldn't afford that.

So how much did he figure it would cost to acquire the Stretch? "Well, Joe kept telling me that for a \$5 registration fee we could get it." Carlson says Joseph L. Wise, manager of the scientific computing facility on campus at that time, was the primary instigator. Carlson had the final say and was supported by his assistant, Willard Gardner.

Wise says that in those days he regularly scanned government publications that listed surplus equipment. In one such listing, he saw an IBM 7094-II system, so he called a man in Washington with whom he frequently chatted about surplus gear. The man said, "Why do you want a 7094 when there's a Stretch system available?" Wise took the idea to Carlson, explaining that the system was available at no cost except for those related to shipping and reassembling. Whereupon Carlson is supposed to have said, "So what if the Navy wants to give me a battleship?" Wise says he still uses that rejoinder whenever anyone talks about getting something for nothing.

But Wise, sympathetic to the needs of researchers for computational power,

was insistent. He talks of users who periodically needed four or five hours of 360/65 time and could get it only on Thanksgiving Day or New Year's Day. And there were some very large simulation runs on campus; one in particular he remembers ran on the campus Librascope L-3055 computer for some 150 hours. When asked if there were that many large jobs to be run, Wise explains that if the capacity is there, people come up with the jobs.

Gary Carlson recalls that in his presentation to the university's board of trustees he estimated the cost of getting and installing the computer at \$100,000. It apparently sounded better to them than the several millions required for a new machine. He also inquired to see if IBM would maintain the Stretch and seems to think their quoted fee was almost \$10,000 a month.

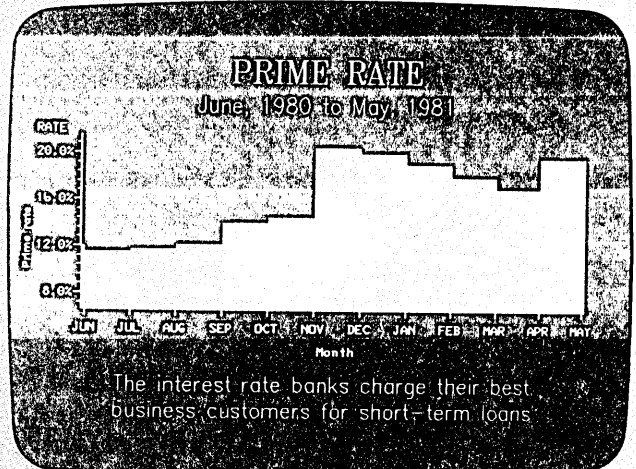
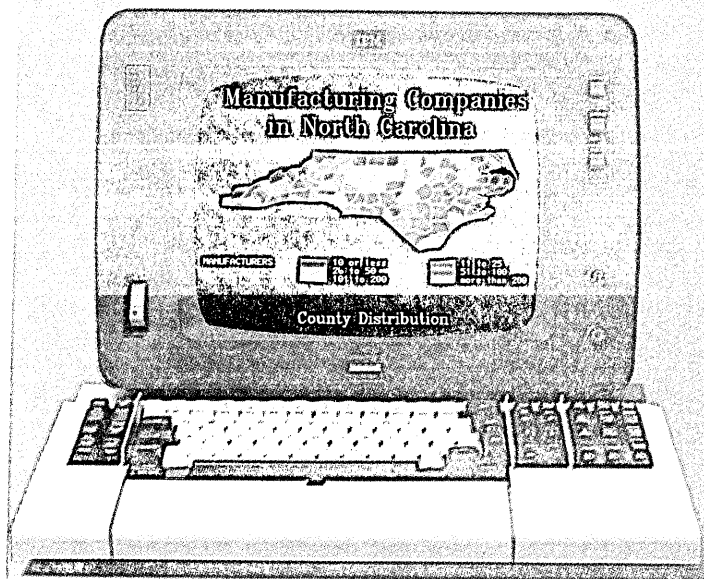
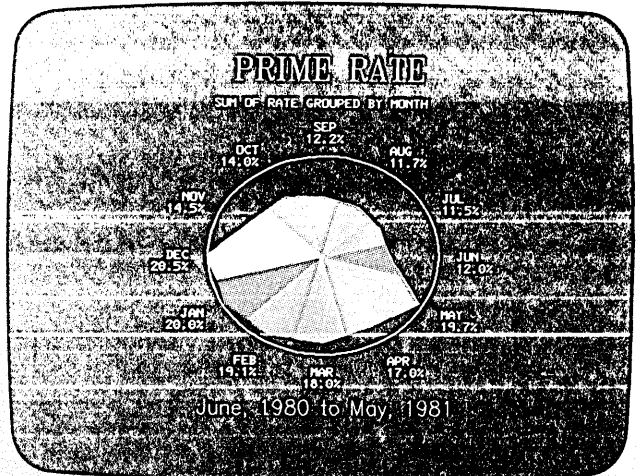
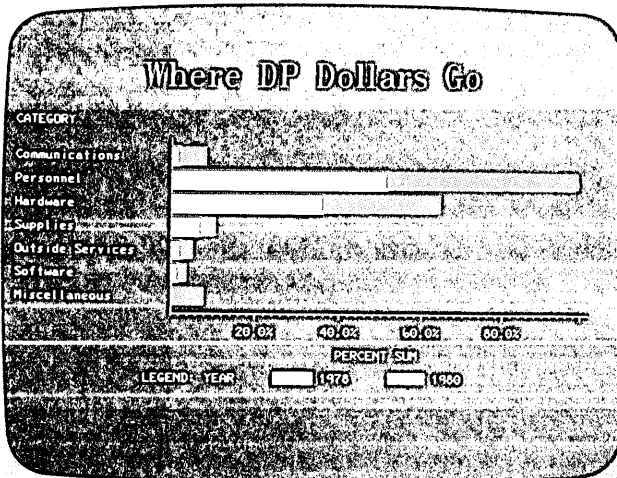
"You get a bargain now, but it'll eat you alive in operating costs," his detractors said. So one can imagine the reaction when Carlson told them he'd maintain it with his

The longest job BYU ran on the Stretch was a chemistry problem that lasted for 523 hours.

own people, plus a couple of students. As it turned out, BYU was able to get by with two full-time staff plus a few students.

"Bill Ivie is the superstar of this whole show," says Carlson of his manager of operations at the Stretch center. Ivie assembled the machine and, for the final seven or eight years, kept it running. Willard Gardner, who succeeded Carlson as director of computer services, says the entire operating costs, including the salaries of Ivie and students and supplies, has been less than \$100,000 a year. "So we've operated it for something less than people thought it would

SAS/GRAPH saves time...



on the IBM 3279.

Since its beginnings, SAS has provided a software system to save time. Now SAS/GRAPH adds a new dimension to the powerful, time-saving SAS system.

With SAS/GRAPH, you don't need a different software system for each of your different graphics devices. The same SAS/GRAPH system supports ARI, Calcomp, Chromatics, Hewlett-Packard, IBM, Ramtek, Servogor, Tektronix and Zen equipment with device-intelligent software. SAS/GRAPH also provides a universal driver that can be easily linked with vendor-supplied software for most other devices.

Whatever device you use, in batch or interactive mode, you only need two or three simple statements to produce most displays. And that adds up to a big time-savings.

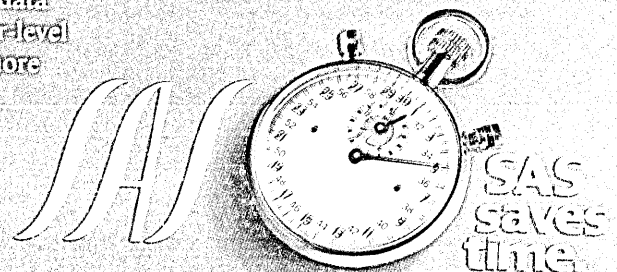
But best of all SAS/GRAPH is integrated into SAS, so you get the benefits of the total SAS system—a system now saving time in report writing, statistical analysis, data management and as a higher-level programming language at more than 2500 OS, OS/VS and VM/CMS sites.

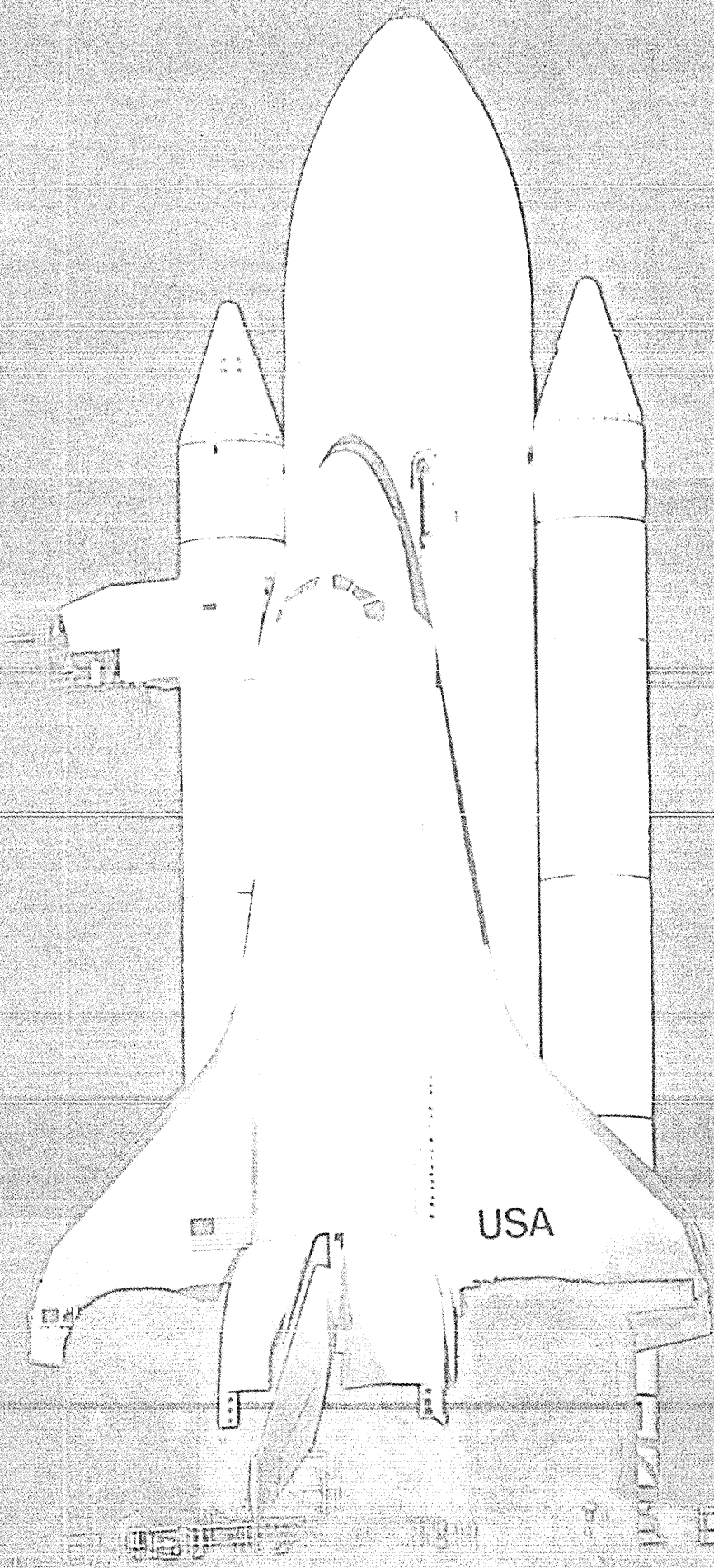
And you can add SAS (including SAS/GRAPH) to your dp staff for

less than half the cost of a new programmer.

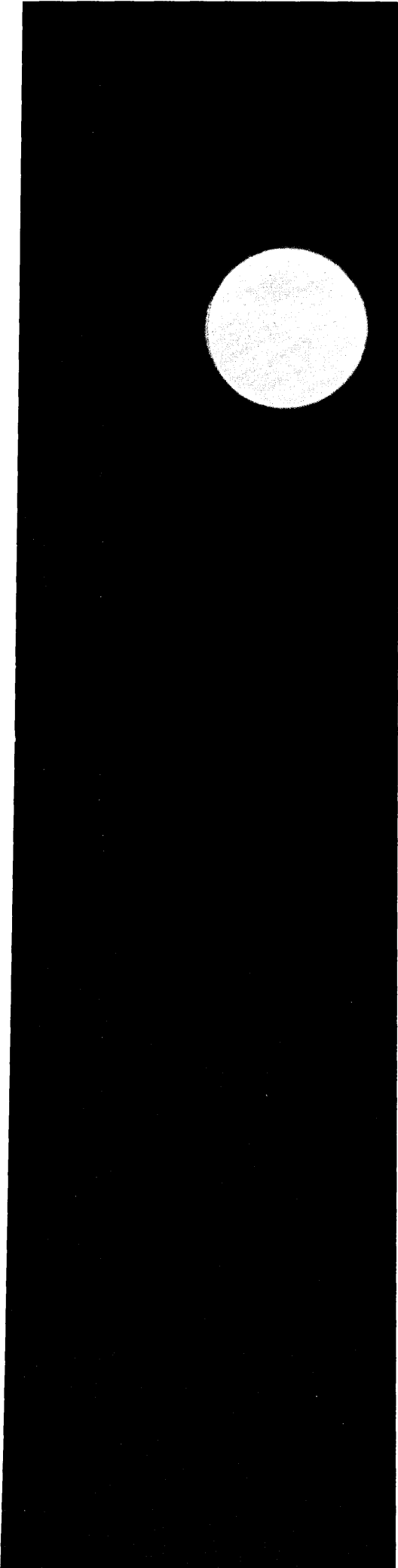
Call or write today. SAS Institute, Inc., Box 8000, Cary, NC 27511. Phone 919/467-8000. Telex 802305.

In Europe: SAS Institute, The Centre, 68 High Street, Weybridge, Surrey KT13 8BL, UK. Phone 0932-56855. Telex 8964365.





USA



When Columbia left the pad, we'd already been tracking it for three days.

Mission control played a big role in the launch and flight of NASA's space shuttle. And 217 MODCOMP real-time computer systems formed a big part of launch control.

From T minus 72 hours until T minus five seconds, MODCOMP systems monitored and controlled all of the thousands of preflight tests and operations that helped make Columbia's first two launches safe and successful.

At T minus nine minutes, control was handed over to the shuttle's onboard computers.

At T minus five seconds, MODCOMP computers approved main engine start, and continued to monitor all shuttle operations until orbit was reached and control was handed over to Johnson Space Center in Houston.

Everything went perfectly.

From shuttles to Saturn...and beyond.

The same no-fail capability that is making the space shuttle program a success is also yielding better than expected results at Jet Propulsion Laboratory in Pasadena, where 140 MODCOMP real-time computer systems in the Deep Space Network are helping to keep Voyagers I and II on course and process the vital data they send back from their interplanetary odyssey.

MODCOMP computer systems are also used in other JPL space missions such as Pioneer, Viking, and Helios.

Meeting or exceeding the demanding specifications of organizations like NASA and JPL is a way of life at MODCOMP. Which is why we're also a leader in real-time computer systems for process control, communications, manufacturing, testing, and power.

Whatever you're launching, if you're looking for the utmost in performance, reliability, and value in real-time computer systems, give us a call. Phone (305) 974-1380. Or write Modular Computer Systems, Inc., 1650 West McNab Road, P.O. Box 6099, Ft. Lauderdale, Fl. 33310.

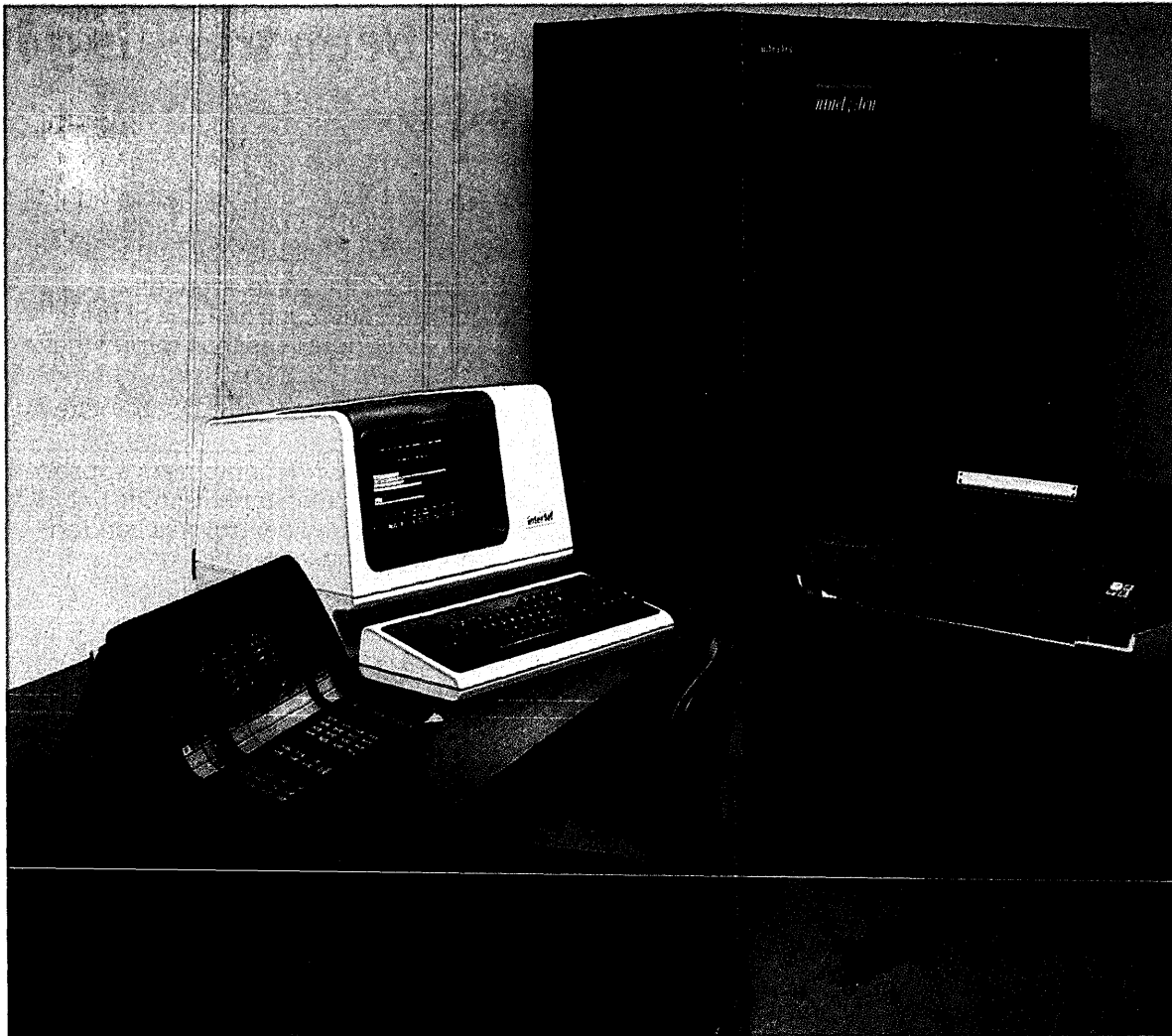
European Headquarters:

Modular Computer Services, Molly Millars Lane
Wokingham, Berkshire RG11 2QT, England

 **MODCOMP**[®]

Computer Systems for Productivity

This is what trouble-free network management looks like.



The New Intertel 90/10.

Corporate management sees things one way. Datacomm managers see things another. We're out to close this gap with the only truly effective network control and management system available today. The new Intertel 90/10. It speaks to the needs of both corporate and datacomm managers.

The Intertel 90/10 gives datacomm managers all the network monitoring, diagnostic control and restoral power they need. With an aggressive service program that provides "Guaranteed Uptime". And it's a vital report-generating tool that gives corporate management the data to improve service, increase profits and plan for the future. Intertel 90/10... the most advanced network management system on the market. It's closing the communication gap fast.

Send for our "Gap" brochure today. You'll like what you see.
Intertel, Inc., Six Shattuck Road, Andover, MA 01810. 617-681-0600.

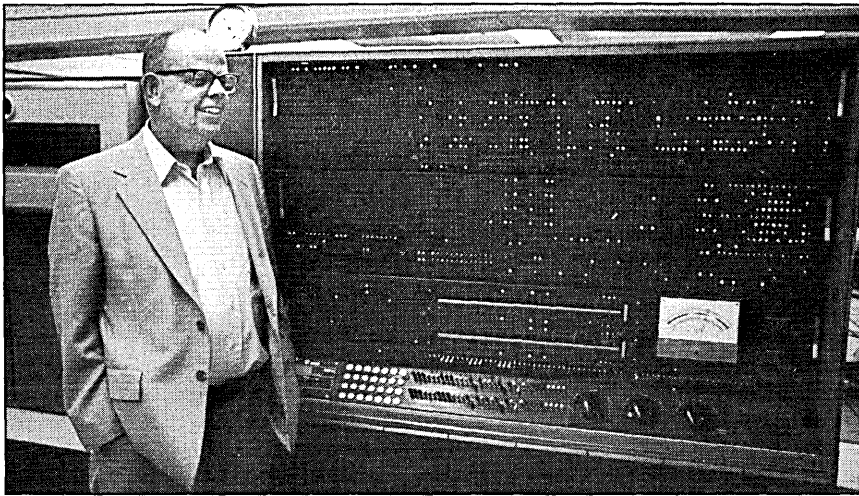
intertel



We Communicate

CIRCLE 34 ON READER CARD

IN FOCUS



DR. GARY CARLSON, who approved BYU's Stretch acquisition in 1971, stands in front of the maintenance panel, which had more than 3,000 lights. About three or four of the bulbs burned out each day.

cost to maintain it," Carlson says proudly.

Approval to acquire the Stretch came in mid-March 1971. The dismantled hardware from Mitre Corp. in Lexington, Mass., had arrived by May, new false flooring at the site had been installed by July 1, and the main units had been reassembled and recabled by the end of July. It required some 14 months, however, before the first user job could be run as a test. (In

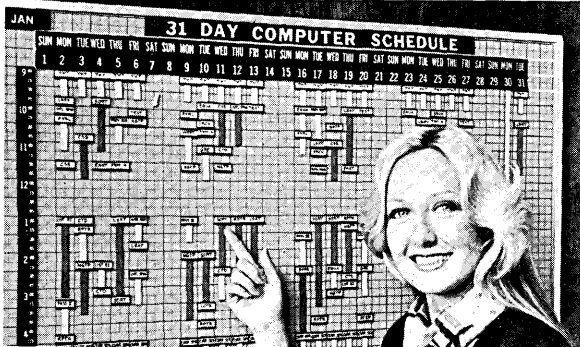
mid-November 1971, BYU also acquired the Los Alamos Stretch, and it was soon cannibalized for spare parts.) A report by Wise in January 1973, about the time the installed system appeared "capable of running programs in a general mode," shows the university's expenditures at some \$165,000, including acquisition of the Los Alamos Stretch, site preparation, installation labor costs, and software development.

Bill Ivié recollects that there were some 8,000 pounds of cabling that came with the Stretch. The cables were so long that he just ran them up and down the length of the machine room before connecting them up to their destinations. According to Willard Gardner, Ivié and his crew got the hardware running long before BYU chalked up any operational time. What held back the initiation of service was the poor software and software documentation that came with the machine.

But Ivié says the longest job they ran on the Stretch was a chemistry problem that lasted for 523 hours. This was made possible by a facility developed at BYU that allowed everything in main memory to be read out onto tape, leaving the processor free to run just one job. When that job stopped, other jobs could be rolled in off tape to be run. Ivié says they ran a number of jobs that lasted for 30, even 40 hours, and some for more than 100.

This Stretch, believed to be the last one to be operational, was shut down by Ivié in September 1980. Replacing it for scientific computing on campus are a Digital Equipment Corp. PDP-10 and a VAX-11/780. Joe Wise says that although the VAX will run some jobs faster than the Stretch, "for the large compute job I don't feel that a VAX is an appropriate replacement for the Stretch, even now." *

SCHEDULIZE with Magnetic Controls



FREE
16 PAGE
ILLUSTRATED
BROCHURE

REPRESENTATION THROUGHOUT MOST OF THE UNITED STATES

- SHOW FACTS INSTANTLY
- CHANGES MADE IN SECONDS
- ELIMINATE FILE REFERRALS
- SYSTEMATIZE YOUR WORK FLOW
- GET THE JOB DONE

For Scheduling • Programming • Personnel • Sales • Shipping • Inventory • Maintenance • Production • Quotations • Computer • Special Situations

201-938-6000

METHODS RESEARCH

70 ASBURY AVE., FARMINGDALE, N.J. 07727

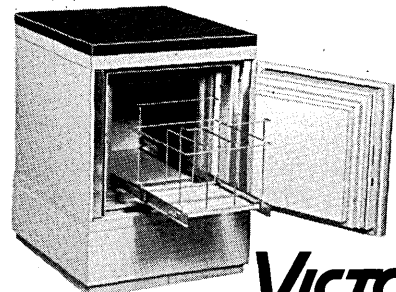
CIRCLE 35 ON READER CARD

New... protection for diskettes and your business

Victor introduces Fire Master 125° — to provide a continuous environment of protection for diskettes. Conventional insulated filing cabinets provide paper protection. Other insulated cabinets give adequate microfiche, microfilm and computer tape protection. But those cabinets will not protect vulnerable diskettes. Rely on Fire Master 125° to provide the extra margin of safety — for optimal diskette protection.

And because Fire Master 125° can be used at work stations, your people save time, increase efficiency, and enjoy faster filing and retrieval of diskettes. Protect your business. Protect your incredibly vulnerable diskettes with a Victor Fire Master 125°.

Call or write today for more information on Fire Master 125°.



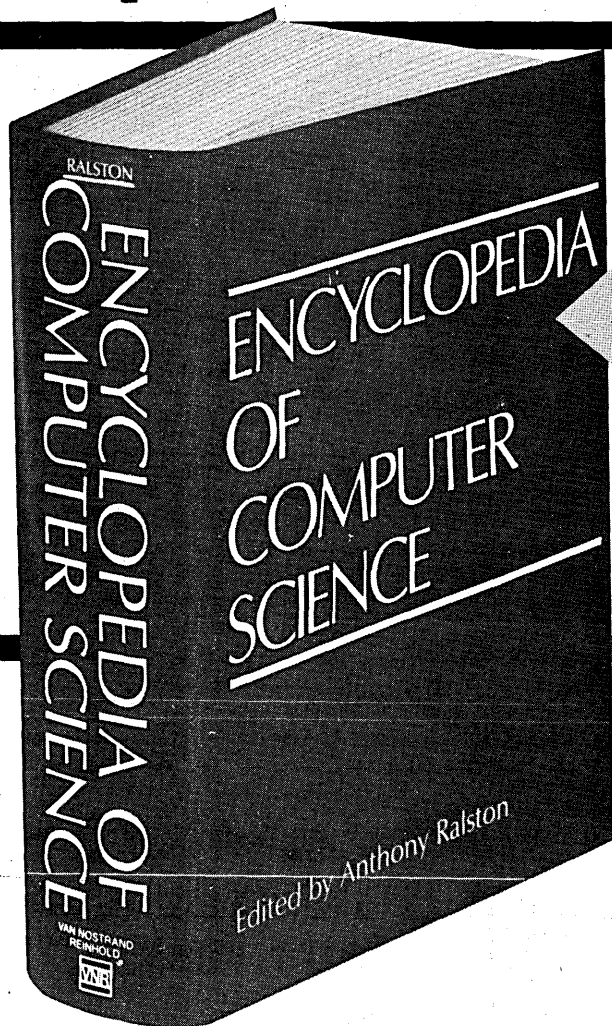
VICTOR
SYSTEMS & EQUIPMENT

A division of Kardex Systems Inc., Marietta, Ohio 45750
Telephone: 800-848-9761 • In Ohio — Call Collect (614) 374-9300

CIRCLE 36 ON READER CARD

JANUARY 1982 47

As your introduction to **The Library of Computer and Information Sciences**



Take this

**\$60.00 classic
for only \$3.00!**

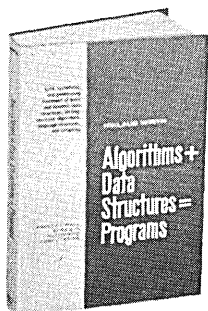
ENCYCLOPEDIA OF COMPUTER SCIENCE

Edited by Anthony Ralston and Chester L. Meek. More than 1550 outsize pages of information on every aspect of computer science—from algebra to automata theory, from basic terminology to string-processing languages. 470 articles by 208 experts. Over 700 charts, tables, graphs and diagrams.

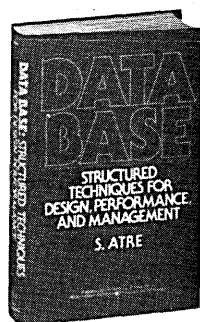
OR 3 other books for only \$1.00 each (values to \$74.95)

You simply agree to buy only 3 more books—at handsome discounts—within the next 12 months.

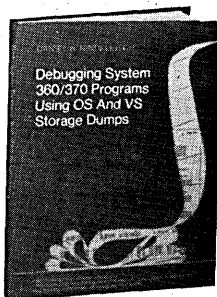
(Publishers' Prices shown)



32485. ALGORITHMS + DATA STRUCTURES = PROGRAMS. *Niklaus Wirth.* "A valuable, novel contribution to the computing science literature."—Edsger Dijkstra. **\$20.95**



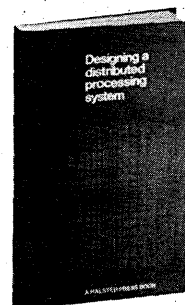
41628-2. DATABASE: Structured Techniques for Design, Performance and Management. *S. Atre.* Spells out how to plan, design and maintain a large data base for batch and on-line operations. 444 pages. *Counts as 2 of your 3 books.* **\$27.95**



41785. DEBUGGING SYSTEM 360/370 PROGRAMS USING OS AND VS STORAGE DUMPS. *D.H. Rindfleisch.* A superior guide to storage dump debugging. Illustrations, examples, sample dumps. **\$24.95**



42000-2. DESIGN AND STRATEGY FOR DISTRIBUTED DATA PROCESSING. *James Martin.* Coverage of the impact of DDP on the ultimate users of a system, the office-of-the-future concept and much more. *Counts as 2 of your 3 books.* **\$37.50**



42053-2. DESIGNING A DISTRIBUTED PROCESSING SYSTEM. *Hamish Donaldson.* Includes file strategy, communication networks, and workflow design. *Counts as 2 of your 3 books.* **\$34.95**

NEWS IN PERSPECTIVE

STRATEGIES

IBM TO BITE THE BULLET?

The computer giant is banking heavily on System/38 in a major strategy shift.

IBM is planning to retreat from possibly the most successful business strategy of all time.

Informed sources say that IBM's top management intends to break from the 360-compatibility which has anchored its phenomenal growth over the past 20 years.

The company intends to construct a new high-level virtual machine (VM) architecture which dispenses with the one central cpu hierarchy that has reigned so long.

The strategy will mean that the company pulls the plug on the traditional heart of its business, its 370 and now 4300 DOS users, and on the users of its vs/1 operating system.

One former IBMer said that IBM will move its 4300 systems to purchase—only as soon as it can—he said that the company's 4321 SSX announcement was an indicator of this. These machines can only be bought outright.

Many of its users' 370/DOS machines have already been purchased, but those that haven't will soon lose value. Early next year, when IBM starts to ship its extended 31-bit architecture, the residual value on its 24-bit machines will be crushed, said one source.

It is now emerging, sources claim, that the active agents in this strategy are the company's mysterious System/38 and a piece of VM conversion software developed within Poughkeepsie and known internally as "the Tool."

The Tool is *not* the VM/370 software that was developed by IBM users and research groups outside Poughkeepsie. Sources say that IBM's VM Tool is largely "incompatible" with VM/370.

Sources reveal that the Tool has several purposes. One, it will help migrate IBM's larger 370 users from their 24-bit machines to the H Series 31-bit extended architecture, MVS/XA. It is also designed to help Amdahl and other large IBM PCM users migrate from their machines to IBM.

Two, the Tool will help to strip complex and irrelevant code from MVS and slim it down to a more handleable VM-type operating system. One Arthur D. Little expert, Ted Withington, recently described MVS as "monolithic."

And three, the Tool will be used to make a conversion path to the System/38 so that its unusual architectural features can be made available with MVS.

Why the System/38? Because, sources reveal, this novel machine is the first stage of the resurrection of IBM's Future System (FS). They claim that when IBM discovered in the middle '70s that its customer base wasn't ready to convert to its multiprocessor mainframe development, it transferred the whole operation to its competing General Systems Division (GSD).

One former IBMer who worked on the FS project in Poughkeepsie said that the company's former head, Frank Cary, wanted to set up a "contending divisions" philosophy with overlapping product developments. Consequently, FS was taken out of the hands of the mainframe people and given to the small systems people (GSD) at one of their facilities in Rochester, Minn.

What has emerged so far from under the cover of GSD is the System/38—whose unusual relational architecture and enormous addressing power has largely been developed in isolation from the rest of the IBM world.

According to one insider, System/38's current 48-bit addressing capability hides an incredible 64-bit register which is latent within the machine. This compares with the 31-bit capability that the MVS mainframes will get in early 1983.

"IBM's future lies with the System/38," said one former employee now in competition with IBM. "It's the only one they have that addresses the needs of new users and that isn't rooted in the past."

According to Bill Foster, president of Massachusetts-based Stratus Computer,

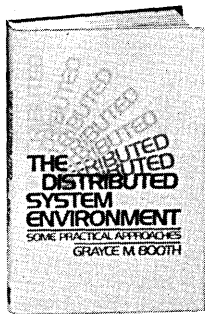
The strategy will mean that the company pulls the plug on the traditional heart of its business, its 370 and now 4300 DOS users.

the "new economics" of the computer age dictate that IBM must eventually shift its focus to this machine.

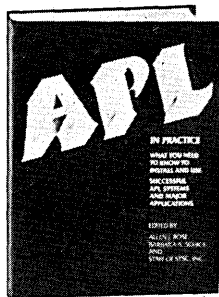
Says Foster, whose company has just produced an innovative new computer, "Users today want 'user friendly' and, above all, reliable computers. Today's powerful microcomputer hardware is the only bargain around—costs are plummeting."

"So it stands to reason," says Foster, "that new reliable processing should be implemented with electronics—not with programming."

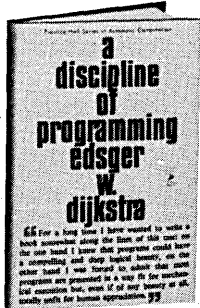
Added Foster: "With traditional architectures such as the IBM 360-set, all processing goes through a big fat central engine and its resident operating system. The disks and memory have to run through the cpu." He said that this wouldn't be so bad if the operating instructions were fairly recent and had been written in a high-level lan-



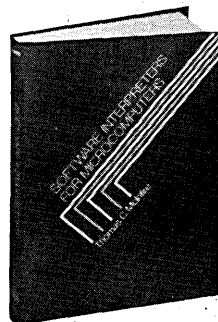
12420. THE DISTRIBUTED SYSTEM ENVIRONMENT: Some Practical Approaches. *Grayce M. Booth.* Covers horizontal and hierarchical distributed structures, networking, and much more. **\$21.95**



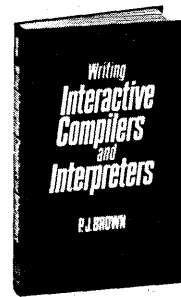
34115. APL IN PRACTICE. *Edited by Allen J. Rosen et al.* An outstanding casebook of APL language solutions to a wide range of data processing needs. **\$25.00**



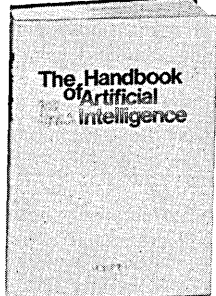
42303. A DISCIPLINE OF PROGRAMMING. *Edsger W. Dijkstra.* Program derivation and composition, common mistakes plus numerous other examples. **\$22.95**



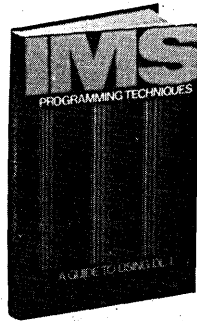
79155. SOFTWARE INTERPRETERS FOR MICROCOMPUTERS. *Thomas C. McIntire.* How to design a reliable software interpreter for any microcomputer system. **\$23.95**



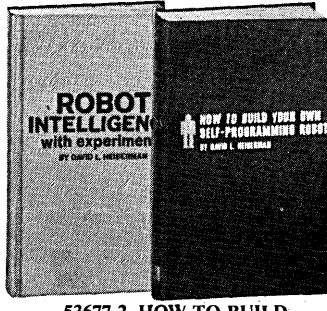
87970-2. WRITING INTERACTIVE COMPILERS AND INTERPRETERS AND INTERPRETERS. *P.J. Brown.* Includes how to design an internal language, error detection and diagnosis in the run-time system, and much more. *Counts as 2 of your 3 books.* **\$26.95**



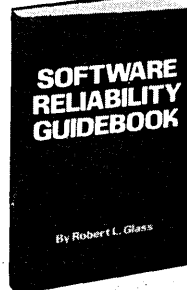
52140-2. THE HANDBOOK OF ARTIFICIAL INTELLIGENCE. Volume I. *Edited by Barr and Feigenbaum.* An outstanding collection of articles which demonstrate how computers exhibit near-human intelligence. Over 400 pages. *Counts as 2 of your 3 books.* **\$30.00**



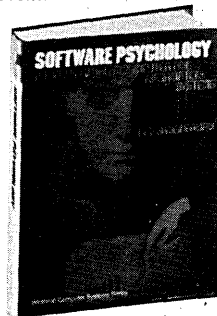
54455. IMS PROGRAMMING TECHNIQUES: A Guide to Using DL/1. *Kapp and Leben.* Spells out specific techniques to write application programs in ANS COBOL, PL/1, or Assembler Language in an IMS DL/1 data base environment. **\$17.95**



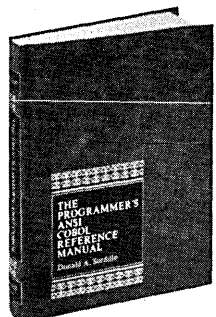
53677-2. HOW TO BUILD YOUR OWN SELF-PROGRAMMING ROBOT/ROBOT INTELLIGENCE... WITH EXPERIMENTS. *David L. Heiserman.* Two books. *Counts as 2 of your 3 books.* **\$29.90**



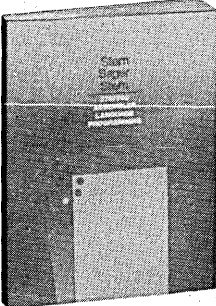
79167. SOFTWARE RELIABILITY GUIDEBOOK. *Robert L. Glass.* Analysis of technical tools available for software design and implementation. Includes applications for small operations to mammoth projects. **\$18.95**



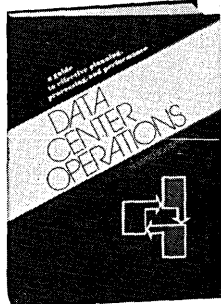
79240. SOFTWARE PSYCHOLOGY: Human Factors in Computer and Information Systems. *Ben Shneiderman.* **\$24.95**



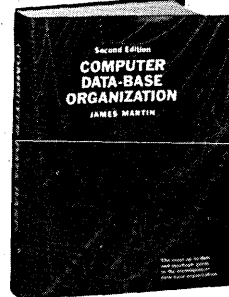
70725-2. THE PROGRAMMER'S ANSI COBOL REFERENCE MANUAL. *Donald A. Sordillo.* Organized alphabetically, and heavily cross-referenced, provides a complete reference to COBOL verbs, syntax concepts and uses. *Counts as 2 of your 3 books.* **\$27.95**



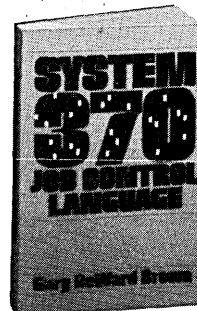
84238. 370/360 ASSEMBLER LANGUAGE PROGRAMMING. *Stern, Sager, and Stern.* A step-by-step handbook that takes you from the basics all the way through efficient, sophisticated coding. 516 pages, softcover. 8 1/4" x 11" format. **\$19.50**



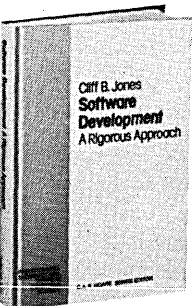
41263-2. DATA CENTER OPERATIONS. *Howard Schaeffer.* Analysis of how to establish performance evaluation measures; how to budget data center costs; how to reduce turnover and much more. *Counts as 2 of your 3 books.* **\$29.50**



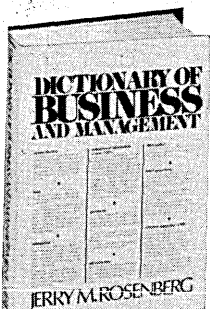
39890-2. COMPUTER DATA-BASE ORGANIZATION. *James Martin.* An invaluable planning tool by the world's foremost computer author. Contains over 200 diagrams. *Counts as 2 of your 3 books.* **\$27.95**



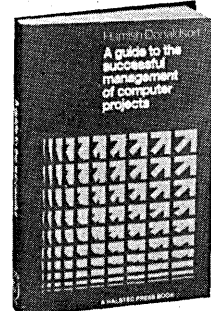
81845. SYSTEM/370 JOB CONTROL LANGUAGE. *Gary DeWard Brown.* Includes descriptions of hardware devices and access methods and reference to many useful JCL features. Softcover. **\$13.50**



79145-2. SOFTWARE DEVELOPMENT: A Rigorous Approach. *Cliff B. Jones.* Includes appendices and glossary. *Counts as 2 of your 3 books.* **\$28.00**



42213. DICTIONARY OF BUSINESS AND MANAGEMENT. *Jerry M. Rosenberg.* Over 8000 entries. **\$24.95**



51955-2. A GUIDE TO THE SUCCESSFUL MANAGEMENT OF COMPUTER PROJECTS. *Hamish Donaldson.* Provides invaluable advice on project management and documentation, systems design strategy, and programming. *Counts as 2 of your 3 books.* **\$34.95**

Plus more books to choose from

85725. UTILIZING SYSTEM 360/370 OS AND VS JOB CONTROL LANGUAGE AND UTILITY PROGRAMS. *Daniel H. Rindfleisch.* An excellent practical guide to every feature of JCL and system utilities. For seasoned professionals and beginners alike, the book shows how to handle everything from the basic JOB card to advanced linkage editor options. **\$25.00**

56712. INVITATION TO FORTH. *Harry Katzan, Jr.* A comprehensive introduction to the powers, syntax, verbs and data structures of FORTH, a flexible language which fits into any microcomputer environment. **\$17.50**

40045-2. CONVERSATIONAL LANGUAGES. *Kupka and Wilsing.* A handbook which explores the concepts and characteristics of different computer languages. Covers interactive program development, languages based on JOSS, syntax and design of conversational languages and more. *Counts as 2 of your 3 books.* **\$27.75**

49295-2. FUNCTIONAL PROGRAMMING: Application and Implementation. *Peter Henderson.* Among the topics covered are: simple functional programs; machine architecture for functional programs; and higher-order functions. *Counts as 2 of your 3 books.* **\$28.00**

If the reply card has been removed, please write to
The Library of Computer and Information Sciences
 Dept. 7-A2, Riverside, N.J. 08075
 to obtain membership information and an application.

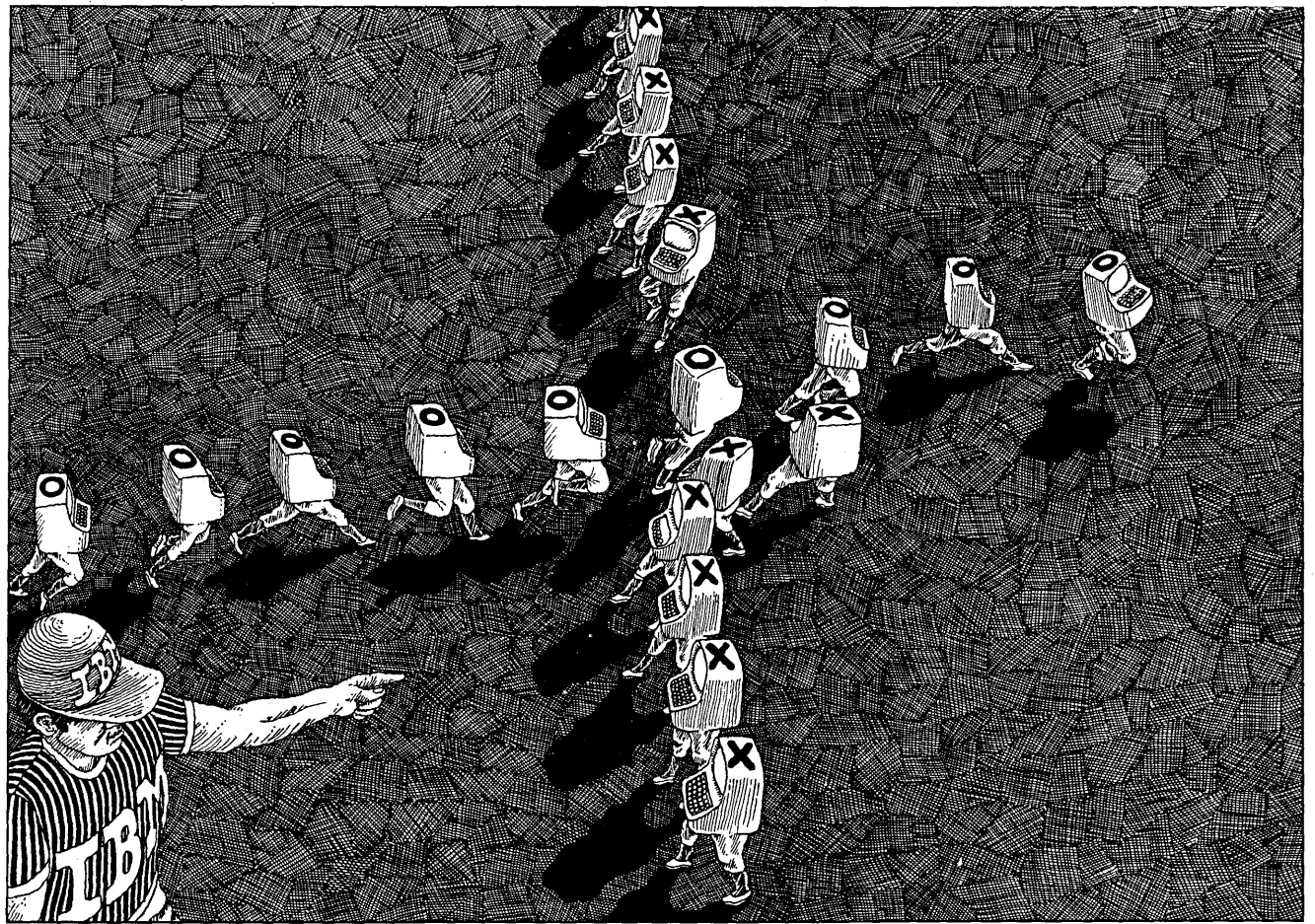


ILLUSTRATION BY JAN SAWKA

guage. "But the 360 code was written in a low-level machine language 20 years ago," says Foster.

The result is that every time an IBM programmer goes through a 360/370-type cpu, he takes a trip into the past and through an index of the history of the computer industry. "So many new layers of complexity have been added in the name of compatibility that the 370-type operating systems have become almost unworkable in a modern environment," Foster added.

According to the Yankee Group's Dale Kutnick, IBM is certainly not unaware of these problems. "But there's a big difference between intent and resolve. IBM's users now have more power and experience than ever before—and it won't be easy for IBM to dictate its wishes.

"It might make economic sense for IBM to move to a new architecture," he adds, "but many of its users won't see it that way." Kutnick added that IBM's base had proved notoriously resistant to change. "Most recently IBM tried to distribute its user base through a non-360-compatible channel via the 8100, and its users were having none of it." He said that the users have enormous investments tied into the 360 architecture.

One former IBMer confirmed that what IBM intends to do is build FS from a meld of virtual machine MVS and the Sys-

tem/38, but added, "I doubt that they have the stomach for it." He suggested that what IBM's big users want right now is a way of extending their 360 core through the compatible 4300s. "They want MVS, which is where their money is, stripped down for use remotely on the 4300s, which is where their heart is."

He added: "But they don't want 4300/DOS because once their programmers have worked on MVS they consider DOS a step down."

Recently another alternative to the IBM strategy emerged from some of its more "opportunistic" former employees. One of

"IBM users now have more power and experience than ever before—and it won't be easy for IBM to dictate its wishes."

these, George McQuilken, formed his own company, Spartacus Computers, Lexington, Mass.

Says McQuilken: "IBM is caught between what it wants and what its users want. Clearly, its users want to build distributed networks using 4300s. IBM wants them to use the 8100 and eventually the System/38."

He continued: "IBM's users don't want to be deprived of the advantages of today's low cost hardware, so they want

their 4300s to be small, inexpensive, and powerful. IBM's quandary is that it can't run its operating systems in such machines because they are too old and too big."

McQuilken's solution is to resculpt IBM's VM/370 operating system and run it on powerful miniaturized hardware. The solution will probably appeal to many of IBM's users because it is a perfect compromise between what IBM wants and what its users are demanding.

Using the Tool, IBM can always do some of this itself by stripping down MVS and running it on small 4300s. But, say sources, it will always come up against the limits of the 360 architecture.

"You can only transcend those limits," says Stratus Computer's Foster, "by breaking the traditional 360 architecture."

So IBM's dilemma in a nutshell is: how do you rise to the challenge of such new wave architecture while maintaining compatibility with your customer base? Or, do you even have to do it at all?

In a sense the current market forces should ease IBM's dilemma, experts explain. It is clear that the cry for compatibility from its mainframe users, especially DOS, is from a market growing at best at 8% a year. The System/38 is positioned in much higher growth markets, and here, among newer users, the demand for prior compatibility is much less apparent.

A survey of over 6,000 small computer users across the U.S. by Grumman Cowen/DATAMATION put "compatibility" as low as seventh on their list of demands.

"These are the people in the industry middle ground who are not committed either way and could go either up or down," says Yankee Group's Kutnick.

He added: "IBM will probably pitch the System/38 at what I call the Division B companies: those in the \$50 million to \$250 million a year range." Division A would be the largest U.S. companies whom Kutnick says IBM is "locking in" with VM/MVS and the 4300s right now.

Kutnick and other experts concur that it is in Division C (companies below \$50 million) that the real flowering of the

"IBM's top people have come down on the side of the machine [the System/38], and they will persevere."

computer industry will come in the late 1980s.

"I would bet," says former IBMer and now Intel software designer Glen Myers, "that IBM is much more concerned with building a bridge to these users from System/38 than going up to MVS.

"I doubt that they even want to be in the mainframe business," Myers added. He said that in a sense they already pulled out of it when they scrapped FS.

So far, there has been no real evidence that IBM is constructing a bridge to its personal computers that run the portable operating standard CP/M. But Kutnick has a theory that the System/38 will, from the middle 1980s, act as a service bureau center to all these small machines. "That includes the Series 1, the System/34, the System/23, the Displaywriter, and so on."—in other words, all the elements in IBM's new Information Systems and Communications Group under John F. Akers.

According to one former IBMer, IBM has got a lot of work to do before it gets that far: "The System/38 has been a disappointment to them so far. It simply has not performed as well as expected. But IBM's top people have come down on the side of the machine, and they will persevere."

This source said that IBM would definitely release a newer and more powerful machine, twice as fast as the current System/38, later this year.

A.D. Little's Withington said that IBM management may be intending to move the superfast H series (3081) logic chips onto the System/38. IBM has developed two new revolutionary approaches to its logic chips to take advantage of modern manufacturing methods.

"The lower, and by far the slower of these, is known as the 'master slice' and is in use on both the 4300s and System/38. The faster devices, 'thermo conduction

modules' or TCM chip, are currently in use only on the 3081," he explained.

"IBM may have determined that it is economic to use its TCM chips on the System/38, not just on its high cost systems."

Said one well-placed source, "It looks as though they will try and sell off the 4300 base over the next couple of years, hold a fire sale on the old 24-bit 370s and move into a heavy development cycle on the System/38 in 1984."

With IBM planning to develop two incompatible streams around H Series/MVS (tailored by the Tool) and around the System/38, IBM's traditional heart of 360-type DOS users would appear to be caught between a rock and a hard place.

"It looks as if the plug will be pulled on them from both above and below," said one former IBMer. "The great attraction from IBM's point of view is that it also pulls the plug on the whole PCM business at the same time; companies like IPL, Magnusson, Nixdorf, and Formation."

Nixdorf, for one, doesn't intend to lie down and die. Sources close to the company say that a new line of 4300-compatible machines with Nixdorf's own new extended DOS operated system is imminent—at prices below the new IBM 4321.

"IBM has nothing better right now," says Spartacus's McQuilken, "than to respond with 4300 solutions. This is why it is giving the new VM-based service bureau its head, because these people are close to user needs."

"In the short term," said one source, "IBM is expected to do even more than this especially in the VM/370 area."

He said that IBM planned to release a relational database package based on its System R for 4300/VM users, believed to be called DSSQL. So far, 4300/VM users have been starved for a good database system

"IBM has nothing better to do right now than to respond with 4300 solutions."

and local and long haul networking links, he explained.

With these new developments pipelined, the philosophy of contending streams (4300 v. 8100 now, and 4300 v. System/38 later) is even more apparent. But this is exactly what IBM's new reorganization is supposed to be getting away from by selling a simple, unified product line.

Now that the System/38 has come out from under the covers of GSD (now melded with everything else), any hidden thinking about FS that IBM has cloaked it with will have to come out too.

"It is decision time: which will it be?" said one source. "IBM must choose. It is either the old order or the new."

Right now IBM isn't saying anything.

—Ralph Emmett

SEYMOUR LEAVES CRAY

Seymour Cray has set himself up as an independent computer designer under contract to the company he founded.

On the surface it appeared to be a radical, risky change for Cray Research Inc. Seymour Cray, founder of Cray Research, gave up his title as chairman for a new role, that of independent contractor. Hours after the announcement was made, the Wall Street rumor mill was running at full tilt, spewing out speculations about a rift between the board and its founder; suggesting a Gene Amdahl-like exit was in the making.

Cray's history at Control Data Corp., another company he helped found, did little to quell the stir. He had walked away from Control Data and formed Cray Research when corporate bureaucracy began to bog down his work on supercomputers.

News of the title change came packaged inside a bigger show, the first public viewing of Cray's technologies for the Cray-2 (see Look Ahead, Dec., p. 13). The machine will have a round frame, stand about 26 inches high, and measure about 38 inches in diameter. Jam-packed inside will be 32 million words of memory and four processors. The system will click along with a cycle time of four nanoseconds. The Cray-1, in contrast, has a 4-million-word memory, one processor, and a cycle time of 12 nanoseconds. Although price is yet to be set, expect at least a 50% increase over the model 1. As for performance, Cray was quite specific: the machine will run about six times faster in scalar and 12 times faster in vector than the Cray-1.

The company calls its four processor arrangement a multiprocessor, which implies a complete cpu per processor. In contrast, parallel processing implies only one cpu but multifunction units, capable of simultaneous calculations. The company declined to discuss what would happen if one of the four processors went down.

While power requirements are not expected to "significantly" exceed that of the Cray-1, the cooling system has undergone a drastic change, and for good reason. Cray is packing more chips per cubic inch than ever before. Using what he refers to as his "3-D" (three dimensional) design, he is packing eight boards into one module, instead of only one board per module, the old "2-D" design. Each 3-D module stands



With Digital,
a service force that covers the world
covers your computer.

© 1982 Digital Equipment Corporation

We're 16,000 people. We're all over the world. And customer service is our only job. We cover your Digital systems from every angle. Hardware. Software. User training. We can tailor service to fit any level of need. On-site management. Off-site repair. 24-hour hot-lines. Preventive maintenance. We can train your people on their own terminals. We can use our computers to diagnose problems in yours. And we can call on the best technology available to keep your computers doing everything you need them to do. So if you demand a lot from a computer

company, talk to one that can meet all your demands, and then some. Anywhere in the world. Talk to Digital. Because with a service force 16,000 strong, we've got you covered.

Digital Equipment Corporation, 129 Parker Street, Maynard, MA 10754. In Europe: 12 av. des Morgines, 1213 Petit-Lancy/Geneva. In Canada: Digital Equipment of Canada, Ltd.

digital

**We change the way
the world thinks.**



Digital's Field Service. We don't just guess when we'll get there. We guarantee it.

When a computer goes down, you want a service rep at the site. Fast. You're not interested in vague arrival times, dispatcher's lunch breaks, or the rep's workload. You want action.

With Digital, action is what you get. Our response times are guaranteed in writing. If your service agreement says we'll be there within a certain time, we won't give you apologies or excuses. We'll just be there.

At Digital, we take field service as seriously as you do. That's why we'll tailor our service agreements to meet the specific requirements of your business, whether you need 7-day/24-hour service, planned maintenance, Remote Diagnosis, or any of our other innovative service options.

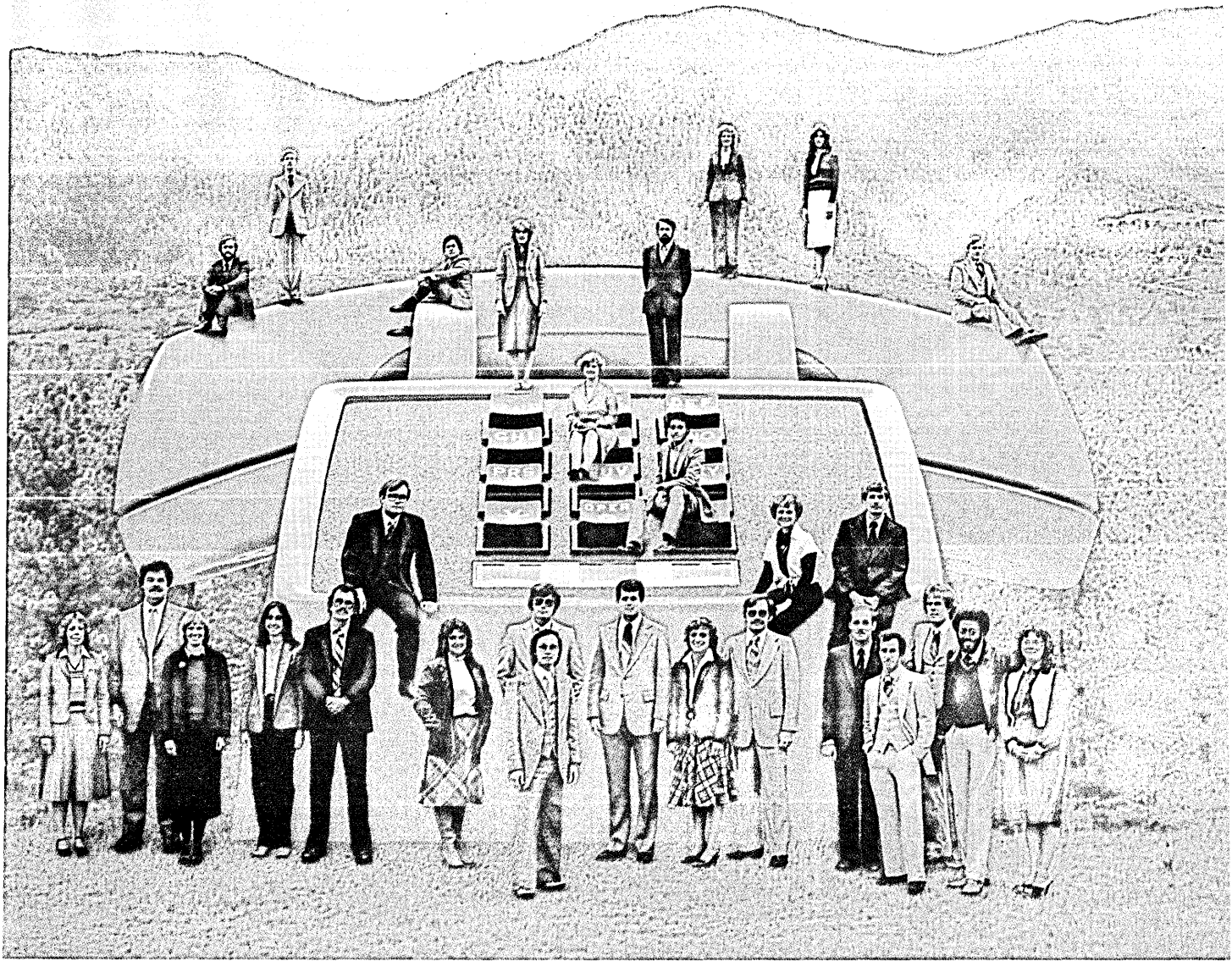
With over 16,000 service people worldwide

and with the latest and most advanced service technology to draw on, we are totally committed to backing up our computers, wherever they are. So you can be sure that we'll do everything possible to keep your Digital computers running smoothly. And to be there in a hurry when they're not.

Digital Equipment Corporation, 129 Parker Street, Maynard, MA 01754. In Europe: 12 av. des Morgines, 1213 Petit-Lancy/Geneva. In Canada: Digital Equipment of Canada, Ltd.

digital

**We change the way
the world thinks.**



Digital's software support teams. They're good. They're fast. And they're right by the phone.

Every call handled by a specialist. Every specialist backed by a team.

When you have a software question, time is of the essence. Your business could depend on a fast answer.

That's the reason behind Digital's Telephone Support Centers in North America, Europe, Japan, and Australia.

If you subscribe to this service, you can call the center if you have a question. As soon as we take your call, we'll retrieve your customer file electronically from our data base and put you in touch with a software specialist, who will be backed by a team of experts in your particular Digital operating system.

Often, this specialist can handle your problem

right away. If not, other members of the team will be consulted automatically.

From then on, the team is responsible for getting that problem resolved. And they'll stay on it until they do.

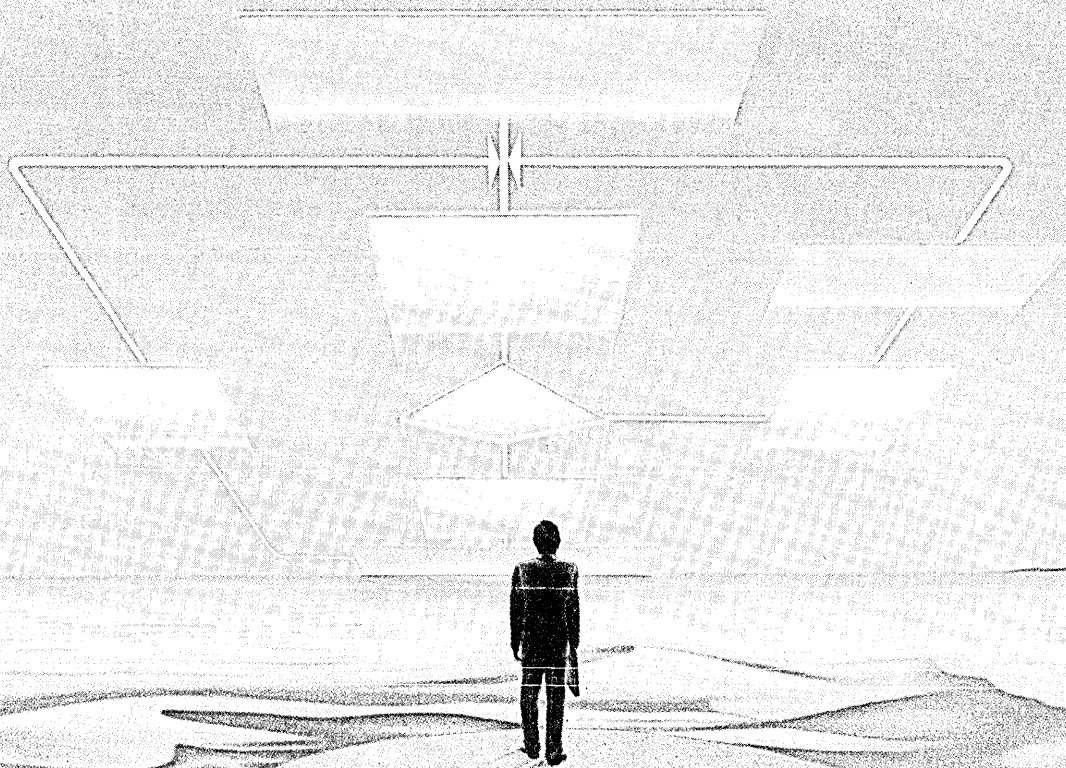
It's all part of Digital's commitment to provide you with the most advanced, most responsive, and most comprehensive software support anywhere.

For more information about Software Product Services, contact your local Digital office.

digital

**We change the way
the world thinks.**

How can you keep up with tomorrow when today's changing so fast?



Talk to Digital Educational Services. Where the best people go to get better.

Anyone running a DP department knows the industry keeps changing so fast, it's difficult for even the best people to keep up. Yet well-trained people are your department's most valuable resource.

Digital is here to help, with one of the most complete and advanced educational services in the computer industry. We can also provide a variety of ways to learn, depending on your training needs and budget.

You can send your people to a Digital training center. We have 24 internationally, where we've invested \$40 million in computers solely for training. We'll help find the right learning path from well over 300 lecture/lab courses. All are taught by experts who know computer technology and the best ways to teach it.

We'll set up programs so your people can study on their own, if you prefer—offering versatile, flexible self-paced print, audio/visual

and computer-based instruction formats.

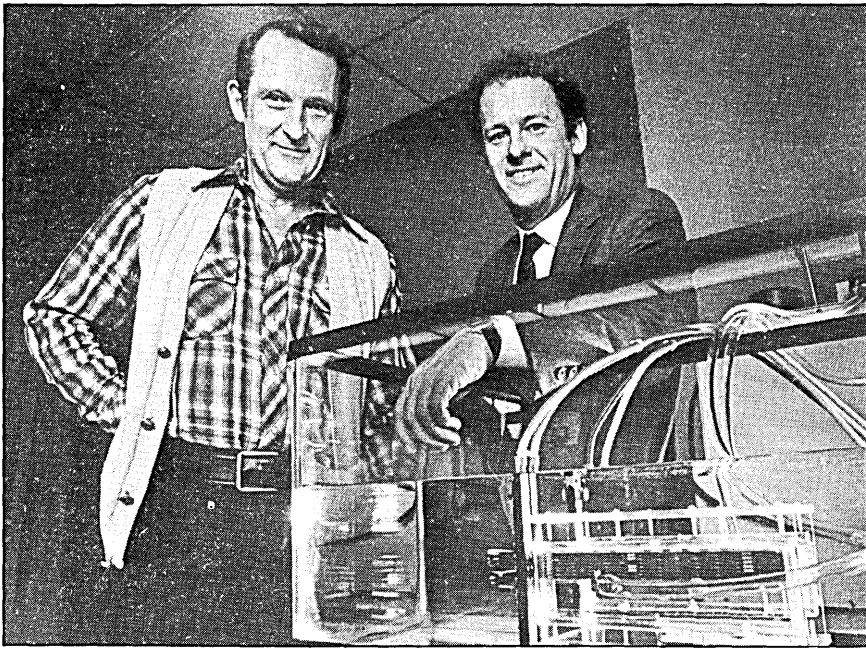
We can also conduct on-site management and technical seminars, on topics ranging from software engineering to corporate DP strategies.

No matter how your people learn from Digital, you can be sure they'll get a practical high-quality education. Because the programs they'll take are the same programs we use to train Digital's own computer professionals.

Learn how we can make your best people even better. Write to: Digital Equipment Corporation, Dept. BU/E33, 12 Crosby Drive, Bedford, MA 01730. In Europe: Dept. HB, 12 av. des Morgines, 1213 Petit-Lancy/Geneva. In Canada: Digital Equipment of Canada, Ltd.

digital

We change the way
the world thinks.



SEYMOUR CRAY (left) and JOHN ROLLWAGEN show their 3-D module for the Cray-2 computer prototype immersed in a tank of clear, inert liquid to demonstrate liquid immersion technology.

What did appear to be in limbo was the future direction of Cray Laboratories in Boulder, Colo. It had been pursuing VLSI technology for a competing Cray-2 design. Now that the company has committed to Seymour Cray's liquid immersion approach, it is not evident what Boulder will be doing in the future. Several board members said that Boulder has an important role in the company—the fact that its budget had been increased seemed to lend credit to that position—but no one volunteered any details. As part of the reorganization, Cray Labs has been renamed the Boulder Division, "something that should have been done in the first place," said Francis Driscoll, board member and managing director of New Court Securities Corp., a New York investment banking firm.

After the Cray-2 hoopla died down, the company got around to mentioning that

"This is what is giving Seymour the greatest peace of mind."

Cray himself would be "stepping aside" as chairman and assuming the role of independent contractor "so he could devote his entire time to the Cray-2 and other design and development work." Cray fueled the rumor fire surrounding his exit as chairman when he went on record saying that there was "conflict" between his interests—"the technology of a narrow market"—and that of his company.

Little wonder there was some alarm on Wall Street. "I think the announcement was very peculiar. There are all sorts of peculiar arrangements between him and the company," began one Wall Street comput-

er industry analyst who asked not to be identified. "I talked to a well-informed guy in the field who said this could mean trouble, like when Seymour was in the middle of the 7600 at Control Data. If I were a stockholder I'd be very uneasy."

Another computer industry analyst drew some parallels between Cray and Gene Amdahl. "First Amdahl stepped down as chief operating officer to go back and do more work in the lab. Second, he announced his semiretirement from the company and stayed under contract to help develop new technology, the 580 computer. Then he muddled around in the twilight zone before announcing his total split. There is no question in my mind that there was a clear rift internally in the Amdahl situation," added the analyst, who also asked not to be identified. Neither analyst had attended the public announcement of the Cray-2 and Cray's change in status.

Was Cray readying for a total split with his namesake? Opinions ran the full range of the spectrum, but there was a noticeable difference between the more gloomy speculations of those who had not attended the company's public announcement and the views of those who had.

"I can't believe Wall Street's reaction," said David Wu, a securities analyst with Montgomery Securities, San Francisco. "But then nobody from Wall Street was there. They didn't see Seymour give his spiel; he looked happy. Based on my own reading of the situation, I don't think it is very likely that Seymour will leave. I've talked to management and I'm convinced Seymour is going to see the Cray-2 through."

The contract causing all the consternation is only two doubled-spaced pages, and it was filed with the Securities and Exchange Commission in December. "It's kind of a living, open-ended agreement and gives Seymour ultimate leverage over the company," said Rollwagen. The contract gives Cray Research the right of first refusal on any technology that Cray puts forth. "If we don't exploit his technology properly, then he is free to go his own way," Rollwagen added.

Not filed with the SEC is an addendum to the general agreement that covers specifics on the Cray-2 project and runs through 1985. What happens after that? "In a sense, the contract could run out if Seymour decides not to do anything or if the company can't support him properly," Rollwagen explained.

The idea of Cray working as an independent contractor instead of assuming some kind of "honored employee" status continues to set some analysts on edge. Others, particularly those more familiar with the personalities involved, see the chain of events as a formal recognition of what is already in practice. "I don't think the announcement is such a big deal. Seymour hasn't been active in the management of the company for some time," observed Ulric Weil, computer industry analyst with Morgan Stanley & Co. Said Tom Niemiec, vice president and analyst with Piper, Jaffray & Hopwood, Inc., Minneapolis: "I don't see this current arrangement being all that dramatic. The recent announcement is merely a continuation of what has been."

Said board member Robert Zicarelli, chairman of Northwest Growth Fund,

The Cray-2 machine will be liquid cooled, its 16-gate ECL circuits having a cycle time of 300 to 500 picoseconds.

Inc., Minneapolis: "A lot of directions were considered before settling on the independent contractor approach. It gave Seymour the most independence and yet kept him committed to the company. With employee status there would have been a lot more accountability and red tape, something Seymour didn't want to be involved with anymore. The contract overcame that need for accountability."

A quick poll of several board members showed strong agreement with Zicarelli's explanation of events. It also showed strong support for Cray's approach to the Cray-2. "We are all extremely excited about it [the Cray-2], more so than Wall Street, apparently," Zicarelli insisted.

"Seymour's relationship with the board is outstanding. It has never been an issue, at least not in the board's mind," summarized Longo.

So what did Cray mean by his comments about conflict between his direc-

COMPUSTAR™

INTERTEC'S INCREDIBLE 255 USER SMALL BUSINESS COMPUTER

At last, there's a multi-user micro-computer system designed and built the way it should be. The CompuStar™. Our new, low-cost "shared-disk" multi-user system with mainframe performance.

Unlike any other system, our new CompuStar offers what we believe to be the most practical approach to almost any multi-user application. Data entry. Distributed processing. Small business. Scientific. Whatever! And never before has such powerful performance been available at such modest cost. Here's how we did it . . .

The system architecture of the CompuStar is based on four types of video display terminals, each of which can be connected into an auxiliary hard disk storage system. Up to 255 terminals can be connected into a single network! Each terminal (called a Video Processing Unit) contains its own microprocessor and 64K of dynamic RAM. The result? Lightning fast program execution! Even when all users are on-line performing different tasks! A special "multiplexor" in the CompuStar Disk Storage System ties all external users together to "share" the system's disk resources. So, no single user ever need wait on another. An exciting concept . . . with some awesome application possibilities!

CompuStar™ user stations can be configured in almost as many ways as you can imagine. The wide variety of terminals offered gives you the flexibility and versatility you've always wanted (but never had) in a multi-user system. The CompuStar Model 10 is a programmable, intelligent terminal with 64K of RAM. It's a real workhorse if your requirement is a data entry

or inquiry/response application. And if your terminal needs are more sophisticated, select either the CompuStar Model 20, 30 or 40. Each can be used as either a stand-alone workstation or tied into a multi-user network. The Model 20 incorporates all of the features of the Model 10 with the addition of two, double-density mini-floppies built right in. And it boasts over 350,000 bytes of local, off-line user storage. The Model 30 also features a dual drive system but offers over 700,000 bytes of disk storage. And, the Model 40 boasts nearly 1 1/2 million bytes of dual disk storage. But no matter which model you select, you'll enjoy unparalleled versatility in configuring your multi-user network.

Add as many terminals as you like - at prices starting at less than \$2500. Now that's truly incredible!

No matter what your application, the CompuStar can handle it! Three disk storage options are available. A tabletop 10 megabyte 8" winchester-type drive complete with power supply and our special controller and multiplexor costs just \$4995. Or, if your disk storage needs are more demanding, select either a 32 or 96 megabyte Control Data CMD drive with a 16 megabyte removable, top loading cartridge. Plus, there's no fuss in getting a CompuStar system up and running. Just plug in a Video Processing Unit and you're ready to go . . . with up to 254 more terminals in the network by simply connecting them together in a "daisy-chain" fashion. CompuStar's special parallel interface allows for system cable lengths of up to one mile . . . with data transfer rates of 1.6 million BPS!

Software costs are low, too.

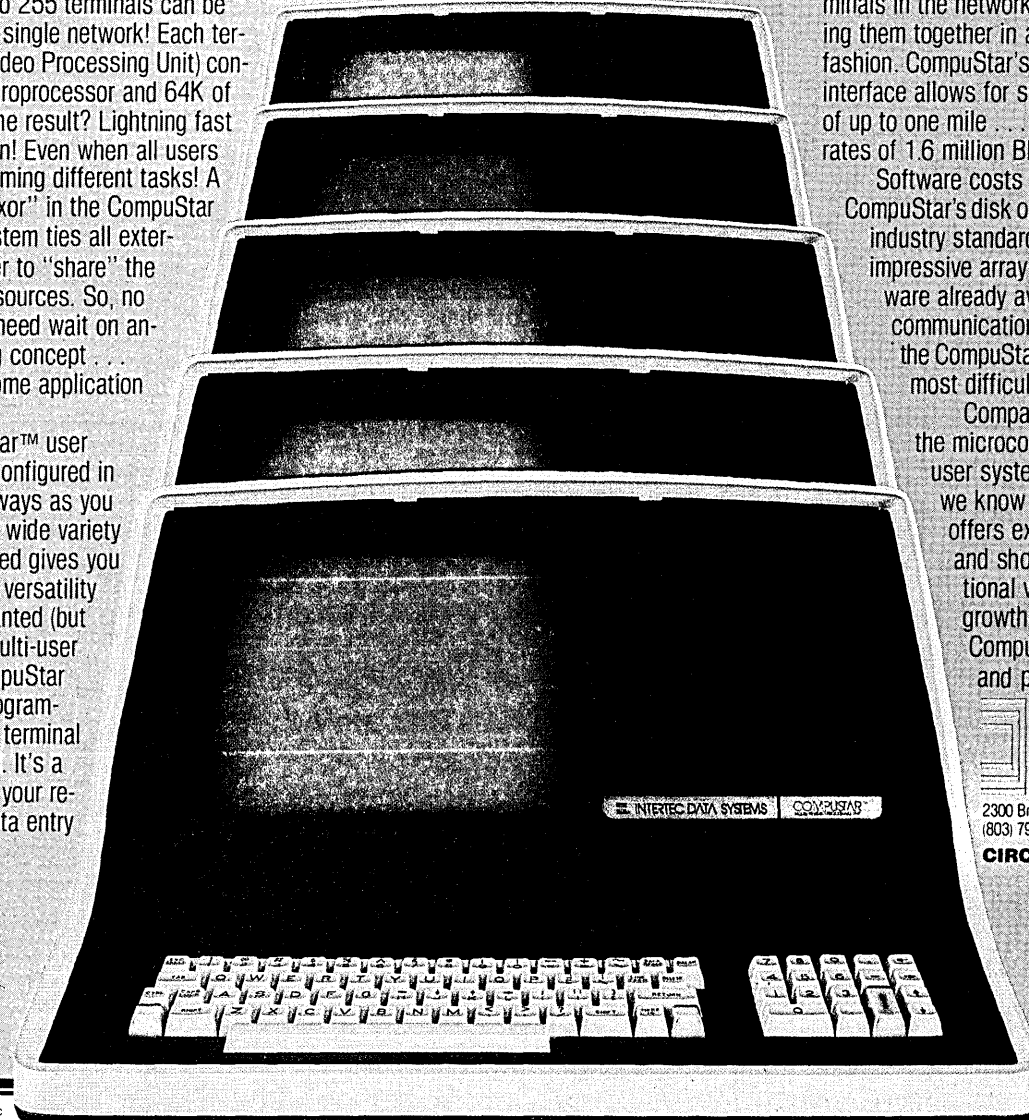
CompuStar's disk operating system is the industry standard CP/M*. With an impressive array of application software already available and several communication packages offered, the CompuStar can tackle even your most difficult programming tasks.

Compare for yourself. Of all the microcomputer-based multi-user systems available today, we know of only one which offers exactly what you need and should expect. Exceptional value and upward growth capability. The CompuStar™. A true price and performance leader!

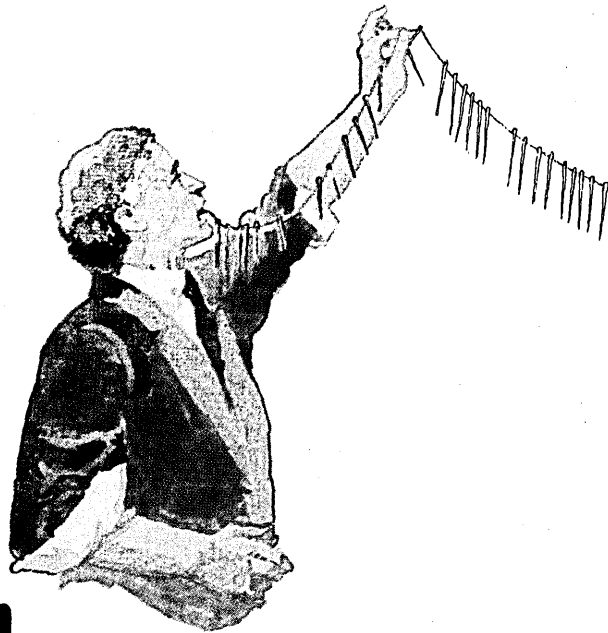
**INTERTEC
DATA
SYSTEMS®**

2300 Broad River Rd. Columbia, SC 29210
(803) 798-9100 TWX: 810-666-2115

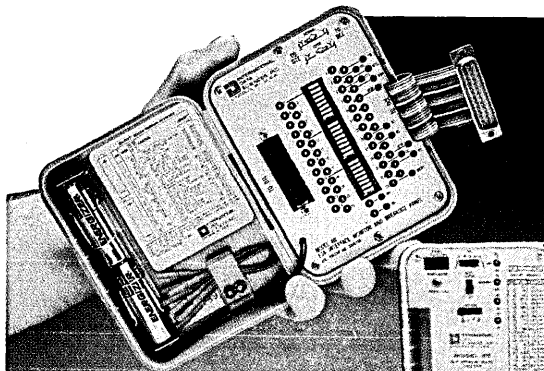
CIRCLE 88 ON READER CARD



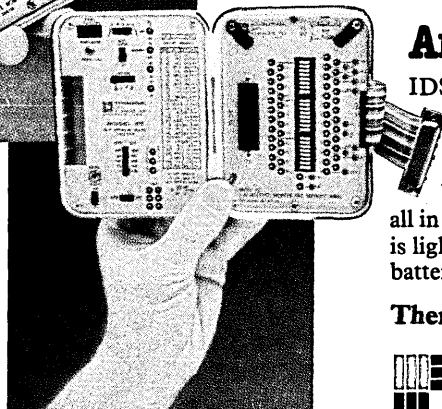
Houdini had the magic touch.



So does IDS's famous Blue Box.



Thousands of data communications servicemen carry the Model 60 "Blue Box" when they go on a call. Because this compact modem and terminal interface analyzer gives them the most testing capability per dollar. Pinpoints source of trouble between modem and terminal. Accesses all 25 lines of EIA RS 232 interface. Has 12 monitoring LED's plus two voltage sensing LED's. And much more. This sturdy 10 oz. unit has hard plastic case, is battery powered, regular or rechargeable. Houdini would have loved it.



And Red Box.

IDS's Model 65/60 packs a double dose of magic. It lets you both analyze and test at the EIA interface between a modem and terminal. It combines the Model 60 EIA interface breakout panel with a bit error rate test set — all in a pocket size, hard plastic case. The 65/60 is light, portable and works on rechargeable batteries.

There's a touch of magic in everything we make.

 **INTERNATIONAL
DATA
SCIENCES, INC.**

7 Wellington Road, Lincoln, RI 02865
Tel. 401-333-6200 TWX 710-384-1911

CIRCLE 45 ON READER CARD

NEWS IN PERSPECTIVE

tion and that of the company? If there has been one outstanding consistency in the Cray character through the years, it has been Cray's persistent aversion to "the corporate world." Red tape, slow-to-come corporate decisions, and marketing strategies have remained nuisances to Cray. Rising up in direct conflict to his way of operating are the characteristics of any maturing company, particularly a publicly held company.

"The management of that company has to be somewhat short-term, bottom line-oriented. That's just the way it is," stressed Weil. "The new arrangement does not bespeak a rift between Cray and his company in the sense that rift is interpreted. It's simply a recognition by Cray that he doesn't belong in the corporate world. Cray's a designer and not interested in mar-

Comparisons abound between Seymour's situation and that of Gene Amdahl, another top-ranking computer designer who founded his own firm, left it gradually, and has now formed a second venture.

keting and all that that implies. But as a consequence of a company's bottom line orientation, marketing does tend to take over. Otherwise, how do you fuel the company? It's not by one-of-a-kind technical monuments. It's by stamping out multiple models."

With the market for the Cray-1 line expanding, the company is moving in the direction of a "stamp-'em-out" company, a multiproduct company that stands at the opposite end to Cray's interests. Said Rollwagen, "I think I know Seymour well enough to say that he really has no desire to be a part of an organization like that.

"We've known from the beginning that we were creating a tension that would have to be relieved somehow. We have been talking about this for years and have taken certain steps to relieve that tension so he doesn't have to be involved in the development of the company as a commercial enterprise—first making me president, then ceo, and now chairman." The ultimate step has been taken. By becoming a free agent, "he can devote 100% of his time on what he loves to do—design the world's fastest computer," Rollwagen added.

Under the new arrangement, said Rollwagen, Seymour Cray doesn't have to worry about designing for the company. "This is what is giving him the greatest peace of mind," Rollwagen noted. Nor does Cray have to worry about corporate management. "He doesn't work for anyone, so he doesn't have to report to the company. The people working with him [soon to be located in a new facility in Chippewa Falls, Wis., that Seymour Cray is personally having built and will lease back to

the company] will remain on the Cray Research payroll," said Rollwagen. The agreement, however, does give Cray complete control over Cray-2 development. "He can change it any way he wants or cancel it any time he thinks there is a technical problem."

An ironic twist to the new arrangement, though, is that as a member of the executive board, Cray will have access to more parts of the company. As part of the reorganization plan, Les Davis, responsible for manufacturing and hardware development, and Peter Appleton Jones, responsible for marketing, field support, and software development, became executive vps and members of the executive board. Because of these additions, Seymour Cray ends up with direct access to two areas of the company that he did not have before.

Finally, there is one other side to the Cray story: "Setting up Seymour as an independent contractor reinforces within the company the fact that Seymour Cray is mortal," stressed Rollwagen. By 1985, Cray will be 60; he turned 56 last September. "The arrangement becomes a very graceful way of easing the company onto its own two feet. Not that we would ever abandon Seymour's technology—I can't conceive of that—but that it will end sometime down the road."

—Jan Johnson

MAINFRAMES

MID-LIFE KICKER FOR 4300s

When IBM cut 3705 prices, it gave notice that a new front-end processor is due soon.

IBM broadened its already wide-ranging assault on the computer market with late November additions to its 4300 series computers and price cuts that foretell new disk and front-end processing equipment.

Following closely the latest H Series announcements (Dec., p. 36), the 4300 additions fleshed out the E Series line, filling in gaps that analysts had seen for some time, and gave the firm additional tools to fight off growing competition from mini-computer makers, particularly of the 32-bit variety. A new low-end 4321, to be sold on a purchase-only basis, and new models of the 4331 and 4341 were offered along with price cuts and volume discounting schedules for the entire 4300 and 8100 lines.

TELTONE

Data Carrier System

No more modems...

DATA PROCESSING VS. FINANCE.

AT WESTINGHOUSE THE QUESTION IS WHO BENEFITS THE MOST FROM INFO?

At the Westinghouse Telecomputer Center in Pittsburgh, financial information for the worldwide corporation is consolidated and reported. INFO, the application development system/Relational Data Base Management System, is used by both programmers and non-technical accounting personnel.

"My group's responsibility is providing interactive data base support information to management. Two years ago, we installed INFO software on our Prime systems. This enabled our non-technical people to quickly develop applications that would directly support their efforts. Today, there are more than thirty different applications of INFO at Westinghouse. There's no question, our staff has benefitted most from INFO." — *Clair John, Manager,
Prime Timesharing Systems*

"My department produces many of Westinghouse's corporate financial reports — from the monthly trial balance to LIFO and investment accounting reports. When we found out how easy it is for non-technical people to generate their own reports with INFO, we tried it. Now, much of the financial statement analysis and practically all the non-standard reports are prepared using INFO. This means less dependency on technical specialists and generally a decrease in the turn around time for preparation of specialized reports for upper management. No doubt about it, our financial people have benefitted most from INFO." — *Don Janson, Director,
Financial Information Systems*

INFO is helping make computers more accessible at Westinghouse. This came about because INFO is productive, complete, and user friendly. Could INFO do the same for you? If you use IBM 4300, 303x and 370 systems (with VM/CMS), Prime, DEC VAX, Honeywell DPS/6 or Harris Computers, you should find out.

Write or call HENCO, INC.,
35 Walnut Street,
Wellesley, MA 02181
617-237-4156
(TWX 710-383-7529)


For Greater Productivity.



NEWS IN PERSPECTIVE

Industry analysts saw the IBM moves as furthering its preparation for a broad attack on new markets and further penetration of current ones. For instance, the new 4321 seems designed for use as a remote "drone" computer that would tie into a central service bureau, something IBM is understood to be developing for introduction in the near future (Aug., p. 38). Moreover, the firm is warding off competition from the likes of Digital Equipment, Data General, and Perkin-Elmer, which market their 32-bit minis into the very distributed processing markets at which IBM has aimed its smaller 4300s.

"There's no doubt this is an effort to counter the 32-bit mini makers," said industry analyst Robert Fertig, head of Enterprise Information Systems, Inc., in Greenwich, Conn. "There's an obvious emphasis by IBM on distributed processing with the 4321. We've seen more 4300s go into ddp than 8100s, even though that product was designed specifically for ddp."

Like others, Fertig noted that IBM has made the 8100 compete against the 4300 in the distributed processing arena with a "may-the-best-product-win" philosophy. That approach has, according to widely reported but unofficial estimates of IBM unit sales, resulted in the 4331 product, until now the smallest 4300, exceeding the 8100 in shipments. This has been attributed to the fact that the former offers 370 software compatibility and thus a savings in program development. The 8100's operating systems, however, are said to be more compatible with the popular central operating system, MVS.

Perhaps to counter that perception, IBM came out with the SSX operating system for the 4300s, a pregenerated, easy-to-install version of DOS/VSE. The SSX software had been available as a PRPQ special-order item for several months before gaining widespread attention at a recent pep talk IBM held for third-party software vendors.

"SSX may be the solution to the operating system problem," said Fertig, noting that the 8100's DPPX and DPCX operating systems "work hand in glove with MVS."

IBM described SSX as preconfigured and offering on-line productivity aids, prompters, and procedures designed to support batch, interactive, and on-line applications in standalone and distributed environments. The software is delivered on a single tape with components based on the DOS/VSE package originally introduced for 4300s. Networking support under SNA is included in the new package, the firm said, adding that SSX can also take advantage of the remote operator console facility introduced as a hardware upgrade to 4300s the month before (Dec., p. 36). Thus, it appears that IBM is intent on broadening its attack on the distributed processing market, even at the expense of other product lines.

Furthermore, the firm cut prices by

12% to 17% on its 3705 communications controllers, boxes that were introduced about a decade ago and that for several years have been seen as a weak link in IBM's overall networking plans. The price cuts were read by industry watchers as a housecleaning move in preparation for the introduction of a new family of front-end processors which have been developed under the code names Mirage and Mistral. As reported earlier, the expected new machines are thought to be based on 4300 architecture and will offer significant new functions and cost savings for users who have through

A new operating system, SSX, will work with the new 4321.

various means squeezed every last drop of power from their aging 3705s.

Bob Fertig, for instance, says Mirage's introduction is running late by about six months but is now imminent. He expects the machine to have an emulation mode for running 3705 programs already in place and a native mode for "richer functionality." Among the new functions expected is at least a partial off-loading of the VTAM communications software from the mainframe where it currently resides to the Mirage controller. That off-loading is expected to give the cpu more time to handle user tasks and to make telecommunications systems operate more efficiently.

Some analysts have suggested that IBM has been driven by economic forces to keep communications functions in-board, on the cpu rather than in a more autonomous front end. It is thought that overall more hardware could be sold to users who have very few alternatives, even though the concept of a full-fledged, programmable controller has been proven by other manufacturers starting with General Electric and its Datanet product.

Other industry sources have suggested that IBM's new communications front ends may operate outside of the firm's much-touted SNA networking scheme. This view, also reported in these columns (Feb., p. 40), maintains that SNA has grown restrictive and outmoded and is due for replacement by a new networking strategy. Time will tell, of course, but in any case, a replacement for the 3705 workhorse is soon to be unveiled.

IBM also reduced prices on its 3310 8-inch disk drive and 14-inch 3340. Those cuts, of 25% and 35%, respectively, indicated to industry observers that new disk products are due soon. The 3310 will probably be upgraded with a doubling of density so that as much as 200 megabytes or so will be stored on a single spindle. IBM has recently taken that product to the oem market, hoping to sell it against the long list of 8-inch competitors that were spawned with

TELSTONE

Data Carrier System

**No
frustration...**

Our story begins in the middle.

Introducing BBN Computer's New C/60. It's right in the middle, for those who don't need a \$100,000 mini but need more than a \$20,000 micro. What a story it is. At under \$50,000, the new C/60 is the price/performance leader in the UNIX* marketplace.

The C/60 is a mid-priced, mid-sized machine but it's a giant in systems programming capability. The C/60 is the newest member of BBN Computer's growing family of C Machines, the first machines optimized to execute the C programming language and the UNIX operating system. BBN has been a pioneer in the computer field since 1961, and the new C/60 incorporates the best of our advanced technologies.

C/60 standard configuration supports 8 users, with 80 Mbytes fixed disc, IBM compatible back-up tape, a 1/4 Mbyte of main memory and BBN-UNIX software. And the system is readily expandable to 64 users, with 600 Mbytes mass storage and 2 Mbytes of main memory.

The C/60 fully supports UNIX, the growth operating system of the 80's. With UNIX and the C language, the highest software productivity and portability is achieved. BBN Computer's full line of UNIX software includes UNIX V7, Fortran 77, our innovative screen editor-PEN, text processing software, and electronic mail. And of course, our system can be enhanced with networking capability, BBN-Net, our unique heritage.

BBN Computer offers incomparable customer service, a full range product line, and the rare advantage of nationwide single vendor sales and support. If you want to finish first, begin in the middle.

BBN Computer

BBN Computer Corporation
33 Moulton Street Cambridge, MA 02238
Phone: (617) 497-2800/Telex No. 92-1470
A Subsidiary of Bolt Beranek and Newman, Inc.



*UNIX is a trademark of Bell Laboratories.

CIRCLE 47 ON READER CARD

NEWS IN PERSPECTIVE

the 3310/Piccolo's introduction several years ago.

At the high end of the 4300 series, IBM came out with the 4341 Groups 10 and 11 and doubled the main memory of the 4341-2 to a maximum of 16 megabytes. This broadening of the 4341 line and expansion of main memory indicated to Fertig at Enterprise Information Systems that the 4341 will be a large system to be marketed by the same group that will market 303X and 3081 machines under the reorganization IBM is currently undergoing. Additionally, the new memory capacity will ensure that the large-scale MVS operating system will run effectively on the 4341, a consideration that struck the industry when MVS was initially supported on that machine.

In brief, IBM said the 4341-10 offers performance of about 85% of the 4341-1's for commercial workloads and of about 95% of the Group 1's for scientific workloads. The Group 10 has two or four megabytes of main memory and three standard channels, plus three optional ones. It also features a 4K byte high-speed buffer and eight-byte parallel dataflow structure.

The 4341-11 is 1.25 times faster than the 4341 Group 1 and comes with two, four, or eight megabytes of main memory and six standard channels. It has an 8K byte buffer. IBM said the purchase price for the Group 10 with two megs of main memory is \$178,000, while a similar Group 11 sells for \$275,000. Deliveries are to begin in the first quarter of this year.

The new 4321, selling for \$85,000 will replace the 4331-1, which was introduced with the unveiling of the E Series in January 1979. The new machine has a megabyte of main memory and integrated adaptors for attaching up to 15 display terminals or printers and other peripherals. It can handle up to three telecommunications lines.

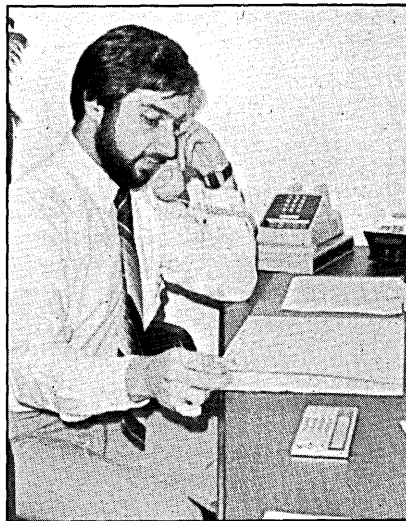
—John W. Verity

COMMUNICATIONS

MERGING VOICE AND DATA

A venture startup firm is working on a system that could revolutionize corporate communications networks.

The answer to forging a marriage between the worlds of telephony and data communications may ultimately be developed in an old New England textile mill in Andover, Mass. There, in the James Bond setting of a



MICHAEL LENTO: "Our goal is to have a data call be as close as possible to a voice call."

renovated warehouse, a small group of engineers and designers are working on a system that could revolutionize corporate communications networks.

Visitors who enter a creaky elevator in the cavernous old mill are surprised to step out into the modern paneled offices of Zitel Inc., a venture startup firm. While the physical facade may be somewhat decep-

tive, the goals of the young company are very real, according to president Michael Lento. "We felt our uniqueness, our niche in the market, was going to be innovation in voice/data mix—not in data alone and certainly not in voice alone."

Actually, what Zitel is working toward defies a simple explanation. The merging of voice and data is only part of it. The common (or mixed) communications traffic will operate through a single PBX, or "switching mechanism" as Lento calls it, and the system will include an integral local data network tied to the common PBX. If that isn't enough, the local network will employ a ring network structure that Lento says has not yet been used for both voice and data.

The company is a spin-off from Cambridge Telecommunications Corp. (CTX), which was acquired by GTE Telenet and is in the communications processor business. Because Lento and the other founders were well versed in data communications techniques, they realized a first priority would be to get some talent from the world of telephony.

"Our central equipment cabinet will perform the PBX switching as well as the data switching functions. Every major company needs a PBX-type voice switching network. The ones that have sufficient amounts of data communications need

TELONE

Data Carrier System

No more
cable...

SCIENCE/SCOPE

A new adaptive radar, using technology that could be applied in the future to many different weapon control systems, has completed feasibility tests. The radar, called FLEXAR (Flexible Adaptive Radar), uses a multimode transmitter and a programmable signal processor that are now in production, plus a new light-weight, low-cost electronically-scanned antenna. The antenna rotates once each second while the beam electronically scans up and down and back and forth. Waveforms are selected automatically to match the environment. Such flexibility enables the radar to adapt its waveform beamwidth and scan rate as needed to acquire and track targets. Hughes developed FLEXAR for the U.S. Navy.

A series of lightweight millimeter-wave parabolic dish antennas has been introduced by Hughes. The antennas, designated the 4581xH series, are made with a special aluminum and glass laminate. They are available in eight waveguide bands between 26.5 and 170 GHz and in six different sizes. The smallest, a 4-inch diameter dish, incorporates a prime focus feed. The others, in sizes of 10, 12, 18, 24, and 36 inches, use a Cassegrain feed. All are designed for low sidelobe performance. A typical weight is 7.5 pounds for the 12-inch model.

Satellite pictures are helping geologists understand major features around the world, including continental plates. Images from NASA's Landsat spacecraft, along with earthquake data, have given tectonics specialists insight into the relative motions of the Indian subcontinent and Eurasia. Scientists previously thought that one earthquake-prone crustal deformation was confined to a long, narrow zone -- the result of the Indian plate thrusting under Eurasia. Landsat images, however, revealed landforms that indicate the deformation extends over a large area quite similar to California's San Andreas fault. This interpretation also helps explain why earthquakes occur throughout Asia. The "cameras" on the Landsat spacecraft, called multispectral scanners, were built by Hughes.

Hughes Industrial Electronics Group offers the advantages and opportunities of a small company backed by the resources of a \$2-billion company. Our facilities are in the Southern California communities of Carlsbad, Irvine, Newport Beach, Torrance, and Sylmar. Our programs incorporate 34 different technologies. They include silicon and GaAs semiconductor technologies, fiber optics, microwave and millimeter-wave communications, microprocessors, lasers, and solar cells. Send resume to B.E. Price, Hughes Industrial Electronics Group, Professional Employment, Dept. SE, P.O. Box 2999, Torrance, CA 90509. Equal opportunity employer.

A new solid-state millimeter-wave sweep generator covers the entire W-band from 75 GHz to 110 GHz. The unit, designated Model 47726H, plugs into the Hewlett-Packard 8620C main frame or the new H-P 8350A main frame with high-resolution digital displays. Like other Hughes sweepers, it consists of a full-band sweep source, leveling loop, and a full-band sweep plug-in. An automatic feature allows the user to select the frequency spans of interest directly on the 8350A.

Creating a new world with electronics

HUGHES

HUGHES AIRCRAFT COMPANY
CULVER CITY, CALIFORNIA 90230

(213) 670-1515 EXTENSION 5964

CIRCLE 48 ON READER CARD

NEWS IN PERSPECTIVE

some sort of data switching capability. If you combine the two, there's an inherent saving right there in plant equipment. Part of the Ztel design concept will be to allow both voice and data operation over conventional telephone wire pair facilities, but it will also support both types of information over coaxial cable for longer distances over local data networks.

"Our goal is to have a data call be as close as possible to a voice call. Hopefully we're going to be able to give the data user some of the neat features that the PBX people have been using for a couple of years. In our case, the telephone presents the entrance to the switching network for your terminal also. To our system, the host at some location in the plant is just like another extension off the PBX or off the network switch," Lento explained.

The idea for a common communications system (it doesn't have a name yet) first developed at the beginning of 1981 when Lento left CTX with three others. In addition to Lento, the group included Henry Zannini, Ztel vice president of development; William Tao, director of software development; and Richard Epstein, director of hardware development. The Ztel name was contrived from the first letters of each last name, Lento revealed.

The first major chore the group had was to convince financial backers that the plan was viable. One of the prime Ztel supporters turned out to be Frederick Adler, the venture capital expert who had helped fund CTX, was a founder of Data General, and specializes in telecommunications-oriented startups.

"We had some block diagrams and some paper sketches of the product concept which made sense to him as it made sense to

The common (or mixed) communications traffic will operate through a single PBX or "switching mechanism."

us. Certainly, the technical implementation parts we didn't know at that point because those are the kinds of things that you only learn by actually doing the development. The market for this product is recognized to be very large. So I think the combination of the team and the market potential offset the risk of the technical concept enough to make it a viable investment."

In addition to funding from Adler & Co., Ztel got venture capital from Business Development Services Inc., the venture affiliate of General Electric.

From the initial group, Ztel has grown to 25 employees. By the end of 1982, Lento projects there will be close to 40. With 1982 being devoted almost entirely to product development, Lento looks to early 1983 for the first system announcements from the fledgling company.

While Ztel will be the manufacturer

and distributor of its new system, the PBX-like system will be sold through the telephone interconnect industry. Reasoning that interconnect companies know the telephone installation business, Ztel will rely on these established outlets instead of having to build its own sales force. While specific components or subassemblies may come from subcontractors, system level assembly will be done by Ztel in the former textile mill.

Although Lento says it is too early to talk about the price of a typical system, he pledges that Ztel will meet the reliability standards of conventional phone systems at a per line cost that is competitive. The first

One of the prime ZTEL supporters turned out to be Frederick Adler, the venture capital expert.

systems will be most cost effective for companies that have 400 to 1,000 line PBXs.

Ztel will have some competition from digital PBX suppliers such as Data-point, Rolm, and Lexar. And in the data switching area, Gandalf and Infotron have similar systems. But according to Lento, nobody will have the same combination of features that Ztel hopes to have ready to release early in 1983.

—Ronald A. Frank

PHONE OF THE FUTURE?

Northern Telecom offers a desktop combo: phone, modem crt, and microprocessor.

In the race to merge data processing with telecommunications, Northern Telecom Ltd. appears to be the first to hit the streets with a product. Called Display Phone, the device is a compact, smart-looking package that houses a telephone, a modem, and a computer, with a display screen and a pull-out keypad. It sells for about \$2,000.

"We don't think we have any competition at present," said David Smith, director of office automation products for the Electronic Office Systems Division, Minneapolis. Smith guesses that the company has a six-month lead over its closest competitors, who he believes are Matra of France and Plessey of England. By the end of 1982, Smith expects a half-dozen or more competitors on the market.

At present, Display Phone is only

TELONE[®]

Data Carrier System

Installation.

PERQ[®]

The unshared computer

10 Mbs on the Ethernet highway.

Now, for the first time, there's a network capable of keeping up with PERQ's extraordinarily fast processing and response time. With Ethernet,[™] PERQ[®] gives you instantaneous access to all resources on the network, such as files, printers, other I/O devices—even other mainframes—plus all the speed of a dedicated single-user computer.

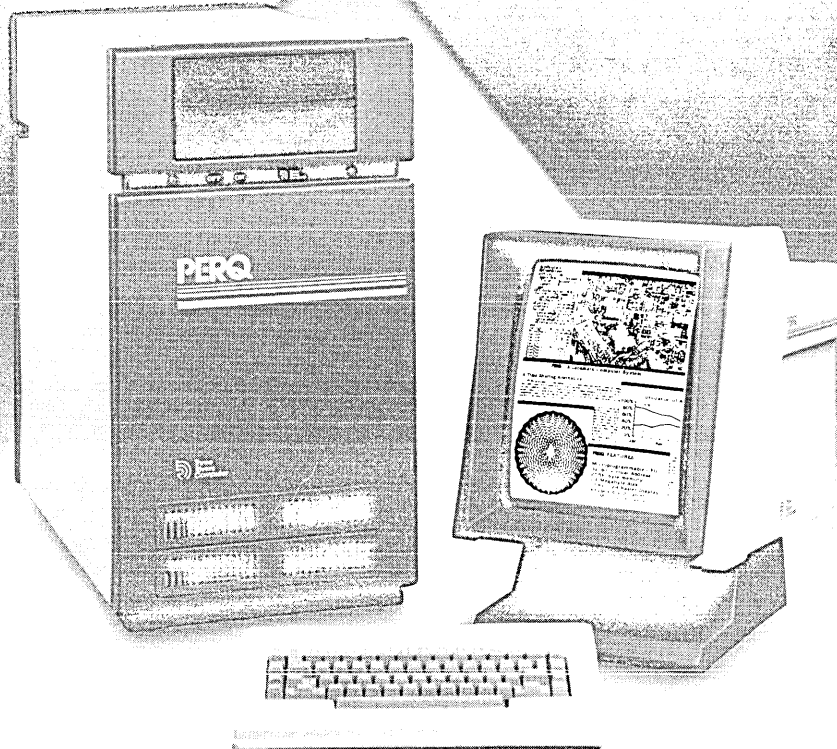
In real terms, what it means is this. Instead of taking as long as 4.4 seconds to transmit 10 pages of data, the transfer takes place in .042 second. In the 4.4 seconds it would take a conventional network to send one page of War and Peace, with PERQ and Ethernet, you could send the entire thousand-page novel.

The PERQ single-user, microprogrammed computer system is truly unshared. PERQ gives you all the power of a mainframe, executing over 11 million Pascal Q-codes per second in user-modifiable microcode, but without the wait time associated with time-shared systems. Need more computing power? Just add more PERQs. The high-resolution display is unmatched. The display's 800,000 addressable points are completely refreshed 60 times per second. PERQ with Ethernet. A revolutionary computer. A revolutionary network. To find out more, write or call us today at 412-621-6250.



Three
Rivers
Computer

PERQ is a registered trademark of Three Rivers Computer Corporation.
Ethernet is a trademark of Xerox Corporation.



USA AND CANADA: Three Rivers Computer Corporation, 720 Gross St., Pittsburgh, PA 15224. (412) 621-6250 TWX: 710-664-4490.
Offices in Hartford, Washington, D.C., Atlanta, Pittsburgh, Chicago, Dallas, Los Angeles.
EUROPE, ASIA, NEW ZEALAND, AUSTRALIA, SOUTH AFRICA: contact your local office, International Computer, Ltd.
JAPAN: Rikei Corporation, Shinjuku Nomura Bldg., 1-26-2 Nishishinjuku, Shinjuku-ku, Tokyo 160, Japan. (345) 1411.

CIRCLE 49 ON READER CARD

NEWS IN PERSPECTIVE

sold through the company's direct sales force. But with such low unit costs and margins, Northern Telecom plans to be on the dealer/retailer bandwagon by the end of next year, selling through office product dealer networks and large retail chains, such as Sears.

Although the company would not reveal its production capacity, it seems to be gearing up for high volume at both its manufacturing sites, one in Minneapolis and the other in Belleville, Ontario, Canada. The firm has targeted the top 1,500 U.S. companies as its prime market. Over 1,000 units have been ordered, said Smith, but "most orders at present number in the five- to 10-unit quantity for evaluation purposes." By year's end Display Phone is expected to be a "significant contributor" to the division's revenues and, eventually, to outsell all other products in the Office Systems Division, he added.

Limited delivery of the first model, based on the prototype design, began in December. It features 32K bytes of memory, 11 pages of directory with nine names and phone numbers per page, automatic log-on for accessing timesharing services, a digital clock, a calendar, a reminder service that sounds a tone to get attention, a full QWERTY keypad, and battery backup that lasts for three days.

Other features include a 103-type modem, a 300bps fixed data rate, and provisions for setting half/full duplex, odd/even/mark parity, and a 40- or 80-character display with 24 lines down. A 25th line is reserved for softkey labels. As for ease of use, the system has numerous screen prompts and function labels on the keys.

Delivery of the next model, which incorporates improvements made to the prototype design, such as a full-function speakerphone with microphone, will begin next month. And more improvements are on the way. "At present, the 8085A chip has limited processing power," acknowledged Smith. Expect to see processing power upgraded over time, as well as changes and additions to screen size and other features. "The product will evolve as our users' needs evolve," Smith added.

As part of its test and design program, Northern Telecom ran a beta test program for a year and a half, stopping at 25 sites, one of which was Nabisco Brands, East Hanover, N.J. According to Richard Brightman, a member of the Nabisco evaluation team, the product was easy to install and never went down during its three month stay at the company.

"As a matter of fact, installation was a piece of cake. Basically, you just connect it to an electrical outlet and two telephone lines. We did have one problem with the prototype design. Northern Telecom used a standard modular plug but ran two lines through it. We had to get our local telephone company to come and set up a

special jack that could handle two lines," Brightman recalled.

In addition to changing the jack connector, Nabisco suggested that Northern Telecom make the pullout keypad more sturdy, add a microphone to round out the speakerphone feature, increase the size of characters for the 80-character display modes, and add programmable function keys to the unit.

Nabisco employees were using the unit as a personal telephone directory and as an information retrieval terminal for financial data. "The two-line scheme is very

A half-dozen or more companies are expected to compete in the coming year in the advanced function telephone market.

nice. It allows you to connect to a computer on one line and still use the other line for voice. You can see the scenario: somebody calls for information and you read it right off your screen at the same time. That's something I've never seen another device do," commented Brightman. Nabisco, however, has not placed any orders for Display Phone. The \$2,000 price tag is no problem. "For what you are getting I don't consider that unreasonable," said Brightman. The hangup is compatibility. "The big question for us is whether Display

Phone can support our existing user-friendly, full-screen applications, for which the IBM 3277s and 3278s are well suited. Whatever we get, it pretty much has to fit our standards. We can't design just for the Northern Telecom device alone. We need something with program function keys." One approach to overcome that limitation is to use protocol conversions so a dumb terminal can be compatible with Nabisco's standard programs. "If the Northern Telecom device fits that bill," said Brightman, "it would be suitable because of the other features it possesses at that price tag."

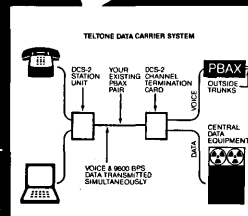
Meanwhile, on the marketing front the Display Phone sales force is wrestling with a dilemma of its own: should they approach data processing managers or communication managers when selling this hybrid machine? Companies aren't much help, for they too are wrestling with similar issues that arise when a company tackles an application that crosses traditional boundaries. Those that have tackled electronic mail development, observed Smith, are forming separate development groups. But whether these groups report up the dp side or communications side varies from company to company.

At Nabisco the problem seems to be solving itself. "Fortunately," said Brightman, "the information services department [where the data center resides] has an advi-

TELSTONE

Data Carrier System

Telstone DCS-2



Now there's a faster, better way to make computer hookups in local area data networks—one that doesn't require special modems or expensive cable installation.

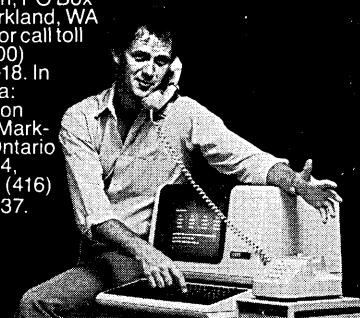
With our new Data Carrier System (DCS-2), your existing PABX wires do the trick. Voice and data move simultaneously, on the same wire pair—up to 9600 BPS of dedicated-channel, full-duplex, asynchronous data transmitted or received.

Find out why major data users like ADP, Boeing, Intel, Standard Oil of California and Lincoln National Life

have already purchased this remarkable communications system... and start your own DCS-2 savings plan.

Just write Telstone Cor-

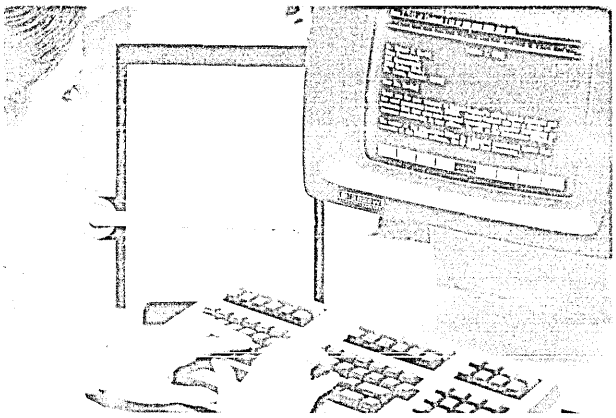
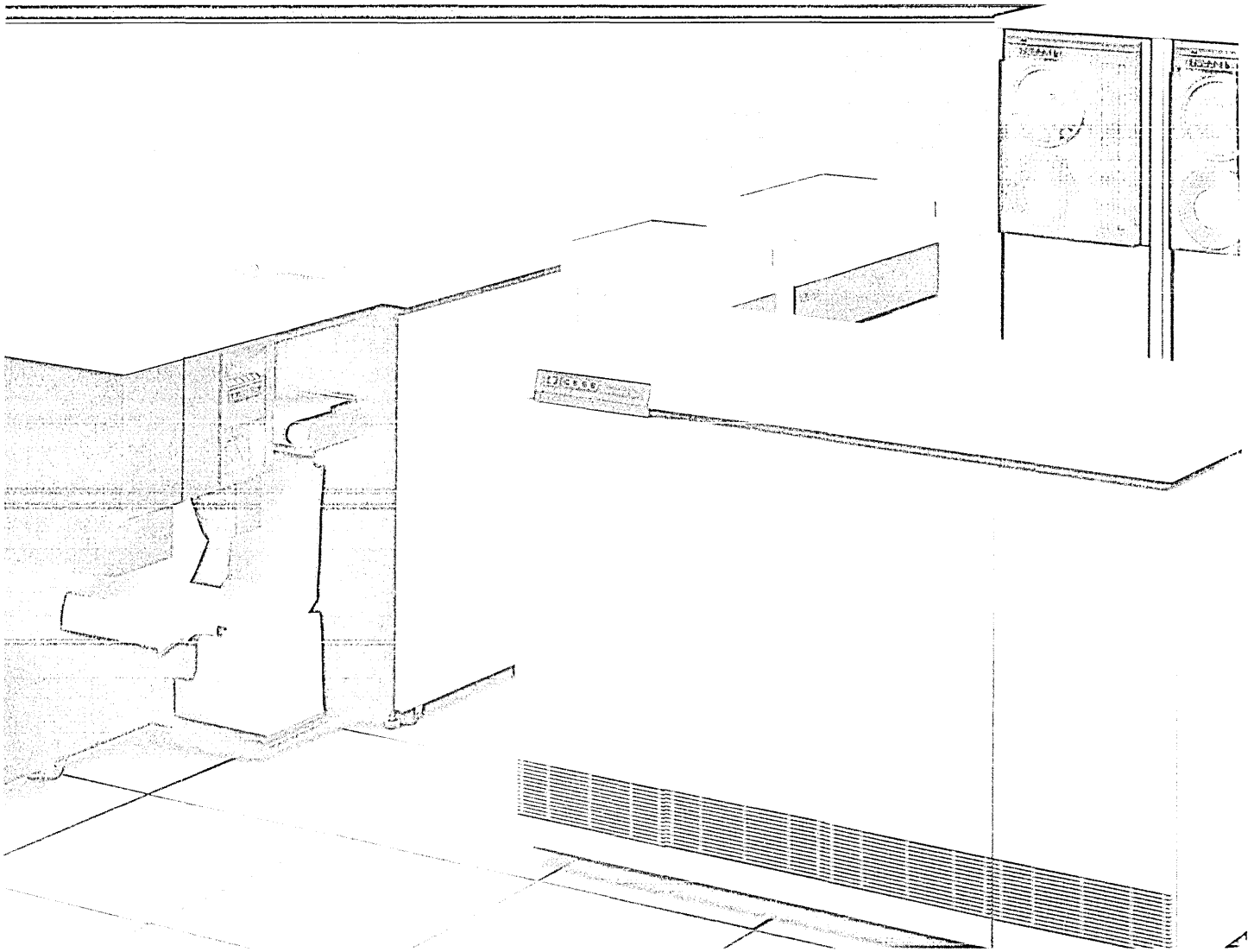
poration, PO Box 657, Kirkland, WA 98033 or call toll free (800) 426-5918. In Canada: 91 Telson Road, Markham, Ontario L3R1E4, phone (416) 495-0837.



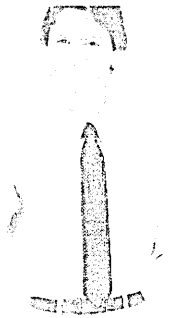
FCC part 68 registered. For users of DEC, H-P, Data General, Prime, Tandem, IBM Series/1 and other asynchronous computers.

CIRCLE 50 ON READER CARD

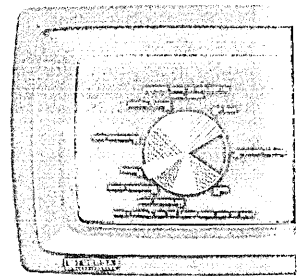
More power



Our new word processor makes text composition and editing fast and simple. And with its links to the computer, it can also process data.

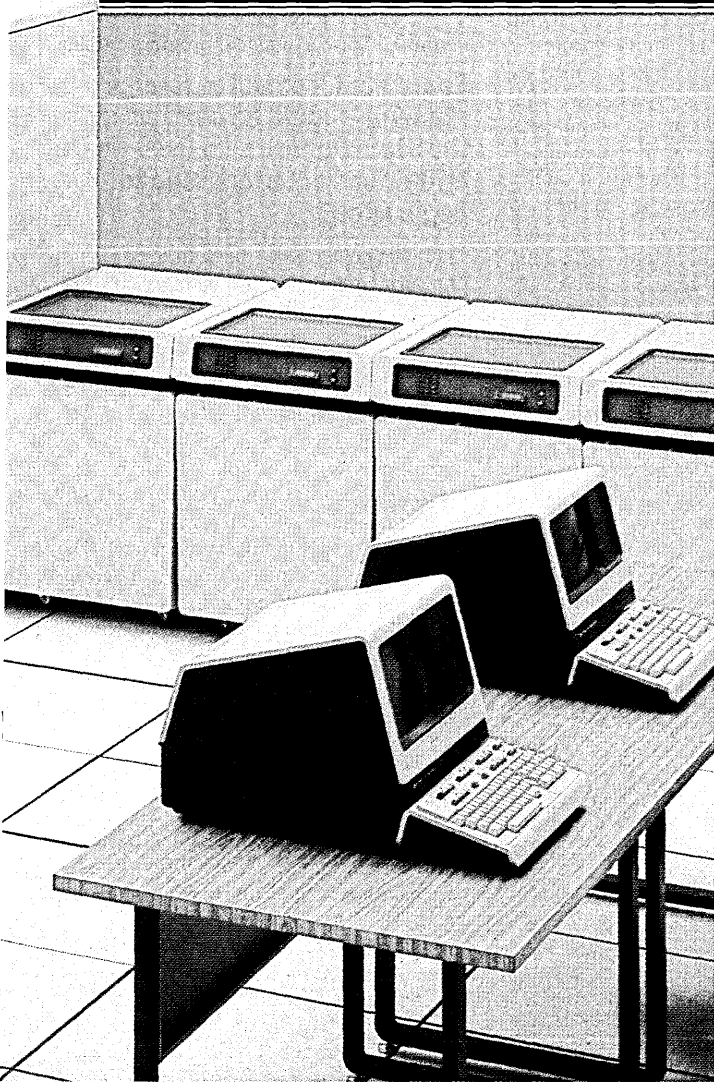


Applications development time can be slashed from years to months with our new RAPID/3000 programming tools.



Business graphics created on this low-cost terminal can be plotted on paper or transparencies.

er to you.



The new HP 3000 Series 64 more than doubles the processing power of our popular Series 44. Now, users at more than a hundred terminals around your company can enter and retrieve data, prepare reports, do word processing or generate graphics — while the Series 64 runs batch jobs at the same time.

With up to 8 Mb of main memory and supporting as much as 6.4 Gb on disc, the Series 64 can handle your most demanding EDP applications — in sales and marketing, financial management and manufacturing administration. It also supports our HP Interactive Office by integrating document management, personal computing, support for decision making and communications. And, the system is available with our Guaranteed 99% Uptime Service.

Family Plan.

As a member of our HP 3000 family of computer systems, the Series 64 protects your data processing investment with our traditional hardware and software compatibility. This lets you transport programs between the Series 64 and smaller HP 3000s throughout your company — without lengthy and costly conversions.

But that's not all. With our new RAPID/3000 programming tools, you can develop business applications in much less time. By automating many routine computer instructions, RAPID/3000 lets you concentrate on the really important jobs.

The entire HP 3000 family now supports the international CCITT X.21 and X.25 standards as well as SNA networking. So you have greater flexibility in accessing other HP computers and IBM mainframes, across town or around the world.

And to complement the Series 64 and the rest of the 3000 family, there's our new 400 Mb HP 7935 disc drive. This new HP drive automatically monitors its own performance with self-diagnostics, making preventative maintenance a thing of the past.

800-538-3003

Call this toll-free number for more information on the powerful new Series 64. Or better yet, come to our Productivity '82 Seminars for a hands-on demonstration. (Your local HP sales office has details.) You can also write to Hewlett-Packard, Attn: Bob Bond, Dept. 04124, 11000 Wolfe Rd., Cupertino, CA 95014.

When performance must be measured by results.



Personal office computing with the new HP125 handles a manager's individual needs — including word processing, graphics and data analysis. And communications with HP 3000s and mainframes.



**HEWLETT
PACKARD**

47204

CIRCLE 51 ON READER CARD

NEWS IN PERSPECTIVE

sory capacity for all purchases related to data processing. Since Display Phone's intrinsic function is to hook into the data center, nobody buys a terminal without knowing whether it will function within our standards. From the other point of view, my department is active in office automation. If we determine that Display Phone is a suitable device, we will actively promote its use within the company."

—Jan Johnson

EDUCATION

'SECRETS' ON THE CAMPUS

Stanford University has protested a federal government request that it monitor the computer activities of foreign students.

The U.S. government, which has long controlled the export of high technology products such as computers, is now trying to get universities to similarly place export re-

strictions on academic teaching, on the transfer of technical data on computers and microelectronics to foreign students. The effort has been rebuffed by Stanford University.

"If the State Department is concerned about [a foreign scholar's] access to any aspects of Stanford's academic programs, it is curious that they issued him a visa to come to Stanford initially," says vice provost Gerald Lieberman, Stanford's dean of graduate studies and research. He adds that the control of technology transfer on campuses could better be controlled by those who grant visas, explaining that "Stanford has no means of monitoring [students'] activities, either on or off campus."

What brings this issue to a head is a letter from the Commerce Department to Prof. Bruce Lusignan, director of Stanford's Communication Satellite Planning Center, concerning a foreign visiting scholar program.

The letter asks that Lusignan "describe any laboratory facilities, equipment [such as computers], specialized library collections, or other special facilities" that might be used by the scholar. It also inquires into any contacts by the visitor with private industry and about any planned trips to be taken as part of the program. Lusignan, in a reply to Henry D. Mitman, director of the capital goods and production ma-

terials division of the Office of Export Administration, deemed it "inappropriate" to respond to the questionnaire concerning the applicability of Export Administration regulations to visiting scholars.

But Keith Powell II, State Department country officer for Chinese affairs, is said to have written to the University of Minnesota, seeking restrictions on a scholar in computer science there from the Peoples Republic of China.

In that letter, Powell suggested that in the Chinese student's program "there

Some think control of foreign students should be handled at the State Department level where entry visas are processed to begin with.

should be no access to the design, construction, or maintenance of data relevant to individual items of computer hardware. There should be no access to design of microelectronics. . . . This office should be advised prior to any visits to any industrial or research facilities."

The government apparently looks into all programs of scholars from the Peoples Republic of China, and if the study program is in a subject regulated by the government, the appropriate agency—Defense, State, Commerce, or whatever—is notified and follows up.

Powell estimates there are in the U.S. some 7,000 students from China, about 10% of whom are studying subjects that prompt the State Department to make preliminary inquiries to their academic advisors. In the last couple of years, contact with an institution was made in perhaps 70 cases. "There have been a few cases where we've gone back several times trying to reach a compromise," Powell says. "In no case have we been unable to reach an agreement."

Powell also wrote to Stanford's Lusignan and to Prof. Edward McCluskey of the electrical engineering department there. According to Lieberman, Stanford permits no secret or classified research on campus. He said there are thousands of foreign students on campus, including some 140 from China.

The issue of academic freedom, especially the importance of a free flow of information among scientists and engineers, arises in the public consciousness with seeming regularity.

Back in 1978, nuclear physicist Edward Teller observed that it is precisely in those military fields where secrecy is practiced that the U.S. has lost ground in the last few decades. But he noted that the U.S. has maintained its leadership role in the field of electronics, especially in computers, where the scientific community has been relatively open.

—Edward K. Yasaki

\$4,895*

LIMITED TIME OFFER

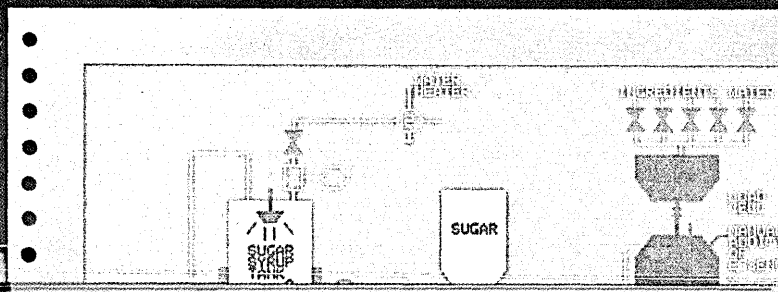
IS-8001 Ink Jet Color Printer

All the high quality of ink jet printing without the high cost. Dot-matrix overlay system produces eight-color hard copy graphs and charts. Unattended operation. On-board microprocessor. Can be driven as an intelligent terminal! Compatible with Intelligent Systems' character graphic computers. Typewriter-size unit uses

ordinary fanfold paper. Fast, very quiet and cost efficient. Only 10¢ per copy!

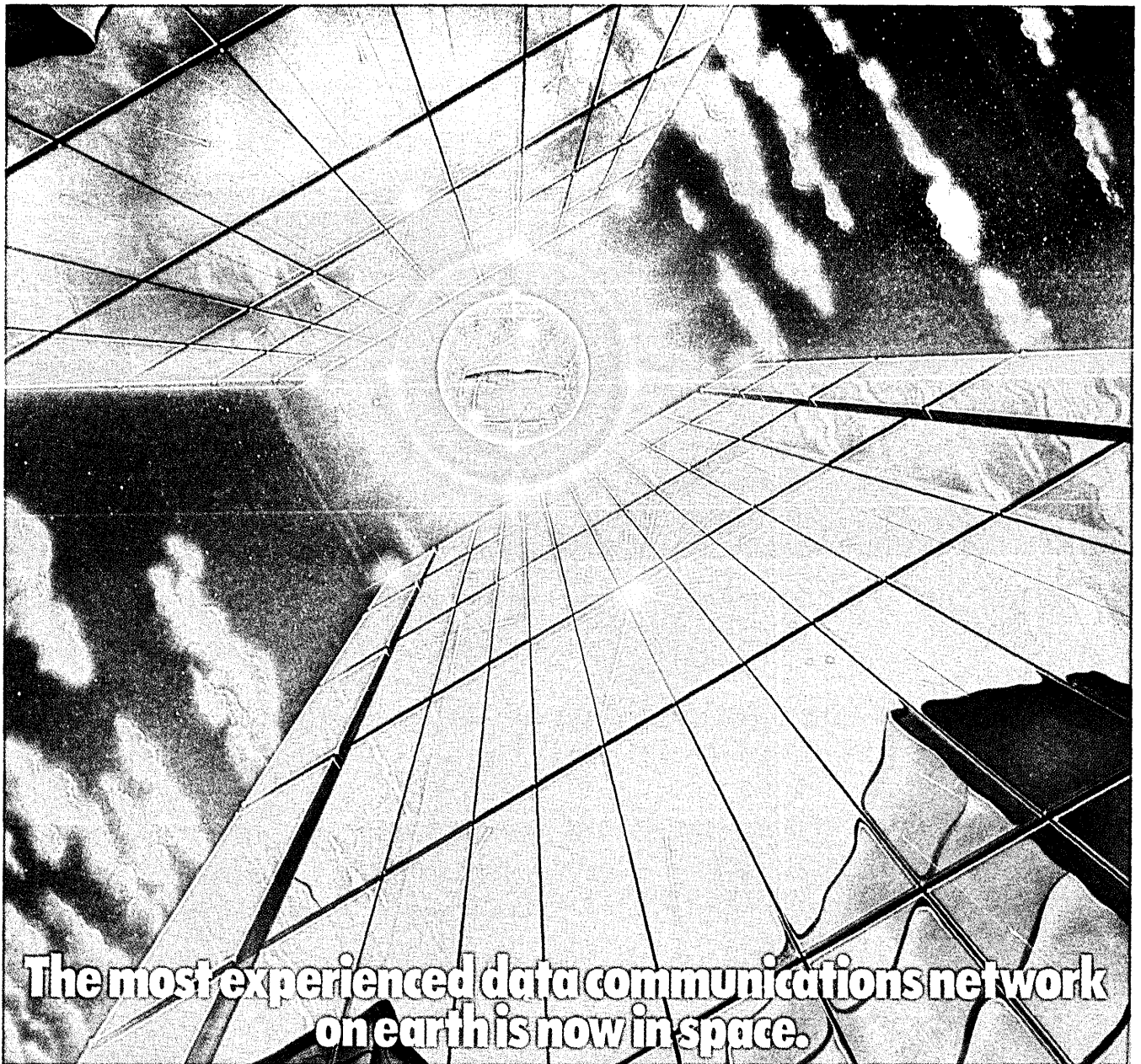
Hurry! Offer expires January 31, 1982. Compare this incredible price. Compare the per-copy cost. Call or write *today* for the name of your nearest representative. And hurry! Time is running out.

PrintaColor



PrintaColor Corporation, P.O. Box 52, Norcross, Georgia 30091 404/448-2675

CIRCLE 52 ON READER CARD



The most experienced data communications network on earth is now in space.

The Cylix data communications network service, using two satellites in geosynchronous orbit, offers many leased line users significant savings, better reliability.

We're in space because it costs less and is more reliable to send messages by satellite than by leased lines.

That's how Cylix Communications Network can offer you a lower-cost alternative to conventional means of data transmission.

If your terminals are widely distributed, Cylix could save you plenty.

Cylix is the only network service that routinely takes full responsibility for error control from user premises to user premises. User operator involvement is rare. You don't need to buy diagnostic equipment. And Cylix diagnostics don't interfere with user data.

For reliability, our central facility is earthquake and tornado-proof, with a back-up power supply. There's back-up for all processors, antennae, RF and IF radio equipment, too.

Cylix offers on-line, transaction-oriented, high-speed (up to 9.6 kilobits/second), high-volume (up to 100 million characters/month per remote), high reliability data-only communications with IBM 3270, X.25, Burroughs Poll/Select and other protocols.

We've been in networking for a decade, and now transmit over 400 million characters of information daily for users in

over 300 cities. We can do it for you.

Starting for as low as \$345/month per remote site. If you built your in-house network to cut costs and improve reliability, it's time you took another look.

Cylix can help, with a simple way to figure your true network costs: our free *Network Cost Analysis* brochure. Why not beat AT&T's rates? To get a copy, return the coupon, or call Carl Sievert at (901) 761-1177. You belong in space.

NAME _____

TITLE _____

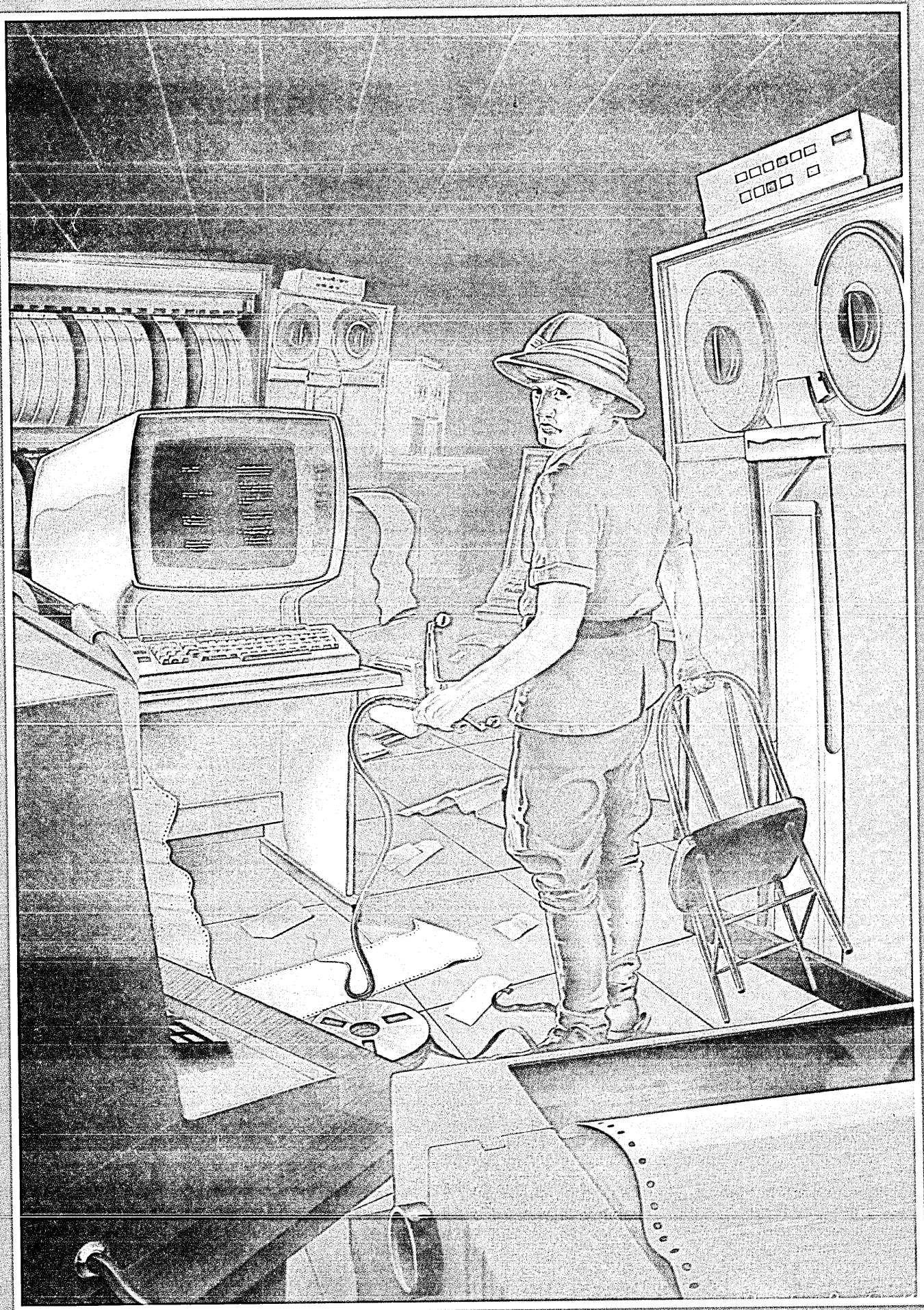
COMPANY _____ PHONE _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CYLiX™
 COMMUNICATIONS NETWORK
 AN AFFILIATE OF DATA COMMUNICATIONS CORPORATION
 Department DA, 855 Ridge Lake Boulevard, Memphis, TN 38119

CIRCLE 54 ON READER CARD



YOUR PRODUCTION WORKLOAD. DO YOU CONTROL IT OR DOES IT CONTROL YOU?

You can take complete charge of your data center's entire production process with the UCC-7 Automated Production Control System.

UCC-7 doesn't just schedule; it moves the workload to, through, and out of the data center . . . on time. It manages every production activity — from receipt of input through output delivery.

UCC-7 is the only software package that lets you centralize control for all work areas — Data Preparation, Scheduling, Operations and Distribution. Plus, it gives you one common source of information for all user requests.

The UCC-7 Automated Production Control System: it is probably the most significant single step you can take to improve your data center's productivity. Call us at 1-800-527-5012 (in Texas, call 214-353-7312) or circle 60

And, why not ask us about:

A Tape Management System that protects data from loss or destruction (UCC-1). Circle 61

A DOS Under OS System that lets you execute DOS programs without conversion (UCC-2). Circle 62

A Disk Management System that can save the cost of new disk drives (UCC-3). Circle 63

A PDS Space Management System that eliminates PDS compression (UCC-6). Circle 64

A Data Dictionary/Manager that really gets IMS under control (UCC-10).

An Automated Re-run and Tracking System that solves your re-run problems (UCC-11). Circle 65

A software package that reduces hardware failure because it improves vendor responsiveness (UCC Reliability Plus). Circle 66

General Accounting software packages. Circle 67

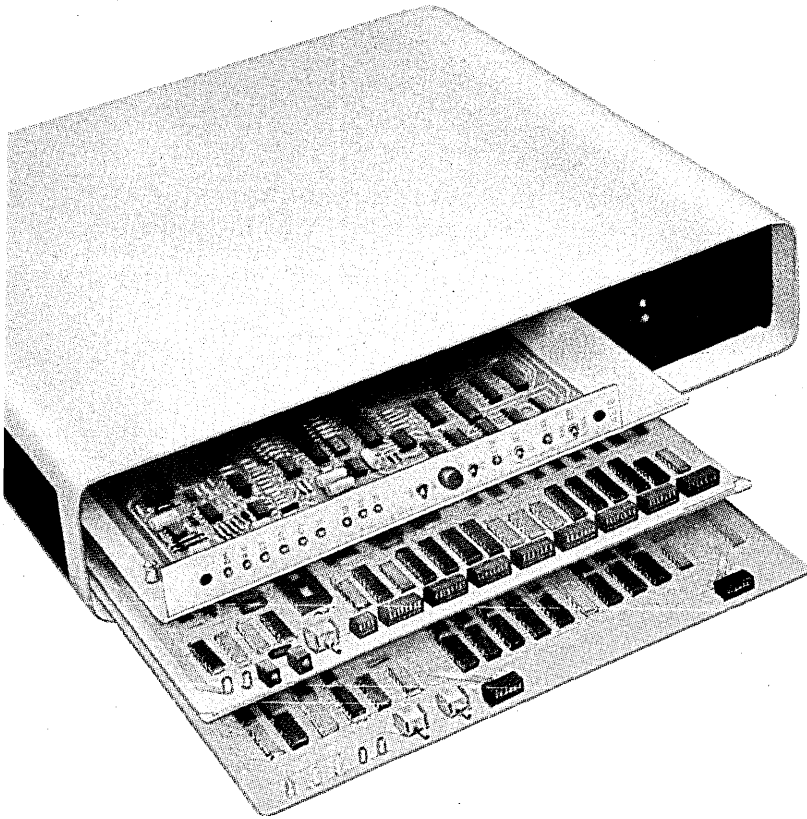
Application software for the Banking and Thrift industries. Circle 68



UNIVERSITY COMPUTING COMPANY
DALLAS • LONDON • TORONTO • ZURICH

Minicomputer users:

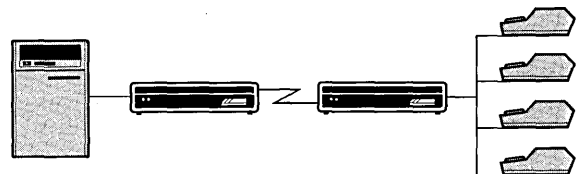
Timeplex offers a one-stop system solution for communicating with multiple remote terminals. Economically.



Asynchronous statistical multiplexer

Synchronous statistical multiplexer

High speed modem



The Timeplex E/SERIES is a complete data concentrator system designed to economically link clusters of remote terminals to your minicomputer.

E/SERIES: Cuts communications costs. Suddenly, saving communications costs by linking several terminals to one shared telephone line becomes easy.

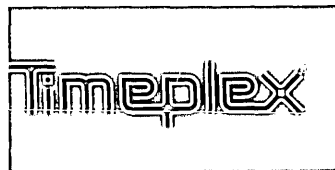
Unlike the competition, the Timeplex E/SERIES simplifies the challenge of point-to-point communications by incorporating three functions in a single compact unit. One system offers you a statistical multiplexer supporting 4 to 16 asynchronous channels, *plus* an optional statistical multiplexer for an additional synchronous channel, *plus* an optional integral high speed modem.

E/SERIES: Puts it all together. Putting three functionally distinct modules in one enclosure eliminates external communications units and bulky, expensive cables. And, a minicomputer interface option further reduces costs. The result: System planning and installation is extremely simple. Reliability is enhanced. Costs are dramatically reduced.

Free step-by-step Guide. This easy-to-understand booklet contains all the facts on how to remote your terminals, simply *and* economically. Just write or call Timeplex for your free copy.

For the name of the E/SERIES stocking distributor nearest you, call 201-368-0736.

Timeplex, Inc./One Communications Plaza/
Rochelle Park, N.J. 07662.



The technology leader
in data communications

CIRCLE 70 ON READER CARD

NEWS IN PERSPECTIVE

SOFTWARE

UNIX: A STANDARD NOW?

Western Electric has cut licensing fees drastically. What will it mean to users and vendors?

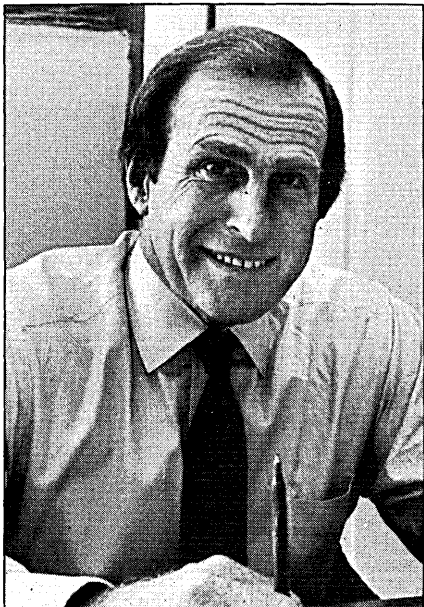
An ever-expanding user base of Bell Labs' Unix operating system may move from linear to geometric growth in the wake of a Western Electric announcement of new licensing policies for the system.

Crux of the announcement was a dramatic lowering of a fee schedule which saw a license that recently cost \$2,500 drop to \$250. Western made the announcement in a long anticipated, but not highly publicized meeting on the day preceding opening of the Comdex show in Las Vegas in late November. In some cases, licenses now can be had for as low as \$40.

"There were 50 or 60 people crowded into a room for 25," said Jean Yates, manager of the Microprocessor/Microcomputer Industry Analysis and the Unix Information service of Gnostic Concepts, the Menlo Park, Calif.-based research and consulting firm.

"This [the Western Electric announcement] is going to make Unix the standard for low-end systems," said Bob Marsh, president of Plexus Computers, Inc., Santa Clara, Calif. "But I always considered it the standard anyway."

Marsh's company was introducing



GARY FRIEDMAN: "Unix is the way of the future."



Miniterm® is the Answer.
A remarkable tool that gives you instant information wherever your work takes you.

Finally, a truly portable computing system for people who don't know the first thing about computers. Just plug it in, respond to a few simple prompts, and get immediate answers.

The Answer lets you provide computer-aided sales demos, enter orders on the spot, check inventory, audit field operations, or automate field diagnostic operations. In short, you can process data anywhere, anytime. You can even send data over ordinary telephone lines. It's as easy to use as a portable typewriter, and it's no bigger than a briefcase.

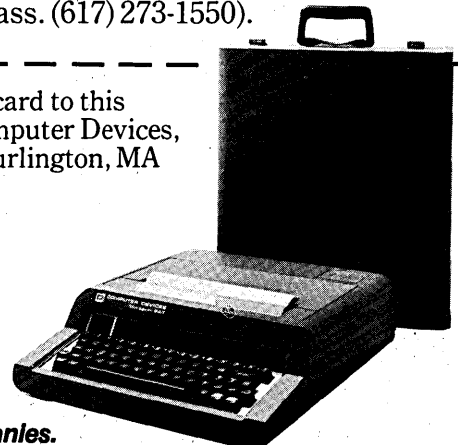
It's the latest in the Miniterm® Series from CDI, a leader in portable computing for over a decade; but you can call it the Answer, because that's what it gives you.

For a demonstration or more information call
(800) 225-1230 (in Mass. (617) 273-1550).

Or attach your business card to this coupon and return to Computer Devices, Inc., 25 North Avenue, Burlington, MA 01803.



We travel in the best companies.



NEWS IN PERSPECTIVE

at Comdex its Z-8000-based P/40 system, which it described as "the first minicomputer specifically designed for the Unix operating system." The P/40 combines multi-processor architecture, large main memory, intelligent communications processors, and up to 580 megabytes of high-speed disk storage.

Another Z-8000-based Unix system was being shown at Comdex by Zilog itself.

"I think it [Unix] was skyrocketing before and would have continued on that course anyway."

Rolando C. Esteverena, vice president of Zilog's systems division, described Unix as "the only available, portable, mature operating system with a base of followers."

"Unix," said Esteverena, "is used in 2,000 sites and is supported in one way or another by more than 100 commercial suppliers. There's a synergism taking place that is dictated by market forces."

In Santa Monica, Calif., Peter Weiner, president of Interactive Systems Corp., the first company to bring the Bell Labs operating system to the commercial marketplace, was quite pleased with the Western Electric announcement.

"There are some elements about it [Unix] we're pleased with and some we're

not so pleased with," said Weiner. He wouldn't comment on the parts he didn't like, noting that "We've asked Western Electric to change the parts we don't like. We wouldn't want to jeopardize our negotiations with them." Of the pluses for Unix, Weiner said, "they're good for everyone doing business with Unix."

One of these pluses was the announcement of Release 3.0 of Unix, which Gnostic Concept's Yates described as "finally a production version instead of an R&D version."

Weiner sees the Western Electric licensing move as something that will push Unix into standard status. "It's a very definite prospect now, and I applaud that."

In Walnut Creek, Calif., Walter Zintz, organizer of the newest Unix user group, said of the Western Electric move, "I was pleased to see them do it, but I don't think the growth in the number of Unix users is going to be as great as many are saying. Unix was skyrocketing before and would have continued on that course anyway." Zintz is president of Nova Venturian, which is putting up a Unix-based system on a Motorola 6800 processor for a service business.

There are many firsts being claimed for Unix offerings. Gary Friedman, former president of Intel and now president of Fortune Systems Corp., a one-year-old San

Carlos, Calif., firm, said his company is the first to offer a floppy version of Unix in the commercial environment.

Unix was developed in Bell Labs on a DEC PDP-7. One of its developers, Ken Thompson, wrote the first version when he became dissatisfied with available computer facilities at the laboratories. He discovered a little-used PDP-7 and set out to create a more hospitable environment. His work sparked the interest of Unix's other designer, Dennis Ritchie, and Unix grew first to an 11/20 and later to an 11/45.

Word got out about Unix, mainly to universities, and Bell offered it to them free. Interactive Systems' Weiner was one of the first to pay the then-\$20,000 license fee to use Unix commercially when he went to Rand in 1973. He paid this amount again when he formed Interactive in 1977.

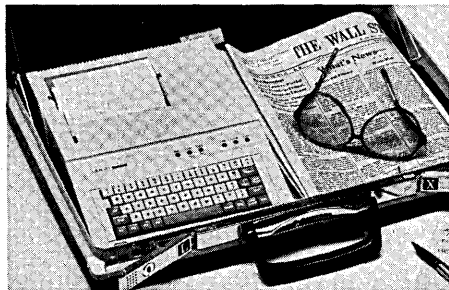
Initially what Weiner was offering

"It [Unix] takes on the attributes of the user. It's a chameleon."

was enhanced Unix software and Unix support, something Bell and Western Electric never did and still don't offer.

More recently, Interactive began offering its IDEA (Interactive Distributed Electronic Alternative) Machine based on Unix and a Z-8000 system. This can be linked in local Ethernet-like area networks with gateways to distant networks for communica-

Our new LEX-21 Computer Terminal



I want to know more about the LEX-21.
Please contact me with details.

Name _____

Title _____

Company _____

Street _____

City/State/Zip _____

For information, mail this coupon to Lexicon Corporation, 1541 N.W. 65th Ave., Ft. Lauderdale, FL 33313. Or call us today toll-free at 800-327-8913.

In Florida, call (305) 792-4400.

Which means you can carry the resources of your company's computer and data banks with you. No matter where you go.

Our LEX-21 is a cinch to carry. It weighs only 5 pounds. And all you need to put yourself in business is telephone and a 110 electrical outlet. The LEX-21 is the ideal terminal for executives, sales and service people and electronic mail.

Our LEX-21 can also easily plug into the Dow Jones News/Retrieval Service, the Lockheed DIALOG Information Retrieval Service, CompuServe and the

Actual size shown

tion, remote printing, and file transfer between users on other IDEA machines or on DEC PDP-11 and VAX computers running Interactive software.

Not everyone likes everything about Unix. Gnostic Concepts' Yates thinks it's a step in the right direction. She, along with Dr. Rebecca Thomas, authored the first Unix primer, titled *The Unix Guide to the Unix System*. "We had to go through four different Bell lawyers to get the name approved," she recalls. The two authors are now at work on a more advanced version which they haven't yet named.

Yates describes Unix as "a chameleon. It takes on the attributes of the user. Someday it will be possible for a third-party sales group to build its own pipes and filters depending on what they want done with it. We're not there yet." She sees a lot of "value added" possibilities for third-party sales organizations.

But she also sees "a lot of room for cleanup, like in record locks and memory management, and for 16 bit systems. There's not a lot of application software there yet."

It's generally agreed there are several hundred vendors selling products related to Unix. The Western Electric announcement could boost this dramatically.

Zilog's Esteverna warned against look-alike products. "An operating system

marketed under the label Unix-like, for example, may offer many of the same capabilities as the original, and even some added features, but internal differences such as data structures mean that weeks or months of programming time could be spent converting files when programs are transported. And there is always a risk that the supplier of a look-alike system will go out of business, leaving an oem with system software that is different from the standard and

"It's messy. There's no documentation."

that is unsupported by any other source."

Lack of support by Bell was something of an impediment to the early spread of Unix. Weiner cited that as a reason for forming Interactive. "There were a few people out there who were paying a \$20,000 license fee for an unsupported tape."

Weiner's Interactive Systems is still one of the two biggest companies supporting Unix, particularly on larger systems. The other is RLG Corp. in Washington, D.C. On micro-based systems, support is coming from the systems developers like Zilog, Fortune Systems, and Plexus, as well as from chip suppliers like Motorola and Intel.

Zintz, whose user group Uniops will hold its first conference this month in

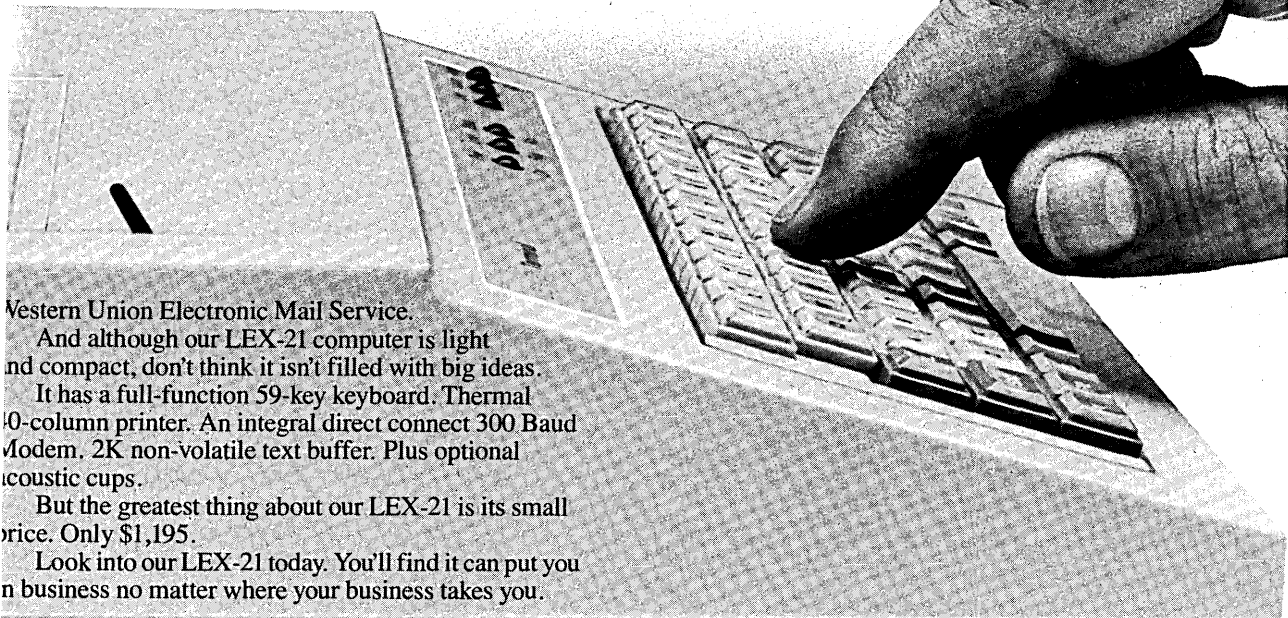
San Francisco, said he considers Unix the only complete software package. "It is everything in one—an operating system, utilities, a compiler language, and interpreter facilities."

He worried initially about lack of support from Bell but now believes that the gap is being breached by private companies. Zintz's user group might be termed the third of a big three. There are more. The first Unix user group, started by university users of the early Bell versions, is Usenix. Later came /USR/GROUP of which Plexus' Marsh is president. Zintz characterized the first group as mainly academic and the second as primarily vendor oriented. He called his a group of commercial users.

Software vendors are taking Unix more seriously now too. Howard M. Bing, president of The Office Manager, Inc., a Seattle, Wash., vendor of software for Wang equipment, feels he must "get out on Unix because I consider software a tool for management."

Frank Fukunaga, president of Data Technical Analysts, Inc., developer and owner of Pro, a software tool to create applications, admits his company will have to bring Pro up on Unix "because it's getting big." But he personally doesn't like Unix. "It's messy. There's no documentation." Data Technical Analysts, Inc., based in Honolulu, licenses Pro to five Southern

fits into your briefcase.



Western Union Electronic Mail Service.

And although our LEX-21 computer is light and compact, don't think it isn't filled with big ideas.

It has a full-function 59-key keyboard. Thermal 10-column printer. An integral direct connect 300 Baud Modem. 2K non-volatile text buffer. Plus optional acoustic cups.

But the greatest thing about our LEX-21 is its small price. Only \$1,195.

Look into our LEX-21 today. You'll find it can put you in business no matter where your business takes you.

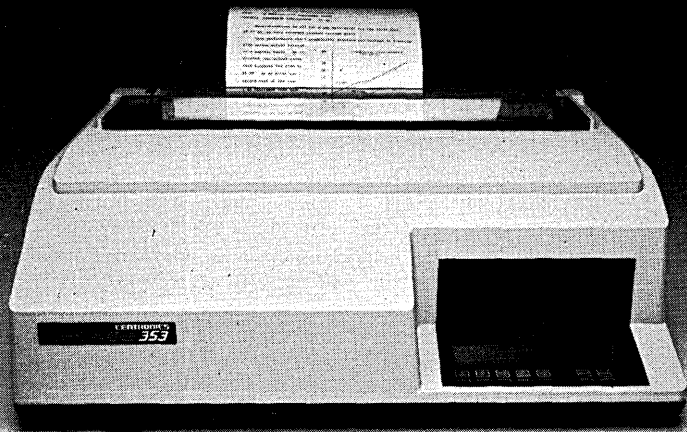
Actual weight 5 lbs.

LEXICON
Corporation of Miami

CIRCLE 73 ON READER CARD

JANUARY 1982 79

CENTRONICS PRINTSTATION 350 SERIES.



The one, totally new, multifunction printer with unmatched paper handling capability.

Printstation 350 Series introduces "Printstation Processing" in an attractive yet fully featured matrix printer:

- **WORD PROCESSING**...load cut sheets, letterheads faster than a typewriter, letter quality printing in multipass mode, high speed printing in "draft" mode.
- **DATA PROCESSING**...200 cps bi-directional logic-seeking operation.
- **BUSINESS PROCESSING**...pin-addressable graphics and "no-waste" multi-part document removal.

Plus built-in self-diagnostics, operator replaceable printhead and famous Centronics worldwide service.

For details or demo write or call.

CENTRONICS PRINTSTATIONS

Centronics Data Computer Corp.
One Wall Street, Hudson, N.H. 03051, Tel. (603) 883-0111

CIRCLE 74 ON READER CARD

Are Your DP Problems Becoming Increasingly Complex?

Maybe It's Time To Find Out Why, And
Learn Some State Of The Art Solutions.

SNOWMASS TECHNICAL SEMINARS HAS ANSWERS

- Software Methodology
- Computer Sizing Algorithms
- Software Requirements Formulation
- Interactive Graphics
- Technical Management

The above seminars are scheduled for the week of March 28, 1982, in Snowmass Village, Co. For brochure, call or write:



SNOWMASS
TECHNICAL SEMINARS

P.O. Box 6018
Snowmass Village, Co. 81615

P. O. Box 1561
Huntsville, AL 35807

800-633-7254 • 9 am-10 pm CST, 7 days • 205-881-3155, in AL.

CIRCLE 75 ON READER CARD

NEWS IN PERSPECTIVE

California-based companies including Microdata and General Automation.

Maybe Western Electric will do something about the lack of documentation, even as independents are already trying to do. Yates of Gnostic sees the recent Western Electric announcement as a move to position Bell for the time when "it is deregulated." She feels WE has "a list of improvements coming through the '90s—software packages under development internally including a writer's workbench, a tool to aid writers that will check for sentence syntax, paragraph syntax, racist terms, and sexist terms, among other items." She also looks for such things from Bell as an internal text processor and a PBX switching system.

What's not to like about the Western Electric announcement? A factor that made license fees go down according to accumulated monies paid in is gone. "We're all starting from the same point," said Plexus' Marsh, one of the newer kids on the block.

In Western Electric's Greensboro, N.C., Unix licensing office, calls were coming in thick and fast following the announcement. "This is usually a slow time of year for us," said WE's Bob Guffey. "It isn't slow this year." He said the three-man Unix licensing staff "gets 60 calls a day anyway but activity has picked up considerably since the announcement."

Guffey said callers were divided between companies wanting to use Unix internally and those wanting to go into business with it. He predicted the peak period will continue for three to four months, then level off.

—Edith Myers

ELECTRONIC MAIL

BATTLE OVER ECOM

The U.S. Postal Service seems determined to press ahead with electronic mail despite mounting opposition.

Damn the Justice Department, National Telecommunications and Information Administration (NTIA), Postal Rate Commission, and private interconnectors. The U.S. Postal Service (USPS) is going full speed ahead with electronic computer originated mail (ECOM).

USPS, the only government organization supporting the advent of ECOM, was scheduled to begin the service on Jan. 4, culminating a stormy, controversial 39

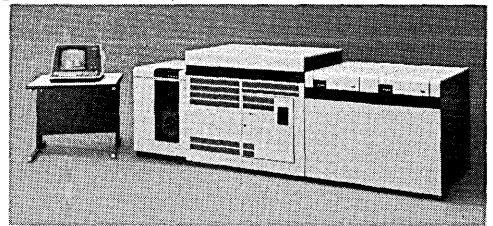
Do your programmers need a reservation to use the computer?

If you're using a mainframe computer, you know the problems your programmers face. Too often, they have to wait in line to get to the computer. When they finally get computer time, they're not even sure if their program will work. And if there are any errors, they have to go back to the end of the line.

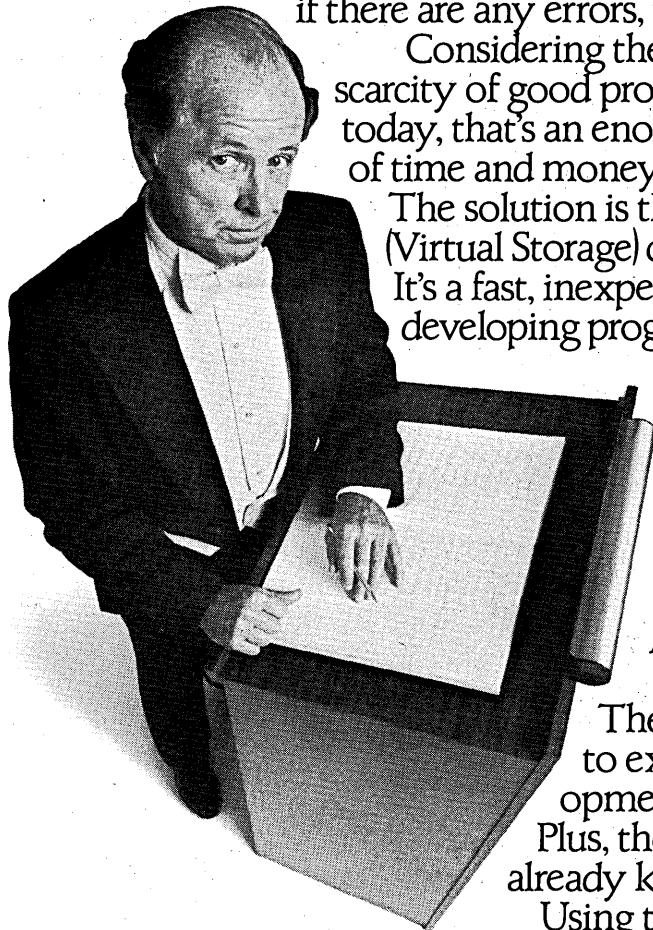
Considering the price and scarcity of good programmers today, that's an enormous waste of time and money.

The solution is the Wang VS (Virtual Storage) computer.

It's a fast, inexpensive system for developing programs for use on your mainframe computer.



Wang VS Computer.



Triple your programmer's productivity.

The Wang VS is interactive, so programmers can work from their own terminals directly on-line with the computer. Programmers write, compile, and debug programs from their workstations. And find out about any errors instantly.

And it's remarkably easy to use.

There are special program development utilities to expedite program design, source code development, and program debugging processes.

Plus, the VS uses high level languages your people already know, like COBOL, RPG II, and BASIC.

Using the Wang VS, programmers can actually triple their productivity. Which can save your company a lot of money, and speed up program development time. What's more, the VS can also be used to simultaneously off-load selected programs from your mainframe. You can even get Wang Mailway™ electronic mail and message system and Wang word processing—#1 in the world.

So find out more about how Wang can help your programmers become more productive. It's one decision you won't have any reservations about.

For a demonstration of the Wang VS computer, call

1-800-225-0643

(in Massachusetts call 1-617-459-5000, extension 5711). Or send this coupon to:

Wang Laboratories, Inc., Business Executive Center, One Industrial Ave., Lowell, MA 01851

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone (____) _____

A201

WANG

Making the world more productive.

"At MSA, packaged soft



John Imlay and MSA Customer Support Team specialists Alma Sanders, Pat Tinley, and Boyd Garber

That's more than a corporate policy at MSA. It's something we all believe in. From top management on down."

John Imlay believes in service. In the past decade, MSA has grown to become the acknowledged leader in the independent software industry.

The key? *Total software support for MSA customers.* Here's what this can mean to you.

Get Advice From The Experts

One of the best reasons to choose software from MSA is the team behind our systems. Your Customer Support Team includes software profes-

sionals who have specialized knowledge of different types of business and the operational requirements of different industries.

We have Industry Specialists in areas like banking and finance, health care, manufacturing, insurance, education, and commercial and non-profit companies, to name just a few.

Other MSA people are specialists in accounting, human resource systems, data processing, and user training techniques.

Led by an MSA Account Manager, these people help plan your new system and work with you on a detailed implementation schedule.

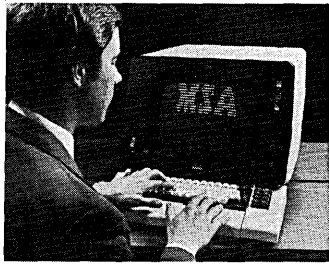
They help get your system up and running. On schedule. Working smoothly.

are is a service business"

John P. Imlay, Jr., Chairman MSA

The Team Behind The Team

Backing-up your Customer Support Team are hundreds of other MSA people who work behind the scenes, both at our local offices and in our



In the last 6 months of 1981, MSA will conduct 10,000 student/days of user-training sessions at MSA Education Centers worldwide.

total revenues of many of our key competitors.

corporate headquarters in Atlanta. Development, for example, is a high priority. This year alone, we will spend more than \$17 million to enhance and improve our application packages. This investment exceeds

Look For More Than Just Software

Naturally you're looking for an application package that's user-proven, dependable, and easy to implement. An up-to-date system with the latest enhancements and a choice of special modules and

MSA Ready To Install Applications Software

1. Accounts Payable
2. Accounts Receivable
3. Encumbrance Accounting
4. Forecasting & Modeling
5. Fixed Assets Accounting
6. General Ledger
7. Payroll
8. Personnel Management & Reporting
9. Procurement Matching
10. Supplies Inventory
11. ALLTAX™ Taxing System
12. ALLTAX™ Reporter
- PLUS—
13. Complete line of Microcomputer accounting software systems
14. Complete line of Microcomputer word processing software systems

online capabilities. And just as important, you want a user-friendly system that won't frustrate your financial and accounting people. MSA gives you this and more.

The fact is, we offer the most comprehensive line of application software currently available from one source. And with more than 6800 of our systems installed around the world, MSA software is user-proven and highly refined. But we don't stop there. We support every MSA software installation with the most extensive customer support organization in the industry.

And it's staffed with trained specialists who have only one full-time job—to be available and ready to help whenever you need them.

We Follow Up

Software maintenance costs can amount to more than fifty percent of your data processing budget. But your MSA application package includes a full year of support services *at no charge.* (After that, you can, like most of our customers, take advantage of our on-going support option.)

As part of our customer support program, we keep track of changes in government regulations, accounting procedures, and technological advances in the data processing industry. We keep you informed with regular update bulletins on how those changes can affect your operations. We also respond with timely enhancements and releases for your system.

Software For Microcomputers, Too

MSA's Peachtree Software division now offers a full line of business application and word processing systems for most popular microcomputers including the Apple II™ as well as microcomputers operating with a CP/M™ operating system.

And our systems are also available from IBM for the IBM Personal Computer.

Ask your MSA representative for details or call 1-800-835-2246 (Ext. 35) for the Peachtree Software™ dealer nearest you.

Send For More Information

For more information on MSA systems, please contact Robert Carpenter at (404) 262-2376. Or clip this coupon.



The Software Company

Management Science America, Inc.

3445 Peachtree Road, N.E. Atlanta, Georgia 30326

Please send me more information on MSA software systems. Write numbers from product list (at left)

Please send me more information on software for microcomputers from MSA's Peachtree Division.

NAME _____
 TITLE _____
 COMPANY _____
 ADDRESS _____
 CITY _____
 STATE _____ ZIP _____
 BUSINESS PHONE () _____
 COMPUTER TYPE/MODEL _____

DM 1/82

NEWS IN PERSPECTIVE

months since the idea was conceived in September 1978. In that span ECOM has changed identities more often than a chameleon. It began as a partnership between Western Union and the Postal Service, evolved into an "experimental" procedure with a termination date of Oct. 1, 1984, then metamorphosed into a full-scale service in which participating businesses will transmit messages to 25 servicing post offices. These post offices will transform the messages into hardcopy "guaranteed" to be delivered within two days.

Potential participants are advised, however, not to divest themselves of stationery and envelopes. There is one potential flaw in the Postal Service's grand design.

"There is no authority for the Postal Service to implement ECOM on Jan. 4, 1982," the Justice Department told the Postal Rate Commission (PRC).

An appeals court in the District of Columbia had earlier ruled against the PRC's decision that ECOM could only be "experimental." The USPS took that to mean full steam ahead; the PRC interpreted it as a nullification of its approval for ECOM. So did many others.

"Once the ECOM approved by the PRC was reversed by the court, there was no authorized ECOM system," said Stan Weinstein, attorney for Graphnet. That carrier has been spearheading legal activity by pri-

vate sector companies opposed to the implementation of ECOM. "Any system the Postal Service institutes will be illegal and unauthorized," Weinstein insisted.

USPS, which Justice alleged has "encouraged potential private sector competitors to stop contesting ECOM before the commission and to sign interconnection agreements with it," surely won't cooperate voluntarily. Unless a competitor—most likely Graphnet, with tacit support from Satellite Business Systems (SBS) and GTE Telenet—goes to court and obtains a tem-

"Any system the service institutes will be illegal and unauthorized."

porary restraining order, the Postal Service is free to proceed with ECOM.

"Our plans for electronic mail systems are not prompted by delusions of grandeur or a desire to displace private-sector activity," Postmaster General William Bolger said. "The simple fact of the matter is that we must advance with the times to do our job."

In this case USPS' job would be simple. Mailers' messages would be transmitted electronically by common carriers to computers in 25 serving post offices, all located in large cities. Machines in those offices would print the messages, fold

them, and stuff them in envelopes for delivery through the regular mail system. Those customers who meet the service's criteria—use transmission equipment approved by a USPS test facility, pay a \$50 annual fee, maintain deposit accounts, and provide a daily quantity of 200 or more messages—can get all this for only 26 cents for the first page and a mere nickel for each succeeding page. No stuffing, folding, labeling, sealing or stamp-licking. Not a bad deal at all.

There are those observers, however, who question whether the USPS ought to engage in this line of work, regardless of how well it might perform. And the price, while comparatively fair, will certainly be higher.

The Department of Commerce (through NTIA) and Justice jointly informed the PRC earlier this year that the USPS ought to stay out of electronic mail. The agencies called a USPS-operated service "wasteful" and argued it would reduce the incentive for private firms to offer electronic mail services. The two departments were expected to reinforce that opinion in a joint policy statement scheduled to be released late last month.

Even the protagonist admitted it has exceeded its budget. When the PRC approved the ECOM proposal, it recommended spending \$7.4 million. The USPS has spent \$32 million, a Pentagonesque overrun of 400%. There's probably more where that came from. Senior Assistant Postmaster General Jim Finch told the House Government Information and Individual Rights Subcommittee three months ago that "common sense would say it [the rate per page increase] would be substantial." Finch demurred on breaking down how much "substantial" would be, saying the USPS would have to wait until ECOM was operational before filing an appropriate rate request with the PRC.

"We don't believe the Postal Service should be involved in this business at all," a spokesman for the Computer Business and Equipment Manufacturers' Association (CBEMA) said. "We don't think it's within their purview at all. We think we should be doing it."

Perhaps the USPS will not be allowed to go ahead. But not for nothing has it scratched and clawed for 39 months. If the switch is thrown on Jan. 4, the USPS wants the transmission wires humming. But what companies will be on-line?

"I don't know who the customers will be," said Mike Cavanagh, a leading Washington consultant. "There appears to be very little user interest even at 26 cents a message, which clearly is artificially low. They're competing against a product already on the market—first class mail. All they're doing is putting things on paper rather than trucking them on the highway.

"They might get up to 100 million pieces per year, but that's nothing. There's

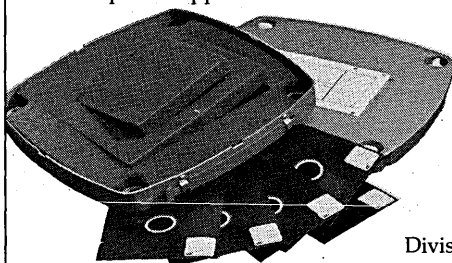
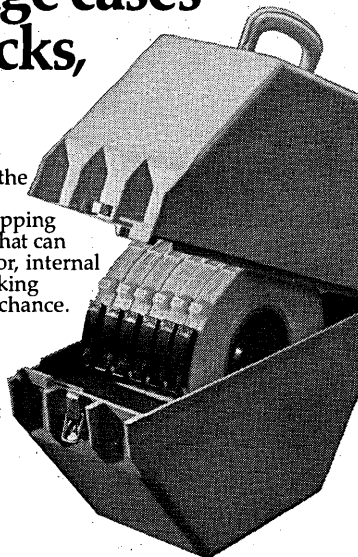
Data Vault™ Software shipping, carrying and storage cases that take hard knocks, save hard cash!

Tapes, disc cartridges, floppies. In Data Vault they can be shipped and stored safely, despite the roughest handling.

The Data Vault line of single and multiple shipping and carrying cases are software security cases that can take it. They've got rugged polyethylene exterior, internal shock-absorbing foam and a positive-action locking system. Dirt, dust, moisture just don't stand a chance.

But it's in the cash you save in shipping that Data Vault really pays off—far less expensive than custom packaging and far more reliable than last-minute makeshift packaging.

For a free catalog featuring the full Data Vault line and pricing information, contact your computer supplies dealer.



Dealer inquiries invited.

© 1981 Plastic Reel Corporation of America

PRC of America®

Division of Plastic Reel Corporation of America
475 Boulevard, Elmwood Park, New Jersey 07407
(201) 796-6600

CIRCLE 53 ON READER CARD

Great Printers

Don't Have to be Ugly.

Or
Heavy.

Or
Expensive.

Or
Unreliable.

Or
Loud.

Or
Hard to
Service.

Or
Poorly
Made.

Or
Huge.

Or
Unavailable.



GE 2030 30/60 CPS

GE 2120 120 CPS

The 2000
Team from
General Electric

Mail today to:
General Electric
Company,
TermiNet 794-65
Waynesboro, VA
22980

Telephone:
(703) 949-1170

Send me more information
about the new GE 2000
series printers.

Have a sales representative
contact me.

I'm interested in a
GE 2000 printer demonstration.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____

We Bring Good Things to Life

GENERAL  ELECTRIC

CIRCLE 42 ON READER CARD

DM/1-82

Who will be first with the software of the future?

It could be you and Hughes Ground Systems.

Today Hughes warning systems form rings around the world. Throughout the NATO countries, the Far East and the United States, Hughes sonar, radar, communications, computers and displays form interactive systems serving whole countries — all dependent on advanced systems and software that you could help develop.

From undersea to outer space, there's really no limit to your career in software at Hughes.

And to facilitate your work, we've assembled a division comprised solely of software engineers. We've created the world's newest, most sophisticated software environment. You'll work with your own terminal on a fully interactive software development

system that includes graphics aides and simulation support for software design.

And if you're qualified, we'll show you an incomparable career path to the top of the field. It's all at Hughes, with 1500 projects and a backlog of over \$6 billion.

Who will be first with the software of the future? It could be you and Hughes.

At Hughes Ground Systems, we'll introduce you to people, ideas and jobs that could change your world. And maybe ours.

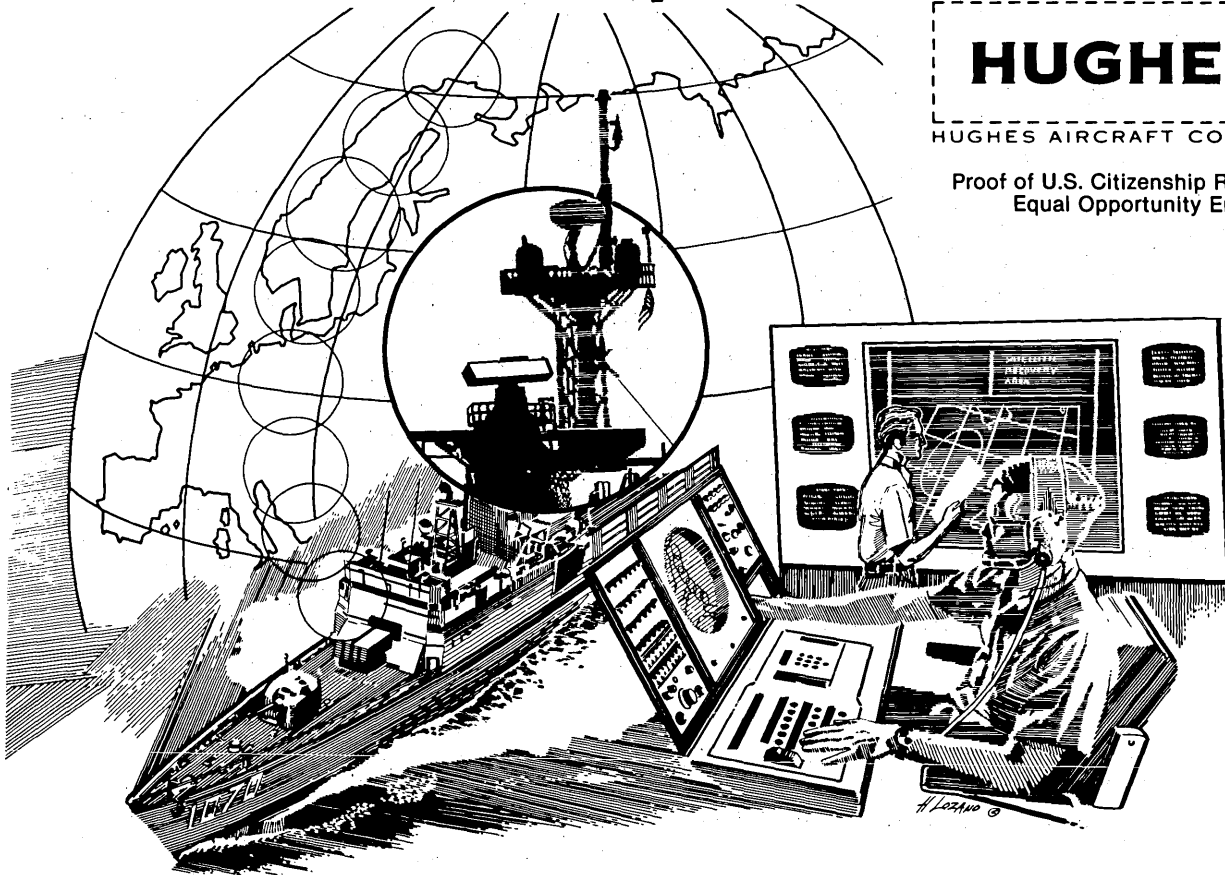
Call or send resume to:

Hughes Ground Systems
P.O. Box 4275, Dept. D-1
Fullerton, CA 92634
(714) 732-7098

Current openings:

Software and Systems Test Engineers
Software Systems Engineers
with experience in:
Systems Software
Tool Development & Graphics;
AED Language and
CAPS 6 Computer
Software Development
Environment Engineers
with experience in:
Programmers Workbench/
UNIX/C Language
Group Heads and Programmers
with experience in:
Sonar or Torpedo Technology;
Software Development
Environment Area;
Utilities, Executive, Displays,
Operational Support;
Air Defense;
Real-Time Systems/Executive
Controls/Diagnostic Applications;
Operating and Data Management
Systems/Navy and Army
Systems/Communication Systems

It could be you and Hughes **Ground Systems**



HUGHES

HUGHES AIRCRAFT COMPANY

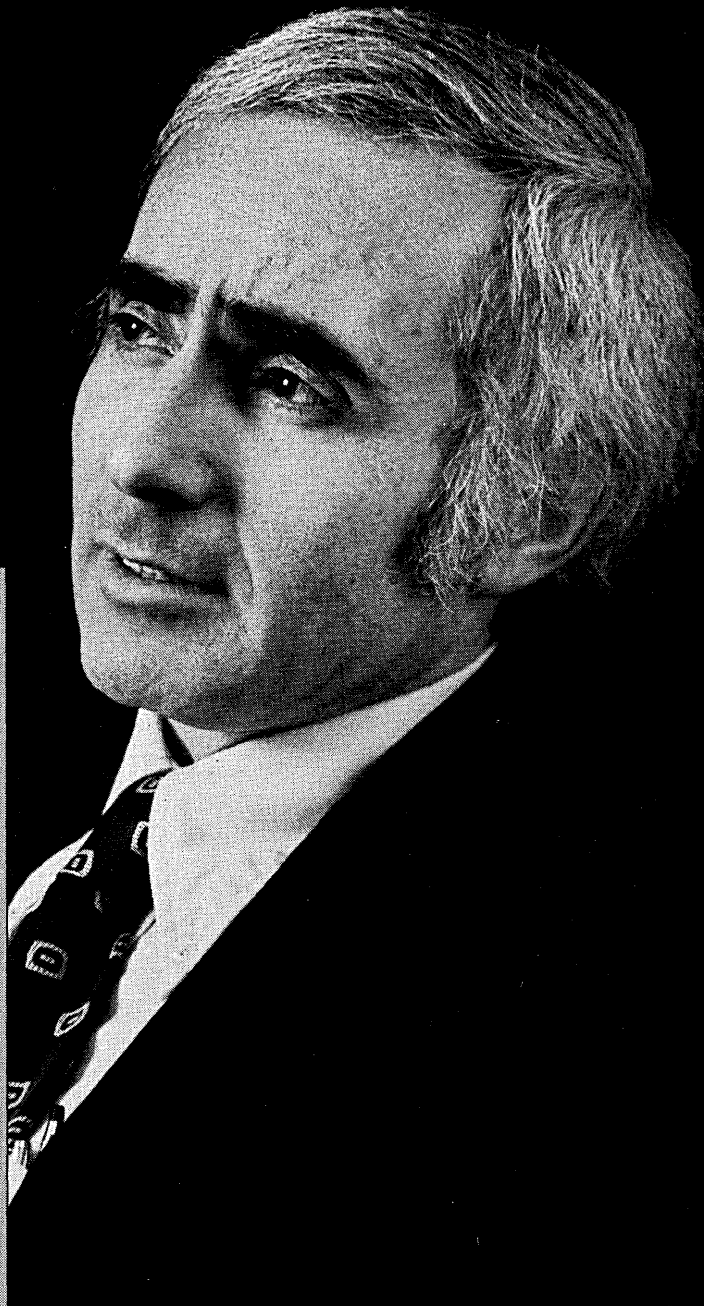
Proof of U.S. Citizenship Required
Equal Opportunity Employer

“

**We get
many
systems
up
instantly
with
INQUIRE.®**

Len Shainheit
Group Leader, Engineering

”



It's a real life situation when one of our engineers will walk into the information center and say, "I'm leaving on an airplane for Singapore this afternoon. I need some drawings and correspondence I think were done three years ago on such and such a project." He will board the airplane with his drawings and memos, thanks to INQUIRE. As the engineering division for a major oil company, we have over 50,000 valuable documents on microfilm. The contents of those documents and other information is kept on INQUIRE. We can do searching by keywords to find all documents pertinent to a given subject. Such access to past information saves us many man-years of labor and allows us to build on our past experience.

professionals to rapidly build a database, write required reports, and through its macro language, make the system transparent to a user department. In the end, anyone can operate INQUIRE. Our personnel department uses an INQUIRE system heavily. In another database we keep track of all contract engineers and their skills. I have built a "business card and casual conversation database" for my boss, who travels a great deal and likes to collect business cards of people he meets around the world. When he plans a trip, he takes a printout of all past acquaintances in that part of the world. That database was a spare-time project.

INQUIRE allows us to bypass the "study" phase of a system. Working directly with the

user, showing him results immediately, we achieve our finished system faster. Moreover, since the user has been involved at the outset, the situation of being presented with something completely unknown just disappears.

I'm personally very glad to have INQUIRE around.

If you run MVS, VS-1 or VM, productive software from Infodata can help solve your information problems. Call us today to find out exactly how.

Infodata

Infodata Systems Inc.
5205 Leesburg Pike
Falls Church, Virginia 22041
800-336-4939
In Virginia, call 703-578-3430

Offices in:
Dallas, Los Angeles, New York
Rochester, NY, St. Louis, Washington, DC

CIRCLE 43 ON READER CARD

NEWS IN PERSPECTIVE

100 billion pieces of mail delivered each year. The Postal Service has sold ECOM as something that will reach 50 billion pieces. That's just not going to happen. They'll probably have a nice little business of 50 million to 60 million pieces."

Not so nice, nor so little, however, for potential competitors. Should that scenario come to pass, then the Postal Service would have an opening to do what its rivals fear most—enter the telecommunications market. As a \$22 billion corporation with 650,000 employees, it would suffocate potential competitors. There are also fears among common carriers that first class mail revenues would be used to subsidize telecommunications business. Allegations abound, consistently denied by Postal Service officials, that first class mail already subsidizes lower class rates.

"The potential for cross-subsidization is enormous," Weinstein contended. "You'd have the same problems as dealing with AT&T. Actually, they'd be worse, because the USPS is a governmental agency and pays neither income taxes nor real estate taxes. Competing with the government would hardly be in our best interests. And if they're serious about deregulating, it wouldn't be in theirs either."

"We are not getting into the telecommunications field," board of governors chairman Robert Hardesty promised skeptical members of the House Subcommittee on Postal Operations and Services at a hearing last month. "We have absolutely no desire to get into telecommunications. We intend to use our leased lines the same way we use planes. We don't own the planes, and we're not going to own our telecommunications systems. We want to use private enterprise."

Some parts of that entity worry they will be used in more ways than one.

"There's no big threat in the USPS beginning service on Jan. 4 if they just do physical delivery," said Herb Jasper, executive vice president of the Ad Hoc Committee for Competitive Telecommunications (ACCT). "But if they're talking about entry into the market as a carrier, then Justice and Commerce will scream. So will we."

"I don't believe the telecommunications industry is worried about ECOM's success," a knowledgeable source said. "They're worried about failure. That would give the Postal Service a chance to take action—like getting into telecommunications—ostensibly to recover costs."

"But you have to wonder if they'd handle the business properly. And you could certainly argue they won't make it competitively. They're not even making it against United Parcel delivering packages. How are they going to make it in telecommunications without any expertise and experience?"

"We're not involved in the telecommunications phase of electronic mail at all,"

Hardesty said to the House subcommittee. "The Postal Service is instead bringing the American people the advantages of new technology the way it always has."

Some would argue that claim too.

—Willie Schatz

POLICY

U.K. HITS TELECOM MONOPOLY

The Thatcher government moves to liberate industry from British Telecom's bureaucratic control.

The British government is leading an attack which could crack state control over telecommunications in Europe and ultimately prove a bonanza for U.S. and Japanese vendors while providing more efficient multinational operations for users.

The attempt by the British government to "liberate" telecommunications from the bureaucratic administration of

British Telecom, the U.K. PTT (Post, Telegraph, and Telephone), goes far deeper and is more aggressive than anything else yet seen in Europe.

For the first time in Europe, there will be a private rival to the publicly owned basic network transmission service. The reason: the British government plans to take out of British Telecom's hands the authority to approve equipment attachments and value-added networks (VANS). Why? The government is determined to ensure that British Telecom is stimulated to act competitively. The U.K. PTT will not be allowed to block the liberalization thrust.

Central to this thrust is the 1981 British Telecommunications Act, which radically reduced British Telecom's monopolistic powers. It is viewed as the most significant manifestation of Prime Minister Margaret Thatcher's aim to "roll back the tides of government intervention." Her policy is being enthusiastically implemented by Europe's first Minister of Information Technology, Kenneth Baker.

Baker believes that the British approach could become a model for the rest of Europe, Japan, and other countries with state PTTs. Many telecommunications users say they hope that the U.K. initiative will spread like wildfire, although it is likely

HOW EUROPEAN PTTs WIELD THEIR POWER

The following table was provided by British consultants Logica to a study conducted by Professor Michael Beesley, professor of economics at the London Graduate Business School for the U.K. government. The Beesley report* became a blueprint for the government's liberalization policy.

The table shows the ranking of countries by "telecommunications liberality" in 1980 (before the British Telecommunications Act). The four categories are:

- Resale of facilities to third parties
- Connection of privately supplied equipment to common carrier facilities
- Regulations governing the use of intra-organization private circuit networks
- Network charges made for private circuits

The higher the ranking, the more liberal is the régime:

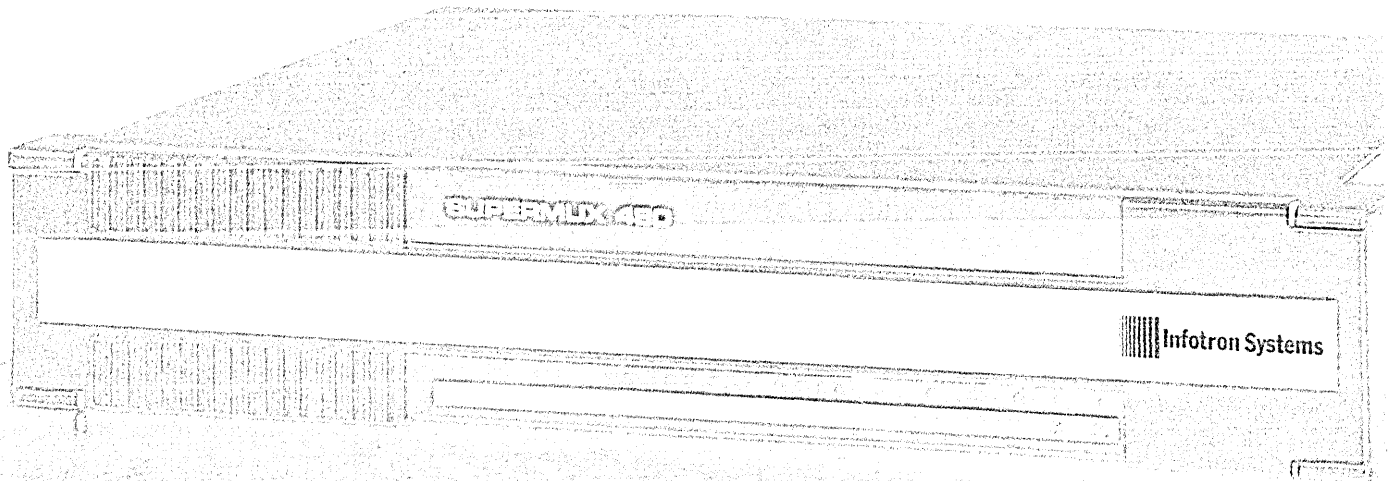
- A "3" means generally permissible, few restrictions, or, for tariffs, low cost charges.
- A "2" means permitted with restrictions, or, for tariffs, "moderate charges with some punitive element."
- A "1" means permitted only to government authorities, or with heavy restrictions, or complete prohibition. For tariffs, a "1" means punitive charges designed to discourage the use of private circuits."

*Liberalization of the use of British Telecommunications Network (Her Majesty's Stationery Office, London, 1981).

RANKING OF COUNTRIES BY TELECOMMUNICATIONS LIBERALITY (1980)

	Resale	Connection	Regulation	Tariffs
Austria	2	2	2	2
Belgium	2	2	2	2
Denmark	2	1	2	3
Finland	2	1	2	1
France	2	2	2	2
Germany (W.)	2	1	1	1
Greece	2	2	2	1
Ireland	2	2	2	3
Italy	2	1	2	2
Luxembourg	2	2	2	3
Netherlands	2	2	2	3
Norway	2	1	2	3
Portugal	2	2	2	2
Spain	2	1	1	2
Sweden	2	1	2	3
Switzerland	2	1	1	1
U.K.	2	2	2	3
U.S.	3	3	3	3

Source: Logica Ltd.



You can now connect up to eight remote terminals to a single telephone line. You save the cost of the lines and modems and you improve system efficiency and performance. The Supermux 480 solves the problem of those line "fills" that show up as trash. Data is temporarily buffered, checked for errors and retransmitted, if necessary, all transparent to your terminals, CPU and software.

The Supermux 480 Statistical Multiplexer allows up to eight remote terminals to share a single telephone line. You save the cost of the lines and modems and you improve system efficiency and performance. The Supermux 480 solves the problem of those line "fills" that show up as trash. Data is temporarily buffered, checked for errors and retransmitted, if necessary, all transparent to your terminals, CPU and software.

Microprocessor-controlled Supermux 480s mix up to eight dial-up and dedicated asynchronous inputs at speeds to 9600 bps. With our optional "bandsplitter" you can even add two remote synchronous terminals, concentrating a total of ten inputs down a single output line that operates at a fraction of the speed (and cost) of the combined inputs.

Infotron Systems Corporation
 Cherry Hill Industrial Center
 Cherry Hill, New Jersey 08008
 Telephone: 800-257-8352 609-424-9400
 TWX: 710-940-1247

Infotron Systems Ltd.
 Poundbury Road, Dorchester,
 Dorset DT1 2PG England
 Telephone: (0305) 66016 Telex: 417276


Infotron Systems
 First in Performance and Reliability

AVAILABLE FROM DISTRIBUTORS
 THROUGHOUT THE UNITED STATES

CIRCLE 7 ON READER CARD

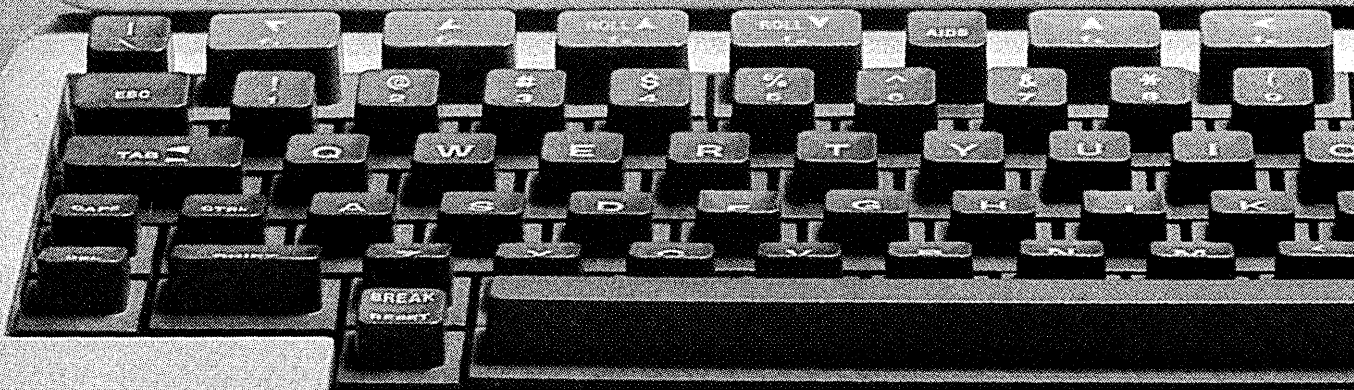
QUARTERLY SALES REPORT

SALES REGION	PREVIOUS QUARTER			CURRENT QUARTER			QUARTER
	actual	target	%target	actual	target	%target	
Eastern	300	307	94	222	342	65	Q1
Southern	127	159	89	119	171	69	Q2
Midwest	107	100	106	142	142	100	Q3
Western	111	108	91	111	111	100	Q4
Europe	111	231	91	111	111	100	Q1
Canada	70	111	68	101	140	72	Q2
Mexico	47	49	96	27	60	61	Q3
Japan	107	92	116	107	117	81	Q4
India	61	61	100	61	61	100	Q1
China	14	14	100	14	14	100	Q2
Korea	5	5	100	5	5	100	Q3
TOTAL	1566	1579	99	1178	1834	64	Q4

Try it on for size.

MESSAGES 47 80 DAILY SCHEDULE SALES REPORT PHONE BOOK ORDER STATUS FORE CAST LETTERS

hp 2382A
HEWLETT-PACKARD



Prop up this magazine against your IN Box and you'll get a good idea of how the new HP 2382 office display terminal would look on your desk. It's that small!

It's got a price to match.

At only \$1700, the HP 2382 provides an affordable and personal "information window" for people in many different departments. They'll be able to see at a glance the information they need for responsible decision making. Whenever they need it.

It's very fitting.

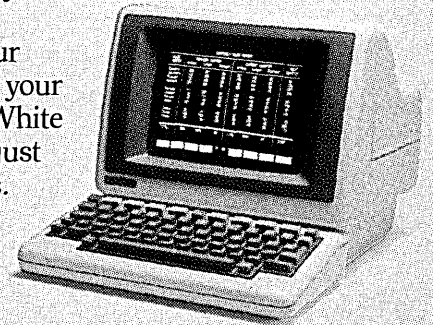
The 2382 is really a full-capability terminal — with "big terminal" features like screen-labeled soft keys, block mode and local editing. But its compact and pleasing design makes it as easy to accommodate on the office desk as the telephone. And it's almost as easy to use.

The detached typewriter-style keyboard has a coiled cord that won't interfere with the desktop work area. And the keys have a sculptured profile and a velvet finish for a friendlier feel. There's even a deep-dish touch on the "F" and "J" keys for easy location of the "home row."

The HP 2382 works with computers from most major manufacturers. But no matter what system you use it with, it's backed by HP's worldwide service organization. *And* our reputation for high-quality products.

Prop up this magazine on your manager's desk, too. Then contact your local HP sales office listed in the White Pages to size up the situation. Or just return the coupon for more details.

You can size up the HP 2382 at Productivity '82. Watch your newspaper for more details.



When performance must be measured by results.



Yes! I'd like to find out more about HP's new office display terminal.

Send information on HP's complete line of data terminal products.

Name _____

Title _____

Phone _____

Company _____

Address _____

City _____

State _____

Zip _____

Mail to: Hewlett-Packard, Attn: Tom Anderson, Dept. 04116,
974 East Arques Ave., Sunnyvale, CA 94086.

Price U.S.A. list — subject to change without notice.

Keyboard reproduced actual size (11" wide); CRT appears slightly smaller because of photographic perspective.

42104 HPT 60

CIRCLE 77 ON READER CARD

Precision Visuals, Inc. Graphics Software Tools.

Announcing The Next Step In Graphics Software

Here's why Precision Visuals has sold over 120 graphics software packages—47 to Fortune 500 companies—in less than 18 months:

1. Efficiency & Economy

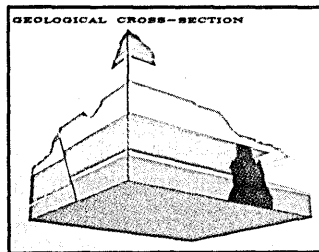
Precision Visuals' software tools are standardized, user-callable subroutine packages. They will save you hundreds of programming hours by forming the foundation of your graphics application programs. Their unique distributed-network design provides extraordinary economy of computer resources.

2. Versatility

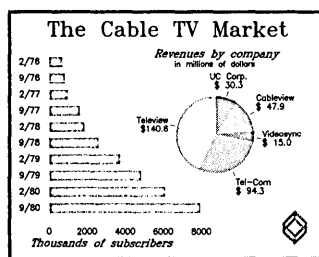
Precision Visuals' software tools provide the capabilities for performing virtually any graphics application: full-color, 3-D, dynamic image manipulation, full access to graphics input, graphics data structuring, a device-independent picture library, a business graphics vocabulary, and much more.

3. Adaptability

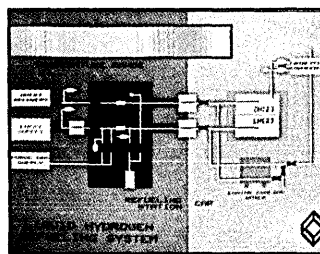
Precision Visuals' software tools currently run on 15 different computer systems, driving 26 different graphics display devices. They take full advantage of today's—and tomorrow's—most sophisticated graphics hardware, and are upward compatible with emerging hardware technologies.



*Geological Processing
for Energy-Related Fields*



*Effective Economic, Demographic
and Scientific Data Presentation*



*Real-time Process Control and
Monitoring on Color Raster Displays*

4. Simplicity

Precision Visuals' software tools represent a refined approach to human-interface design. The functional classes are unusually consistent and coherent, and "special cases" have been practically eliminated.

5. Application Independence

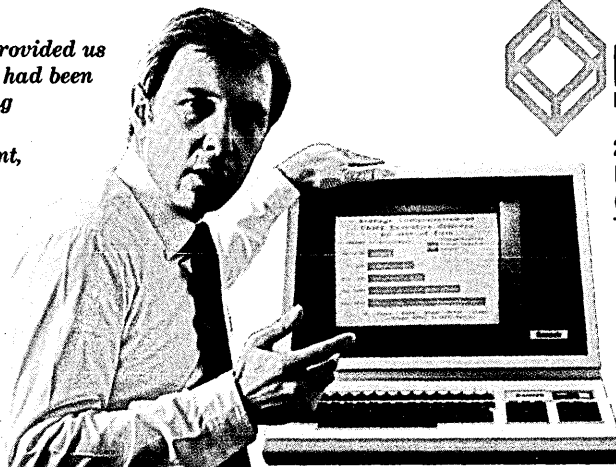
Precision Visuals' software tools are being used in virtually every major industry, including aerospace, energy, communications, engineering, government, service bureau, systems integration and education . . . for applications such as computer-aided design, business graphics, process control, mapping, geological data analysis, and document layout. In fact, Precision Visuals' software tools have become the corporate-wide graphics standard for many of our customers.

Precision Visuals is the pioneer in graphics software tools. We have earned a reputation for doing a good job for demanding customers (our customers particularly appreciate our emphasis on documentation and support).

To learn how you can streamline your graphics applications using Precision Visuals' family of graphics software tools, including DI-3000™—the core system, and GRAFMAKER™—the business presentation system, circle the Reader Service number or call Geoff Scott at 303/449-0806.

"DI-3000 and GRAFMAKER have provided us with the graphics toolbox concept we had been looking for to service our timesharing customers. Resource management is critical in a timesharing environment, and we are especially impressed with the modest memory requirement and execution efficiency of both packages."

Dr. Richard R. Socash, President
Research Information Corporation
Founder, TENTIME Timesharing Services



Precision Visuals
Incorporated

250 Arapahoe Avenue
Boulder, Colorado 80302 USA
(303) 449-0806
TELEX 45-0364/TWX 910-940-2500

CIRCLE 78 ON READER CARD

NEWS IN PERSPECTIVE

that major countries like France and West Germany will take their time before implementing any important new moves towards liberalization.

According to Kenneth Baker, "The U.K. telecommunications framework is now unique. It is a halfway house between America's free market controlled by a regulatory authority and a Niagara of litigation, and the corporatists or national monopoly favored in Europe."

Baker accepts that standards must be set and monitored to ensure the quality of equipment attached to the network. The whole standards making process, however, is being shifted from British Telecom to the independent British Standards Institute. Another independent body, the British Electrotechnical Approvals Board, will ensure an efficient and swift method of private sector approvals.

Although the full standards will not be available until spring, Baker has insisted on interim arrangements to get approvals under way. And he is outspoken about his attitude. "The public is fed up with being

For the first time in Europe, there will be a private rival to the publicly owned basic network transmission service.

told that everything will happen tomorrow. I do not intend to allow the situation to become immobilized while we wait for the full set of standards," he said sharply. "The time for game playing and foot dragging behind technicalities to defend long established restrictive practices is over. Customers want the choice of adding to their telecommunications installations, and they want that choice as soon as possible."

Despite Baker's drive, American vendors licking their lips at the prospect of a lucrative new market may still have to wait. Full liberalization is scheduled for July 1983, when large Private Automatic Branch Exchanges (PABXs) will be freed. But before then, other equipment, including VANS, will be liberalized, mainly during this year.

In addition to meeting technical standards, the government would like to ensure that vendors will provide "some advantage to the U.K. economy." This is likely to lead to joint ventures and the establishment of U.K. manufacturing plants. Already GTE of the U.S. has teamed up with British electronics company Ferranti in a jointly owned company. Canadian telecommunications company Mitel has marketing deals with ICL and British Telecom. And British Telecom is starting an electronic mail service this year based on the system developed and operated in the U.S. by Dialcom Inc.

A leading European expert, Roger Camrass, senior telematics consultant for Arthur D. Little in Europe, warns that there

Join PRC in Sunnyvale—

CREATING MINICOMPUTER SOFTWARE SYSTEMS FOR AN EXPANDING UNIVERSE.

At PRC's brand new facilities in Sunnyvale and Los Angeles, California, there is exciting, challenging work in progress on vital, high technology software systems utilizing VAX hardware on a program of far-reaching importance.

These are high technology software systems calling for individuals who are U.S. Citizens with rigorous background investigations, and who have appropriate physics/math backgrounds. There are immediate openings for:

SOFTWARE SYSTEMS DESIGN ENGINEERS— with 8-10 years experience including analysis, design and test planning for large scale multiprocessor real time systems. Must be familiar with state of the art methods for software systems engineering and specific background involving PDP 11/70, 11/45, VAX 780, RSX 11D or RSX 11M and MACRO-11.

PROGRAMMER/ANALYSTS— with 2 or more years in the hardware/software areas outlined above, and experience in analysis, design, coding, implementation for real time software systems at the detailed specification level.

Write fully in confidence to Technical Staffing,
Planning Research Corporation, Suite 2400,
10960 Wilshire Blvd., Los Angeles, CA 90024.

Planning Research Corporation

An Equal Opportunity Employer

CIRCLE 79 ON READER CARD

JANUARY 1982 85

NEW AJ 520. THE ONLY 132-COLUMN CRT WITH ENGLISH MENU.

Innovative design puts the AJ 520 video display terminal in a class by itself for high productivity.

For example. When you start to work, just press one key to display terminal settings. Instantly. In plain English.

And if you want to change any setting, the display shows you exactly what to do. You never have to decipher codes, refer to manuals, set switches at the back of the machine. Just press the keys indicated. Nothing could be faster, easier, more foolproof, more conducive to productivity.

Of all the 80/132-column CRT's on the market, only the AJ 520 gives you this simple English set-up menu.

Other productivity features abound on the AJ 520. Such as a 5K memory (expandable to 21K), bi-directional scrolling, character/line insert/delete, 24 programmable multi-step function keys with non-volatile memory support, and ANSI coding with VT-100 and VT-52 compatibility.

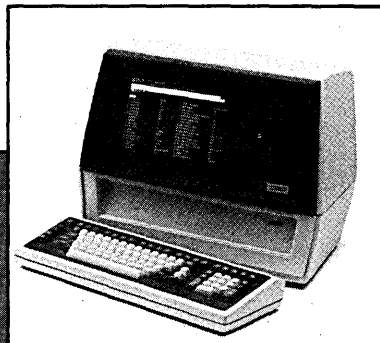
And—because a comfortable operator is a productive operator—we've

built-in the most comprehensive array of comfort features available on any CRT. Including the largest characters available for exceptional screen legibility.

Call your nearest AJ regional office for details: San Jose, CA (408) 946-2900; Rosemont, IL (312) 671-7155; Hackensack, NJ (201) 488-2525. Or write Anderson Jacobson, Inc., 227 Devcon Drive, San Jose, CA 95112.

Also available through AJ subsidiaries in Markham, Ontario, Canada; Montrouge, France; Slough, Berkshire, U.K.; and Bergisch Gladbach, West Germany.

 **ANDERSON
JACOBSON**



**ANOTHER AJ
INNOVATION
TO MAKE YOUR
COMPANY RUN BETTER.**

BEEP A TO EXIT PRESS "SETUP"
TTYS USE CONTROL A OR B OR C KEY TO SELECT SETUP A OR B OR C.
[a] select field to be changed, enter the character(s) in front of it or use the cursor up & down keys.
[b] select a new option, enter the number(s) in front of the option wanted or use cursor right or left keys.
[c] ONLINE, 2-OFFLINE

B LOCAL COPY	ON	S PRINT LINE LENGTH	ACTUAL LENGTH
C SCREEN WIDTH	80	T WRAP AROUND	ON
D CURSOR TYPE	BLOCK	U SEND WITH	ON
E CURSOR BLINK	OFF	V DO \$ WHEN RECEIVED (ANSI AL)	OFF
F STATUS LINE	ON	W DESTRUCTIVE BACKSPACE	OFF
G BACKGROUND	DARK	X DISPLAY CONTROL CHAR	NONE
H BRIGHTNESS	8	Y COMN PROTOCOL	NONE
I CONTRAST	16	ZA COMN TRANSMIT SPEED	300
J MARGIN BELL	ON	ZB COMN RECEIVE SPEED	300
K 3 KEY SHIFTED	# SYMBOL	ZC COMN PARITY & BITS/CHAR	EVEN (7 BITS)
L VOLUME	MEDIUM	ZD AUX COMN PROTOCOL	NONE
M AUTO REPEAT	ON	ZE AUX COMN TRANSMIT SPEED	300
N AUTO REPEAT TIMEOUT	0.5 SEC	ZF AUX COMN RECEIVE SPEED	300
O AUTO REPEAT RATE	30 CPS	ZG AUX COMN PARITY & BITS/CHAR	EVEN (7 BITS)
		ZH COMPATIBILITY	ANSI

CIRCLE 80 ON READER CARD

NEWS IN PERSPECTIVE

may be too many fish swimming in the liberated pool. "There are likely to be about 12 companies operating in the U.K. selling PABXs. But the total PABX market is only about \$100 million a year. However, the U.K. looks like a tempting prospect as a stepping-stone to the rest of Europe. In fact, the U.K. has become something of a test bed for new telecommunications approaches."

Tony Martin, U.K. technical support manager for U.S. communications vender Timeplex, says that liberalization will open up "an enormous new market, particularly in low speed modems and the provision of total networks which were closed to us before." He warns U.S. manufacturers they may find that some products which can be sold in the U.S. will not pass U.K. standards. But he welcomes such quality control even if it leads to a little delay in getting approval, since it will cut out cheap substandard products that could flood the market.

In the long run, however, the most significant liberalization initiative in the U.K. could be Project Mercury. This is a

"Customers want the choice of adding to their telecommunications installations, and they want that choice as soon as possible."

private network offering direct competition to British Telecom's transmission services. It is being run by a consortium of Cable & Wireless, a British communications company that was recently denationalized; oil giant British Petroleum; and Barclays Merchant Bank.

Although details of Mercury's operations and tariffs are not yet known, this move is generally recognized as the biggest breach of PTT monopoly. Derek Nicholas, telecommunications systems manager at Monsanto Europe in Brussels, believes it is an exciting experiment that will stimulate British Telecom into being more conscious of commercial factors. "British Telecom will now take on the shape of an organization more suited to today's environment and more efficient in the future than it would have been," he said.

Colin Southgate, chief executive Britain's largest computer services company, BOC Computer Services, is not yet convinced that his company will use the Mercury network. "But its mere existence has shaken up British Telecom," he said. Southgate heads the Datastream financial information service with over 400 terminals in London's financial district, the City. British Telecom recently took a weekend to move Datastream's communications operation, and took three weeks to install new lines and advanced links, which were part of a special service to the City. "In the past we could have waited months or years for

Before you choose your backup center... ask yourself these questions.

The Recovery Center you select in your computer disaster contingency plan could some day mean the survival of your business. SUNGARD recognized the growing concern about computer dependency in 1978, and opened the first and still most comprehensive Recovery Center available. We're well down the learning curve in offering a capability designed to service the recovery needs of today's critical on-line environments. There are significant contrasts between SUNGARD Recovery Services and some of our competitors. These contrasts should be clearly understood by you and your top management if you're serious about backup. Below are some of the most pertinent questions. There are others. Give us a call at 800-523-4970. SUNGARD has the answers.

Q. Can I be confident the Recovery Center will work?

A. You can if you can demonstrate to yourself and to your management that you have a tested backup capability that runs your critical applications. SUNGARD subscribers have conducted over 600 successful tests of their backup systems. Their early and continuous testing has the support of our technical professional staff, which has the skills and experience to make that job easier.

Q. How are tests supported?

A. At SUNGARD, they're supported with qualified technical SUNGARD personnel from every appropriate discipline. If you don't think you need experienced technical support (software, telecommunications, operations) to achieve a testable backup capability, you may have too many people on your staff.

The experience gained by a Recovery Center staff in supporting customer testing improves your ability to develop an effective capability. The absence of that experience (or worse, the absence of a Recovery Center staff) has the opposite effect.

Q. Can I back up my critical networks?

A. You can at SUNGARD. Our most effective answer to this question is the many users who have a tested capability today at SUNGARD. Non-believers are converted by a visit to our centers. At our Philadelphia Centers, we have in place and operational more than 150 modems of various manufacturers. Dial backup units, central office connections, cabinets, cabling and over 100 3705 ports are in place and operational. All these elements for network backup are interconnected through a Network Control Center which allows for rapidly customizing the capabil-

ity to the unique requirements of each user. And all these elements (except the modems) are in our basic price. If you can't back up your on-line systems, you haven't accomplished anything.

Q. Is the hardware adequate to my needs, current and compatible, or is it "tired iron"?

A. You shouldn't sign for a 370-based backup system when you already have the 3081 in your plans. The 165 is unsupported now. What IBM version of the SP will leave the 168 behind? At SUNGARD we have current IBM hardware installed and a firm commitment to the 3081. We replaced our 168 in 1979. And we're committed to remaining current, not only with processors, but also with peripherals.

**Sungard
Centers
have the
answers.**

Q. Is the facility itself suitable and secure?

A. Each of the three SUNGARD Recovery Centers has an average of more than 30,000 square feet dedicated to supporting the recovery needs of SUNGARD subscribers. This includes, in addition to the backup configuration, a ready-conditioned space in each center with sufficient cooling and power for a replacement 3033 and associated peripherals. Four thousand square feet of office and terminal space is equipped with power and telephone jacks for your recovery team. And the entire facility is secured with a controlled access system and fire detection and protection systems you should expect in a first class center.

Q. Who are the other subscribers, and are they satisfied with their Recovery Center?

A. As a SUNGARD subscriber you will have the right to know who the other users of your backup center are. As a SUNGARD prospect we'll share with you the names of Fortune 500 Industrials and Fortune 200 Financial institutions which have agreed to let us refer you to them to help you evaluate SUNGARD. You'll recognize the names and appreciate their seri-

ous commitment to providing the best available Recovery Centers for their installations. Our subscribers can report to their management with confidence that they have a tested recovery capability that works.

Q. What is the true cost of having a Recovery Center to go to in the event of a computer disaster?

A. We're the high-priced spread, but you get much more with SUNGARD. Our standard offering includes everything you need, so your cost with SUNGARD is very visible. Hidden costs to make other centers usable, especially network backup, can drive their price past ours.

We think that a workable disaster recovery solution is part of the cost of doing business in today's computer-dependent world. When compared with other accepted costs of doing business, your monthly recovery fee at SUNGARD is:

- Less than the cost of a security guard around the clock.
- About half of what you pay for monthly maintenance on your processor.
- Less than one string of disk drives or bank of tape drives.
- The equivalent of about \$1.50 per square foot per year, including equipment, test shifts and technical support.

Q. Can I test remotely?

A. Yes. You can run your backup system without sending your recovery team to the SUNGARD Center. With remote testing and the opening of our third SUNGARD Center in Chicago in December, and our West Coast and Southwest Centers planned for 1982 and 1983, distance should not be a significant factor. And this network of SUNGARD Centers offers you added protection in the event that your primary SUNGARD Center is occupied by another subscriber experiencing a disaster.

At SUNGARD, we are committed to providing a quality nationwide service. Recovery services is SUNGARD's only business. We originated the concept and assembled an organization of talented, experienced professionals to support your needs. Nobody can touch SUNGARD's experience, commitment and capability in providing disaster recovery services.

For more information, call 800-523-4970. In Pennsylvania, call collect to 215-972-4776.

Sun INFORMATION
SERVICES
COMPANY
A Sun Company Subsidiary
Copyright 1981, Sun Information Services Company

CIRCLE 81 ON READER CARD

NEWS IN PERSPECTIVE

British Telecom to do this," Southgate commented.

For multinational users, the liberalization will not make a great deal of difference to operations outside the U.K. But Andrew Karney, deputy manager of the telecommunications division for Logica, U.K.-based consultants, says that at least it will mean "one less problem" for U.S. managers considering international activities. U.S. companies can now expect to use the same telecommunications services in the U.K. as they have in the U.S.

The large international GEISCO network, for example, hopes to bring the U.K. value added services like electronic mail, which has been available in the U.S. for many years. But they will still be faced with restrictions elsewhere in Europe.

Karney believes that once European users experience benefits of a more liberal telecommunications environment, pressure will build up on other countries. "They will be picked off one by one."

European telecommunications experts and users do not expect significant shifts elsewhere in Europe for at least two or three years and nobody can foresee another private network like Mercury. France has been tightening state control under the socialist Mitterrand régime. The French government, for example, recently bought out the users' stake in the Transpac network.

The country looked to with most interest now is West Germany. Together with the U.K. and France, it is one of the top three in terms of market size. Most users

American vendors licking their lips at the prospect of a lucrative new market may still have to wait.

point to the Deutsche Bundespost, the German PTT, as the most monopolistic in Europe. High tariffs and restrictions on use of lines have meant, for example, that little growth is expected in remote bureau communications services in Germany, whereas they are growing by over 15% a year for Western Europe as a whole.

One user commented that "the Bundespost monopoly is crumbling at the seams. Big users are really upset at the high costs and restrictions and are putting on pressure for change. The government seems to be beginning to recognize that some liberalization is needed to restore Germany's telecommunications competitiveness. Multinationals who experience the benefits of the open U.K. environment will be given more firepower to shoot down the Bundespost's stranglehold." Provided that liberalization delivers the benefits expected by users, the influence of the British Telecommunications Act of 1981 may prove to be a landmark in international information technology developments.

—Malcolm Peltu

PRODUCTIVITY

LET THE USERS PROGRAM

Championing the cause of end-user applications programming is none other than famed author and lecturer James Martin.

Applications program development is a major problem for most corporations. Many large dp centers quote as much as two-year lead times to internal users who need new applications programs.

But now a new methodology is changing corporate users' reliance on dp programmers to develop their applications. The key to this new trend is the appearance of simpler step-by-step program development languages that are making it possible for users without detailed programming expertise to develop their own applications.

Although these advanced query languages have been available for a few years, their use potential by non-dp staffers has been retarded by the resistance from traditional dp personnel who want to defend their domains. But a few corporations have instituted end-user use of these fourth generation languages with dramatic improvements in applications development.

The person who is championing the cause of this simplified method for writing applications is none other than famed author and lecturer James Martin. In a new book appropriately titled *Applications Development Without Programmers*, Martin claims that in some corporations, 80% of the programming budget is devoted to keeping existing programs current and only 20% is available for new applications.

To remedy the "impenetrable wall between the application user and the application creator," Martin advises users to begin programming their own applications software.

Application generators such as Univac's Mapper have allowed users to develop software that previously had to be done with the help of skilled programmers. In fact, Martin says, the Santa Fe Railroad used Mapper to put together "an entire railroad operating system; it was done in different bits and pieces by end users. They created a very large set of applications relating to the control of goods ... and put the data into Mapper's relational database so that it could be searched in many different ways. In the whole of the story there was no programmer and no dp system analyst involved," he related in a recent interview.

Direct user applications software development must have the support of top management if it is to succeed, Martin stressed. "As soon as high management begins to realize that this is technically possible and other corporations have done it, they can start the peacemaking activities."

Because of dependence on standard approaches and methods, the dp community has been slow to recognize the potential benefits of the new languages. But typical application bottlenecks make it imperative that innovative solutions be found, he said.

"There's no question that there's a whole set of techniques now which relate to the planning and design of databases. We need to get top dp management to understand that so they can make sure these methodologies are used correctly. Most of these involve getting end users and user management to help by specifying their own objectives, their own data requirements, inspecting the data dictionary, helping to define the data, etc. In general, you want to draw out the knowledge of the subtleties of data which end users have, which businessmen have, which typical computer professionals may not have," Martin explained.

"Once you set up the environment where end users do it, it spreads like a drug through the organization. The message is passed very rapidly from one user to another, and they all want to get rid of their own paperwork and build their own relational facilities."

Martin says that once companies get user application development in place, it is not uncommon to see "1,000% improvement in productivity of application program creation. Companies such as The Equitable Life and the Automatic Electric division of GTE have seen dramatic results with "user-driven computing," he said.

If the new methods catch on, will programmers become obsolete? "We're still going to need very good programmers for writing compilers and for writing database management systems, for creating that type of software. There will be an ever-increasing demand for these types of programmers. But many things which COBOL programmers are doing today—creating typical reports in typical dp installations—should simply not be done in COBOL. So one type of talent which is needed is the ability to select the right methodology in the right place. That's going to require a lot of education. In my book I use the term Techniques Analyst for a person who has the knowledge to select the technique for a particular application requirement."

Martin said that it was hard to define the entire process toward user application programming in one interview. Quite naturally, he said, the process is best outlined in his book, which is available from Telecom Library Inc. in New York.

—Ronald A. Frank

Only One Show Addresses Your Total Office Environment

FEDERAL
THE 1982
**OFFICE
SYSTEMS
EXPO**

March 10, 11, 1982
Conference: March 9, 10, 11, 1982
Sheraton Washington Hotel, Washington, D.C.

Federal Office Systems Expo is the largest forum of office systems, equipment and services in the country. Last year's program attracted more than 12,000 professionals nationwide - 56% from the private sector.

For 1982, exhibit space at FOSE is sold out.
More than 400 exhibits will be displayed by the top 150 companies in the industry.

Of course you will see the latest advances in word processing, data processing, micrographics and telecommunications. But FOSE is much more. You will also see virtually every technology and service for the office including:

copiers/duplicators
calculators
forms and supplies
electronic mail
facsimile
contract furnishing
reprographics
dictation systems

**automated filing
and retrieval**
OCR systems
graphics terminals
records management
**office environment
systems**
photocomposition

With more than 35 conference sessions and 50 speakers covering the hottest topics in the industry, the 1982 FOSE conference is the single most important forum for today's information management community. A limited number of registrations are still available.

**FOSE is the Total Office Systems
Exposition.**

Plan Now to Attend the 1982 FOSE!

For complete information return coupon today

FOSE

National Trade Productions, Inc.
9418 Annapolis Road, Suite 206
Lanham, Maryland 20706
301/459-8383

- Please send _____ Advance Exhibit-Only registration cards.
- I'm interested in attending the FOSE Conference. Please send advance registration and information.
- My company may want to exhibit in 1983. Please send details.

Name _____

Organization _____ Title _____

Address _____

City _____ State _____ Zip _____

Phone _____

DAT

NEWS IN PERSPECTIVE

BENCHMARKS

DETAILS: IBM confirmed speculation that its new marketing organization would be split between national and single user accounts. The new Atlanta-based National Marketing Division, headed by current Office Products Division president J. Richard Young, will handle all types of customer orders throughout the U.S. The National Accounts Division, based in White Plains and headed by George J. Conrades, president of the Data Processing Division, will handle complex orders from large customers. Both divisions will carry the firm's full product line. Meanwhile, a third division, Systems Supply, has been set up to sell and distribute supplies to U.S. customers. It is to be headed by Everett H. Van Hoesen, currently president of the Information Records Division. In an unrelated matter, IBM said it expects 1981 capital spending to exceed \$7 billion, compared with \$6.6 billion in 1980.

LAYOFFS: A softening of orders because of the recession and what appears to be a retrenchment prompted large layoffs of personnel at Raytheon Data Systems and Exxon Office Systems, respectively. Raytheon said it will let go of 250 employees as it consolidates its Data Systems Division and eliminates duplicated posts in its terminal marketing unit, word processing operations, and worldwide division. Exxon said it was closing an Orlando facsimile equipment plant where some 465 people worked, as part of an elimination of 600 jobs, or 20% of its Office Systems work force. The Raytheon move was attributed to a slackening of orders, particularly in the airline terminal market, while Exxon's layoffs were seen as part of a continuing retrenchment the firm has had under way since September when staff was cut by 11%. The oil company did say, however, that its office equipment operations would turn their first profit in the fourth quarter of 1982.

LOSES: A bid by IBM to have charges against it relating to alleged mispractices in the Common Market dropped was tossed out by the European Court of Justice in Luxembourg. The charges accuse IBM of abusing its dominant market position in Europe and run roughly parallel to the several antitrust suits brought unsuccessfully against IBM in the U.S. Specifically, IBM has been charged with withholding interface specifications for peripherals from plug-compatible competitors and with bundling main memory and system control programming prices with those of cpus. Memorex has been one of the most active participants in bringing the charges, having helped the European Commission formulate the accusations. Meanwhile, IBM has replied to the commission's charges with a large document and is conducting meetings with the commission.

RELATIONAL: Dr. Edgar F. Codd, an IBM Fellow at the IBM San Jose Research Laboratory, received the Turing Award, the highest award given by the Association for Computing Machinery (ACM), from ACM president Peter Denning at ACM '81, held in Los Angeles. Dr. Codd was selected for his work in the area of relational systems and relational databases. Codd's work has been the basis for much of the relational database work and products emerging recently, including the System R, SQL, and QBE packages IBM has developed.

OUTLET: As if to show that selling software is just like moving iron, the world's largest distributor of electronic products has begun handling operating systems, programming languages, and utilities from Digital Research Inc., Pacific Grove, Calif. Hamilton-Avnet already serves as North American distributor for the Xerox 820 and Digital Equipment Corp. personal computers, plus the NCR ADDS Multivision computer—all CPM-based machines—in addition to peripherals from Centronics, Diablo, Hazeltine, Lear Siegler, and Novation. Now it will begin stocking software for the 820 and the vt180 computers, plus languages for Apple computers running under CPM. It will also stock the CPM-86 operating system for the IBM Displaywriter and the CBASIC-86 language for the Displaywriter and the IBM Personal Computer. The firm, with outlets in 44 locations, already sells business application packages from Systems Plus, another software company. Working with Digital Research, it will begin a marketing effort for programs written by independents to run under CPM.

SPINDLES: Announcements in recent months of new mass storage systems from Storage Technology Corp. and Masstor Systems Corp. would indicate a huge market for on-line capacity. This is confirmed by a new study that refers to "the computer industry's ravenous appetite for auxiliary data storage."

According to the 1981 Disk/Trend Report, worldwide sales last year of moving head rigid disk drives came to more than \$5 trillion, and worldwide revenues in 1984 are forecasted at more than \$14 trillion. According to James N. Porter, author of the respected annual study, the product category with the fastest growth rate is the fixed disk drive with a capacity of from 30MB to 200MB, which accounted for sales last year of almost \$38 million and is expected to grow in 1981 to \$135 million and by 1984 to more than \$713 million. Last year Control Data Corp. increased its share of worldwide oem disk drive revenues, accounting for 55.1% of the total. Says the Mountain View, Calif., consultant, the IBM 3350-type drives are having their biggest year yet in 1981, worldwide shipments reaching 73,600 spindles. But with volume ship-

ments of the 3370, 3375, and 3380 drives coming up, these drives will make up 80% of worldwide IBM and PCM shipments in 1983. He also sees 1981 shipments of 8-inch fixed disk drives growing in quantity by 351% over 1980 and reaching 247,500 spindles in 1984. But in that same year, thanks to the desktop computer craze, shipments of the 5.25-inch fixed disk models of less than 30MB capacity will reach 644,000 drives.

COMPLETE: Xerox rounded out its product line for office automation with a family of electronic typewriters designed to grab market share away from IBM's dominant Selectric. The new Xerox machines, designated Memorywriters, begin at \$1,430 in single quantities and will be marketed by the firm's office systems and copier sales forces. That combination is hoped to establish Xerox in the typewriter market at a time when it is thought customers will likely replace their mechanical typewriters with electronic models. Xerox claims its machine outperforms IBM's electronic models, and are simpler and cheaper to build as well as more reliable. Upgrades to the new product line will enable users to store as much as 10 pages of text and connect their machines into Ethernet local networks.

ENTRY: Another contender in the office automation race is NCR, which joined the fray with a line of systems primarily supplied by Convergent Technologies. Deliveries are to begin in June for the equipment which ranges in price from below \$10,000 to over \$100,000. NCR has chosen to be a systems integrator rather than a builder of the wide range of required products, according to Robert C. James, vice president of the Office Systems Division. He noted that the firm plans to target IBM equipment users as well as NCR's own base. Convergent builds an intelligent workstation with hard disk, crt, and microprocessor for NCR, one of its newest oem customers. In an unrelated development, Savin, the copier maker, said it would enter the office automation market with Convergent's equipment.

MARKETER: A long-time marketing executive for Univac, Harry A. Steinberg, died in Philadelphia just before Thanksgiving Day. At the time of his retirement from Univac in 1977 Steinberg, at age 57, was executive vice president for worldwide marketing and services, the number two post in the firm's computer operations. Regarded as the key man in Univac's acquisition of RCA's computer business, Steinberg had earlier served in a number of financial management posts in Univac. Upon leaving, he consulted to the industry and served on the boards of several computer firms including Intel, Prime Computer, and Decision Data.

A DIFFERENT PERSPECTIVE

Sometimes a very close look at the familiar can change our way of seeing. That irrevocable change is one of the risks we take in making progress.

The shadings, lines, and textures of the underside of this common Oregon forest mushroom reveal a world that most people willingly ignore.

They're not growing. We're looking for people who want to take the risks involved in finding an important new perspective.

Beyond the safety of a career with limited challenge and a predictable future, we offer our people the opportunity to take risks. Think about it.

Taking risks is what new growth is all about.

If you have a degree or experience in Software Design Engineering, Electronic Design Engineering, or both, we can offer you an opportunity to grow with the world leader in test and measurement, computer graphic, and microprocessor-based products.

A copy of this print is available in a limited edition of 1982 calendars. To request a copy, write to: Bill Eppick, Professional Placement, Tektronix, Inc., P.O. Box 500 1-I, Beaverton, OR 97077.

An Equal Opportunity Employer (M/F/H).

Tektronix[®]
COMMITTED TO EXCELLENCE

CIRCLE 83 ON READER CARD

*This advertisement is neither an offer to sell nor a solicitation of an offer to buy any of these securities.
The offering is made only by the Prospectus.*

December 10, 1981

gandalf

2,170,000 Shares

Gandalf Technologies Inc.

Common Shares

Of the 2,170,000 shares, 1,035,000 are being offered initially by the U. S. Underwriters and 1,135,000 initially by the Canadian Underwriter, subject to transfers between the underwriting groups.

Price \$10.25 Per Share

*Copies of the Prospectus may be obtained from such of the Underwriters as may legally offer these securities
in compliance with the securities laws of the respective states.*

Alex. Brown & Sons

Wood Gundy Incorporated

Bache Halsey Stuart Shields
Incorporated

The First Boston Corporation

Bear, Stearns & Co.

Blyth Eastman Paine Webber
Incorporated

Dillon, Read & Co. Inc.

Donaldson, Lufkin & Jenrette
Securities Corporation

Drexel Burnham Lambert
Incorporated

Goldman, Sachs & Co.

E. F. Hutton & Company Inc.

Kidder, Peabody & Co.
Incorporated

Lazard Frères & Co.

Lehman Brothers Kuhn Loeb
Incorporated

Merrill Lynch White Weld Capital Markets Group
Merrill Lynch, Pierce, Fenner & Smith Incorporated

L. F. Rothschild, Unterberg, Towbin

Salomon Brothers Inc **Shearson/American Express Inc.**

Smith Barney, Harris Upham & Co.
Incorporated

Warburg Paribas Becker
A. G. Becker

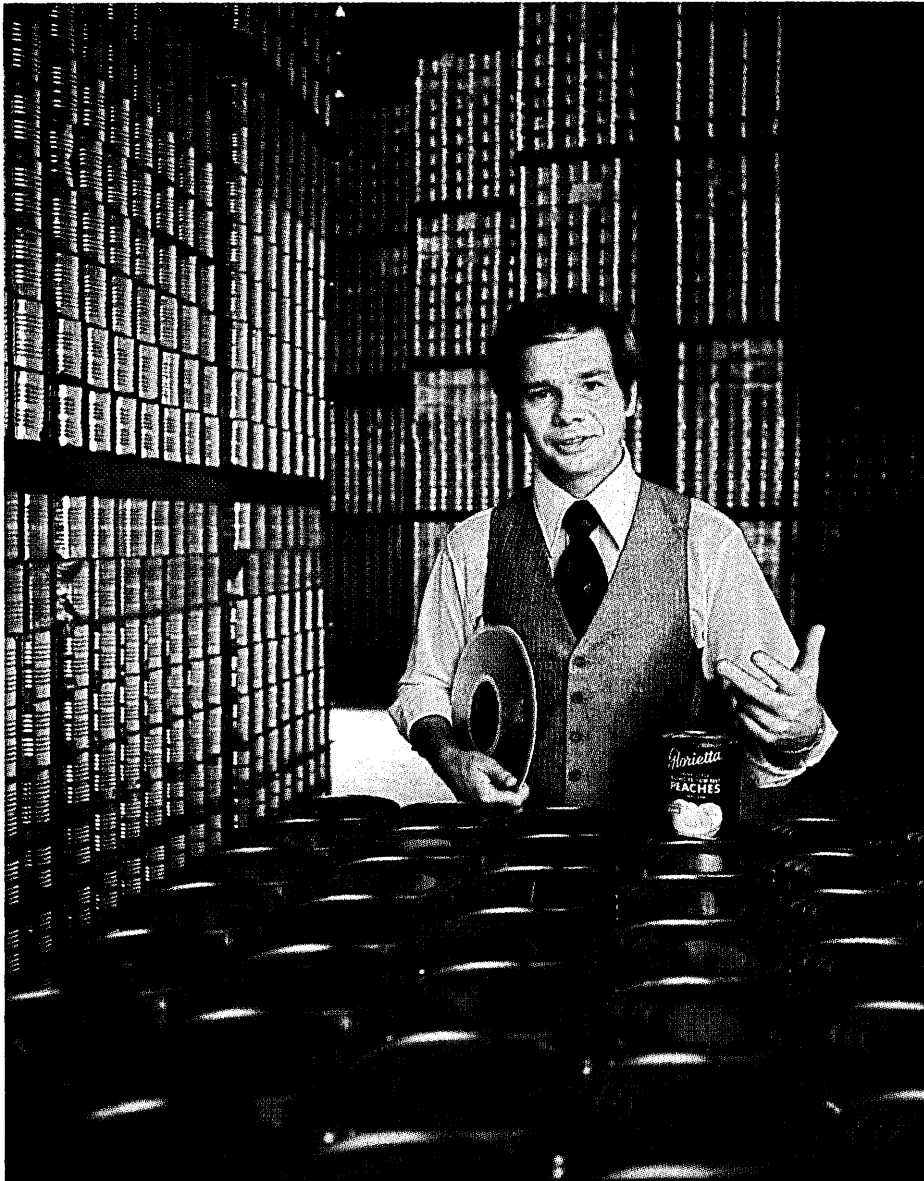
Wertheim & Co., Inc.

Dean Witter Reynolds Inc.

William Blair & Company

Hambrecht & Quist

"We match bushels of orders with acres of inventory. Think we'd trust that job to anything less than Scotch® Brand Computer Tape?"



**Bob Scully, Marketing Manager
Glorietta Foods, San Jose, CA**

Glorietta Foods annually cans over 12 million cases of fruits and vegetables for food distributors across the U.S. Orders are taken, cans labeled, and products shipped to grocers' shelves. The complex order inventory process is put on Scotch 700 Black Watch® Computer Tape.

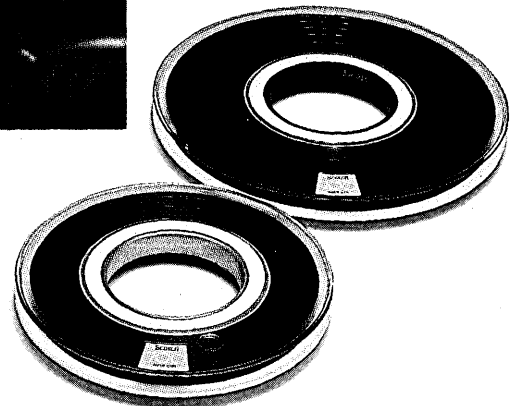
"Glorietta's never had a single problem with their tape, never had a read error." One reason: Black Watch computer tape is made with a textured substrate that prevents common types of physical damage.

This unique textured backing is a major technical advantage. There is less physical damage to the tape and thus fewer read errors than with ordinary tape. So, you get more reliable, longer-lasting computer tape.

These are the reasons Black Watch computer tape has been used in thousands of data processing installations all over the world for years. It can be used dependably in yours.

For information about how you can purchase Scotch Computer Tape, call toll-free: 800-328-1300. (In Minnesota, call collect: 612-736-9625.) Ask for the Data Recording Products Division. In Canada, write 3M Canada, Inc., London, Ontario N6A 4T1.

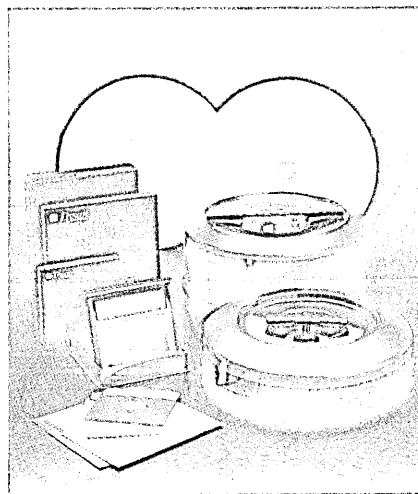
**If it's worth remembering,
it's worth Scotch
Data Recording Products.**



3M Hears You...

3M

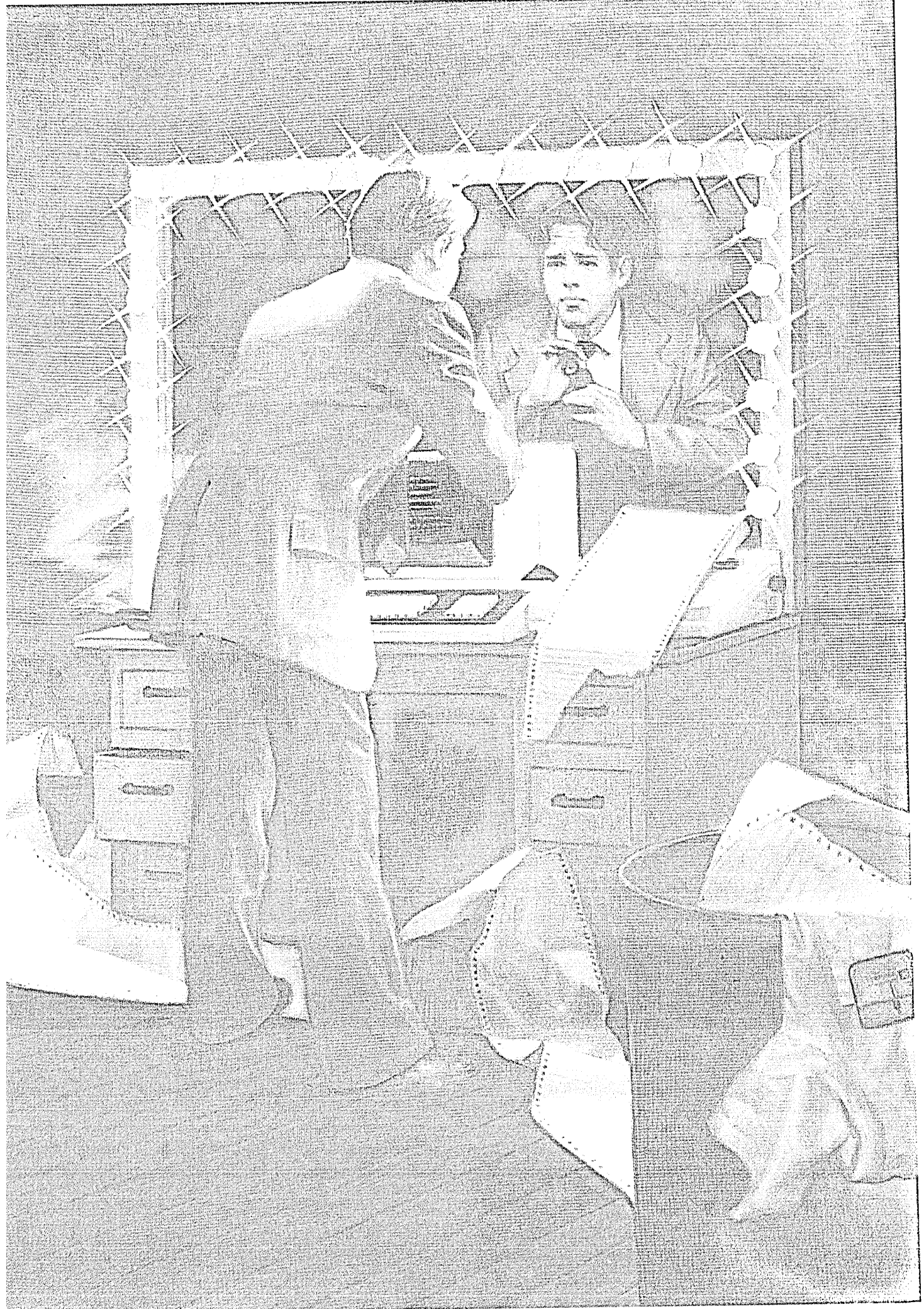
CIRCLE 85 ON READER CARD



dy Jan *Dysain*
Wydawnictwo Literackie

Ólno Władysław de Ólno Władysław

Wydawnictwo Literackie, Kraków
Wydawnictwo Literackie, Kraków



It will take more than
the same old song and
dance to move
MIS execs out of the
chorus and into
the corporate limelight.

THE CHANGING ROLE OF THE DP MANAGER

by Janet Crane

Following his presentation at a recent management seminar on long-range dp planning, Bob King, manager of Mobil Oil's corporate applications services department, was asked: "Bob, you have a well-run operation. Where are your best dp people going? Where do they move within your company?"

His response was not especially comforting: "Generally, nowhere outside the dp function. Unfortunately, with very few exceptions, they're not going anywhere at all.

"In spite of possessing latent talents which could be very effectively used in other areas of the company," King continued, "computer people are not generally seen as movers. Dp people are locked in—due to their own desires, their relatively high pay scales, and their image as technicians with limited business knowledge. Dpers certainly aren't ascending to the top management ranks of other functions as was forecast a decade ago. In fact, the reverse seems to be true: more 'movers' are coming in from other functions to assume top management functions in dp. The bottom line for the dper who aspires to general management is that he should move out of dp early in his career—go away, learn the business, and become a real part of it. When he can come back into a senior dp position, maybe

ILLUSTRATION BY FRED WILKINSON

It isn't the information resource that lies outside the mainstream; it's the information manager.

even on a rotational basis, as part of his overall career progression."

The room was abuzz. "What do we do about our visibility, our image?"

After three decades of growth and development, the dp industry has never been stronger. Where is the industry going? Everywhere, in 20 directions at once. The driving force is still technology, and observers are predicting another 10 years' innovation equal to that of the last 25. Data communications. Office automation. CAD/CAM. Ever lower costs for undreamed of power.

And the people who manage this technology, where are they going? As function after function moves on-line, with the personnel to follow, dp execs are consolidating what they have: lower unit costs for payroll processing; more and better inventory control; competent overseeing of the company's growing central switching function, storage repository, and information retrieval center.

"Dp is building a base for an informed management in the future," one executive asserted. But we have met the management and it isn't us.

"For too long, at too many companies," says Darwin John, a vp at Scott Paper, "MIS has been a secondary function, not a mainstream function. The successful manager must align information services with the strategic plan of the company and its basic management process."

"Dp has earned its way into the mainstream and visibility," another exec comments, "but to occupy that position its managers must become more responsive to general business needs."

Almost unanimously, managers admit that what used to suffice simply isn't adequate anymore, and that if dp managers want to stay they must institute essential changes. Otherwise corporate executives will bring in outsiders to do the job for them. It isn't the information resource that lies outside the mainstream; it's the information manager.

Everywhere the story is the same—increased information, more computer power to enable quicker, better decisions. But aspiring dp professionals are not marching into the managerial roles opened to them by all the opportunities. What's the problem? Why the moderate salaries, the dead-end career paths, the competition and confusion about MIS functions and responsibilities? Why all the grumbling about inefficiencies?

"The problem," comments Philip Dorn, a leading industry consultant, "is that computer people want to stay with their machines, their dp empires. Machines are easier. Adjusting a dial, debugging a code, interpreting numbers—that's what makes many of these guys tick. Their own technical orientation and excessive specialization is doing them in. They shun people problems."

Rapid change and improved capabilities have bailed out the dp manager—made his job easier. He has reaped the benefits from externally initiated breakthroughs. While he has guided the purchase, installation, and maintenance of a rapidly changing machine shop—and its applications—unit costs in even the most poorly managed operations have come down substantially over the years.

"Thus, for years," says John Goodroe, vice president at Equitable Life, "end users didn't know of the gaping inefficiencies in data processing. The industry was, in fact, plagued with excess people and poorly used equipment. No one knew about or understood what was going on over in the dp department. Equipment was often purchased because it was the latest technological goody, nice to have. Now, alternative modes of providing the same services mean that end users can utilize other means to achieve the same ends. Often they prefer to bypass the central department altogether.

"These new developments are forcing us to take a finer look at the costs benefits in the use of technology. There has been a lot of cream skimming," Goodroe adds. "Data processing is an information factor and it must be information efficient."

HIDING BEHIND A SCREEN

Rapid technological change and the use of that technology—too often considered ends in themselves—have been industry traits providing a screen dpers have successfully managed to hide behind. This occurred because dpers long liked to think of the field as unique—its complex theory and applications, rapid change, and technically oriented personnel have set dp budgeting, planning, and management apart, they say. The persistence of this attitude, however accurate it may once have been, has prolonged dp's probationary period and its general lack of accountability.

It has also contributed to a widespread disenchantment with dp management and a reassessment of the dp professional's role. Personal qualities long spurned by dp's technical wizards are now back in demand as the field is demythologized and brought into line as one of many functional departments serving the company. "There is nothing unique about dp," maintains James Collins, corporate vice president at Johnson & Johnson. "MIS management is an integral part of every business along with such divisions as finance, distribution, and sales and marketing. All the vexing issues confronting dp are merely basic business management issues. Problems are perhaps speeded up by a rapidly changing technology, but every aspect of the field can be handled by generally sound management tools."

"A mistake that we've made," says

Darwin John, "is that we've tried to make ourselves different from the rest of the business we're in; we have hidden behind the high technology and rapid change. Rather than hiding behind it, we need to get out in front and manage it. After all, that's what we're paid to do: manage change. Planning and planning techniques need to be consistently focused on where the business will be a few years out, and from that determine how to create a technology and human environment to fit that future. The business requirement is the driving force; change in technology and behavior is the manager's response to that force."

Top management is now demanding that dp operate under the same philosophy and rules as the rest of the company. Lacking appropriate management candidates nurtured within dp shops, they have had to look elsewhere for someone to run MIS. Corporate management doesn't want technicians to head up even the dp operation—its role in the company's overall well-being is simply too vital to entrust to someone not part of the company's general management team. The search is for persons who are profit/balance sheet oriented, persons who have a general management orientation and experience.

Yet even in the things they know best—guiding the acquisition, installation, and utilization of technology—many dp managers have been a defensive lot, afraid of losing their empires. "Managers feel threatened and resist distributed processing," says Collins. "Yet if they resist, they are living in the past." Thus, as the industry completes the transition from batch to on-line computing, many operations lack essential guidelines and standards for the acquisition of hardware and for network design. Haphazard development in many firms has meant that the information resource is often inefficiently and illogically dispersed.

"Here is the MIS manager in charge of a specific business function," comments Ted Withington, vice president at Arthur D. Little. "It should be part of his job to elucidate the information standards, frameworks, and networks through which the company will grow and develop over a period of years. You can't know all the developments that are going to occur in the field, but you can establish effective guidelines and controls that allow for orderly transition and compatible systems."

If indeed the MIS manager's role is diminishing because technologies are developing elsewhere or exploding out from under the department's guidance, that situation is probably self-induced. As systems move on-line and installed computer power skyrockets, the manager's position should be secured by influence wielded over operations and systems growth. Dollar value responsibility is

Media-Flex Cabinets rise to the occasion.

Before Acme Visible developed Media-Flex™, every filing cabinet had a built-in limitation: What and how much you could put in it.

Suddenly, all that's changed. Each Media-Flex Cabinet is built to handle virtually anything a computer or office can throw at it: From printouts to tape reels, file folders to disk packs.

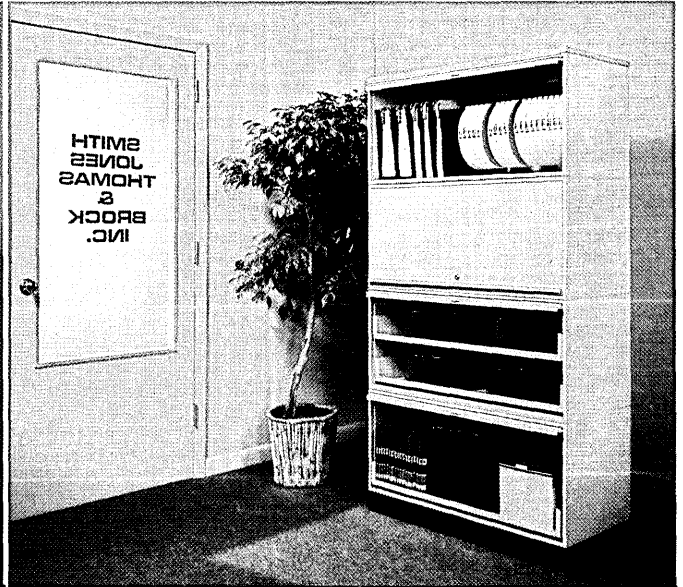
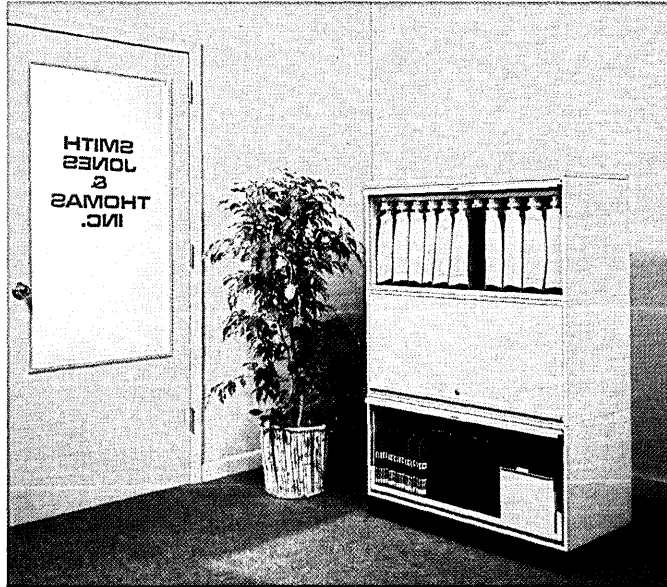
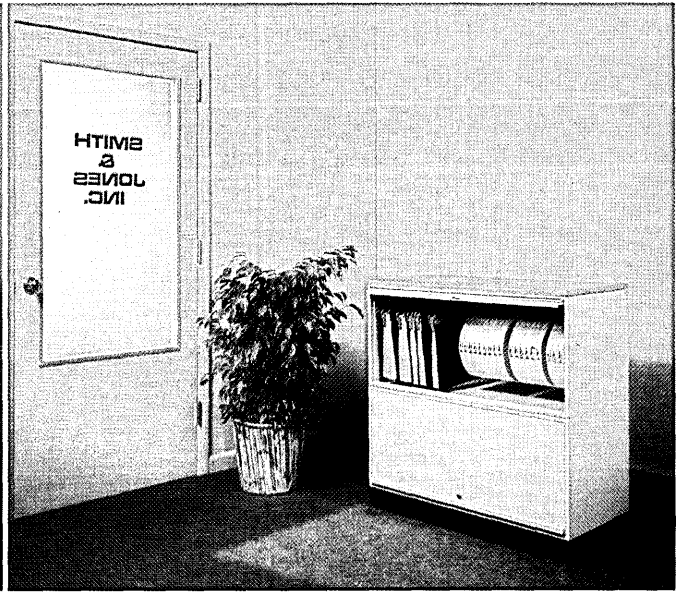
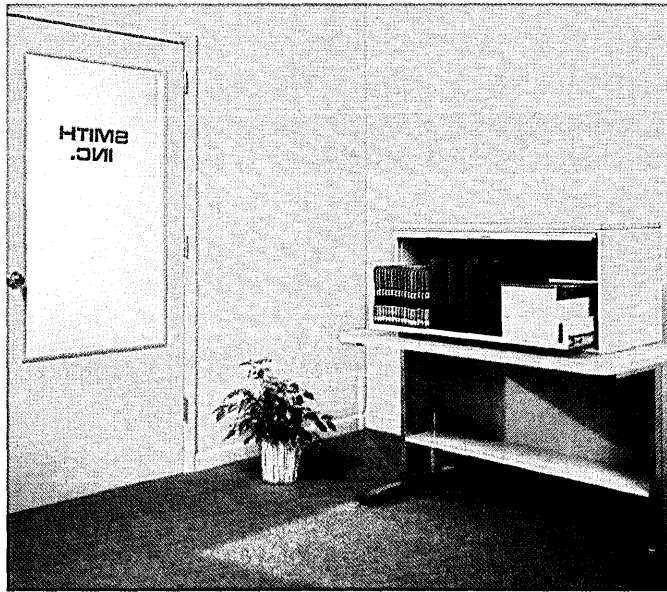
You can even store a combination of

media in a single cabinet.

And when Thomas and then Brock join with Smith and Jones, our modular cabinets stack up to the challenge. All this, plus Acme Visible style and strength. That's Media-Flex.

Media-Flex Cabinets by **ACME VISIBLE**

First in putting information in its place.



- Have your filing system specialist contact me.
- Please send information on your modular cabinets and entire Media-Flex line.

Call collect (804) 823-4171 or send coupon to:
Acme Visible Records, Inc.
1000 Allview Drive/Crozet, Virginia 22932
DA 12CD1

Name _____ Title _____

Firm _____ Phone _____

Address _____ City _____ State _____ Zip _____

Canadian Sales: Acme Seely Limited, Hwy. 17, Renfrew, Ontario. Offices in principal cities.



The rush. The whistling wind of excitement that comes with reaching a frontier that's never been reached. Having an idea that's never had before. Touching your own limits.

That's your opportunity at Phillips Petroleum. Where our people pioneered the huge Norwegian North Sea oil fields when many doubted there was any oil there to find. Where we've led our industry in number of patents issued 12 of the last 13 years. Where we allow computer science to become an art, and we hold patents on some of the most advanced hardware and software in the world. Where recognition can take many forms - from crystal trophies to cash awards and almost boundless chances for more achievement.

And where now we're looking for people in engineering, law, geoscience, computer science, technical sales, data processing, business, tax, accounting, and chemistry to join some of the best people at their jobs in the business. Maybe any business.

The opportunity is here. Achievement is the standard. Talk to us, for a chance to spread your wings to the fullest.



Come to where ideas soar.

Send resumes in confidence to W. M. Hutchison - Recruitment, Box 9AC, Phillips Petroleum Company, Bartlesville, Oklahoma 74004.

Phillips is an equal opportunity employer

Learning to communicate in business terms is a critical first step.

increased by activities that include planning, forecasting, and controlling the development of all information activities. While the manager may have no direct control of on-line budgets, MIS-elucidated standards of procedure ensure that common applications and systems are shared by every department in the company.

"The health and vitality of dp in an organization is indicated by the breadth of the central department," says Warren McFarlan of Harvard's Business School. "Coordination of the telecom function, advice on the purchase of word processing equipment, and guidelines for the acquisition of minis and micros should logically fall to the central dp unit. That these services are not centrally coordinated is often due to the perceived nonresponsiveness of the central unit."

The emerging roles of the once and future MIS manager and the MIS department are increasingly clear. From an earlier position as overseer of a huge technical empire furnishing processed data to the end user, the new manager is moving toward a position that is primarily one of consultation and institutional support. It is management's responsibility to set the policy and direction of how the organization postures itself with regard to information. That role logically links the dp manager to every aspect of the company's business.

LINK DP TO BASIC BUSINESS

The problem is that many dp professionals either don't know how or don't want to be linked to the rest of the business. Lack of general business knowledge and/or interest is a widespread deficiency affecting their image and well-being. It is a major cause of the compartmentalization and isolation of the information resource and its practitioners. It undoubtedly is also related to career dead-ending.

It hasn't always been so. Back in the industry's earliest days, dp professionals were drawn from finance and other functional departments: they were economists, scientists, and engineers who understood the business and were comfortable interacting with other departments. Their dp operations frequently developed as vigorous and integrated operations; some of these professionals have gone on to positions in top corporate management.

This isn't true of dp's second generation, spawned in the technologically infatuated '60s. The central dp department—consumed by rapid technological change and systems proliferation—increasingly hired technicians specifically trained for computer work. The central unit's growth and consolidation and the push to achieve economies of scale completely absorbed their energies. Many senior dp people today have spent their

entire professional lives in the dp ghetto. They are specialized technicians who have a difficult time brandishing the integrative skills that businesses are coming to demand. The best move for dppers with management potential and aspirations, say many observers, is to put them on swing lists and rotate them through a variety of jobs to familiarize them with all aspects of the business.

The installation of distributed processing is now exposing the deficiencies in business and communication skills of some dp professionals. "It is our responsibility," says Irwin Sitkin, vice president at Aetna Life, "to increase the comfort level of people dealing with dp. As dp becomes a more significant item in the budget and in the way companies operate, users and managers have to get more comfortable with it, have a better understanding of it and how it relates to their jobs and needs." This can be accomplished by joint development efforts and improved communications between systems people and end users in the planning, implementation, and evaluation of MIS projects.

To be able to effect these changes, many dp managers will need a new understanding of their own roles. Few have been prepared to face the fact that they are now expected not only to manage their own environment but to be familiar with all aspects of the company's business. "You cannot be an expert on all aspects of the business," says Oliver Desofi, executive vice president at the National Bank of North America, "but you must become a generalist on the business, a specialist in the dp function. If a company hires a good dp person, but he is not willing to be a translator for general business to data processing, he won't succeed and will end up becoming a highly paid technician."

Doing business with other managers may be almost as foreign to many dp managers as COBOL is to the head of customer relations, and the establishment of an effective interface with senior management may provoke real feelings of inadequacy. "Much of the current problem," says John Imlay, ceo of Management Science America, "is lack of self-confidence on the part of the MIS manager. He thinks he has to keep what he does a mystery to hang on to what he's got. He doesn't realize he really has the best position of anyone in the company to learn how to run the business. Because his projects involve all aspects of the company, he has tremendous growth potential."

Learning to communicate in business terms is a critical first step. "You cannot continue to talk in a foreign language," says Desofi. "Our services are more a part of the total operation than ever before. We have to function comfortably as interpreters from one department to another. Logically, everything comes together in information services."

Consultant Dorn says a dp manager's job should logically include only three major responsibilities: doing the budget, appointing a good executive officer to run the shop, and interacting with peers and top management. "The last task is by far the most important," he emphasizes, "and the one to which the vast percentage of one's time must be devoted. Too many managers get caught in the trap of spending their time playing systems analyst, a situation that negatively influences careers and entire departments."

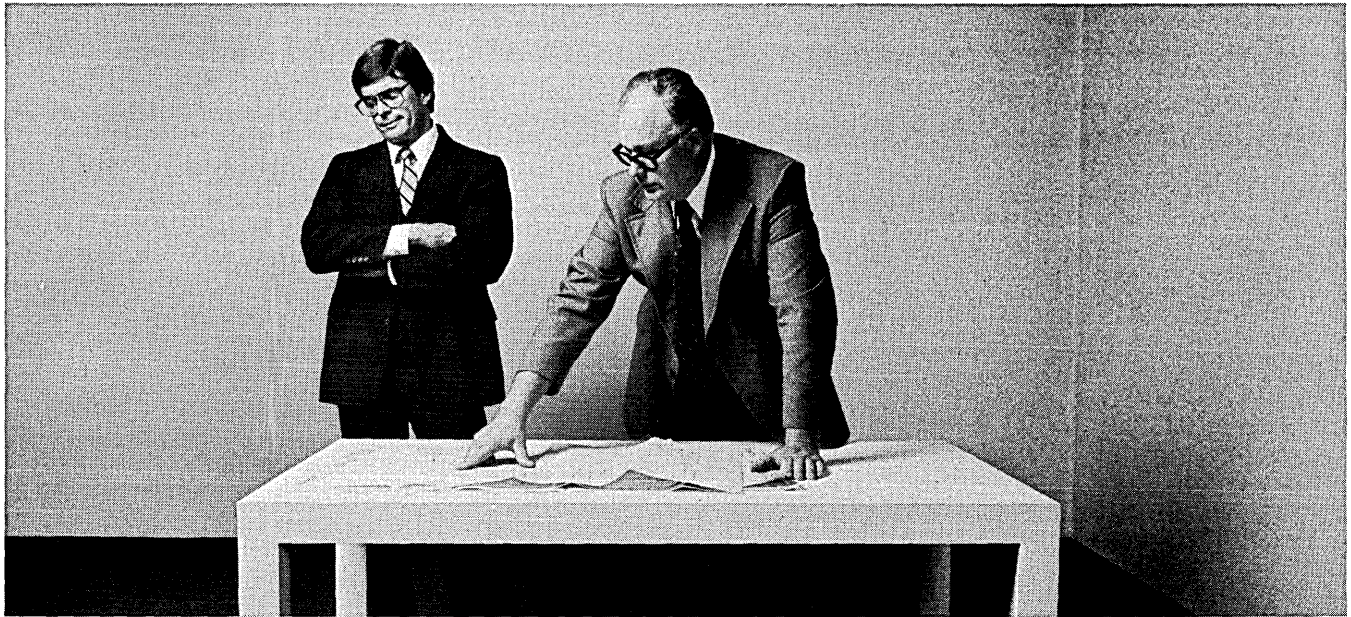
CUES ARE FROM THE TOP

Dramatically increased amounts of time working with middle and top management will be routine in any manager's job. Younger officers in other departments are increasingly comfortable with computers as an integral part of day-to-day operations. They expect to use this tool to monitor more closely the company's operations and to aid decision making, but their knowledge of hardware and systems specifics is limited. "The dper must simplify the computer so that management will continue to call on him and will be able to understand him," says Imlay. "Nuts and bolts guys get nowhere. They often stifle their own growth because they don't use analogies that business feels comfortable with."

"Another aspect of the reorientation of the dp manager's role has to do with the idea of ownership," says Scott Paper's Darwin John. "Information and projects should be 'owned' by the using department. We're here only to help our clients work smarter. We are delivering a set of tools and services, to support our clients as they do their jobs.

"Our past policy toward users, other than to bill them, was a void," John continues. "Now they must be made an integral part of the planning and development of information systems and services. It is certainly in our own self-interest that we develop projects that are going places. If users participate in their planning and design, when projects are rolled out they will already have broad support. If you sit with knowledgeable people in the business and let them work on and prioritize projects, your entire operation will be more responsive and better received."

Dp, however, must take its cues from top and functional management. "The most effective dp applications historically have lagged, or been based upon, existing management knowledge," Bob King maintains. "Dp has generally delivered inferior products when the dppers have attempted to provide systems that reach beyond the 'state of the art' of the users. Our basic job, which is not necessarily simple, is to automate in a modern, cost-effective way the basic activities already known and performed by the users. The challenge is to develop systems ap-



**Everybody promises
information systems that will
work together in the future...**



Datapoint offers systems that work together now

Everybody talks about the office of the future as something you should plan now. Datapoint lets you *order* it now with the Integrated Electronic Office™.

You can increase the productivity of your office staff and decrease the enormous waste of time and effort that outmoded procedures involve by looking into just what Datapoint can do for you *now*.

Data processing at your fingertips

Need to inventory raw materials? Track your sales volume? Do a budget review? Find out your share of market? Check the payroll or cash flow? Delinquent accounts? Sales commissions?

Whatever information you need, Datapoint's data processing equipment, coupled with your software programs, helps you organize data easily and select just what you need quickly. Because with Datapoint's integrated systems, the workstation at your desk can give you access to every file in your company.

Word processing with data processing

Datapoint's word processing and data processing are integrated. That means from your workstation you can access both text and data from anywhere in the system regardless of location. That makes it easy and efficient to exchange information.

And Datapoint's word processors are oriented for you, the user. They're simple to learn. A beginner can quickly be producing documents, editing, filing and retrieving, preparing reports and more.

Mail faster than ever before

With Datapoint's Electronic Message Service (EMS™), messages speed from office to office within your company, from another Datapoint system, or from a company with a Telex or TWX. Messages can be sent and received quickly and inexpensively from any workstation. And priorities can be placed on messages so you know which ones need to be handled first.

Datapoint's Electronic Message Service can send memos, reports, data files, programs, and other documents to people anywhere in your company. You don't have to worry about loss or delay, because messages are always contained within the system and their status is always known.

A telephone switch that handles data too

Datapoint's Information Switching Exchange (ISX™) is a digital PBX that gives you both a voice and data switch to integrate all your information processing. The ISX lets you access and move any digital information, voice, data, text or message, on the most inexpensive lines. And with the ISX's

reporting capabilities, you can stay on top of the cost and performance of your entire system.

The ISX can grow from 100 to as many as 20,000 phones or workstations easily and inexpensively. The modular design of the ISX lets you expand the number of users and incorporate all types of information as your company and its information processing needs grow.

And they work together now

Datapoint doesn't just *promise* you increased efficiency and productivity or better management and control. With Datapoint you get these advantages with systems that work together *now*. And Datapoint's single worldwide sales and service organization will help you plan, install, and maintain these systems wherever you need them.

To see the systems that Datapoint can offer your company *today*, write for our free brochure: A Capsule Look at Datapoint. Datapoint Corporation, Corporate Communications T-41DM, 9725 Datapoint Drive, San Antonio, Texas 78284. Or call us at (512) 699-7059 for the Datapoint sales office nearest you.


DATAPOINT

SYSTEMS THAT WORK TOGETHER NOW

CIRCLE 89 ON READER CARD

The problem is that many dp professionals either don't know how or don't want to be linked to the rest of the business.

proaches that do not get ahead of what users understand but that can be modified as users mature with regard to existing technology and create advanced needs.

"One approach to improving efficiency while fostering innovation," King continues, "is to provide users with direct access to computing facilities—whether central or distributed—and with high-level, user-oriented utilities that allow them to develop and modify their own small systems and reports."

"The trap many dp managers find themselves in," says Darwin John, "is that they have been trying to design and develop information systems without knowing how their company is doing business. One approach taken at Scott has been to ask management to help us understand their business philosophy and objectives. These factors then permeate the design of systems to produce the needed information, and ultimately guide the choice of appropriate technology upon which the systems will be implemented."

Access to other officers and an appropriate operating style will vary from company to company. If MIS contributes much of the final product cost—as in most financial institutions—compatibility between dp management and top management is far more essential than for some manufacturing firms where it is a less critical input. Some efforts at upgrading MIS effectiveness fail from simple misreading of the management style set by top company officers.

Harvard's McFarlan tells of his experience with a dp manager at a southern textile company. The manager, a hands-on type, was testing out his many plans for girding up the dp operation.

"After some observation," says McFarlan, "it became evident that much of the company's most important business was transacted at a local country club. I advised my client to shelve his strategic plans and reinvest his energies in 15 golf lessons. The greatest impediment to that manager's corporate success was his golf handicap."

If dp shops are to work more closely with the companies they serve, some managers will have to reevaluate the ways they use their technical staffs. Shop employees have long displayed signs of dissatisfaction with dp management, and that high turnover rate isn't entirely attributable to a shortage of good technicians. Systems people, cubbyholed with their machines on a single long-term project, are apt to become frustrated. Many would prefer to be working on a wide array of business and technical problems.

Happily, the same innovations that effectively address job enrichment are those that best respond to the distributed environment and projected user needs. "Companies want an increase in people involved with information interpretation," says John Good-

THE CHANGING ROLE: CHALLENGE OR THREAT?

As the accompanying article points out, the role of today's MIS manager is frequently being redefined by a variety of pressures and developments over which he or she has little or no control. Some MIS managers view these changes as an opportunity—a chance to move more into the mainstream of corporate management. Others see change as a threat—something which may undercut their authority and ultimately render them obsolete. To gauge the extent of these changes and their effects, DATAMATION field editors interviewed dozens of MIS execs around the country. Here are the results of their findings:

A new role for the MIS manager is slowly beginning to take shape. For one thing, the pressures of the current political environment on corporate profitability have created a more demanding senior management—one that wants quick answers. In addition, the MIS manager is now facing a more computer-wise and knowledgeable (not to mention vocal) user community. The presence of minis and micros (thanks to vendors making inroads into end-user departments with hardware and software) and distributed and/or decentralized data processing—now in the hands of many users who have never seen the inside of a computer room—is yet another factor in the MIS manager's changing role.

What underscores the changing role, according to William Sumner, director of management information systems at Bullocks, a division of Federated Department Stores based in Los Angeles, "is the movement of computers out of the financial side across the whole business. The computer used to be a glorified accounting machine in the financial division. Now, its impact covers the entire spectrum of business."

As this impact is increasingly felt throughout the organization, the MIS manager is increasingly held accountable. "As management hears buzzwords like artificial intelligence or CAD/CAM or office automation and tries to understand these new terms, it wants to know what return it can expect from the new technology," says C.E. Couchman III, manager of computer and information systems at ESL, Inc. (a subsidiary of TRW Corp.) in Sunnyvale, Calif.

"I think they [upper management] realize that computers give tremendous benefits in terms of productivity," adds William Hutchinson, general manager of information services at Standard Oil of Indiana, in Chicago. "But they have trouble understanding exactly what systems analysis and programming are, why they can take

so many man-hours and why they cost so much." Their understanding is getting better, says Hutchinson, and the information systems function is getting more attention as resources in this area continue to increase.

Another group that wants answers lately from the dp department—a group no longer afraid or ignorant of computer technology—is the user community. Says Couchman: "It seems that we've come a long way; we used to refer to them as dumb users, then just as users. Now we call them customers, and we recently hired an analyst who calls them clients." Adds Couchman, "There's an awareness of the need to put the power of an application in the hands of the ultimate user."

Some dp people don't agree. Ralph Loftin, vp for information processing at Blue Cross/Blue Shield in Boston, for instance, complains that experienced end users are now competing within his organization for computing resources, and as a result, he no longer has the same authority.

Couchman points up another problem with putting dp power in the hands of users—redundancy. "We're arguing that personal computers are not really necessary," he says. "What the dp people don't like about them is the propensity for users to develop their own MIS-type systems that are already available on the mainframes and VAXs."

Sumner of Bullocks admits to being a "mainframe bigot" and doesn't want minis in his operation. "It's my belief that they [minis] are interim products and the wrong way to go. I fear the distribution of data." But while Sumner is against distributed data processing, he's all for distributed intelligence and thinks micros can play a part in that.

Bob Klein, director of MIS at Byron Jackson, a division of Borg Warner Corp., where the presence of minis and micros is strongly felt, is generally positive about the use of small machines. "It takes small projects out of our hands and gives them to the users. This frees us to concentrate on projects that have to be coordinated over multiple sites."

Though there may be differences in attitudes among dp heads toward the changes in their midst, one thing is certain: MIS managers are learning to deal with new roles and to overcome what many see as obstacles to their effectiveness.

As Couchman pointed out, the dp-user relationship has indeed changed. At Standard Oil, for example, dp people are divided into groups that parallel operations. Says Hutchinson: "It is important that there

be extensive interplay [between dp and the operations groups] on a daily basis. Before running off to design a system, dp discusses with user representatives what features should be incorporated into programs," he explains. "You don't rent Carnegie Hall. It's done on a one-to-one basis."

"We don't want the 'them vs. us' attitude that used to exist," agrees Don Norman, vp of information systems for Target Stores in Minneapolis. Target has a systems planning department that contacts user departments when a project is initiated. Moreover, the dp department is broken up into four major departments that parallel user departments.

Explains Norman: "About three years ago we started using bubble charts depicting top-down design of projects to explain to users what the system would do for them. They took to that like a duck takes to water." He adds, "I still think we need to communicate better when talking about project features and gathering requirements." Target uses a task force approach to this—what Norman describes as "a difficult task."

ESL is organized into nine units and dp meets with the managers of each of those units monthly, at which time, according to Couchman, there is a review of the projects that the two groups are working on. In addition, there are quarterly meetings at which issues such as system availability and response times, decision support systems, and artificial intelligence are discussed.

MIS managers are learning to cope with what many perceive as yet another nemesis: the infiltration of the small computer. At the Del Monte Corp. in San Francisco, "There's no company policy on personal computers but dp wants to get involved before everybody starts doing it independently," says Lowman McCarley, assistant director of information services. According to McCarley, the central dp operation in San Francisco is "taking a leadership role in the use of personal computers." In fact, the company purchased one this year and has five worked into the budget for next year.

"Dp is heavily involved with the small computer but at the same time is not controlling what's going on at user locations," says McCarley. "By getting involved with personal computers, dp hopes to keep itself apprised of those devices and at the same time serve the user community."

Dealings with senior management represent another area that may require a reassessment of the MIS manager's role. "The dp budget is no longer just an over-

head," says William Synott, manager of information systems and services at the First National Bank of Boston. "It's a key part of corporate plans." Because of this, a new kind of "information manager" is expected to emerge. According to one dp manager "top executives are looking for tough, old-fashioned line managers to fill this role; first and foremost, they want an accomplished manager."

Says Synott, who came to his job through general management rather than from the technical side: "When top managers picture an information manager, they think of someone who understands the business. They don't think of the dp manager; he's the guy who provides the pipes, boxes, codes, and things." And, claims Synott: "This situation will persist until the dp manager sheds his technical cloak and shapes up as a general business manager."

For technical staff at First National who are highly motivated to become information managers, Synott has devised what he calls a "Trojan horse" technique to get them on the right path. These people are placed in end-user departments, often as part of a facilities management contract. "They become a dedicated resource in these departments and trade their automation skills for an on-the-job education in business methods. By acting as go-betweens and bridges between end users and top management they put their career paths on the way to the executive suite," says Synott.

"An MIS person has to understand the broader spectrum of information technology and has to concentrate on more than dp and information systems," says Reed Phillips, senior information resource management official at the Department of the Interior. "More and more MIS directors are recognizing that they must become business oriented to get involved in corporate planning. Top management has to recognize your value."

Art Dalton, vp for management information systems at Allegheny International, agrees: "It doesn't do much good to yell that we should be at the decision table if we bring nothing to the table. If dp managers bring information that's relevant, they'll not only be invited [by upper management] but soon their presence will be required."

According to John Naftzger, director of MIS for the Rocketdyne division of Rockwell International in Canoga Park, Calif., "Things have changed a lot in the last year. We're definitely more a part of the overall picture." Naftzger, who participates in strategic business planning at Rocketdyne, feels that the biggest change in his job has been

increased control of the system development process. "There is greater emphasis on justification and project management."

Others are not as optimistic that the MIS manager will be accepted so readily into the management fold. One dp manager—in the industry for 14 years—sees his role as diminishing, not expanding. At his present job for 1½ years, he says he used to report to the vp of operations and now reports to the comptroller. In the hopes of attracting the attention of upper echelon management, he's doing some "politicking" to change the situation via a "white paper to division management outlining the services of corporate MIS."

Says Rhoda Mancher, deputy assistant attorney general for litigation and management systems at the Department of Justice: "We're still not getting the high level executive saying, 'I know how vital information is to us and I want to know about it.' If someone hasn't come from a dp environment, he or she won't care much about MIS."

In the meantime, MIS managers are busy just trying to keep up with what seems like daily changes in their fast-moving industry.

Sumner, of Bullocks, believes self-education is the hedge an MIS director needs in coping with change. "I do my homework," he says, concentrating on communications, personal computers, large on-line systems, and crts.

Similarly, Couchman recently attended a one-day executive briefing sponsored by Teknowledge, Inc.—a consulting firm in the field of knowledge engineering. Couchman calls his attendance there "technology scanning"—a way of keeping up with a changing world. "I try to maintain an awareness of what might be coming down the pike, and I assess the extent to which we might use these technologies as practical tools. If we can use them, I try to determine to what extent upper management will accept them."

If Art Dalton has his way, however, "down the road, MIS people will have to sell less and less. The kids of today have grown up with computers and will be much more attuned to their benefits."

Moreover, if MIS managers overcome the obstacles to opportunity, they'll be part of upper management, having a greater decision-making role themselves. Says Rhoda Mancher: "Recognition is coming slowly. It's improved in the last few years. Getting MIS people on boards and committees is closer than people think. It has to happen."

THE NEWEST IN COMPUTER POWER CONDITIONING EQUIPMENT

INTRODUCING DELTEC'S ADVANCED NEW GSC SERIES — COOL, QUIET, EFFICIENT.

Prevent AC Power Problems. Our new AC line conditioners will protect your computer from the most common AC power problems such as noise spikes, transients and low line brownouts.

Solid State Quiet. These new line conditioners are whisper quiet... well below your normal office background noise level.

Wide Range of Models Available. Four sizes are available in the GSC Series to meet your system needs: 500VA, 1200VA, 2500VA, and 5000VA.

New Switching Technology. They use a new electronic tap switching technique which eliminates potentially damaging transients that can occur with other designs.

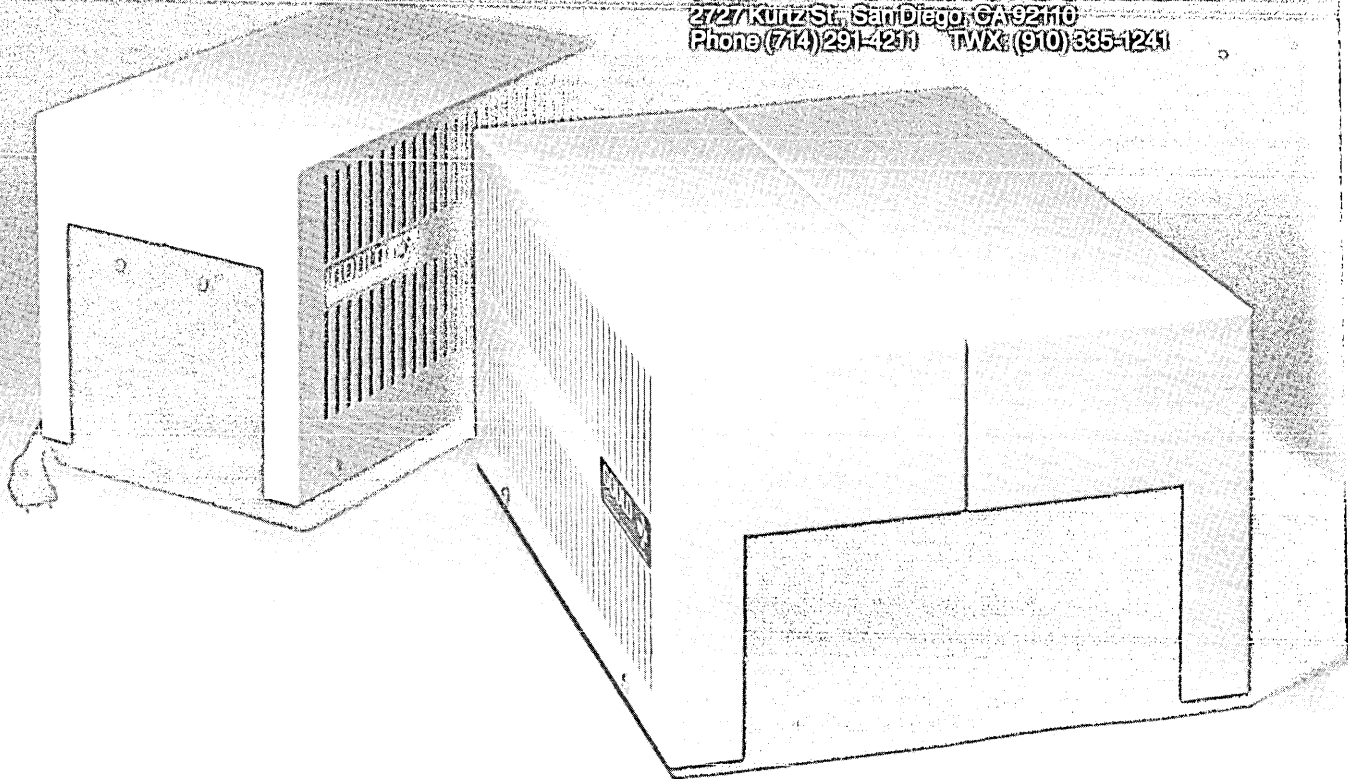
Designed For the Office. We have styled these conditioners to fit in your office environment. They are not only pleasing to the eye, but rugged too.

Economical. You save in many ways. Our design gives you greater efficiency, is most cost effective, and the price is surprisingly low.

Call or write Deltec for more information.

THE AC POWER SPECIALISTS

2727 Kurtz St., San Diego, CA 92110
Phone (714) 291-4231 FAX: (910) 335-1241



GOULD

Electronics & Electrical Products

CIRCLE 90 ON READER CARD

OTHERS MAY SEE THE ERRORS OF YOUR WAYZ.

ONLY MICROSPELL CORRECTS THOSE WAYS.

Lifeboat Associates, the world's foremost source for microcomputer software, proudly presents MicroSpell,[™] the first program that not only isolates spelling errors in your text, but actually corrects them.

MicroSpell works with your word processor. And if you have the best word processing system, why settle for anything less than the *best* spelling corrector?

Goes Beyond The Competition

Other spelling programs function primarily as spelling checkers, merely pointing out words with suspect spelling. It's left up to you to determine the correct spelling and then type it in.

MicroSpell, the only spelling program that knows how to "spell," corrects the error automatically. Here's how it works: MicroSpell will read your text, carefully looking for words that might be spelled incorrectly. When it comes across a word that it's not absolutely sure of, it stops and shows you that word, along with its context. Then it searches through its own built-in dictionary and presents a list of guesses which it "thinks" might be correct. All you have to do is press a key and the misspelled word is corrected. There is no

need to bother with your own dictionary, or even to type in the change. MicroSpell will do it all for you!

The Most Complete Built-In Dictionary

MicroSpell uses word stems and suffix stripping routines, so its dictionary of 25,000 word-parts can deliver over 150,000 words to you. And if that's not enough, MicroSpell will let you add thousands of additional words, so you can create and store specialized dictionaries of technical terms, unusual expressions, even acronyms. And you can let MicroSpell know just when any of these special dictionaries are wanted.

MicroSpell is highly interactive and designed to complement word processing systems that create ASCII text using a CP/M[®] compatible operating system. It requires minimum disk storage capacity of 70K per drive.

So why settle for a program that merely finds your *misspellings* when you can get the one that corrects your *misspellings*? MicroSpell. It corrects the errors of your ways.

MicroSpell is brought to you exclusively and supported completely by Lifeboat Associates. Call or send us the coupon below.

LIFEBOAT WORLDWIDE offers you the world's largest library of software. Contact your nearest dealer or Lifeboat:

Lifeboat Associates
1651 Third Ave.
New York, N.Y. 10028
Tel: (212) 860-0300
Telex: 640693 (LBSOFT NYK)
TWX: 710-581-2524

Lifeboat Inc.
OK Bldg., 5F
1-2-8, Shiba-Daimon
Minato-ku, Tokyo 105, Japan
Tel: 03-437-3901
Telex: 2423296 (LBJTYO)

Lifeboat Associates, Ltd.
PO Box 125
London WC2H 9LJ, England
Tel: 01-836-9028
Telex: 893709 (LBSOFTG)

Lifeboat Associates GmbH
Hinterbergstrasse
Postfach 251
6330 Cham, Switzerland
Tel: 042-36-8686
Telex: 865265 (MICO CH)

Intersoft GmbH
Schlossgartenweg 5
D-8045 Ismaning, W. Germany
Tel: 089-966-444
Telex: 5213643 (ISOFD)

Lifeboat Associates, SARL
10, Grande Rue Charles de Gaulle
92600 Asnieres, France
Tel: 1-733-08-04
Telex: 250303 (PUBLIC X PARIS)

Mail coupon to: Lifeboat Associates,
1651 Third Avenue, New York, New York 10028
or call (212) 860-0300.

- Please send me more information on MicroSpell.
 Please send me a free Lifeboat catalog.

Name _____ Title _____

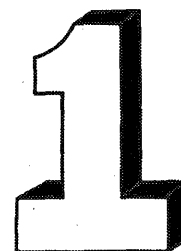
Company _____

Street _____

City _____ State _____ Zip _____

MicroSpell is a trademark of Bob Lucas.
CP/M is a registered trademark of Digital Research, Inc.
Copyright © 1981, by Lifeboat Associates

6002



Software With
Full Support

1
Lifeboat Associates
World's foremost software source

CIRCLE 91 ON READER CARD

There is a shift away from mechanical, technical types and toward generalists.

roe. "There is a shift away from mechanical, technical types and toward generalists. We need more people who understand the application of computing to day-to-day problems. This in itself is a major argument for the decentralization of dp."

Says Mobil Oil's Bob King: "Rigid centralization, although initially good for cost and quality control, has resulted in some stifling of creativity. A period of distributed applications development could be an imaginative renaissance. There are obvious risks in a fully distributed environment, but the possibility of more creative use of dp tools can justify those risks."

Developing this interface gives the dp manager an opportunity to rectify past problems—the often inaccurate perception of and negligible commitment to the dp employee. "Dpers don't move around just because of money," maintains Imlay. "Most are changing companies because they are stuck in dull, dead-end jobs. Companies need to become more sensitive to the needs of aspiring com-

puter professionals and show them the career options that are available. Wise companies are developing career paths for their systems people."

"Lack of job challenge and career dead-ending is a major cause of attrition," adds Thomas Bigelow, director of systems development at Allstate Life. "We now cross-train our people. We've found that they like multiple areas in a large organization. Such diversity gives them a greater sense of participation in the company, which is what they have been seeking."

Despite the widespread attitude that computer folks are technically oriented and want to stay that way, indications are that companies with low turnover rates are those that have directed attention to people management, career development, and professional advancement for their systems people. The beginning of this reorientation comes through "nurturing an environment and attitude of professionalism, a service attitude," says Darwin John. "We must stop treating dp peo-

ple as technicians only and begin to appeal to their creative intelligence, their analytical skills."

"This is not a problem of too few talented people," John went on. "It is primarily a management problem. When dp people are challenged and given the opportunity to participate in the overall business thrust, turnover is almost obliterated."

"Until a couple of years ago, very few of our people had had the opportunity to be part of a highly visible project—not only one using state-of-the-art technologies, but also one connected to an important business contribution. By restructuring jobs—generalizing them, taking them out of narrow boxes—we have been able to assign people of varying levels of experience to projects of varying complexity. People are now with a project from beginning to end. This gives them more satisfaction, and we get more commitment."

Apparently those people, like many other dpers, were just waiting for such opportunities. Yet aspiring professionals must not wait for the company or the boss to make all the moves, to initiate the changes. "An employee," says Imlay, "must communicate his own desires, objectives, plans, and goals to the employer. The boss will naturally want to keep an employee in a pigeon hole—after all, good programmers and analysts are hard to find. Only if the person communicates the desire to broaden, the desire to become a mover rather than remain a nuts and bolts type, will the boss understand and make provisions to accommodate that desire."

"Nor can the employee with management aspirations believe it is possible to move up without any effort, without some study directed toward that objective," continues Imlay. "A would-be manager or executive must take the initiative—enroll in night courses, request participation in a wider array of projects, seek broader exposure to company operations, get an MBA. The person in dp has the perfect lab at his fingertips—perhaps the best in business—because dp projects serve all aspects of the company. The opportunities are simply too frequently left untapped."

If these senior management people are right, the time has come for the dp department to occupy a slot along with already established departments from which top executives are traditionally nurtured and prepared. "In the '80s," says John Imlay, "the well-rounded MIS person will take a place among the professionals from finance, manufacturing, and marketing. The MIS route to chief executive officer, if properly developed, will be as strong as any in the business." *

Janet Crane is a free-lance writer who covers the information processing field.

DATA BASE ADMINISTRATOR

Trinidad-Tesoro Company Limited is an exploration and production company jointly owned by the government of Trinidad and Tobago and Tesoro Petroleum Corporation, San Antonio. We have recently installed an IBM 4331 model computer using the DOS/VSA operating system and several application systems are already successfully implemented. The IDMS Database package is intended for use on the machine.

Currently, Trinidad-Tesoro is seeking a Data Base Administrator with a Bachelor's degree in Engineering, Computer Science, Mathematics or equivalent, plus 7 years experience in data processing with 3-4 years as a Data Base Analyst. Also required is training in computer systems, systems planning and data base/data communications applications.

A major requirement is that the applicant be either a citizen of Trinidad and Tobago or be able to qualify under the immigration laws of Trinidad and Tobago, as the opening is in Trinidad.

Qualified applicants should send resumes in confidence to:

Employee Relations Superintendent
TRINIDAD-TESORO PETROLEUM COMPANY LIMITED
Santa Flora
Trinidad, West Indies



TRINIDAD- TESORO

We Are An Equal Opportunity Employer M/F

CIRCLE 92 ON READER CARD

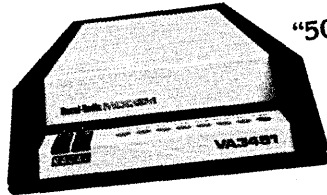


Dear Ma:
For remote user or central computer site, Racal-Vadic offers the broadest line of low and medium speed modems.

PACKAGING

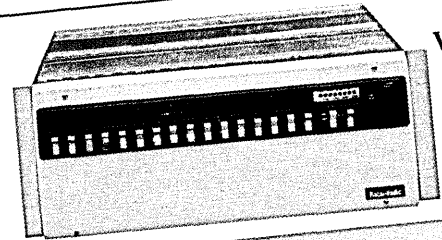
Near Right: Low profile, low cost, low heat "50" series. Includes displays, diagnostics and voice/data switch.
 Far Right: VA1616 Multiple Data Set 16 channel chassis houses up to 16 intermixed modems and automatic dialers in 7-inch high chassis. Includes displays, diagnostics and redundant power supplies.

MODEMS FOR THE REMOTE TERMINAL USER



"50" Series

MODEMS FOR THE CENTRAL COMPUTER SITE



VA1616

300 bps Full Duplex Bell 103/113 Compatible

VA103 — World's first voice/data phone with modem circuitry built inside standard rotary or tone telephone. Direct connect.



VA355 — Direct connect originate/answer 300 bps FDX modem. Switched network and 2-wire leased line in single package. Replaces Bell 103A2/F/J, 108, 113A/B/C.

VA315 — Direct connect auto originate/answer 300 bps FDX modem. Operates with Racal-Vadic VA811 Singleline/Multiline Automatic Calling Unit. Replaces Bell 103A/E/J and 113A/B/C/D.
VA317 — Direct connect answer only 300 bps FDX switched network/2-wire leased line modem. Replaces Bell 113B/D.

1200 bps Half Duplex Bell 202 Compatible

VA1250/55 — Direct connect switched network 1200 bps half duplex modem (with or without reverse channel). Replaces Bell 202C/E/S. Leased line models available to replace Bell 202D/T.

VA1230/40 — 2/4-wire leased line 1200 bps half duplex (with or without reverse channel). Replaces Bell 202D/T. VA1230 is 1800 bps version.
VA1244/45 — Direct connect switched network 1200 bps half duplex (with or without reverse channel). Operates with Racal-Vadic VA811 Singleline/Multiline Automatic Calling Unit. Replaces Bell 202C/S.

1200 bps Full Duplex Bell 212A/103 and Racal-Vadic VA3400 Compatible

VA3413/12 — Full duplex dual acoustic coupler (VA3413). Operates at 1200 and 0-300 bps. Bell 103/113 and Racal-Vadic VA3400 compatible. VA3412 operates at 1200 bps FDX (VA3400) mode.
VA3450 — Direct connect switched network originate/answer triple modem. 1200 and 0-300 bps FDX operation (VA3400, Bell 212A and 103 modes). 2-wire leased line model available.



VA3467 — Direct connect switched network answer only triple modem. 1200 and 0-300 bps FDX operation. (VA3400, Bell 212A and 103 modes.)
VA3480 — Direct connect auto originate/answer triple modem. 1200 and 0-300 bps FDX. (VA3400, Bell 212A and 103 modes.) Operates with VA811 Singleline/Multiline Automatic Calling Unit. Replaces Bell 103A/E/J, 113A/B/C/D and 212A.

2400 bps Half Duplex Bell 201 Compatible

VA2450 — Direct connect switched network 2400 bps half duplex modem (with or without 75/150 bps auxiliary channel). Replaces Bell 201B/C. 2/4-wire leased line models available.

VA2440/45 — Direct connect switched network 2400 bps half duplex (with or without 75/150 bps auxiliary channel). Replaces Bell 201B/C. Operates with VA811 Singleline/Multiline Automatic Calling Unit. 2/4-wire leased line models available.

Available from these stocking reps...

Alabama: (800) 327-6600 • Alaska: (907) 344-1141 • Arizona: (602) 947-7841 • California: S.F. (408) 727-6491, L.A. (714) 635-7600, S.D. (714) 565-1557 • Colorado: (303) 779-3600
 Connecticut: (203) 265-0215 • District of Columbia: (301) 649-6000 • Florida: Fort Lauderdale (800) 432-4480, Orlando (305) 423-7615, St. Petersburg (800) 432-4480 • Georgia: (800) 327-6600 • Illinois: (312) 255-4820 • Indiana: (317) 846-2591 • Kansas: (913) 362-2366 • Maryland: (301) 649-6000 • Massachusetts: (617) 245-8900 • Michigan: (313) 973-1133 • Minnesota: (612) 944-3515 • Missouri: (800) 327-6600 • Mississippi: (800) 327-6600 • Nevada: (800) 422-4591 • New Jersey: North (201) 445-5210, South (609) 779-0200 • New Mexico: (505) 299-7658 • New York: Binghamton (607) 785-9947, N.Y.C. (212) 695-4269, Rochester (716) 473-5720, Syracuse (315) 437-6666 • North Carolina: (800) 327-6600 • Ohio: Cleveland (216) 333-8375, Dayton (513) 859-3040 • Oregon: (503) 224-3145 • Pennsylvania: East (609) 779-0200, West (412) 681-8609 • South Carolina: (800) 327-6600 • Texas: Austin (512) 451-0217, Dallas (214) 231-2573, Houston (713) 688-9971 • Utah: (801) 262-3000 • Virginia: (301) 649-6000
 Washington: (206) 364-8830 • Wisconsin: (414) 784-9379 • Canada: Calgary (403) 243-2202, Montreal (514) 849-9491, Toronto (416) 675-7500, Vancouver (604) 681-8136

Free Short Form Catalog. Better send for yours today, Ma!
 Your independent thinking son,

Alexander Graham Jr.

Racal-Vadic

Member IDCMA

RACAL
 The Electronics Group

222 Caspian Drive
 Sunnyvale, CA 94086
 Tel: (408) 744-0810 • TWX: 910-339-9297

Racal-Vadic Regional Offices: West: (408) 744-0810 • East: (301) 459-7430
 Central: (312) 932-9268 • Northeast: (617) 245-8790 • Southwest: (617) 277-2246

CIRCLE 93 ON READER CARD

With some help from overseas, the Japanese are beginning a 10-year R&D effort intended to yield a fifth generation system.

TOKYO LOOKS TO THE '90s

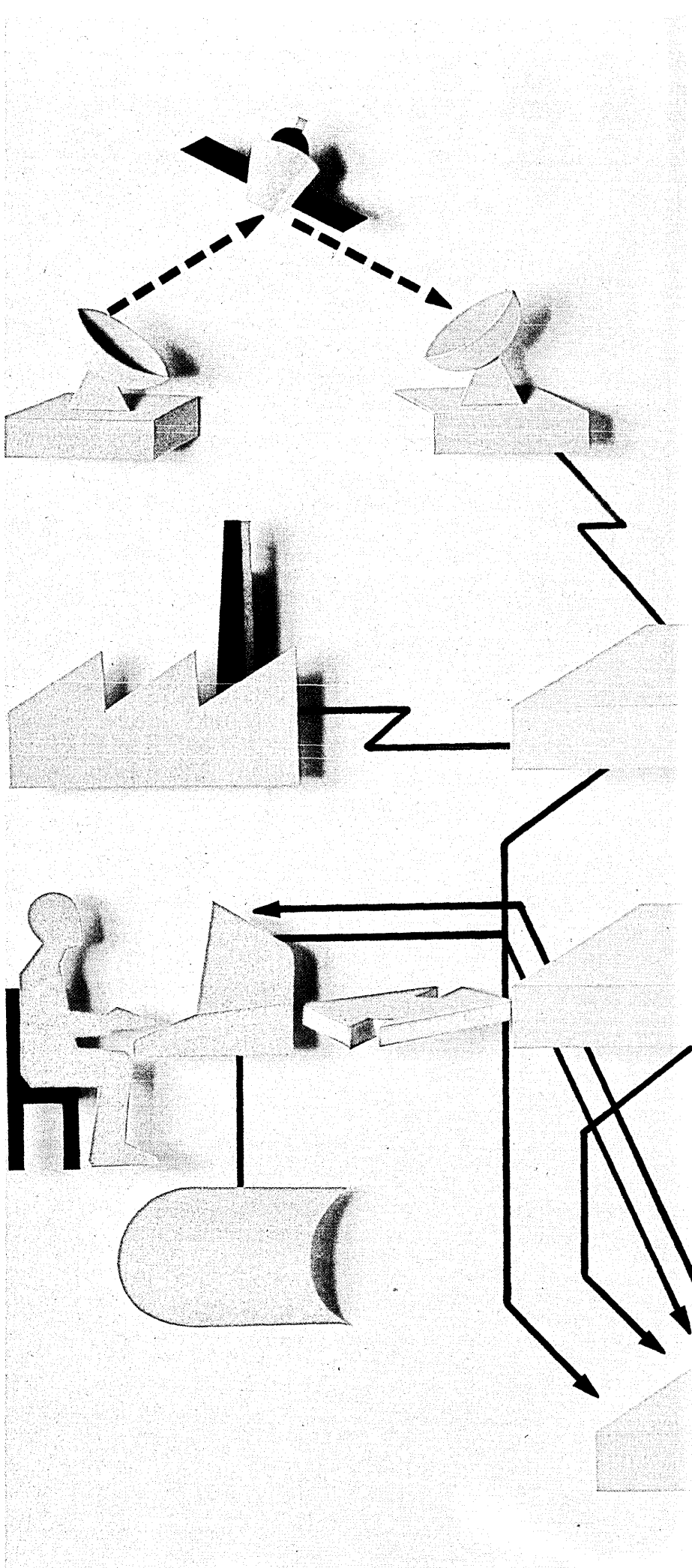
by Edward K. Yasaki

In Japan, as elsewhere, the government is stressing the need for spending cuts. The urgency there is no less than in the Reagan Administration, which is trying to get the federal government to cut an additional 12% from nondefense agency budgets. But just when Japan's Ministry of Finance finds it must pare expenditures wherever possible, here comes the Ministry of International Trade & Industry (MITI) with a new 10-year research and development project. MITI is proposing to spend some \$44.5 million over the first three years on something it calls, for lack of a better name, the fifth generation computer system project (August, p. 40).

To delineate and defend the various aspects of this project, the Japanese government invited scholars and researchers from around the world to an international conference in Tokyo in October. Those foreigners, numbering 86 out of the 300 or so in attendance, labeled the project ambitious and interesting, and they marveled at how open the Japanese have been about their plans. But behind some of the comments one could also detect some suspicion that the Japanese might not remain open about the results of their research.

Research does, indeed, seem to be the operative word. At the closing session, MITI's Sozaburo Okamatsu told attendees that the Japanese were still trying to come up with a concept for this advanced computer system. Therefore, those who came expecting to get the "complete R&D plans for the fifth generation computer might feel a bit dissatisfied." But, he added, the idea here

ILLUSTRATION BY SALLY JO VITSKY/PHOTOGRAPH BY DAVID M. SPINDEL



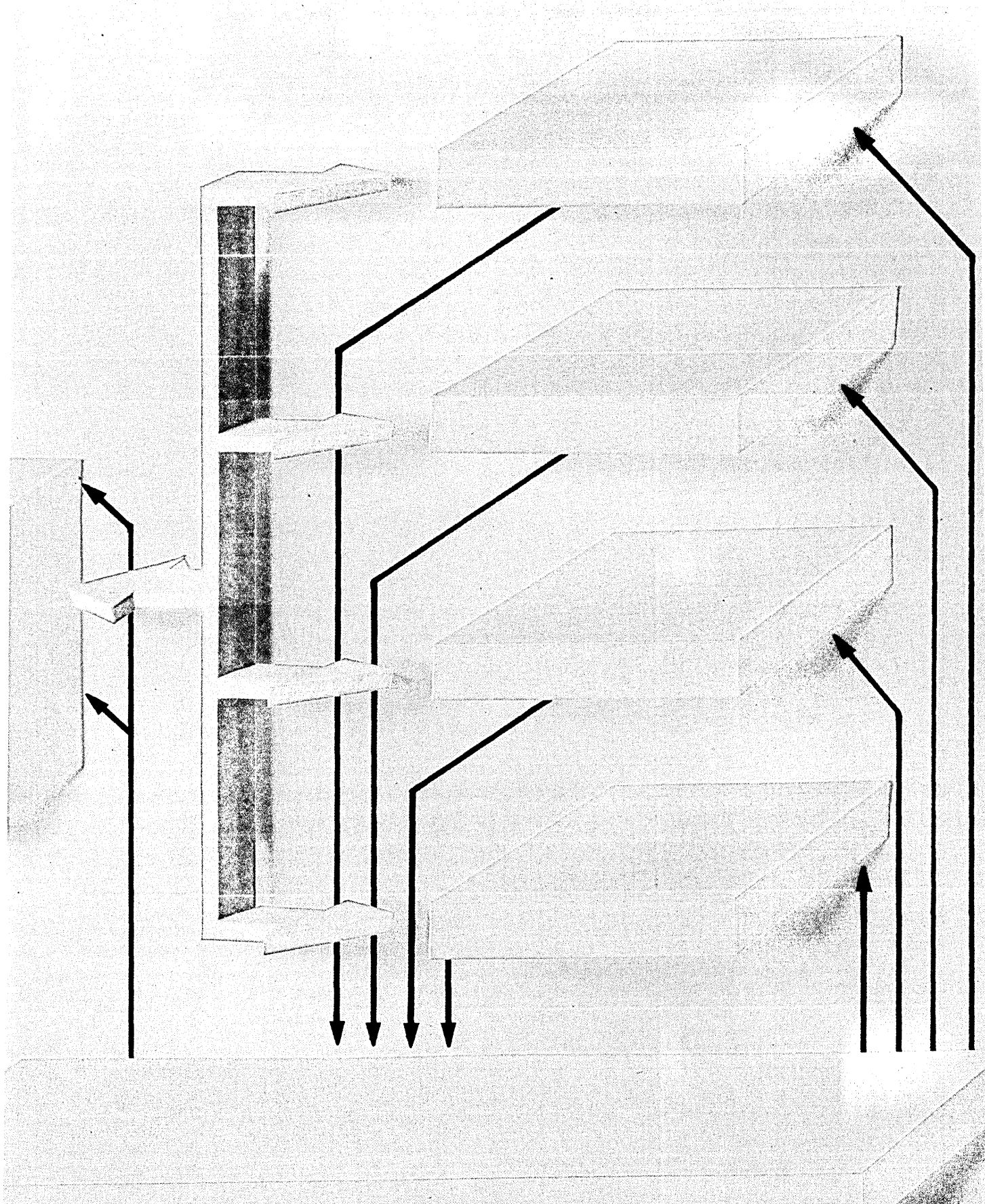
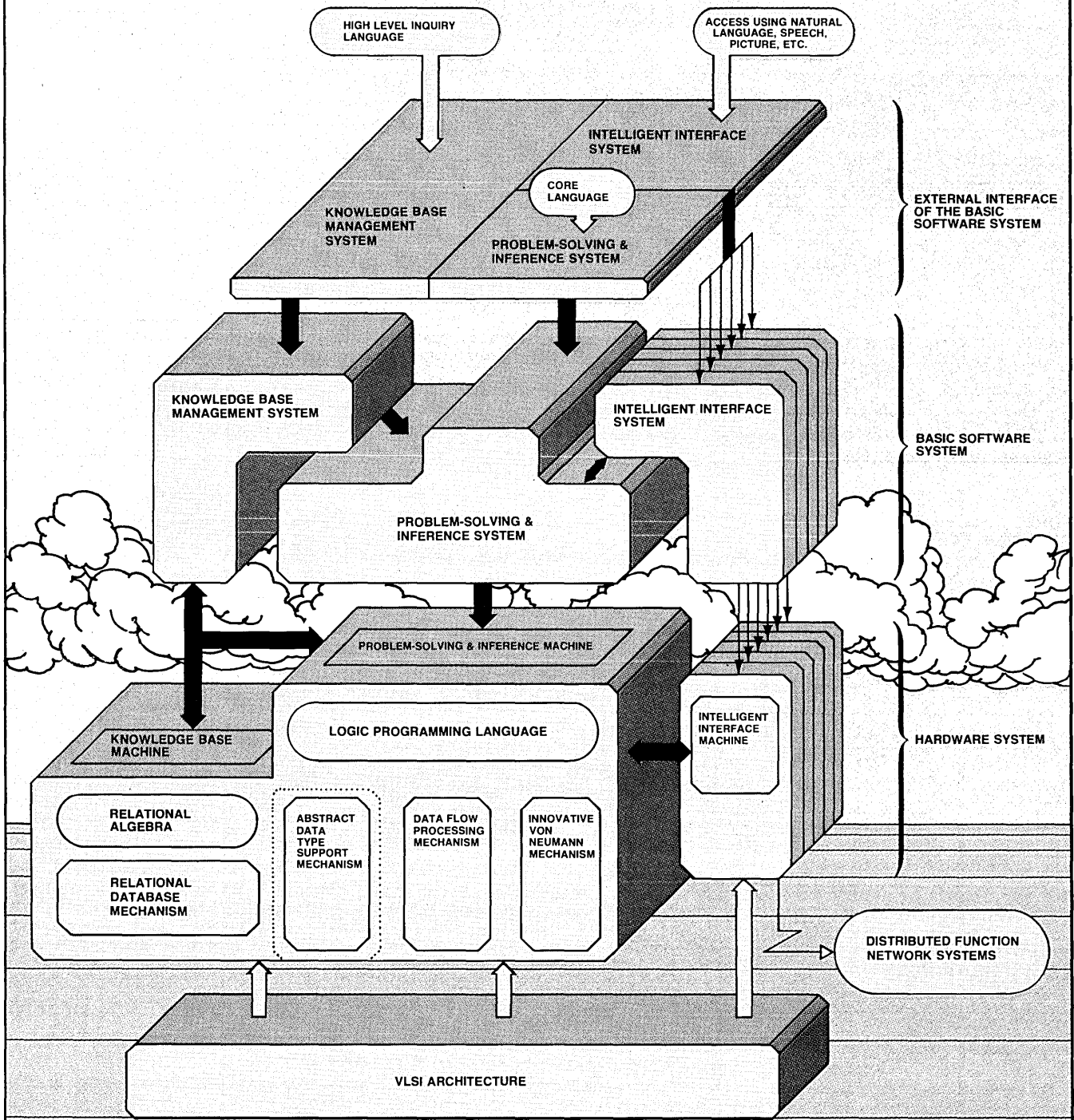


FIG. 1

BASIC CONCEPT OF THE FIFTH GENERATION COMPUTER SYSTEM



SOURCE: JIPDEC

CHART BY CYNTHIA STODDARD

Participating governments might conduct their own research in parallel with the Japanese for at least the first three years.

was to get an exchange of opinions during this early planning stage, not to report to the world what the Japanese had already cast in silicon.

What the conferees saw, then, was a menu of research themes on computer architectures (dataflow seems to be the main entree), programming languages (they lean heavily toward Prolog), knowledge engineering (expert systems with their knowledge bases and inference mechanisms), and facilities to handle speech I/O and image I/O—all implemented in VLSI, of course, and so the need for a CAD system. With natural language processing thrown in, plus language translation and database management, there's something for everyone.

There is a striking similarity between the structure of this project and that of the preceding national research program called the Pattern Information Processing System project. That one ran from about 1971 until last year and called for research into the recognition of characters, pictures, 3-D objects, and speech, as well as natural language processing, and into such devices as semiconductor lasers. While government funding has run out on the PIPS project, individual companies continue their research independently into such topics as scene analysis and the recognition of kanji characters.

In a similar way, the FGCS project can be split into a number of component research topics that the participating domestic mainframe makers seemingly can commit to as they see fit, picking and choosing from among them to complement their in-house capabilities or lack of same. So the Japanese "conceptualization" of a computer system for the 1990s seems to be more a list of technologies in which a company would want to be involved now to prepare for that decade. Those who went to Tokyo expecting to get a peek under the Japanese exhibition tent and a glance at a detailed plan of the system for the '90s were perhaps disappointed.

BEST TIME FOR CHANGE

But Jonathan Allen, of the Massachusetts Institute of Technology said never before in history was there a better time for technological change, combined with the capability to effect that change. Bruce H. McCormick of the University of Illinois observed that no supercomputer project in the past—whether it be the Univac Larc or the IBM Stretch or the Illiac—came near its stated goal or achieved commercial success. He said he views the FGCS project as a supercomputer development project and as an attempt by the Japanese to get up to speed in knowledge engineering.

Stanford University's Edward A. Feigenbaum said the system as outlined by the Japanese "is discontinuous with traditional computing" but "completely

continuous with the vision of computer scientists over the years for a truly intelligent computer system." The artificial intelligence guru opined that if the project is a success it will be an "epoch-making event."

"The fifth generation system project aims to build the artificial intelligence machine that we have all been waiting for," he added. "If successful, the project will have a revolutionary impact on the computing world. I believe it is the right concept at the right time on the right schedule."

Expressing strong disagreement with Feigenbaum was Philip C. Treleaven of the University of Newcastle upon Tyne in England. He reported that a number of participants were dismayed to find that the Japanese "by and large put forward an American AI view of computer science." Addressing the Japanese, he then said that if semiconductor makers in the next five years develop the ability to manufacture microprocessor chips with the same ease with which they turn out memory chips, "you'll be forced to build your knowledge-based systems on top of what they come up with, and therefore what you're proposing could have very little impact."

In attendance at the conference were people from three Western governments—the U.K., France, and West Germany. In an exclusive interview, Tohru Moto-oka of Tokyo University said the three nations are engaged in negotiations with MITI on participating in the fifth generation project. Moto-oka, who is chairman of the project committee and who chaired the conference, said the current thinking is that participating governments would conduct their own research in parallel with the Japanese for at least the first three years. When informed that some Westerners accuse the Japanese of picking the best brains of people from around the world for what is essentially a Japanese research project, the professor didn't deny this. But he asserts the U.S. has been doing this for decades, causing a brain drain to occur in the direction of the West by offering munificent salaries. "What's the difference?" he asks.

In addition to those nations, participants also came from Belgium, Bulgaria, Canada, India, Italy, Mexico, the Netherlands, the Philippines, Republic of China, and Sweden. There were people from Cray Research, Digital Equipment Corp., Honeywell, IBM, NCR, Sperry Univac, and Texas Instruments, as well as from Cii-Honeywell Bull, Nixdorf, and Olivetti.

What they heard was a well-orchestrated presentation, simultaneously translated into English, on what the Japanese see as the system of the '90s. It will have an intelligent front end capable of performing input/output operations with speech signals

and graphic images. It will process natural languages, at least English and Japanese. It will perform language translation, at least 90% of it automatically, such that the cost of a translation job could be reduced by 70%. Then there are the expert systems (September, p. 63) that consist of a so-called knowledge base on a narrow field of expertise and a mechanism by which inferences can be drawn from that fount of knowledge. If current machines can perform 1,000 to 10,000 of those inferences a second, the goal for the '90s is to do 100 million to a billion of them in the same time span.

NEW MACHINES PLANNED

With the idea that that requires some advances in computer architecture, the project planners have scheduled research in the design of faster processors with which to build logic programming machines, symbol manipulation machines, relational algebra machines, and such. One of the end goals is a dataflow machine comprised of from 1,000 to 10,000 processors, storage of from one to 10 gigabytes, and a speed of from one to 10 billion instructions per second. Hoped for, as well, is a personal dataflow computer with a 10 MIPS speed. Also on tap is a numerical computation machine consisting of processor elements that perform 4 million floating point operations per second; by combining a thousand such PES, it is hoped to have a 1 billion FLOPS machine.

According to Shunichi Uchida of the government Electrotechnical Laboratory (ETL), the project is divided into three stages of three, four, and three years' duration each. Speaking on the architectures of inference mechanisms, he said they hoped to study the basic mechanisms of inference machines in the first stage, including the applicability of dataflow machines for symbol processing. In the intermediate stage they'd like to build a sequential inference machine, then a parallel machine, and then integrate the inference machine with a knowledge base machine. In the final stages they would build from scratch an integrated version of a complete system. Prototypes of the various pieces of hardware to be developed in this project are scheduled for completion in 1990. Again, that's just a goal, not a deadline.

However close the Japanese come to achieving their goals in, say, the number of floating point operations or logical inference operations per second, the point is that they have set specific long-term goals. Even Tsuneo Uraki of Hitachi Ltd. was able to ignore for the moment the details and note that the major expectations of the project are to enlarge both systems capabilities and the range of computer applications, to improve software productivity, and to produce a better

ARTIFICIAL INTELLIGENCE—KEY TO THE FIFTH GENERATION

Data processing researchers are increasingly turning to artificial intelligence (AI) techniques to tackle the major computing challenge of the 1980s—improving the usability of systems.

One country particularly busy in the AI realm is Japan. In seeking changes in hardware architectural structures as part of their ambitious project to develop fifth generation computers for the 21st century, the Japanese hope to come up with new techniques that have been traditional concerns of artificial intelligence experts.

Critical to this effort is the user interface. Interactive dialogs, database interrogation, natural language communications, speech understanding, automatic programming, handwriting recognition, and computer-aided learning will all be intrinsic parts of the fifth generation design objectives.

Mainstream dp users, however, will not have to wait until the turn of the century to benefit from AI developments. Many dp vendors from Japan and other countries are already pouring considerable resources into AI activities, the results being incorporated into some of their current products. Philips Research Laboratories in the Netherlands, for example, has come up with a natural language question-answering system for database queries called PHLQA 1. Question-answering systems have, in fact, been one of the most fruitful areas of AI research. In England, ICL's Research & Advanced Development Center has also taken a strong interest in AI techniques, which are being applied to work in such areas as speech recognition and data management.

In the States, the Xerox Palo Alto Research Center (PARC) has been zeroing in on AI for many years in an effort to produce more accessible office systems. PARC's research is paying off in the design of products like the Xerox Star workstation, which has high usability standards. Digital Equipment Corp. engineers are also using an AI setup to help configure systems. Another U.S. giant, Texas Instruments, is examining AI to try to improve the efficiency of programming environments and VLSI design. And industry leader IBM is actively evaluating AI-related systems to handle various tasks such as automatic generation of accounting programs and system fault diagnosis. The mighty company, however, wasn't always in favor of these techniques. In fact, former IBM chairman Thomas J. Watson Jr. had nixed AI because of its possible blasphemous implications.

Dr. Richard Wexelblat, director of software research for Sperry Univac, believes the surge in vendor interest over the last few years is due to the fact that AI is one of the few disciplines that has methodically studied the relationship between people and machines. "The success of a computer-based system is as much due to the user interface as to the technical functions it per-

forms," he explains. "Absence of a learnable, usable interface can doom a system to failure."

Wexelblat staunchly maintains that these user interface requirements should not be regarded as an optional extra or add-on modification. "Learnability and usability must be designed in from the beginning," he stresses.

Virtually all computer suppliers are making some use of AI in their developments, even if they are not explicitly aware of the link. It is only in the last four or five years, however, that the practical uses of AI in dp have become apparent. Previously, and with some justification, the field was regarded as a "beyond the fringe" science.

Thomas Watson's disapproval of AI reflected a general concern in the 1960s that the artificial intelligentsia (as AI specialists are sometimes called) were intent on creating artificial human beings. Early AI experts did indeed make some unrealistic claims which led to general distrust of the field and its practitioners. As early as 1958, for example, two AI pioneers, Herbert Simon and Allen Newell, from Carnegie-Mellon University in the U.S., wrote the following: "There are now, in the world, machines that think, that learn, and that create. Moreover, their ability to do these things is going to increase rapidly until—in the visible future—the range of problems they can handle will be coextensive with the range to which the human mind has been applied."

That "visible future" is still far over the horizon. After more than 20 years, AI may have helped computers mimic many intelligent human activities, but it has made only minimal advances towards emulating genuine human thinking. During the 1960s, relatively little progress was made in the field. A combination of overblown claims and slow progress threatened the future of AI as an independent area of study.

In the U.K., for example, a report was prepared in 1972 that virtually killed AI and robotics research in that country. The damaging report was the work of a respected applied mathematician, Sir James Lighthill, who undertook an investigation of AI for the Science Research Council (SRC), which sponsors university research. In his report, Lighthill debunked AI so thoroughly that funding dried up for this field as well as the associated area of robotics.

In 1980, the SRC changed its mind. It inaugurated a \$5 million support scheme for robotics, and is considering other investments in AI, including the possibility of establishing a special research center to be called the Turing Institute.

Such support of AI activities has been slow in coming. Indeed, it wasn't until the 1970s that AI began to come in from the cold, gaining recognition as a credible science.

During the decade of the '70s, AI researchers lowered their theoretical sights

and raised the practical elements in their work. Instead of trying to create a general purpose thinking machine to act like a person, they channeled their energies into specific tasks to help people create and use computers.

Another major change came when dp scientists and users began to realize the importance of making computers easier to use. Yet there was still very little systematic research that could realistically be applied to the problems of what marketing people began to call "user friendliness."

The human behavioral scientists, such as psychologists, also paid little attention to computer usage. Even the well-established activities of ergonomics and human factor engineering saw minimal application in computing.

Computing practitioners, on the other hand, have been primarily concerned with the technology itself and the specialist user (analyst, programmer and operator). As a result, AI developed as an offshoot of cybernetics, rather than as a branch of computer science. Cybernetics is concerned with control mechanisms which enable biological, organizational, or artificial systems to operate successfully.

AI's computer bias eventually pulled the field away from the cybernetics camp, which was concerned with more generalized systems. The link-up, nevertheless, brought the valuable cybernetic interdisciplinary approach to computing.

Developments in natural language communication with computers illustrate the path taken by AI. The main computer language research in the 1960s was in programming languages. The 1970s saw the development of database definition and access languages and information retrieval techniques, which were primarily an extension of a computer-oriented view of the user interface.

AI, however, started by trying to communicate with computers in natural languages. As part of his research on language grammar, leading American linguist Noam Chomsky studied whether it would be feasible to have an English language compiler. Chomsky concluded that the learning and understanding of natural languages was too complex to be handled by an automated system and must rely on an inherited ability unique to humans.

Most AI researchers also recommended abandoning further attempts to get computers to understand natural languages in a totally free way. Instead, attention was focused on context-dependent natural language communications. In the early 1970s, a number of interactive dialog systems were developed in the U.S.

Two main types of natural language developments emerged. One was based on the notion of "scripted dialogs." The other was designed to retrieve information from databases. Both started with primitive, su-

perfluous experiments in the early 1970s. Later they blossomed into more sophisticated commercial systems.

The script dialogs predefine the kinds of questions and answers that may occur at various stages of a well-structured dialog. Doctor-patient or waiter-customer are typical script situations. Such systems are being used within very specialized contexts. Database inquiry systems using AI developments, on the other hand, are being used on generalized database management systems.

In 1979 Cullinane bought the rights to Artificial Intelligence Corp.'s Robot natural language system for use with its IDMS database management system. Question-answering systems like the Philips PHLIQA 1 and techniques like IBM's Query By Example (QBE) data language also draw directly or indirectly on AI natural language work.

Also in the late 1970s, human factor engineers, applied psychologists, ergonomists, and computer scientists began to realize the significance of developing more natural ways of communicating with systems. These other disciplines have now built upon and extended early AI work.

Computer linguistic research also began to pinpoint the database as an important consideration. More precisely, the knowledge base became a focus of research.

In order to understand natural language, the program needs some knowledge about the "world" from which information is required. The script dialog approach is a relatively crude way of defining this world model. More flexible techniques of building up and using a knowledge base are clearly needed. Researchers in other branches of AI, from chess playing to automatic programming, also agreed that a knowledge-based system was of great importance.

Knowledge bases hold the distilled essence of human expertise in the form of knowledge rules that are structured in human reasoning patterns. Such knowledge-based systems are known as expert systems. The DEC R1 service, for example, is an expert system containing the knowledge of engineering experts. IBM is also funding an expert system project called DART at Stanford University. DART's primary goal is to capture the special design knowledge and diagnostic abilities of experts who understand the design of a system.

There are other expert systems performing such chores as medical diagnosis, structural analysis, and geological exploration. For the dp world, however, one of the most exciting aspects of expert systems could result from their capability to capture expert programming knowledge. Advances in this realm could eventually lead to completely automatic programming. Professor Ross Quinlan of the University of Sydney, for example, has used an expert system to write a program for a particular chess situation. The program is more efficient than any

program he himself could write. More generalized automatic program generators, however, are unlikely to hit the market during this decade. But semiautomatic programming systems could make an impact much sooner.

Instead of expecting the computer to do all the work, semiautomatic programmers ask the user certain questions about the nature of the problem being tackled. From these answers, the systems will produce the required code. IBM is investigating this technique as a means of enabling nonspecialist users to create accounting and business programs tailor-made to their environment.

Earlier this year DJ AI Systems in the U.K. launched a product called The Last One for the personal computer market. It uses AI techniques to generate BASIC code once the user has specified the flowcharts in an English-language format and has answered questions on such things as file sizes and error routine options.

Futurist Earl C. Joseph of Sperry Univac believes that AI techniques, particularly in the area of expert systems, will serve as "people amplifiers." These technologies, along with LSI advances, he predicts, will lead within a decade to such people amplifiers as "book-on-a-chip," "teacher-on-a-chip," and "doctor-on-a-chip." Such breakthroughs, he says, will give people direct access to their own expert systems.

Stanford University's Dr. Penny Nii is more skeptical. She feels it will probably take longer than 10 years for the industry to come up with a wide range of handheld expert systems.

Whatever the timetable, AI specialists agree that the future belongs to expert systems. One staunch believer in this technology is Professor Donald Michie of the Machine Intelligence Unit at Edinburgh University. Michie maintains that expert systems are vital to mankind's survival.

The world's increasing dependence on computers has made these systems a necessity, says Michie. Programmed from the start with human reasoning, these systems, according to Michie, would provide a "human window" into the "inscrutable" machine. Expert systems, he further points out, could also function as tutors, since they distill expertise into clearly defined rules.

In the future, expert systems promise to solve many of the man-machine interface problems currently hampering computer usage. In the world of today, users have already benefited from advances on the AI front. It was the early work of AI specialists, for example, that helped provide the coherent framework needed to cope with the rising demand for user-friendly systems. That demand is growing, as the Japanese are well aware. Their serious interest in knowledge-based systems virtually guarantees that artificial intelligence schemes will be central to the computing scene in the 21st century.

—Malcolm Peltu

man-machine interface.

Kazuhiro Fuchi of ETL observed that research in artificial intelligence and software engineering has been conducted by separate groups in the past but that the trend was toward a merging of these efforts. He added, too, that the Japanese are less concerned with whether they'll be able to develop an "innovative" computer system and more concerned with whether they will be able to benefit society.

It was Hajime Karatsu of Matsushita Communication who headed the committee that studied the social needs of the '90s and the impact of the system. In a witty but no less serious presentation, he addressed the problems of an aging society, of industry segments suffering from a low rate of productivity, and of a shortage of energy and natural resources. He spoke of the need for continuing education, and for computers in schools to lower the student dropout rate. He mentioned the impact of computers on a nation's social, industrial, international, and personal fabric, acknowledging that they cannot be described separately because of the interrelationships among them.

TECH ASPECTS AVOIDED

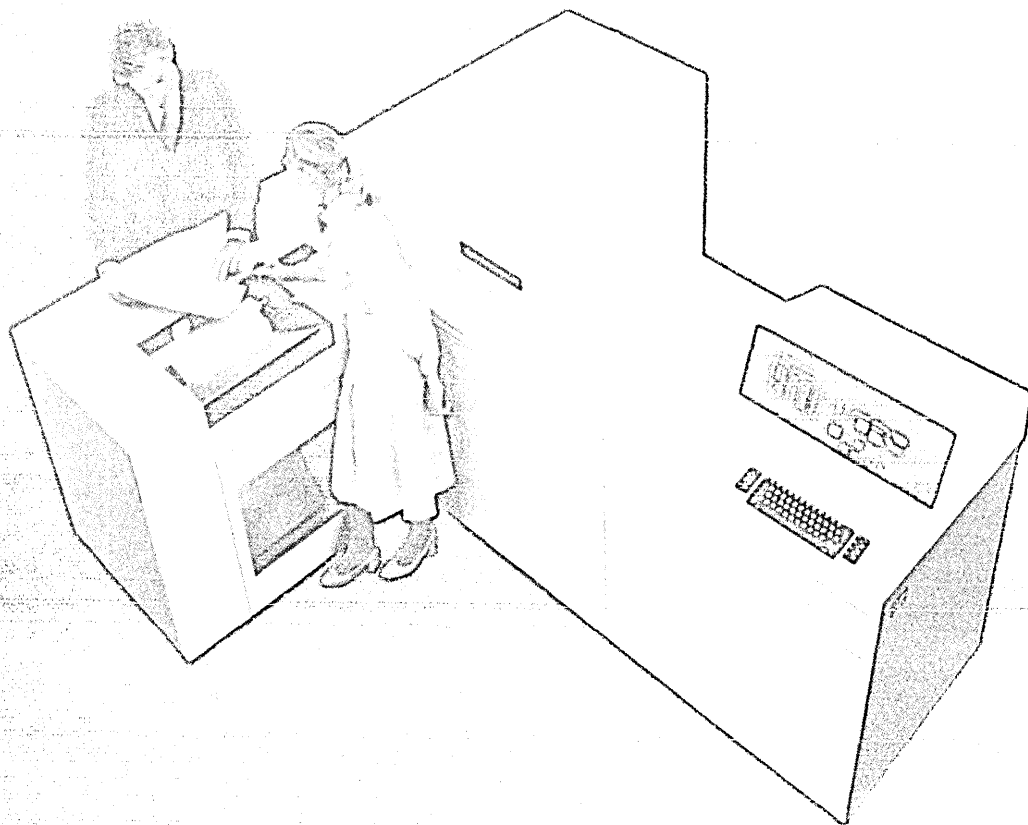
But when foreign participants were asked to comment on the project, a number of them avoided the technical aspects and thoughtfully questioned whether the Japanese really understood the society they were trying to influence. John Riganati of the U.S. National Bureau of Standards (NBS) referred to Studs Terkel's book *Working*, an eye-opening look at the attitudes of people in all walks of life toward their jobs. Riganati asked whether the Japanese had such a bottom-up knowledge of the society they wish to transform.

From the U.K.'s Interbank Research Organization, C. Read lamented the world's reliance on statistical data to justify so many things. "Least cost solutions or maximum productivity are not desirable in themselves," he averred. "Indeed, they are often very harmful." So he warned against automation in support of efficiency and productivity when it leads to a growing sense of isolation on the part of consumers.

"If the fifth generation [system] does all that is hoped for, it will make it possible for us to make proper use of nonnumeric information," he added. ". . . If we can do that, then we can use qualitative value judgments in our decision-making." He continued, "If that can be done, that alone would justify the fifth generation computer. I believe it is perhaps the one intellectual development that could have the greatest benefit to society by improving the quality of decision-making . . . particularly by our governments." *

IBM System/38

It's making traditional
measures of
price/performance
obsolete.



When managers compare the cost of computers, they often leave out the biggest factor—"people cost."

That's why measures like hardware price/performance only begin to gauge the potential productivity of IBM's System/38. This innovative system can help programmers generate more programs, sales reps generate more sales, and management generate more decisions.

But what traditional price/performance ratios can't tell you about System/38, its users can. Here's what they're saying:



"We converted from a System/34 to the System/38 and the time saving with System/38 is fantastic. I rewrote a program in a day that previously would have taken two weeks. We completely converted our order entry system programs in four days. We can debug in one-tenth the time. System/38 is a terrific management tool."

Greg DiBacco, Data Processing Manager
Clark-Schwebel Fiber Glass Corporation
Anderson, South Carolina



"It's almost scary how fast you can turn around a small job on System/38, and how easy it is to design a sophisticated application. We're writing programs significantly faster and with significantly less trouble. We're also having more fun."

Ron Nino, V.P.-Information Services
Bently Nevada Corporation
Minden, Nevada



"The System/38 has more than lived up to our expectations. It certainly is faster, it certainly is much more responsive. We can do analytical work which heretofore was not possible. We can write interactive programs in minutes using the data base. We write less down, do less checking, but our working speed is up."

Jim Wessing, Director of Administrative Data Processing
Colgate University
Hamilton, New York

What makes System/38 so versatile and so productive? It offers large computer features integrated into a compact, easy-to-use system. Plus new features rarely found in any computer, large or small.

For a better idea of what the System/38 can do for your business, call us toll-free at 1-800-241-2003. (In Georgia, 1-800-282-7994.) Or write us at P.O. Box 1385, Atlanta, GA 30055.



COPING WITH COMPUTER CRIMINALS

by Charles L. Howe

Too often MIS managers concentrate on hardware and software rather than on personnel as a means of checking computer abuse. But security is first and last a people problem.



Feel compassion for the troubled MIS manager who drifted into troubled sleep last night after reading yet another report on the purely technological aspects of computer crime. His \$50 million corporation has no standing security committee, no external edp audits, and no meaningful personnel screening system. Thus, the full responsibility as the house electronics watchdog has fallen to him by default. Like most MIS types, he has been unable to properly convey his concerns about computer security to higher management, whose backgrounds run to sales and marketing.

His nightmare begins. He wanders

through an air-conditioned data processing center, wearing a stethoscope and listening intently for the ticking of a logic bomb that can erase his programs. The scene shifts. Now he roams a barren desert, vainly trying to lasso a Trojan horse trained to take a swift, vicious bite out of the corporate payroll. Sight changes to sound. Can that squeak be the opening of a trapdoor that will let outsiders in to ransack the computer for privileged passwords? A pungent aroma invades his dreams. Is it the odor of a clandestine salami technique, which is quietly taking thin slices from an assortment of corporate accounts under the

computer's control? Permutation follows permutation until the alarm clock goes off.

Surrealistic nightmares aside, every computer installation is vulnerable to criminal activity. White collar thieves have misused computers to embezzle funds, pilfer timesharing services and programs, eavesdrop on the bids of business competitors, divert inventory, disclose tax and banking records, snatch valuable mailing lists, monitor private medical and pharmaceutical records, print payroll checks and other documents that can be converted into ready cash, reduce or eliminate premiums on insurance and other



ILLUSTRATION BY BRIAN AJAR

In some cases, nothing but a door stands between a \$10 million computer installation and a criminal.

installment-type payments, and alter transcripts at colleges and universities. And in the case of a city-owned computer, dp personnel used the hardware to store programs and data on the breeding and racing of horses—to gain an edge at the racetracks.

Why do these crimes occur? Mainly because dp types are too damned unsophisticated and trusting when it comes to human relations, say the experts. Too often they concentrate on hardware and software at the expense of personnel. "Computer security is first and last a people problem," says Donn B. Parker, senior management systems consultant at SRI International, a research and consulting firm in Menlo Park, Calif. "People represent a much greater vulnerability than worrying about file access control mechanisms and installing physical access control devices. Unfortunately, computer security is usually in the hands of technologists, who study problems analytically."

As a classic example of naivete in opening the door to computer criminals, consider the Case of the Corrupted College Computer. You've probably never heard of it, for the take was nowhere near the whopping \$21.3 million computer-related embezzlement that hit Wells Fargo Bank in Los Angeles early last year. Nor were the two college perpetrators the Napoleons of crime that laymen might expect to find masterminding the scam. Instead, they were simply two thieves who operated with the hubris of street muggers. "This was a textbook example of computer abuse by staff dp personnel," says Rolf Moulton, director of the Computer Security Services Unit of New York City, who was loaned to nearby Nassau County police to investigate the crime. "It could have happened almost anywhere."

"The college's acting director of the computer department [the systems programmer] and his predecessor simply used the college's Xerox Sigma-9 unlawfully to go into business for themselves," recalls Nassau County Assistant District Attorney Paul Kowtna, who prosecuted the case. Over a period of at least three years the pair used minimally \$200,000 worth of college computer time, selling its services to three private corporations which were unaware a crime was taking place.

College officials, who had never questioned the pair's sometimes strange behavior or their high living, finally became suspicious after beefing up the computer's work capacity and finding that it still could not handle routine chores like billing, accounting, and classroom instruction. The dp director resigned and the incoming director began a quiet investigation. Among other things, he noticed 25 modems attached to the computer when there should have been only 19. Separate recognition codes were discovered that

allowed outside clients to use the computer. The college reported its suspicions to police, who called in Moulton. Here's what they discovered after a midnight raid on the facility:

- No written policy on authorized or unauthorized computer use had been issued by the college.
- No system usage statistics had been kept.
- No network documentation had been maintained. Six telephone dial-up lines had been used exclusively by the two suspects and billed to the college.
- Aside from bills and receipts, all equipment inventory records had been maintained by the suspects.
- All records of active media (disk and tape) and those in the library had been maintained by the suspects, if at all.
- A program hidden in the computer system had been capable of destroying all data stored on disks.
- The systems programmer had kept a private telephone line in his office, which he told all staff members never to use. Ironically, the phone line had also been paid for by the college.
- The suspects had been responsible for systems backups, though it was not determined whether the backup tapes had been real or dummies.
- The systems programmer had owned several expensive cars, plus a home in an exclusive neighborhood. His salary at termination: \$24,000.

DEVISE A BASIC PLAN

A first step in developing computer abuse as an indictable crime is the issuance of a policy statement on what can, and can't, be done with the computer, says Moulton, whose unique department monitors the work of several thousand dp employees in New York City's 12 big computer centers. New York City Mayor Edward I. Koch, for example, recently distributed a directive on computer use to all heads of agencies and departments, employing some 230,000 employees. "Have top management issue a policy statement that clearly defines what's expected of every employee concerning the protection of the organization's assets, including computational time, resources, data, and computer programs," Moulton recommends. Then sit down and draw up a similar policy regarding vendors and suppliers.

A second step is to check out potential employees closely before hiring. "We find that many times the prospective employer doesn't even check to find out if the candidate has the background he claims," says John T. Errett, vice president of United Intelligence Inc. (Unitel), a New York City private detective agency that specializes in computer crime investigation. "Instead, they'll take the em-

ployee on faith or simply make one phone call to the previous employer."

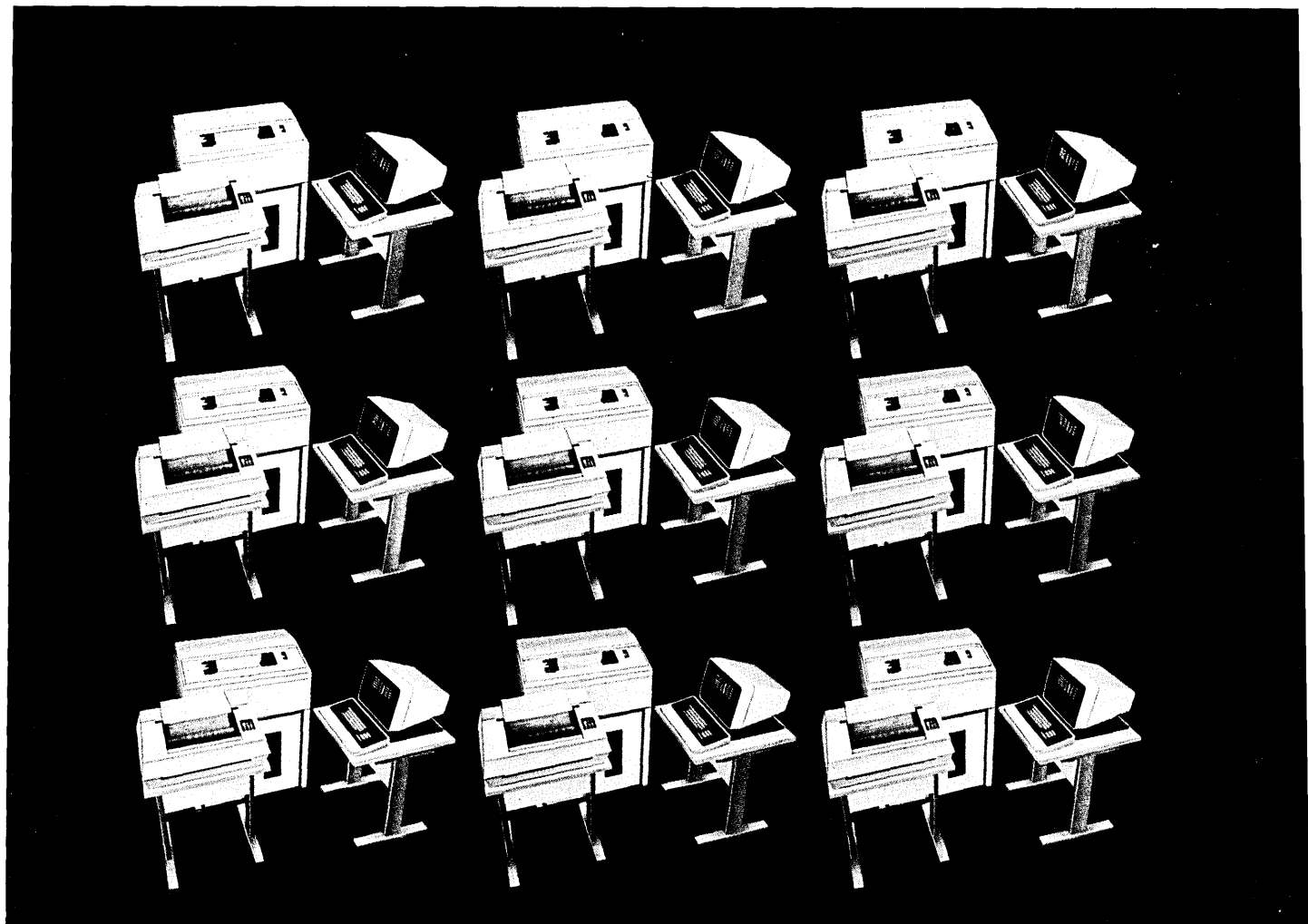
One factor contributing to this is that many companies feel they'll be in violation of privacy laws if they probe too deeply. But this is not necessarily so, says Susan B. Nycum, a partner in the Palo Alto, Calif., law firm of Gasten Snow & Ely Bartlett. "Everyone has the wrong impression about how many questions you can ask," notes Nycum, who specializes in civil suits arising from alleged computer abuses.

How do you avoid asking the wrong questions of a job candidate. "Just don't go about it in an awful way," Nycum says. "Avoid setting up what can be viewed as a pattern of discrimination. Ask questions closely related to the job the potential employee is applying for. Then get his or her signature okaying the fact that you can verify the applicant's claimed background. The problem now is that many employers went too far in the past and asked all kinds of personal questions not related to the job." Lawsuits resulted, and privacy and disclosure laws were passed that intimidated too many personnel departments, says Nycum. Review your personnel department's handling of preemployment screening and then see if it can be legally tightened by talking to house counsel.

How much time and money should you spend on a background check? It depends on the opportunities available to the employee. Clearly, a middle manager warrants a closer scrutiny than a keypunch clerk. "Obviously, you're not going to spend a helluva lot of money on a youngster who probably doesn't have much of a background to investigate," Errett says. Some firms do modest checking on a volume basis, spending from \$25 to \$75 and using local credit reporting agencies. A candidate, say, for a programmer's job might warrant a \$200 investigation, which includes verification of dates and places of residence, a motor vehicle driving record, and other pertinent items. Equifax of Atlanta handles investigations on that level and at about that price, says Errett.

A candidate for the MIS manager's position would be worth an even closer scrutiny, says Errett. Bishop's Service, with offices in many major metropolitan areas, and Proudfoot Reports, in New York City, are two firms that handle investigations on that level, with costs ranging from \$400 to \$700. "And after that there's us," Errett adds, quoting rates of \$300 and up for checking out the bona fides of middle-management candidates for employment.

Once you get past the basics on laying down policy and hiring practices, immediately form an information security department. "Appoint an information processing security manager with sufficient clout and staff to be effective," says Moulton. "Ev-



WHAT'S THE BEST THING NEXT TO IBM?

service organization in cities and towns across the country.

To find out more, send in this coupon. Or call us at 800-523-6529 (in PA call: 215-674-3300). The best thing next to your IBM has our name on it.

Choosing peripherals can be difficult. Until you call Decision Data.

WORK STATIONS THAT WORK WONDERS.

We have the IBM-compatible peripherals you need. Our Work Station does everything an IBM Display Station will do with a System/34 or 38... and more. But it costs less, and has more features. Automatic dimming. Expanded error message display. Cursor-position display. Tilting glare-free screen. Plus a movable keyboard and a document holder.

Your input may increase so much you need to boost your output.

FASTER INPUT, FASTER PRINTING. Which is why our printers operate at 300, 450, 650, 800, 900, 1000 and 1500 lpm, local or remote. Some can be upgraded to higher speeds in your office—at low cost.

THE LOGICAL DECISION. Our peripherals let you do more work, faster, for less money—which is why you chose your computer in the first place. And they're backed by Decision Data's reliable



**Decision
Data
Computer
Corporation**

Box 2501, 100 Witmer Road, Horsham, PA 19044

Please tell me more about Work Stations
 Printers Other Peripherals _____

Name _____

Company _____

Address _____

City _____

State _____

Zip _____

Telephone _____

IT'S YOUR DECISION.

CIRCLE 95 ON READER CARD

Nobody sizes up your network needs like Digital.

Digital's know-how is changing the way networks are planned to perform right from the start.

Not everyone takes sizing as seriously as Digital.

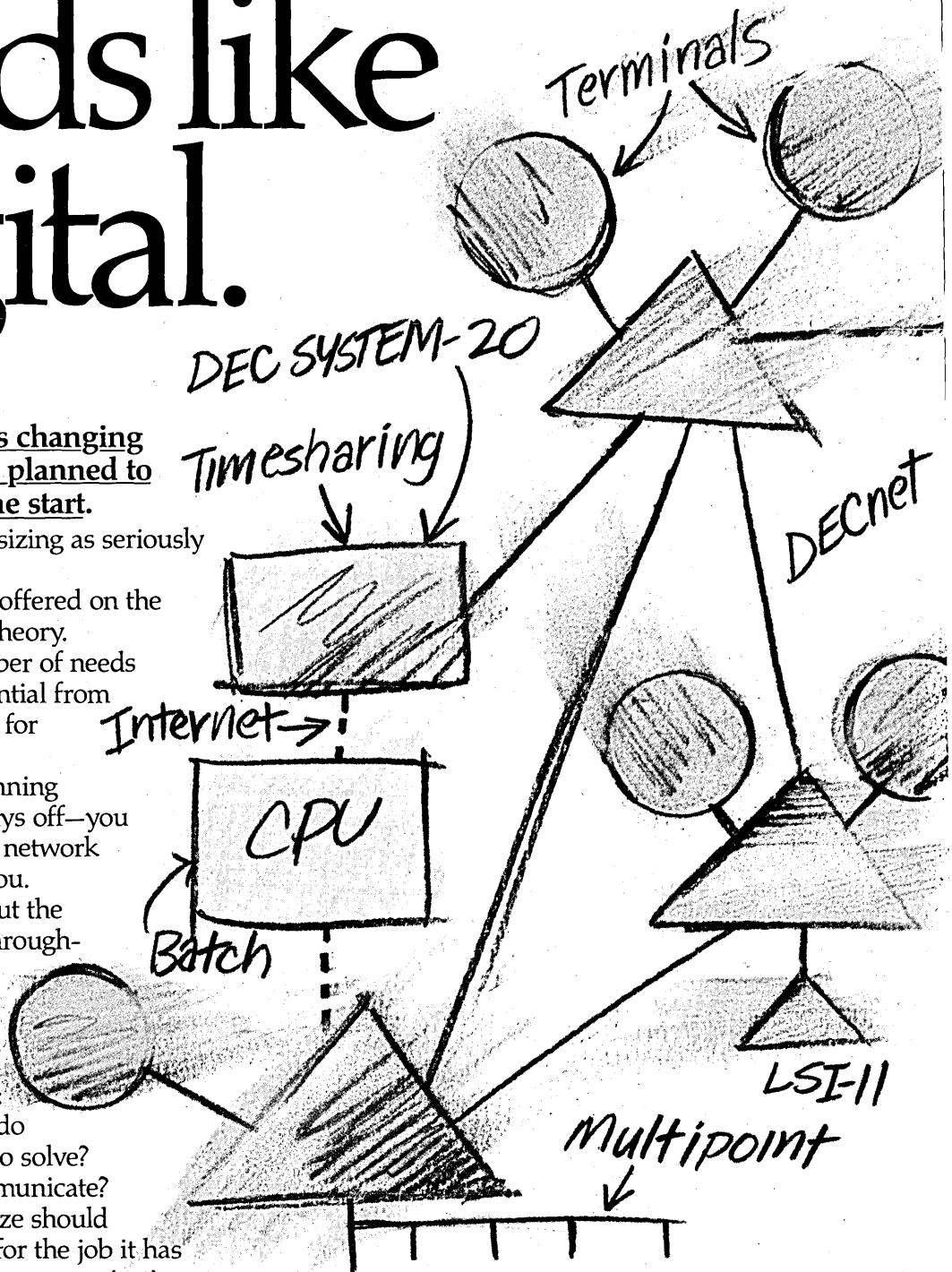
You'll see networks offered on the "one technology fits all" theory. Networks that fill a number of needs but may not get top potential from your investment or allow for future growth.

At your earliest planning stages—where it really pays off—you can put Digital's years of network experience to work for you.

Experience works out the ideal balance of speed, throughput, cost, data integrity, flexibility, control.

Experience asks the right questions to start with. Basics such as:
What business problem do you want your network to solve?
What systems must communicate?

To specifics: What size should each individual node be for the job it has to do locally? How much communication



redundancy should be planned to avoid downtime? What options are possible later for future growth?

And how do you meet your requirements most economically?

Digital's range of options.

No other vendor can match Digital's broad range of flexible, cost-effective communications and processor options which allow networks to be sized to your organization's particular needs.

A few examples. Some manufacturers support only BISYNC or X.25. Digital supports Batch BISYNC, Interactive BISYNC, and other standard

mainframe communications protocols.

An advanced SNA protocol emulator allows Digital systems to participate in IBM/SNA networks.

And Digital offers X.25 Packetnet™ System Interfaces so Digital systems can communicate to public packet-switched networks.

DECnet™ Digital's highly functional networking software, provides features not available with mainframe protocols. With DECnet, you have point-to-point, multipoint, and parallel communications.

You can automatically reroute information around problem areas so network operations can continue even when communication links or nodes fail.

Even add new nodes without shutting down operations. With DECnet, you can have complete control.

Your Digital Network Profile.

A Digital team of networking experts will work closely with you, from concept through installation through support.

First, a written Profile details your network requirements. The number and location of each

proposed node, each terminal. Types of network applications. Volume of data to be transferred between individual nodes. Data urgency and importance. Line and system reliability, availability, and maintainability. Costs. Network operations and security. Future growth.

Digital's Customer Support Plan.

Based on your Network Profile, our experts, working with you, document how Digital will help satisfy your needs. Installation, start-up, training, network maintenance, troubleshooting. This plan clearly spells out what Digital will do, when it will be done, and how it will be accomplished.

Following this thorough preplanning, Digital field service and software support experts will install and verify the hardware and software needed at each node, and demonstrate working network connections.

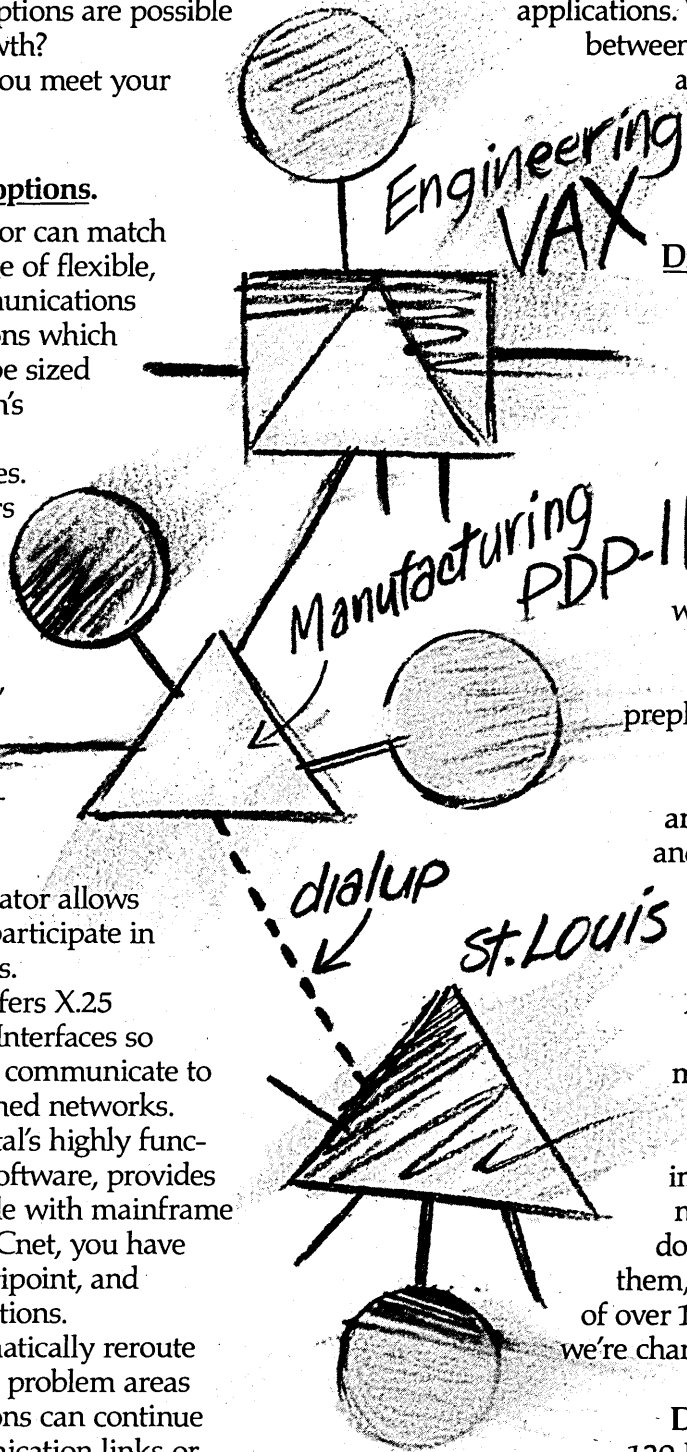
Digital planning leads to Digital performance.

A working network, ready to go. Ready to perform to the maximum now. Capable of expanding later as your business grows.

To date, Digital has implemented over 5,000 network nodes around the world. And we don't just install them. We support them, too, with an international team of over 14,000 service people. At Digital, we're changing the way technology works for your needs.

Digital Equipment Corporation,
129 Parker St., Maynard, MA 01754.
In Europe: 12 av. des Morgines, 1213
Petit-Lancy/Geneva. In Canada:
Digital Equipment of Canada, Ltd.

©1981, Digital Equipment Corporation



digital

**We change the way
the world thinks.**

ery major organization should have a designated information processing security function which is different from that of traditional auditing. It should be oriented to prevent abuse and be prepared to detect and then deal with actual situations of computer abuse."

That's fine for a large shop, but suppose your business isn't big enough to warrant such a move? A number of firms are calling in experts to perform computer security reviews, to determine assets that require protection, the likelihood that these assets will be threatened, and ways to protect them. The experts then make their recommendations to management, which has the option of implementing them.

"You can perform a thorough and comprehensive security review for a single, large-scale computer installation at a cost of from \$30,000 to \$80,000," says Parker. "Don't confuse these security reviews with quantitative risk analysis, which is much more expensive and may involve a lot of overkill."

A competent security review is done on a contractual and fixed-price basis and may involve sending in a team of from two to five people for periods of up to 15 weeks to see what needs tightening up from the standpoint of access, protective software and hardware, and other measures designed to eliminate computer crime. "These reviews must be conducted discreetly," Parker cautions. "It's also important that you have the understanding and support of your dp people, who could be constrained or intimidated by this kind of study. You must have their cooperation or they'll beat you every single time!"

Part of any ongoing security program involves keeping tabs on your people in an informal and compassionate manner. "I've interviewed about 30 so-called computer criminals and among my findings were that they all had an unshareable problem they were trying to solve," says Parker. "Indeed, one of the most common reasons for fraud reported by one insurance company was divorce."

Parker cited the classic Case of Old Silent Joe the Programmer, who sent up danger signals that management failed to perceive. "He was a very introverted guy who looked like a hippie," Parker recalls. "He was brilliant and knew the system at the 360/40 installation backwards and forwards."

Joe was caught by internal audit controls after stealing approximately \$4,700. "I asked his boss if he hadn't seen anything unusual in Joe's behavior prior to learning of the crime," Parker says. "The superior replied, 'Looking back, it should have been obvious to me. I'd been over to his apartment and saw a \$4,000 hi-fi system, not to mention the two matching Jaguars he and his wife drove. And

WHO'S DIDLING WHOM?

Years ago the Black Panthers had a saying: "Those who know don't say, and those who say don't know." A lot of MIS managers would agree with that insofar as the literature on computer crime—reported and unreported—is concerned. One recent account puts the take from hundreds of reported and unreported crimes in the United States at \$3 billion annually. On the other hand, a senior consultant with the auditing firm of Peat Marwick Mitchell maintains that computer crime in the United States has been vastly overestimated, adding that only some 75 true cases were reported among some 350,000 installations in 1980, with a collective annual loss of \$40.3 million. By comparison, fraud and embezzlement losses in U.S. financial institutions in 1975—all accomplished without computers—amounted to a whopping \$181.1 million, and have since risen.

One authority puts part of the blame

on secrecy. "There is a general reluctance on the part of organizations victimized by what might be termed computer frauds to admit their losses publicly or to introduce such cases into the public domain at court," he says. "Their reasons are almost always that the expected costs exceed the benefits, the chances of recovery or successful prosecution are too low, or the indirect costs of publicity and notoriety are too high."

A New York City data security officer at the Irving Trust Co. takes the opposite tack. "To propose great numbers of unreported crimes is to accuse senior managers around the country of being accessories after the fact of crimes as well as of obstructing justice."

Who is right? We probably won't find out until some single private or public agency is charged with investigating all computer frauds—reported and merely suspected. Which means, most likely, never.

I kept getting these dunning letters threatening to attach his salary, but it never dawned on me that something crooked was going on.'"

Even agencies that spend millions of dollars annually on employee security reviews can fail to get the simplest of messages from troubled employees. Consider the case of Joseph George Helmich Jr., recently sentenced to life in prison. Helmich was an Army code custodian with a known history of money troubles. Indeed, his commanding officer had told him to pay off debts of less than \$1,000 or face a court martial. The strapped Helmich did what seemed logical—to him, anyway. In 1964 he went to Soviet intelligence agents and received \$131,000 after selling them the maintenance manual, technical details, and key lists to the KL-7 Cryptosystem. As a result, top-secret military electronic mail and other communications were compromised from the mid-1960s until the crime was discovered, some 17 years later.

"Managers of every computer-oriented organization should be required to receive a certain amount of sensitivity training," Parker recommends. "Make managers sensitive to the problems of their employees. This shouldn't be an intrusive thing. Instead, a good manager ought to stand around the coffee machine two or three times a week. Help your employees solve their problems so that they won't go off and solve them in a way that will hurt you."

Computer criminals and their confederates often spend a lot of time devising ways to beat costly mechanical or electronic physical access barriers. In other cases, nothing but a door stands between a \$10 million computer installation and a criminal. Consider an old-fashioned guard service, says retired security consultant Laurence Wakefield of San Francisco, Calif. For \$6 an hour you can expect a daily report on who is going where, your own physical representative in an area that probably ought to be looked at more than

it is, plus the periodic appearance of the guard's supervisor to check on his work. An added advantage is that the guard is an outsider and unlikely to develop the close relations with dp employees that could lead to collusion.

A guard is also worthwhile from the standpoint of preventing physical damage to your installation. "In one recent case the upstairs room in a building flooded. The water leaked through the ceiling, ruining an unguarded and expensive computer," says Wakefield. "In another instance out here, a guard saved the whole installation simply by pulling a manual fire alarm."

Hiring a guard service means checking first with comparable firms on the reputation of the supplier. Then tell the security service exactly what you want, and expect it to draw up a contract for your approval. Ask for a one-day free "break in" period for indoctrinating your guard on special requirements. Also demand that you get the same guard, day after day, to avoid being saddled with a succession of newcomers who don't understand your special security requirements.

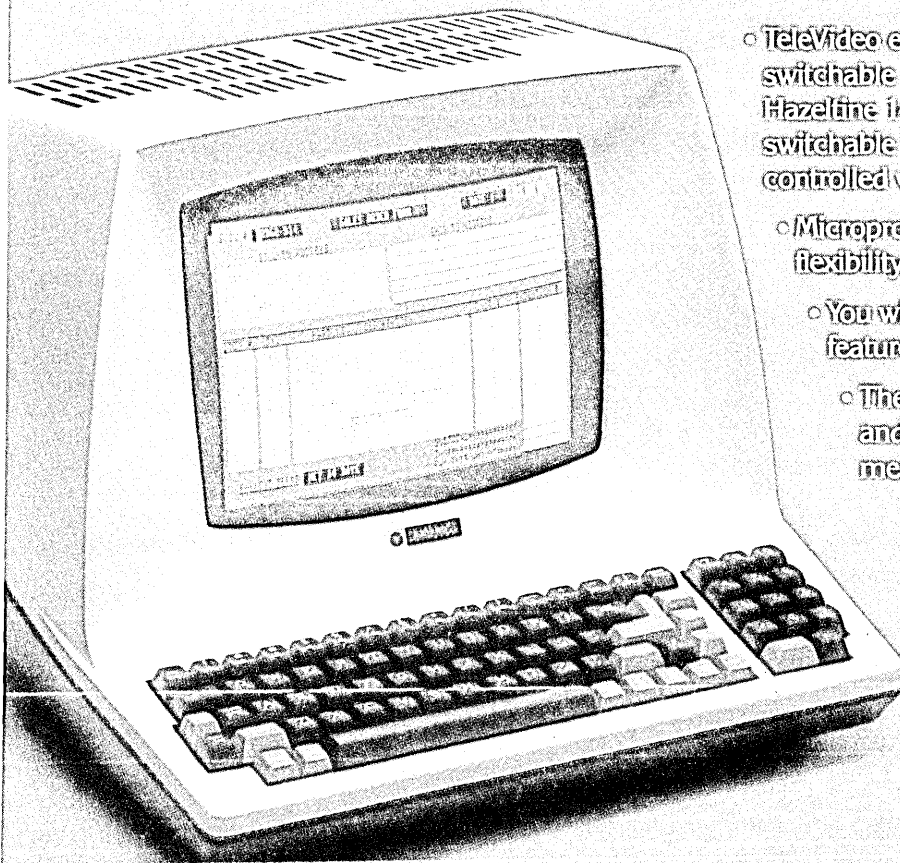
Wakefield offers three more tips: Don't ask for an armed guard unless your building is not secure; you'll have to pay a slight premium for that pistol, and in the long run a loaded gun may intimidate your employees. Be suspicious of the guard agency submitting the lowest bid. "It may be a 'hot uniform' operation," says Wakefield. "A guy and his two cousins, all size 42 regular, will alternate shifts using the same uniform." Finally, check on the guard service's insurance liability coverage. In California, the going rate is \$2 million.

An internal as well as external auditing system should also be set up. Firms like Coopers & Lybrand in New York City and the EDP Auditors Assn. near Chicago are among those specializing in computer-related audits. "Have an audit committee," Susan

COMPATIBILITY

...that's the 910

You no longer have to pay high prices for conversational terminals. Now you can get TeleVideo's new 910 terminal at a low price.



- TeleVideo engineering provides you with switchable emulations of the ADDS 25/Viewpoint, Hazeltine i410, Lear Siegler ADM-3A, 5A. Four switchable character fonts and five independently-controlled video attributes.
- Microprocessor design offers OEM's the flexibility of code changes.
- You will get TeleVideo's high quality value and features.
- The 910 uses the same monitor, keyboard, and case as our popular 912/920. This means field-proven reliability.

TeleVideo®

TeleVideo Systems, Inc.
11170 Morse Avenue
Sunnyvale, CA 94086
408/745-7760
800/538-8725 (outside CA)
TWX 910-338-7633

*Nationwide field service is available from General Electric Co
Instrumentation and Communication Equipment Service Centers.*

The Value Leaders

Santa Ana, CA 714/557-6095; Sunnyvale, CA 408/745-7760; Dallas, TX 214/980-9978; Atlanta, GA 404/255-9888;
Bloomington, IL 312/351-9850; Morris Plains, NJ 201/257-8805; London 44-9905-6464

CIRCLE 97 ON READER CARD

DP employees who see a crooked colleague avoid prosecution may be tempted to do a spot of data diddling themselves.

Nycum recommends. "There is collusion involved in a number of computer-related crimes, so consider having a lot of outside members of the board of directors on the audit committee." In a nutshell, don't have all the auditors reporting solely to someone in higher management, who may be a party to an ongoing crime. Also check with your lawyer to see if state or federal law requires an

audit committee. If your operation is covered by the Securities and Exchange Commission, or falls under the provisions of the Foreign Corrupt Practices Act, such a committee is mandated.

What happens when you believe a computer crime is being committed and you want to call in the police? For openers, expect them to know as much about the mechanics

of your operation as you know about investigating a homicide. Prosecutors like Kowtna, however, say that there is a growing awareness in the law enforcement community about handling computer crimes. Still, be prepared to sit down and review the circumstances with them carefully, and repeatedly.

CRIME LAWS VARY

One problem facing law enforcement today is that the laws on what constitutes a computer crime vary from state to state. Indeed, only 12 states now have laws on the books particular to computer-related crimes: Arizona, California, Colorado, Georgia, Montana, Florida, Illinois, Michigan, New Mexico, North Carolina, Rhode Island, and Utah. A federal law on computer crime has been pending in Congress for years. Still, you can call in the FBI if you believe the crime involves wire fraud or a violation of some similar federal statute. More than 500 of the FBI's 7,800 special agents have received a special four-week course in detecting computer crime, and almost all of these graduates have a solid background in accountancy.

Some businesses elect to bring in private investigators when they suspect a computer-related crime is being committed. "There are some firms that do a fine job in this area," says Nycum, "but talk to your lawyer first. And be sure that you don't stub your toe by announcing that Joe Programmer is the culprit. Joe may just turn around and sue you, claiming you've ruined his life. It only takes \$1,000 for a plaintiff to get into court these days, and even if he loses the suit, you'll have paid a lot of money defending yourself. In short, don't blow everything by acting precipitously."

What can you expect from private investigators? Placing the suspect under physical surveillance runs about \$30 per hour, plus the operative's expenses, says Wakefield. Some agencies tout gimmicks like the voice stress analyzer or the polygraph as tools of interrogation. "They're a hinky piece of business at best," Wakefield says. How about lie detectors? "We use them very rarely and, then, most selectively," says Unitel's Errett, whose rates start at about \$75 per hour. "In the long run," he adds, "nothing will replace solid evidence." There are three things worth remembering about these gadgets: you cannot fire an employee just because he refuses to submit to one, nor can you fire an employee solely because he didn't "pass" the test results. Finally, their use is prohibited in some states.

Some major businesses quietly dismiss admitted computer criminals rather than report them for possible prosecution. Consider this: you are breaking the law if you have knowledge of a crime and fail to report it.

Solve all these EDP entry-level recruiting problems...



- Unqualified candidates
- Excessive employment agency fees
- Tremendous paperwork
- Need for costly retraining



We have the qualified entry-level EDP personnel you need...without the problems you don't need. Control Data Institute is one of the largest EDP personnel training organizations. And one of the most demanding.

Our hands-on training and computer-based instruction produce between 400 and 600 candidates nationally, every month, with the skills to work with virtually any major language or hardware. The comprehensive CDI training program also allows our graduates to transfer their skills quickly to almost any modern computer system.

Many of our graduates are willing to relocate. All are available without advertising costs, without placement fees, without paperwork.

Call collect now. (713) 965-5916.

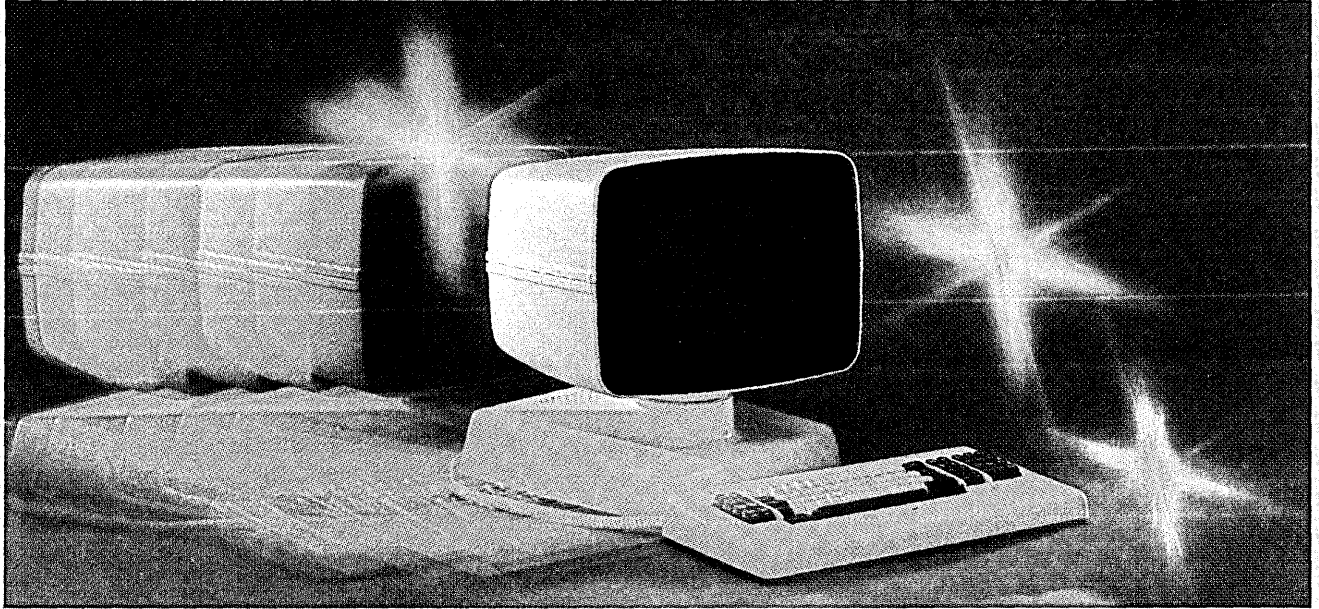
For more information, call or write Al T. Swinney, National Placement Sales Mgr., Control Data Institute, 2000 West Loop South, Houston, TX 77027.



CD CONTROL DATA INSTITUTE

CIRCLE 96 ON READER CARD

NEW
Lee Data's All-In-One Display System
the best
is a better choice for your 3270 requirements.



You get economy with Lee Data's Coax Eliminator™ and unsurpassed character clarity with our new high resolution All-In-One display. And you get the choice of BSC or SNA communications in either remote or local cluster systems.

DISPLAY ADVANTAGES

- Four 3278 compatible screen sizes in a single All-In-One display: 24, 32 and 43 lines by 80 columns and 27 by 132.
- Unsurpassed character clarity with no flicker achieved with a screen refresh rate of 60 times per second, twice that of similar displays.
- Display cabinet tilts 25 degrees vertically and rotates 180 degrees horizontally for convenient and comfortable viewing angles.
- Special treatment achieves non-glare and fingerprint-resistant screen, enhancing character readability.
- Detached and lightweight keyboard with 9' extendable coil cable—available in five standard and many special styles.
- Display is lightweight, only 31 lbs.
- Display is also compact, with a base footprint of only 14" x 16".



The Lee Data Interactive Display System also includes: Model 310 Remote Controller, Model 320 Local Controller, Matrix Printer and the exclusive Coax Eliminator, Models C/8, T/1 and T/8.

**LEE DATA
 CORPORATION**

10206 Crosstown Circle
 Minneapolis, MN 55344
 612/932-0300

SYSTEM ADVANTAGES

- A full range of controllers emulate IBM 3274 local and remote systems using either BSC or SNA communications.
- Multiple microprocessor design provides a system that easily meets the performance demands of a 32 station cluster.
- Select from a line of printers including printers compatible with the IBM 3287.
- Save coaxial cable costs with the Coax Eliminator™ that supports up to eight displays or printers on one coaxial cable or twisted wire circuit.
- Advanced system software offers • easy system configuration • access to multiple station addresses for individual stations • system and station statistics collection • dynamic on-screen communications line trace.
- Experienced and responsive service personnel in over 70 U.S. locations.

Call our system specialists toll free and ask about our 30-day delivery:

800-328-3998

CIRCLE 98 ON READER CARD

In the long run, prevention always beats prosecution.

Misprision of a felony is a little-known statute, but a hard-charging district attorney could put you in the penitentiary if a jury believed him. Moreover, the manager who fails to report a criminal act leaves himself vulnerable to blackmail. Finally, employees who see a crooked colleague avoid prosecution may be tempted to do a spot of data diddling themselves.

Also, warns Nycum, failure to take

appropriate action with a criminal suspect could lead to a whopping civil action, with you named as the defendant. If you knowingly pass a crooked programmer along to another firm without telling them, and that programmer continues his criminal activities, plan to spend your declining years in civil court—if not in a correctional facility. Also expect to be named in a civil suit if your firm's stockholders learn their dividends were re-

duced because you failed to obtain restitution.

There's yet another reason for demanding criminal prosecution. A growing number of district attorneys are seeking inventive new ways to hit white collar criminals with maximum sentences and fines. Let's return for a moment to the Case of the Corrupt College Computer.

Under New York statutes, an unimaginative prosecutor might have gone into court with only misdemeanor charges, which is how theft of services cases are usually handled in that state. A misdemeanor is punishable by only a minimal fine and up to one year's imprisonment in the county jail. Instead, Nassau County District Attorney Denis E. Dillon elected to bring third-degree larceny charges against the two defendants, upgrading their crime to a felony status. Dillon based his charges on the fact that the two had siphoned off at least \$43,000 in profits by unlawfully putting the college's computer to work for them. The duo pleaded guilty, were sentenced to three years' probation, and ordered to repay the \$43,000 to the college.

In the long run, prevention always beats prosecution. Bringing in private investigators and policemen will almost certainly disrupt your applications, systems, and data processing operations. The system may be shut down for password changes. Ditto for a shutdown for a day or two while programs and other data are copied for evidence or checked for alteration. Expect morale to plummet and employees to quit.

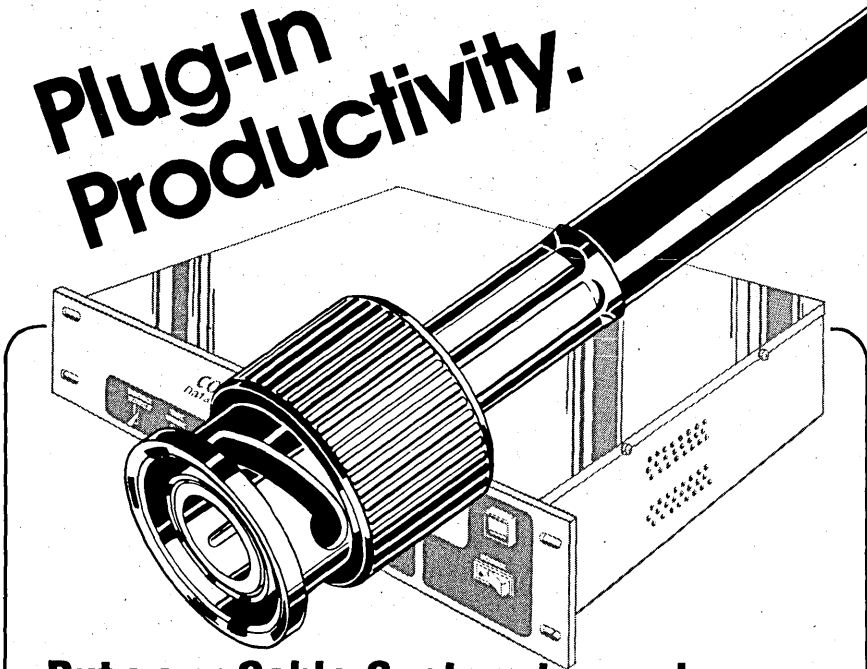
"You'll lose a lot of sleep and likely find it traumatic to watch and then to help investigators probe deeply into the personal and professional activities of your friends, colleagues, and subordinates," says Moulton, who has done his share of probing. "Your best alternative is vigilance and attention to the security implications of good systems development and operational control."

REFERENCES

1. *New York City System Security Standards for Electronic Data Processing*, revised ed., September 1981. City Record, Municipal Building, One Centre St., Room 2223, New York, NY 10007. Price: \$6.50.
2. Donn B. Parker, *Computer Security Management*, Reston Publishing Co., Inc., Reston, VA 22090, 1981.
3. Eduardo B. Fernandez, Rita C. Summers, and Christopher Wood, *Database Security and Integrity*, Addison-Wesley Publishing Co., 1981.
4. Donn B. Parker and Susan B. Nycum, *Criminal Justice Resource Manual on Computer Crime*, SRI International, Menlo Park, Calif., 1980.
5. Institute of Internal Auditors, *Computer Audit Guidelines*, 550 Diplomat Circle, Orlando, FL 32810.
6. National Bureau of Standards, *Guidelines for ADP Security and Risk Management*, FIPS PUB 31, SD Catalog No. C13.52:31. U.S. Government Printing Office, Washington, DC 20402, June 1974.
7. Robert Bigelow and Susan Nycum, *Your Computer and the Law*, Prentice-Hall, Inc., 1976.

Charles L. Howe is an editor and writer in New York City. He was formerly an investigative reporter with the San Francisco *Chronicle*, where he was twice nominated for the Pulitzer prize.

Plug-In Productivity.



Put your Cable System to work as a high speed data communications network using Comtech Coaxial Cable Modems.

Here's how . . .

Connect the Comtech M500 Cable Modem to your system. You can now transmit high speed data (56 Kb/s to 7 Mb/s) bi-directionally on your CATV or broadband coaxial system. Aggregate data transmission rates of up to 500 million bits per second are possible.

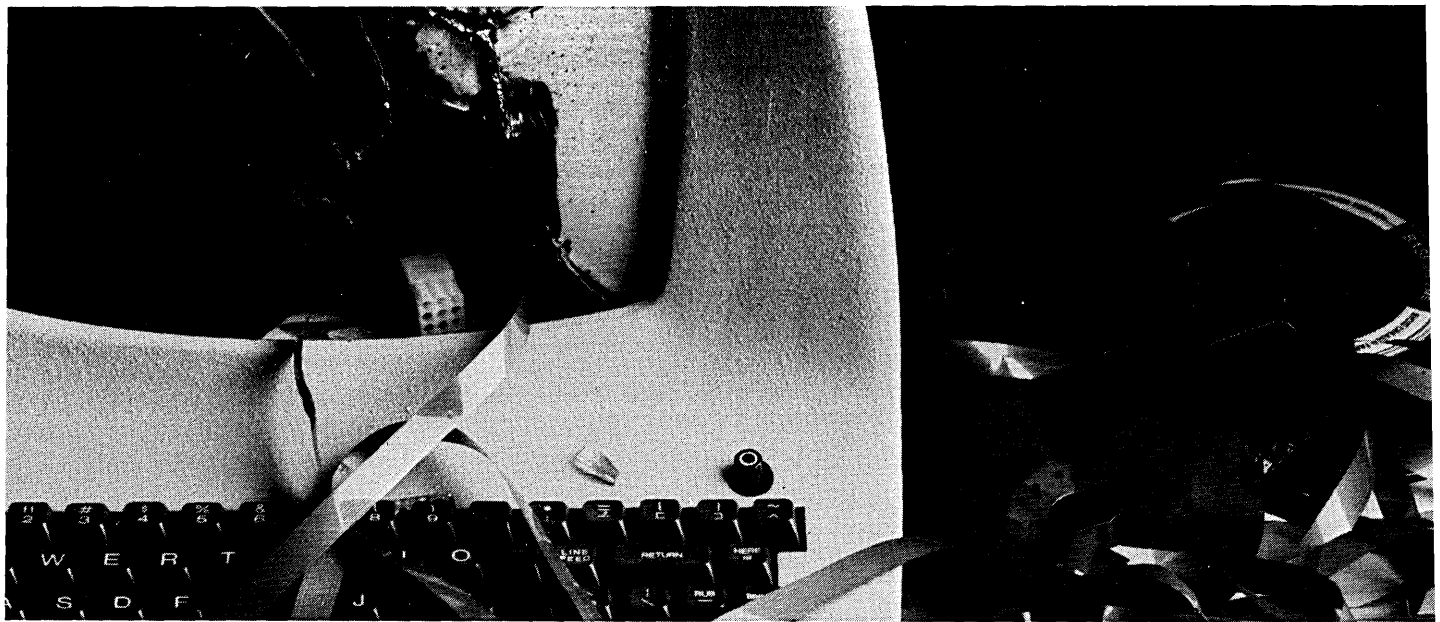
Applications include high speed computer graphics, data collection and processing, process automation, robotics and transmission of high speed composite streams for multiplexors, as well as digitized voice between PBXs. The M500 is totally compatible with existing CATV systems and requires no external filtering.

A Comtech Data Coaxial Cable Modem is one of the answers to the productivity challenge of the 80's. M500 Applications Notes available on request.



COMTECH Data Corporation
A SUBSIDIARY OF COMTECH TELECOMMUNICATIONS CORP.
Creative Solutions in Data Communications.
350 North Hayden Road Scottsdale, Arizona 85257
(602) 949-1155 TWX 910-950-0085

CIRCLE 99 ON READER CARD



"Oh no! Somebody got into the computer room last night"

"I don't know who was madder — our data processing manager, our controller or our auditors. But they all came into my office and complained that anyone could get into the computer room — at any time. So we installed an RES CARDENTRY® system, and now we control who uses the computer room. And our smart machines are protected by some other pretty smart machines!"

As well they should be.

Without an RES CARDENTRY system to protect your data processing facility, it can be subject to information security breaches, as well as damage to your expensive computers.

An RES CARDENTRY system solves the problem of securing your data processing equipment. It also does away with employee keys (and the possibility of duplicating them), and lack of personnel accountability.

When we install a CARDENTRY system, we give each employee a RUSCARD™ with a personalized code. The cards are virtually impossible to dupli-

cate. Your computer or DP room has a single, compact CARDENTRY reader. You tell your system who's allowed in and when. Then, if an unauthorized person tries to enter the room the door won't open.

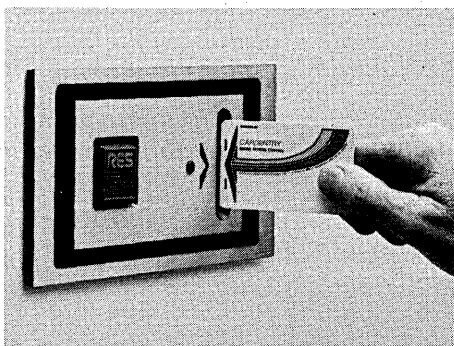
What's more, a central printer immediately tells your security guard where and when an unauthorized entry has been attempted — in easy-to-read English text.*

It's that easy to account for (and control) unauthorized access and activities. And it's that easy to save money.

Your RES CARDENTRY system can even turn utilities on and off at pre-determined times, streamline your data collection activities and provide real-time monitoring, pre-defined, and user-defined historical reports. Small wonder we're the world leader in access control systems.

So if your computer isn't already protected by our system, it should be. After all, do you know who's using it right now?

For more information, call or write Rusco Electronic Systems, 1840 Victory Blvd., Glendale, CA 91201, 1-800-528-6050, Ext. 691. In Arizona, 1-602-955-9714, Ext. 691.



RES RUSCO
ELECTRONIC
SYSTEMS
A DIVISION OF ATO

CIRCLE 100 ON READER CARD

CARDENTRY is a registered trademark and RUSCARD is a trademark of Rusco Electronic Systems.

*Also available in French, German or Italian.

The personal computer industry grew nearly tenfold in a four-year period. Where will it go from here?

THE FUTURE OF RABBITS

by Everett T. (Bill) Meserve

In "A History of Rabbits," (September, p. 188) Bill Meserve described how the personal computer industry got to its present stage. He also named two strategic user segments—business/professional and consumer—to which the industry must look for much of its future growth. Herewith his analysis of how those two segments may be approached and his comments on problems facing industry suppliers.

Managers at all levels are being required to operate in increasingly competitive and complex environments. For example, business decisions that were once based upon domestic market knowledge must now include consideration of foreign competitors and foreign marketing environments. Also, as the cost of capital has risen, rate-of-return requirements have increased, forcing middle managers to make sharp decisions about which products to push or prune.

Given a fixed amount of time and commonly available tools such as calculators and paper, managers would seem to face two choices—spend more time securing information and analyzing alternatives, or make less well-informed decisions. The latter is unacceptable, so managers need a new business information/analysis tool to increase productivity and to perpetuate high-quality business decisions. Also, because managers and professionals contribute disproportionately to office labor cost and organization results, improving the quality of professional and managerial output would have great impact on the overall operations of the organizations.

For some time, senior operating managers have been the beneficiaries of computer-aided business analysis provided by dedicated staff and supported by local or timesharing computing capability. But such resources, staff, and time are seldom available to operating middle managers. A cost-effective professional productivity improvement tool, which the manager, operating alone, can use to create, manipulate, and analyze information, is needed. As the following examples

indicate, the personal computer and its supporting software is emerging as such a tool.

Two years ago, a Fortune 500 industrial company made some strategic observations about the future of intelligent electronics. One result of this activity was the purchase of more than 10 personal computers for the company's operating managers. Since then, about 200 personal computers have been acquired by the company for operating personnel. Some are located in the employees' homes, and others are at the office. Uses range from games to the creation of specialized management decisions documents. For many operating managers, an important discovery has been made: they can use a personal computing tool to help them make better management decisions, and to improve their professional productivity.

The experience of Charlie, a regional sales manager for a large paper company, is a different example of professional productivity improvement. Charlie was intrigued with how small computers might be used in management functions, and his curiosity led to purchase of a \$250 Radio Shack pocket computer. Having satisfied his curiosity, Charlie anticipated that the computer could help monitor the monthly performance of his distributors. The reality of his first computer experience was both disappointing and encouraging. Disappointment came when he experienced the inconvenience and tedium of programming in BASIC, and when he learned there was only enough memory capacity to handle four of his 28 distributors. Encouragement came from the discovery that a "bigger brother" personal computer could perform all his original applications plus more, and that the larger unit was much easier to use than the pocket computer. Charlie has tasted the potential of his professional productivity improvement tool, and realizes the benefits.

REAPING GREAT BENEFITS

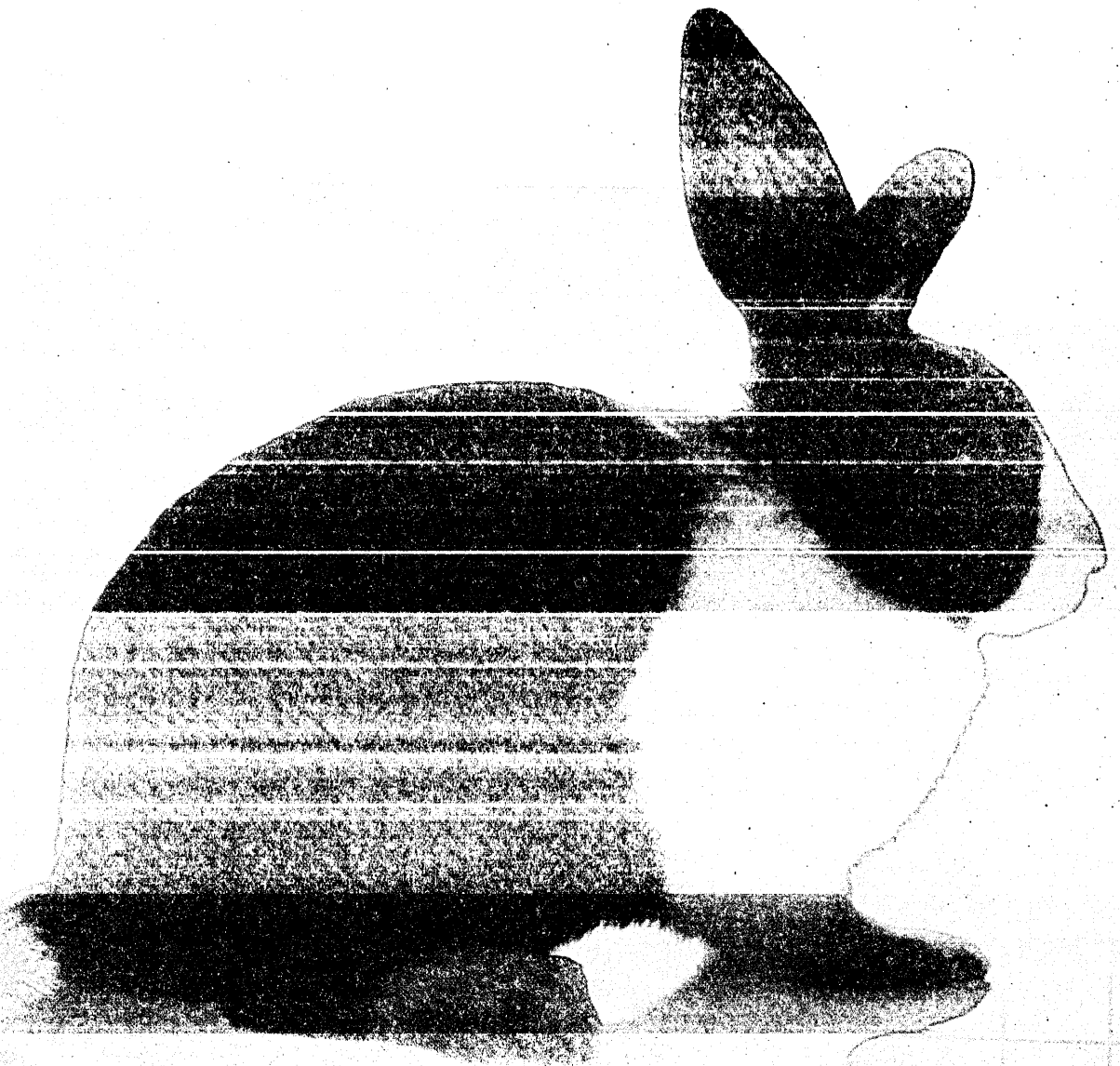
How significantly will middle management's decision-making ability be improved upon by the personal computer? There are some indications that the benefits will be great. Senior operat-

ing executives believe that computer-aided analysis is worthwhile, and many have used it for over a decade. The cost of computing capability and special support staff has been high, but the benefits have apparently been sufficient to justify the investment. Another confirmation comes from the analysts and planners who have adopted personal computers at an unprecedented rate in the last two years. Also, line supervisors and middle managers are becoming comfortable with computer resources, but impatient with central data processing's poor responsiveness, inflexibility, and high cost. They are becoming increasingly convinced that they can become more productive with their own facilities. According to a study by Arthur D. Little, Inc. over 100,000 personal computers are being used by U.S. managers, and business and technical professionals.

One of the most significant barriers to middle management's adoption of personal computers will be the difficulty of confirming operational benefits. Management productivity is hard to measure in traditional quantitative terms—four more units of production per hour, six more letters typed with no errors, or 200 documents printed in 10% less time. In fact, the results of management analyses and decisions are frequently not measurable until some time after actions are taken. Middle managers who invest time and money in personal computers must do so largely on faith.

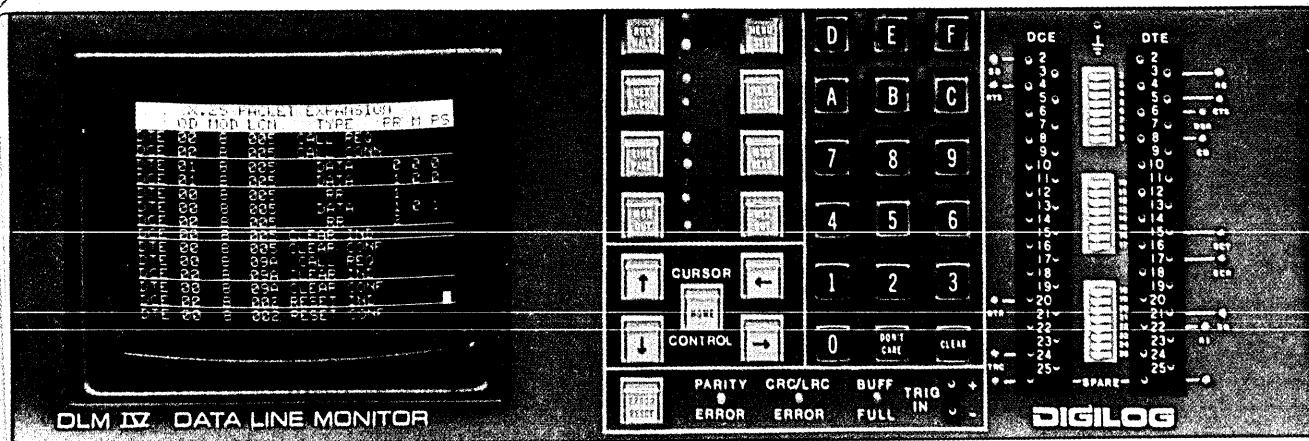
Computer-aided business analysis has been expensive, and while the price of computing capability is decreasing rapidly, the cost of the people needed to support the analysis continues to rise. For many managers, this means that staff size will not increase. Thus, if managers are to make greater use of computer-aided analysis, both software and hardware must be utilitarian. Without easy-to-use software like VisiCalc supporting low-cost (about \$2,000) personal computing hardware, managers will profit less from computer-aided business analysis.

What is available to the business professional today is just the beginning. The ultimate management productivity improvement tool would eliminate all of those activities for



Introducing

DLM IV



The First Low Priced Data Line Monitor with X.25 Frame and Packet Level Analysis

Capabilities You Need for Now and Tomorrow

Our new bit-protocol-oriented DLM IV is the only data line monitor that gives you the testing power of X.25 level 3 and other interactive diagnostic capabilities in a low cost 17 lb. unit.

Special DLM IV features include menu guided set up, BERT Test, and a segmentable 1024 byte non-volatile output buffer. DLM IV helps you to quickly isolate faults anywhere in your network. On private lines, dial lines, and packet switched lines.

- X.25 HDLC & X.25 BSC to Level 3
- Non-Volatile E²ROM Menu & Output Buffers
- Menu Guided Setup
- 1024 Character Output Buffer
- Counters and Timers
- Bit Protocol Orientation
 - Match under Mask
 - Start & Stop Trap on Bit/Byte
- 12K Bytes Data Storage
- 9 Codes Standard + 1 Option
- EIA Breakout Box
- Clear Text and Hex Printer Output

Pace Setting Low Digilog Price

DLM IV is a breakthrough for users who want full bit oriented X.25 capability without having to justify 3 or 4 times the cost. Priced at \$4695, the new DLM IV is in a class by itself.

Proven Digilog Reliability

Based on actual field performance records, we believe the reliability of DLM IV is superior to any competitive product at any price.

Call or write Digilog Inc., 1370 Welsh Road, Montgomeryville, PA 18936 (215) 628-4530.

DIGILOG
NETWORK CONTROL DIVISION

CIRCLE 110 ON READER CARD

The personal computer industry is emerging as a cost-effective, professional productivity tool.

which managers now use writing instruments (pencils, pens, typewriters, word processors, and printing presses) and hardcopy media, primarily paper. Future personal computing tools will permit the user to access information databanks (public or private), display information visually or have selected information spoken, manipulate information for selective analysis, and communicate to databanks and other users the results of analyses and decisions. Hardware would operate standalone using local information banks and memories, operate on-line to remote information sources, be portable and occupy part of a briefcase, and respond to oral instructions. Much of the technology to accomplish these operational features is available or rapidly becoming so. Eventually, the personal computing tool may combine the portability and convenience of today's calculator with the operational features of a standalone personal computer and a Xerox 8010 Star executive terminal system.

It will not be enough for a company merely to manufacture such a product. Distribution channels as well as products will have to demonstrate an understanding of user needs. There will have to be practical solution packages. Solutions, especially hardware, will be available from many sources, but the marketers who understand user requirements and who have local distribution will be most successful in serving operating managers.

THE CONSUMER SEGMENT

U.S. consumer electronic product sales are measured in millions of units per year: videotape recorders, one million; color tv, 10 million; calculators, 20 million; and radios, 40 million. Consider also a consumer market of 80 million households, 70 million adults over age 25, and 23 million wage earners with annual incomes over \$25,000 per year. The rewards are immense for the maker of any new electronic product accepted by this group, and personal computer suppliers are anxious to capture their share. Simple arithmetic—80 million households times \$500 per computer—yields a potential market of \$40 billion for personal computers in the U.S. That's larger than the entire U.S. 1980 computer industry. But that's only a potential market. Does the demand really exist?

Between 1979, when the first consumer-oriented personal computers were announced, and 1980, fewer than 100,000 of the devices were sold in the United States. This is about a thousandth of the potential market, and little progress has been made during the last two years. Based on past performance, and compared to other market segments of the personal computer industry, the outlook for the consumer segment is not encouraging.

For the consumer market to realize its potential, three events must take place:

- The personal computer must move from the narrow-appeal, luxury market to a broad-appeal, necessity market through the creation of primary (vs. replacement) demand.
- Personal computers must make the transition from entertaining to functional uses.
- Personal computers must move from high cost, limited application products to lower cost, broad application products.

What will it take for personal computers to reach the heart of the consumer market? First, and foremost, there will have to be a few compelling applications that will do for the consumer what VisiCalc has done for the business/professional user. Second, product prices must be reduced from the \$500 to \$1,000 range to \$300 or less. And third, personal computer offerings must fit existing mass consumer distribution channels.

What are these compelling applications that will unlock the vast consumer market? We don't know today, but by looking at other successful consumer software products we can find some clues. Successful consumer software offerings are:

- likely to be entertaining and produce pleasant results;
- likely to have a low price and narrow benefit; and
- likely to be an addition rather than a displacement of an existing, established application.

While the application "golden keys" may not exist today, it is widely believed that they will be discovered. All consumer computer market forecasts make this assumption.

Industry opinions point to a retail price of \$300 or less for personal computer hardware. The consumer can already get interactive tv games for less than \$200, sophisticated programmable calculators for less than \$150, and chronographic watches for less than \$50. Technology is available to produce a \$300 personal computer today; what is missing is the volume of demand that would justify the manufacturing investment.

If cheaper hardware and more useful software are produced, how will over a million units per year reach a broadly dispersed consumer market that buys on impulse? If consumer demand builds quickly, as is likely after the discovery of important applications, there is only one distribution channel capable of responding to the challenge—existing retail mass merchandisers. To use this channel, hardware and software must be virtually self-demonstrating and self-selling. Mass merchandise retailers do not have the time, resources, or interest to educate purchasers.

The future, then, is uncertain. These projections are based on faith in yet-to-be discovered software and untested distribution channels. Others might argue that the con-

sumer market will continue to be typified by high-priced goods offered to a select group of people.

TERMINAL VERSUS COMPUTER

The personal computer has thus far been described as a standalone device with a keyboard, semiconductor memory, microprocessor cpu, and some means for connection to a tv display. This conventional characterization does not describe other devices that could satisfy consumer needs. What the consumer really wants is a typewriterlike device that uses smart electronic stuff to entertain him, show him things, help him learn, and help him work. Thus, the consumer personal computer of tomorrow could well be what is labeled an intelligent terminal today—a keyboard connected to a tv connected to outside information resources, with processing capability and local information storage. The question of whether the consumer personal computer of the future will be a standalone device or a terminal will be heavily influenced by which of these hardware configurations first provides compelling applications and a low price.

As the personal computer industry has moved from an embryonic to a growth stage, the keys to success have changed. For example, in the embryonic stage, when the primary market was computer hobbyists, the key to success was maximum operating performance for the minimum dollars. As the market evolved to include other strategic user segments—business professional and small business users—new keys to success emerged. Application software availability and service became increasingly important.

To compete successfully in the professional and very small business segments, suppliers must provide offerings that satisfy real needs. Technical professionals are more likely to identify real needs and develop software if off-the-shelf solutions are not available. Business professionals are less inclined to do so, and very small business users have little of the expertise and interest needed for software development. Some hardware suppliers have taken a passive approach to this challenge, and have become clearinghouses of programs developed for their equipment by early users. A shortcoming to this strategy is that software creation and control, a key to success, is thus left to chance. To date, the advantages of low investment have outweighed the risks, but as the number of less technically knowledgeable users grows, there will be increased demand for software quality (e.g., debugged, goof proof, documented, forgiving, easy to learn). In essence, software, like hardware, must become more professional. If it is to succeed, a clearinghouse software strategy must emphasize quality rather than quantity.

**TEXAS INSTRUMENTS
SILENT 700* USERS:**

**WE'RE NASHUA. WE MAKE
THERMAL PAPER FOR T.I.*
NOW YOU CAN BUY
DIRECT FROM US.
HERE'S WHY YOU SHOULD:**

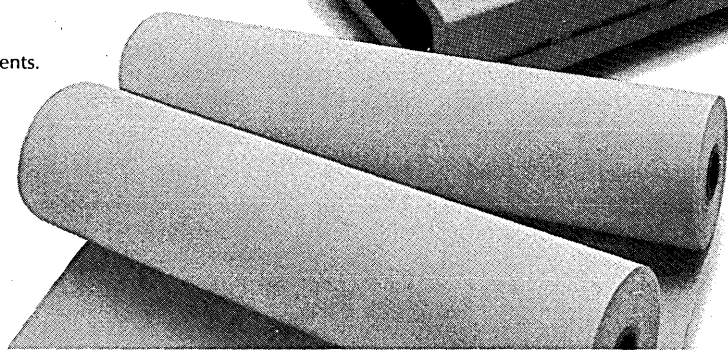
- Nashua® thermal paper is compatible with all TI Silent 700 data terminals and meets all machine manufacturer's specs.
- Paper is prime quality, has bond-like appearance. No waxy coating.
- Lower your cost. Buy direct from us, eliminate middleman and enjoy price advantage.
- Fast delivery. We ship promptly, within 24 hours of order receipt. Major stocking locations east and west.
- With Nashua paper, you get black print on white background for superior legibility and excellent contrast for best quality photocopies.
- Paper meets TI residue and abrasion specs for longer print head life, fewer service calls. Equipment warranty remains valid.
- Available in 100 and 300-foot rolls.

*Trademark of Texas Instruments.

Nashua Corporation
44 Franklin Street
Nashua, NH 03061

Yes. I'm interested in saving money on thermal paper for my TI Series 700 printers. Please send me price and ordering information.

Name _____
Title _____
Co. Name _____
City _____
State _____ Zip _____
Phone _____



Place your order today or send for further information and price list.

**NASHUA
CORPORATION**

Chart Division
44 Franklin Street
Nashua, New Hampshire 03061
603-880-2664

CIRCLE 111 ON READER CARD

Simple arithmetic—80 million households times \$500 per personal computer—yields a potential U.S. market of \$40 billion.

CHOOSING A MARKET PLAN

Several strategies are available to suppliers wishing to participate in the personal computer market. Companies able and willing to make large up-front investments can consider providing total system solutions—hardware and application software—for mass consumers or business users, both of which are markets

large enough to justify the expenditure of significant resources and effort. These systems solutions might be developed internally or in partnership with outside hardware or software producers. Such strategy carries with it both high risk and high potential rewards, and therefore is most appropriate for large, financially capable organizations like IBM, DEC, Texas Instruments, Xerox, Hitachi,

Sony, and Siemens.

A second strategy is to develop an integrated package of hardware and software tailored to the needs of one or more vertical market segments. Such packages might be designed for business analysts, pension managers, stockbrokers, CPAs, educators, architects, civil engineers, or electronic design engineers. The keys to this strategy are the identification of viable market segments, the development of uniquely useful and economically justifiable offerings, and successful systems marketing. Such a strategy may be appropriate for smaller hardware manufacturers, existing or new computer system houses, and business equipment marketing organizations like Victor and Monroe.

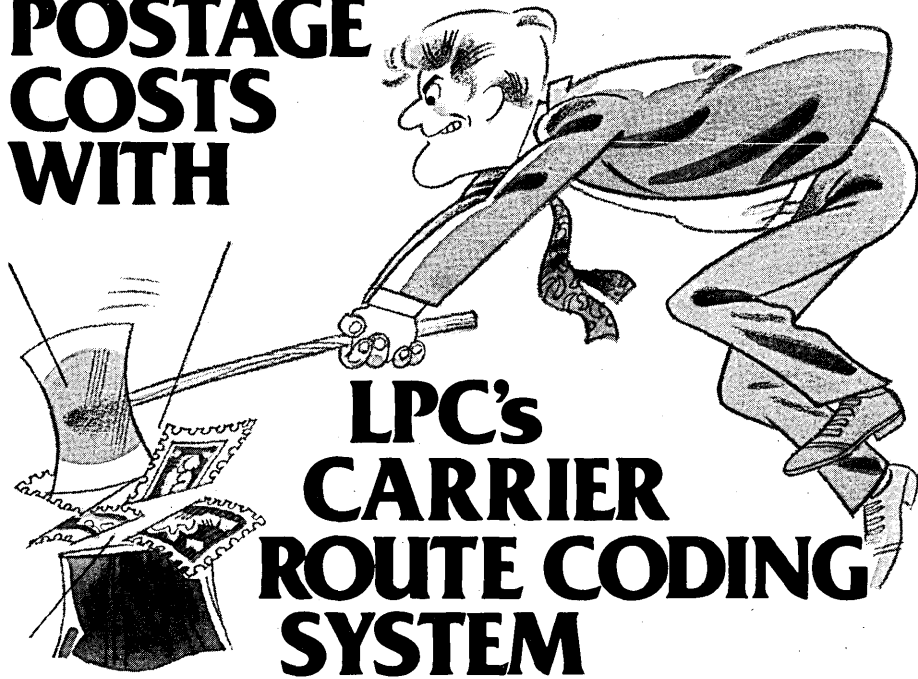
Suppliers primarily oriented toward equipment may choose to focus on technology-based users—hobbyists, engineers, scientists, and industrial users. The shortcoming of this strategy may be insufficient long-term market potential. Since hardware technology is traditionally an entry point for new suppliers, and markets may be small, there is likely to be a large number of suppliers aggressively seeking a viable position.

Finally, some companies may still be successful as oem equipment suppliers while leaving to others application software development, systems solution sales, and maintenance. This alternative is viable for firms with unique technology and hardware design skills and the ability to manufacture cheaply.

Software suppliers are also facing changing conditions. The prime source of personal computer application software has been nonprofessional, "cottage industry" personal computer enthusiasts. Programs from these sources are made available through hardware vendors that act as clearinghouses and directory publishers. Some professional software companies like Microsoft were started and staffed to create professional quality operating systems and programming language software. These organizations were followed by software marketers like Personal Software, Lifeboat Associates, and Instant Software, which market products produced by others. The trend is toward more professional independent software sources and dedicated software marketing organizations that provide distribution, software quality assurance, user application assistance, and after-sale maintenance. *

Everett T. (Bill) Meserve has followed the personal computer industry for Arthur D. Little clients since 1978. For 17 years prior to joining Arthur D. Little, Meserve was an industry operating manager at TRW, Bunker Ramo, and General Instrument. He has an MBA in marketing and finance from the University of Southern California.

COST CONSCIOUS UTILITIES CAN SLASH POSTAGE COSTS WITH



LPC's CARRIER ROUTE CODING SYSTEM

The following companies have. Read their comments.

Wisconsin Electric Power Co.:

"It's saving us \$400 a day ... we mail around 45,000 pieces a day."

Consolidated Edison:

"We're saving about \$800 to \$1000 a day ... we send approximately 140,000 bills a day."

Florida Power and Light:

"We expect it to save over \$100,000 per year. We send out about 1.7 million (bills) a month."

Cleveland Electric Illuminating Co.:

"We mail 700,000 bills ... every month. \$300 a day (saved)."

The average utility is saving \$100,000 a year, some over \$1/4 million.

Call or write for our illustrated brochure which describes the ease of installation. Also included are user testimonials.



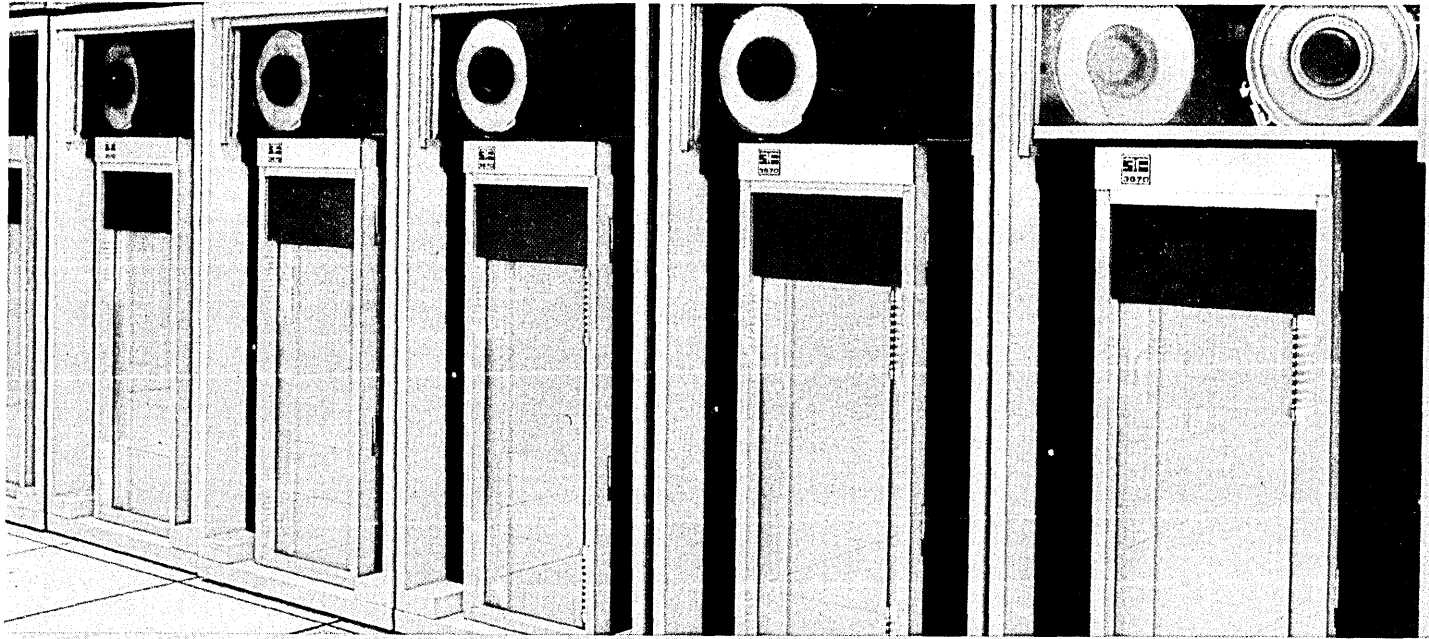
312-543-0100

600 Enterprise Drive
Oak Brook, IL 60521

The world's finest application software for large scale mailers.

CIRCLE 113 ON READER CARD

A Word to DP Professionals from Radio Shack—World Leader in Microcomputers



Don't Tie Up Your Million-Dollar Problem-Solver with \$5000 Problems!

Do What We Do At Radio Shack. Our mainframe computers handle the big problems. For smaller problems we use our own TRS-80 microcomputers — because it saves us valuable big-machine time!

Surprising Power at Your Disposal. Our top-of-the-line TRS-80 Model II computer combines keyboard, video display and disk storage in one desktop system. It has 416K of on-line storage and is externally expandable to 33 megabytes.

Bi-Sync Communications. A Model II can be outfitted for 3270 or 3780 bi-sync communications with IBM® and DEC® computers.

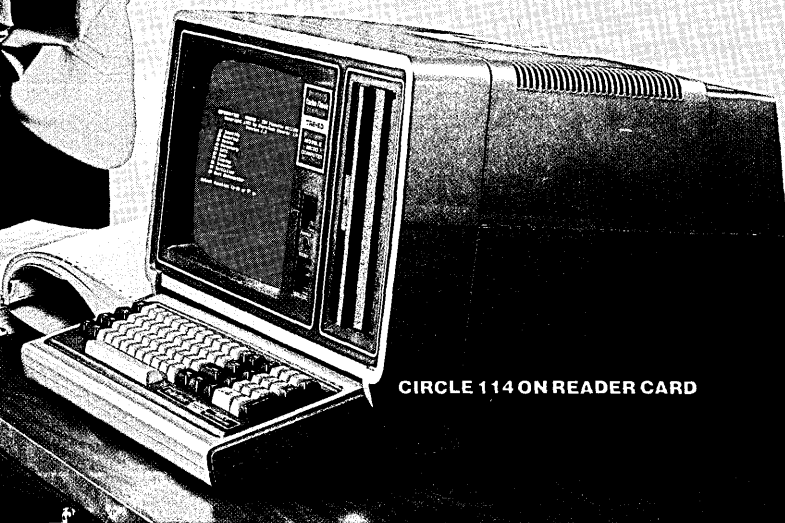
Do Your Own Programming. We have BASIC interpreter and compiler, COBOL, FORTRAN and Assembler.

Don't Train on Your Mainframe. With a Model II and our ANSI '74 COBOL, you can evaluate programmers before putting them on your big system. Our COBOL is just like your mainframe COBOL without "sort" and "report writer."

Have a Planning Job? VisiCalc® provides a powerful "electronic spreadsheet" system that makes "What if . . ." forecasting incredibly simple. And since you need to know where you stand today to know where you're going tomorrow, you'll find our Statistical Analysis software useful in many applications.

Want a Stand-Alone Filing System? Our Profile II data base management program provides instant storage and retrieval of a variety of data. You can design dedicated systems around specific needs — relieving your mainframe.

Find Out More Today! See how effective a Radio Shack TRS-80® Model II (from \$3450) can be. On-site service plans are available in many areas, and we can arrange to train your staff in our classroom. Get all the facts at your nearest Radio Shack Computer Center.



CIRCLE 114 ON READER CARD

Radio Shack®
COMPUTER CENTER

A DIVISION OF TANDY CORPORATION

VisiCalc is a trademark of Personal Software, Inc.
IBM is a trademark of International Business Machines Corp.
DEC is a trademark of Digital Equipment Corp.

Tell me more! Please send me your free TRS-80 Computer Catalog today.

Mail To: Radio Shack, Dept. 82-A-142
1300 One Tandy Center, Fort Worth, Texas 76102

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

The MDS Theory of Productivity

Consider the cost-saving implications of MDS Series 21 distributed processing systems: Data processing. Word processing. Electronic mail. All at a single, multifunction workstation.

Better yet, all the workstations in your organization can communicate with each other and with your central computer through WING—the World-wide Integrated Communications service from Mohawk Data Sciences.

WING combines all applications of information exchange on one economical network. It provides access to telex and TWX networks to send

your messages and data worldwide, wherever common carriers reach.

And WING is a turn-key service. You get all the benefits of a customized network, without high start-up costs and long lead times.

For true office automation, with or without WING, our Series 21 multifunction workstation handles sophisticated word processing with features that can't be beat by stand-alone systems. With expandable disk and diskette storage and high-level programming languages, Series 21 can handle a multitude of local data

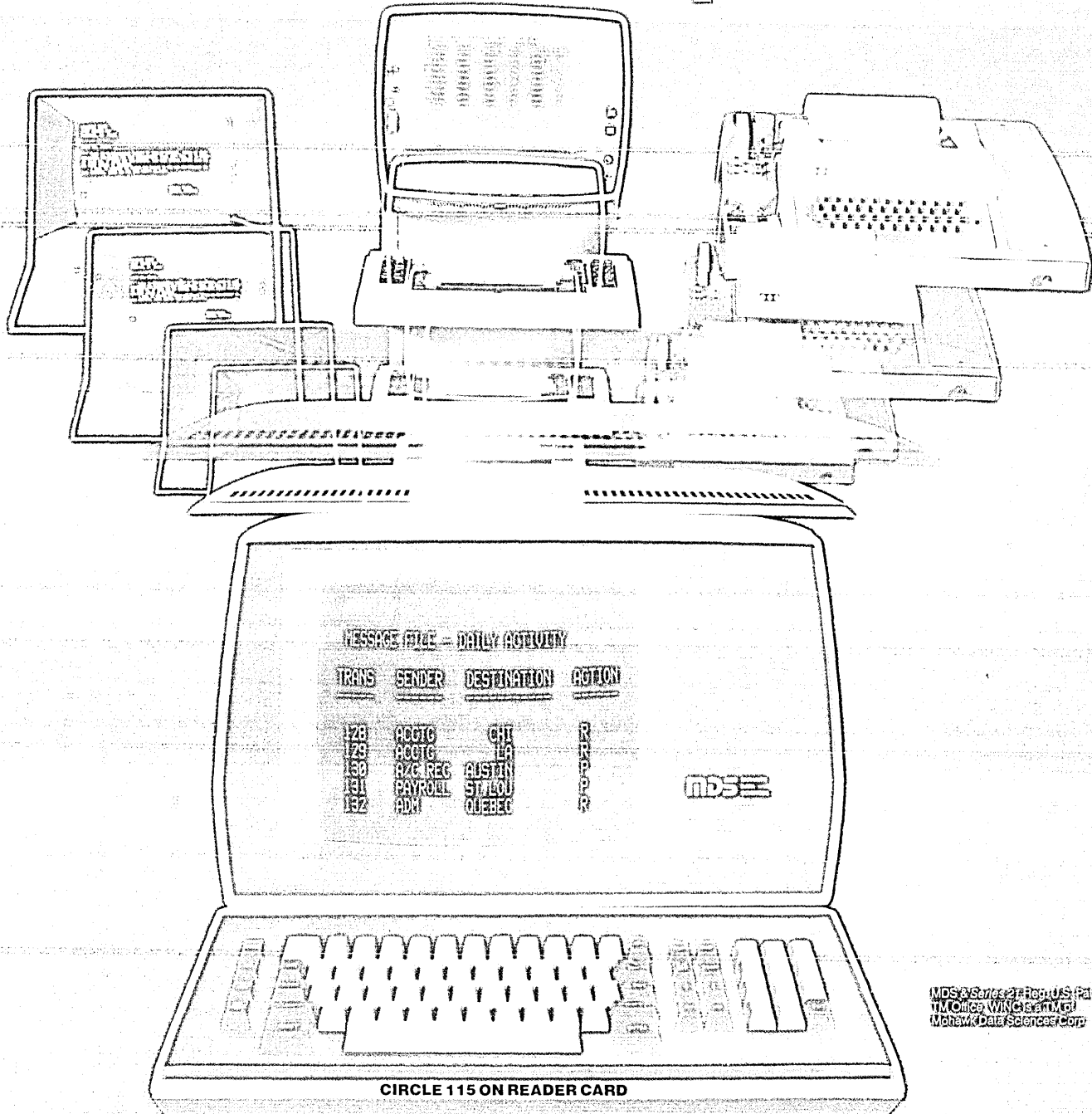
processing applications as well.

Saving valuable dollars through multifunction systems is an important aspect of the MDS Theory of Productivity.

To learn more about our cost-cutting systems, call (201) 549-9880, Ext. 282; write MDS, Seven Century Dr., Parsippany, NJ 07054; or call your local Mohawk Data Sciences office.

MDS MOHAWK
DATA
SCIENCES
Building on the Theory of Productivity.

One can work cheaper than 3.

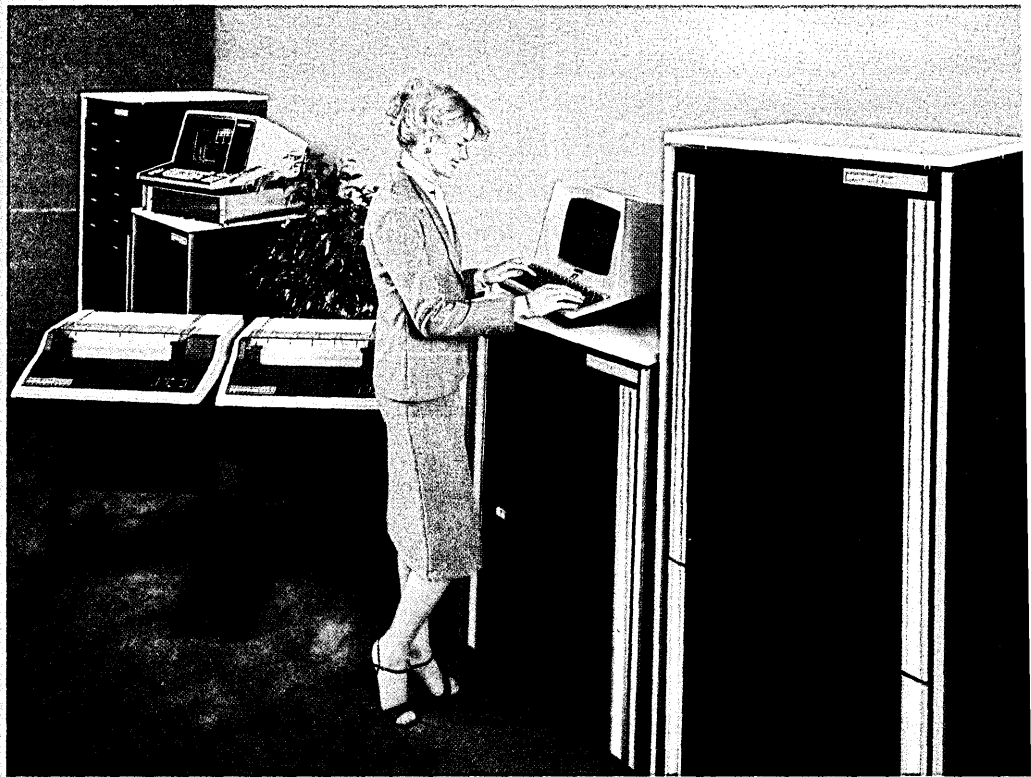


MDS® Series 21® Reg. U.S. Pat. & Tm. Office. WING® Reg. U.S. Pat. & Tm. Office. Mohawk Data Sciences Corp.

CIRCLE 115 ON READER CARD

Paradyne

Automated Network Management System... The New Generation



ANALYSIS 4430

From within the Analysis product line — the most advanced automated network management system available today — evolves the newest generation in the Analysis lineage... Analysis 4430.

Paradyne's 4430 automatically monitors your network conditions allowing your operator to analyze problems and initiate restorative action. Unique features of the 4430 are:

TROUBLE TICKET MANAGEMENT...with history file, custom designed, changeable screen formats and response time alarms.

MULTIPLE INQUIRY CAPABILITY...supports multiple operator stations.

INVENTORY MANAGEMENT CAPABILITY...means your operator has the capability of maintaining the network inventory and immediately locating any component of the teleprocessing network.

REPORT GENERATOR...allows your user to generate detailed or summary reports using any data in any file.

DATA BASE MANAGEMENT...allows your user to define files, the keys into those files and the relationships between the files.

EARLY DETECTION OF DEGRADED LINES...unique to Paradyne, will increase your uptime.

ACCESS TO THIRTY TWO SECURITY CODE LEVELS...is available to allow multiple levels of access and privacy.

The 4430, modular in structure, changes and grows as your network needs change and grow. **The Datalyzer option** provides inservice parameters with **COLOR** graphic displays. **Other options** include multiple local or remote front ends that monitor several networks and numerous input/output devices.

As new communications products are introduced by Paradyne, you may be assured that your Analysis 4430 will continue to be the network management system that grows with the future.

We're **PARADYNE**...THE Data Communications Company of the 80's.

If you would like to know more about Paradyne's products, write on your letterhead or call:

**Paradyne, 8550 Ulmerton Rd., Box 1347,
Largo, FL 33540, (813) 530-2000;
Paradyne Canada Ltd., (416) 494-0453;
Paradyne (U.K.) Ltd., (07535) 56712;
Paradyne G.m.b.H. (West Germany), (0221) 491078;
Paradyne Japan, (03) 245-0431.**

paradyne

A methodology for verifying automatically that programs have been transported effectively from one host computer to another.

PROGRAM PORTABILITY

by **Michael G. Walker**
and **Richard G. Harrison**

The purpose of program conversions is to transport the capabilities of a system from one host computer to another. Programs that can be transported without degrading their capabilities are called portable. In a successful conversion, the target computer fulfills the same processing tasks as the source computer: it accepts the input, produces the output, and stores the data necessary to complete the functions that comprise the original capability. The converted system is not less reliable, maintainable, or enhanceable. And the conversion is cheaper and more predictable than if these same capabilities were produced as part of a program development. What follows is an automated methodology for verifying program portability, for judging that transportation has been effectively carried out and that programs are portable.

Since a software system is the sum total of its programs, files, database management system, transaction processor and documentation, a conversion must transport each of these components to a target configuration. The configuration can be an upgrade within your own vendor line, a plug-compatible target, or a target host of another vendor's line. In converting, the dialect of the programs is usually changed (for instance, '68 ANS COBOL to '74 ANS COBOL) but not the language (COBOL to FORTRAN). Conversion from an assembler language to a high-order language (for instance, autocoder to COBOL), however, is not uncommon.

An example of an upgrade would be a conversion of a supply system running on a 360/40 in DOS COBOL to '74 ANS COBOL run-

ning on a 303X, or a conversion of a supply system in non-ANS COBOL running on a Univac 1108 to '74 ANS COBOL running on an 1180.

An example of a plug-to-plug conversion would be the transporting of a logistics system running in '68 ANS COBOL on a 360 to '74 ANS COBOL on an Amdahl 5806. An example of a total transportation to another vendor's line would be the conversion of a logistics system running in '68 ANS COBOL on a Honeywell 600 to '74 ANS COBOL running on an IBM 303X; the conversion of an accounting system running in autocoder on a 7080 to '74 ANS COBOL on an H6000; or a system of FORTRAN programs running on a Univac 1100 to FORTRAN running on a CDC Cyber.

One of the most difficult tasks in converting programs is verifying that the capabilities have been successfully transported. There are two steps to verifying the portability of programs: program conversion verification and program quality verification.

Program conversion verification tests that the programs have been converted, the data files moved, and the documentation updated. This is the traditional method for verifying program portability. Program quality verification is more important but also more difficult. It includes tests for verifying the quality of the converted system because it tests the reliability, maintainability, and enhanceability of the converted system. The system must be reliable—it must work as the user reasonably expects; it must be maintainable—the user must be able to find and fix errors; and it must be enhanceable—the user must be able to change it. These properties are the focus of program quality verification, and since the material that is tested is the convert-

ed system, program quality verification also certifies that the conversion has worked.

Converted programs can pass program conversion verification and still be woefully unportable and the conversion effort a disastrous failure. In this case the programs would be transported and would pass acceptance tests, the files would be moved and would pass file comparison tests, and the documentation would be changed. The converted system, however, would be so unreliable, unmaintainable, and unenhanceable that the user would be unable to use it. The sad history of many program conversions is a testament to the inadequacy of program conversion verification as a sufficient verification technique.

The problems of program verification can be avoided, however, by employing an automated technology that uses a set of tools to automatically perform program quality verification for converted programs; the tools are reliable, portable, and economical, and have been found to reduce verification labor costs by as much as 90%.

Basically, the technology for verifying software portability is composed of four parts. It is a total methodology, each part contributing to the others. The four parts are static analysis, test case generation, dynamic analysis, and quantitative program evaluation. The totality of these methods verify both program conversion and program quality as shown in Fig. 1.

The first of these parts, static analysis, inspects the structure of programs, files, databases, and documentation. It verifies the quality of these components by analyzing their structure. Test case generation directly follows static analysis. Among the tasks of

PHOTOGRAPH BY CARL FLATOW/GRAPHICS BY CYNTHIA STODDARD

static analysis is the identification of every arc in a program. An arc is a connection between decision-to-decision paths. An analyst can use the test case generator to create a set of test conditions that exercise each arc. These test conditions will be exercised during dynamic analysis. Dynamic analysis verifies the behavior of a program against live, carefully selected test data. It also instruments the program with probes, exercises the program with the carefully generated test cases, and gathers data. Dynamic analysis then interprets the gathered data, verifying the program's quality.

Quantitative program evaluation produces a quantitative picture of the program's quality. It computes statistics from the data gathered during static analysis and dynamic analysis. The numbers are compared against metrics for program quality, and a quantitative picture of the system's quality is produced. Program portability is successful if the programs have been converted and if their quality meets accepted standards. Program portability verification automatically and quantitatively measures that success.

The following four sections will discuss static analysis, test case generation, dynamic analysis, and quantitative evaluation.

USING STATIC ANALYSIS

Static analysis would produce the following statistics:

- number of statements that violate ANS standards;
- number of statements that violate language architecture standards;
- number of statements that were translated from the source host to the target host;
- number of statements that violate structured programming conventions;
- syntax of the translated instructions as they appear in target environment;
- data dictionary of fields, structures, files, and their usage;
- called-calling relationships among the programs of the system; and
- parameters and data passed between programs.

These statistics give a picture of the structure of transported programs and can be used both before the conversion, as a planning tool, and after the conversion, as a verification tool. As a planning tool, they can indicate the quality of a program before conversion and thus indicate the difficulty and cost of transporting the system. As a verification tool, they can indicate the success of the conversion.

Fig. 2 shows that the static analyzer is a table-driven technology composed of the following elements:

- a universal parser that decomposes a program into a tree structure of tokens;
- a table that contains the BNF representations

FIG. 1

PROCEDURE FOR PROGRAM PORTABILITY VERIFICATION

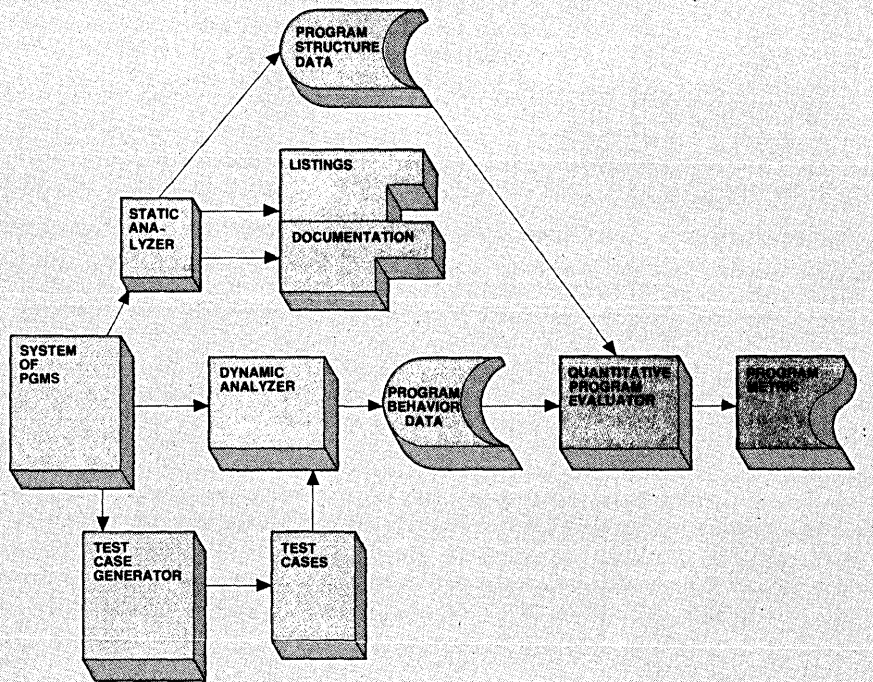
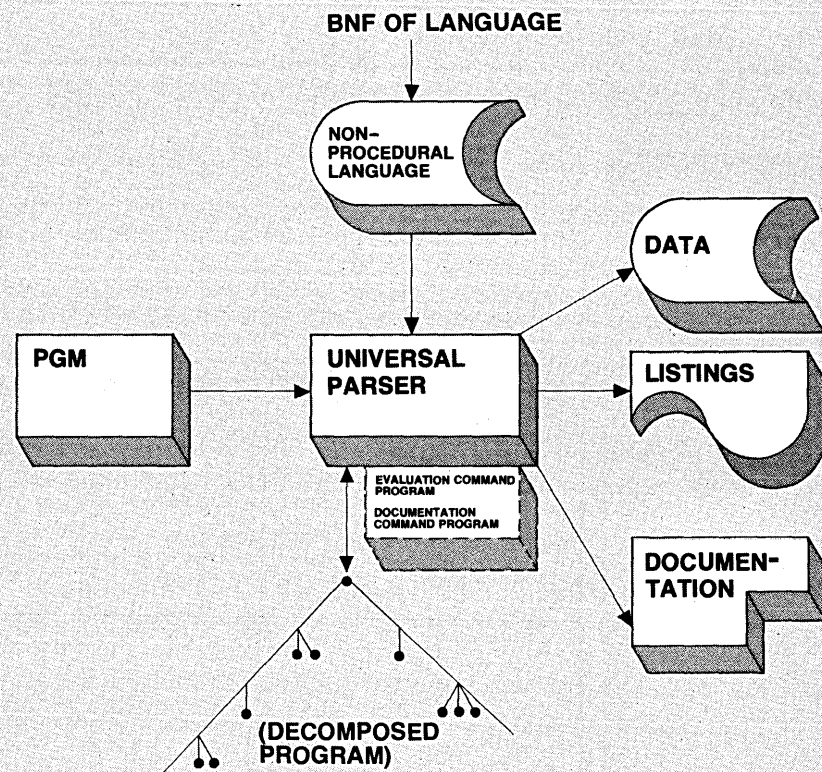


FIG. 2

STATIC ANALYZER: A TABLE-DRIVEN TECHNOLOGY



CHARTS BY CYNTHIA STODDARD

TABLE I

DECISION-TO-DECISION POINT RULES FOR AUTOMATIC TEST CASE GENERATOR

PDL CONSTRUCT	DECISION-TO-DECISION PATH(S)
IF	One path for the true condition (IF-T) and one path for the false condition (IF-F)
DO WHILE	One path for the true condition (DW-T) and one path for the false condition (DW-F)
DO CASE	One path for each case name within DO (DC-NAME) and one path for the default condition (DC-DEFAULT)

All other constructs do not generate any decision-to-decision paths.

- number of statements to be translated, and
- listing of the source program with flagged statements highlighted.

5. The documentation command program would produce the following:

- data dictionary,
- called-calling relationships, and
- parameters passed by calls.

Static analysis presents a complete picture of the syntax of a program or a system of programs. It automatically updates program documentation, giving a complete picture of a systems structure. This picture provides much of the material for the quantitative evaluation of the quality of a system of programs and gives management the ability to predict the cost and success of a conversion effort.

The test case generator automatically analyzes syntax and aids the test analyst in producing test cases that exercise each arc in a program. The output of the test case generator consists of a definition of the specific input and output conditions required to exercise each arc. The number of arcs in a program depends upon the size of the program and the structure of the program. An unstructured program, for instance a COBOL program with many GO TOS and ALTERS, may have more paths than it is economical to test. If this is the case, then the test case generator will flag the program as untestable.

The test case generator will aid the test analyst in producing a test case for each decision-to-decision, as is shown in Table I. The process produces a test matrix and a set of test procedures. For instance, a structured flow that compares three numbers and sets flags according to these values is shown in Fig. 3. It sets the following flags:

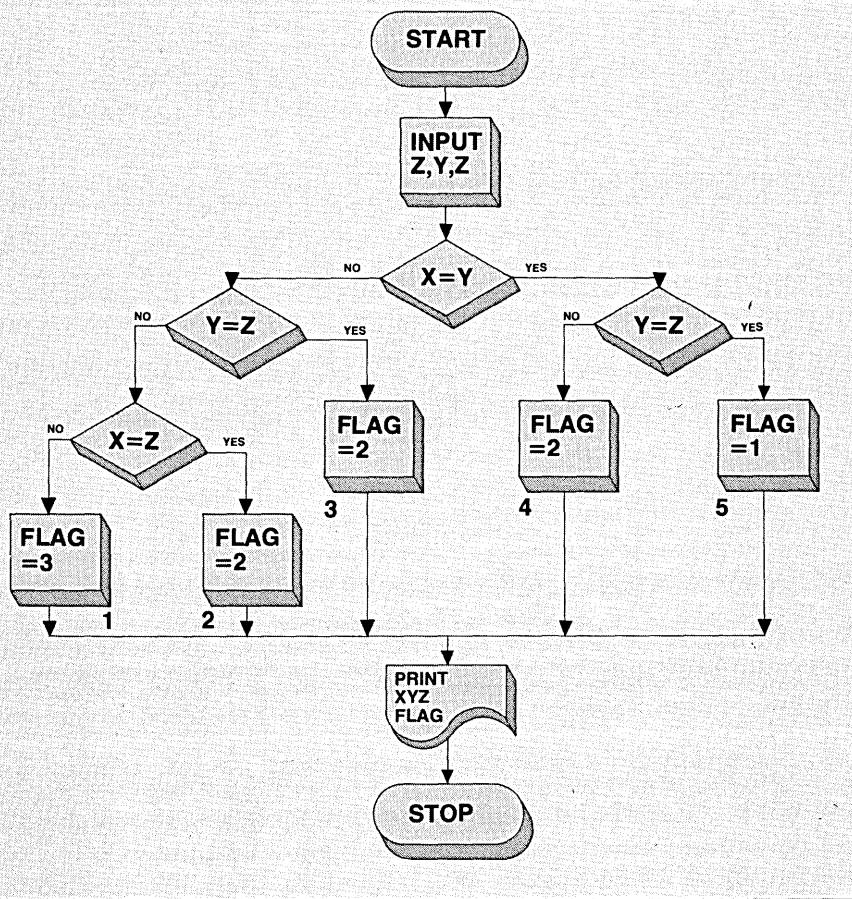
- All numbers same FLAG = 1
- Two numbers same FLAG = 2
- No number same FLAG = 3

The test case generator would analyze the program that computes these values and would aid the analyst in producing a test specification matrix that looks like Table II and a test procedure that looks like Table III.

The test case generator fits into the universal parser, as shown in Fig. 2. Its output is the test specification matrix and the test procedure table. These are shown in Tables II and III. The test cases are input to the dynamic analyzer, and the combination of these tools help automate the dynamic testing process. Also, the test case generator flags programs that are untestable.

FIG. 3

SAMPLE PROBLEM FLOWCHART



of the source language and the target language; and

- command programs that contain sets of rules telling the universal parser what to do.

Each of the command programs operates upon the decomposed source program. The tool would operate as follows:

1. The parser decomposes the source program into a tree structure of tokens.
2. The parser uses the BNF tables to recognize the tokens.
3. Command programs perform their

tasks on the decomposed program; both the evaluation command program and the documentation command program are examples of command programs.

4. The evaluation command program produces the following:

- number of statements that violate ANS standards,
- number of statements that violate language standards,
- number of statements that violate structured programming standards,

USING DYNAMIC ANALYSIS

Dynamic analysis exercises the test cases and measures the behavior of the program while the cases are being processed. During dynamic analysis, the converted programs are instrumented with probes, the test cases are exer-

cised, and statistics are generated about program behavior.

Test probes are placed in each arc of the program. These probes count the number of times the arc is entered and log critical variables and their contents. Probes not only help verify program execution but also identify and count arc traversal. This information can be used to find "inner loops" for which optimization payoffs are great. Thus, dynamic analysis is not only a verification tool but also an optimization tool.

Dynamic analysis statistics include the following information:

- ranges of variables,
- control flow and data flow information,
- data sensitivity information,
- environmental information including parameter passing and procedure evaluation environments, and
- assertion information—comparing asserted behavior to actual behavior.

This information provides a history of program execution, helps the checking of program assertion like those in the test procedures chart, and facilitates the tracing of control flow dependency and data flow dependency and thus program optimization.

Fig. 4 shows the instrumentation of our sample program. Probes have been inserted and data will be collected at execution time. The dynamic analyzes inserted test probes, and collects data on program execution of test cases. This information is input into the final step in the verification technology, quantitative program evaluation.

The quantitative program evaluation phase computes the statistics gathered during static analysis and dynamic analysis, and compares them against metrics. These metrics are measures of program quality. The comparison gives a picture of the quality of the programs and a verification of program portability.

Quantitative program evaluation measures three program attributes: program reliability, program maintainability, and program enhanceability.

Program reliability is a measure of the extent to which a program performs as the user reasonably expects; program maintainability is a measure of the effort required to locate and fix an error in an operational program; and program enhanceability is a measure of the effort required to modify an operational program.

Each of these attributes is related to criteria for program quality, as shown in Fig. 5. Definitions of these criteria are given in Table IV. Notice that the attributes share criteria. For instance, both the attribute program maintainability and program enhanceability share the criterion consistency. This means that the criterion consistency contributes to both maintenance and enhancement.

TABLE II

SAMPLE PROBLEM TEST SPECIFICATION MATRIX

DECISION-TO DECISION PATH	INITIATING CONSTRUCT	PARAMETER	TEST CASES								
			1	2	3	4	5	6	7	8	
1	IF-T	X-Y				X	X				
2	IF-F	X-Y	X	X	X						
3	IF-T	Y-Z			X						
4	IF-F	Y-Z	X	X							
5	IF-T	X-Y		X							
6	IF-F	X-Z	X								
7	IF-T	Y-Z						X			
8	IF-F	Y-Z					X				

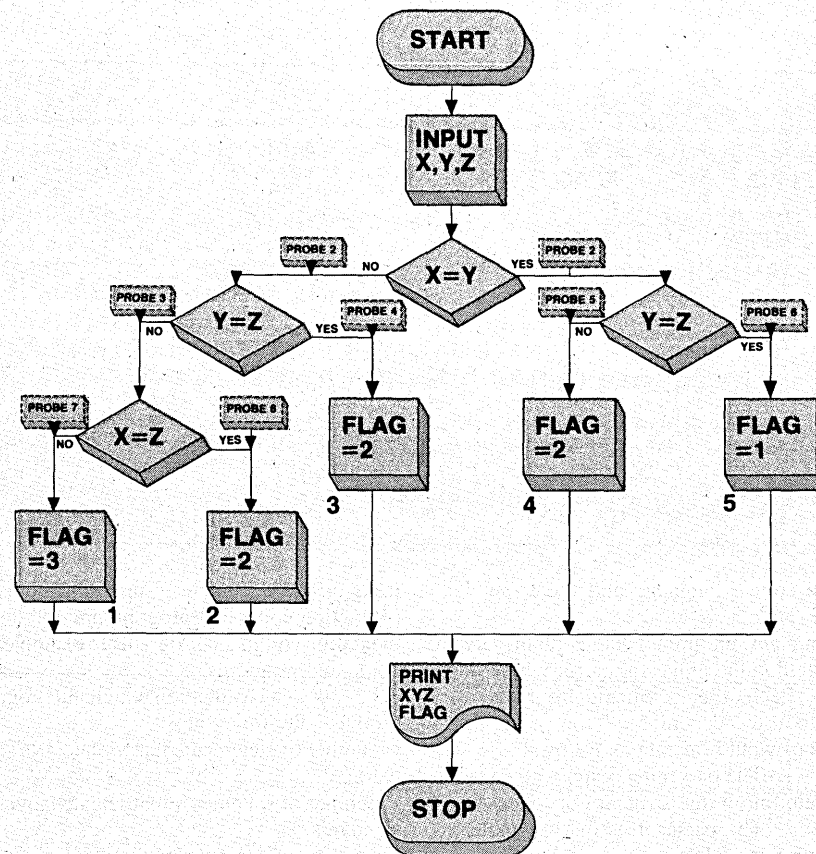
TABLE III

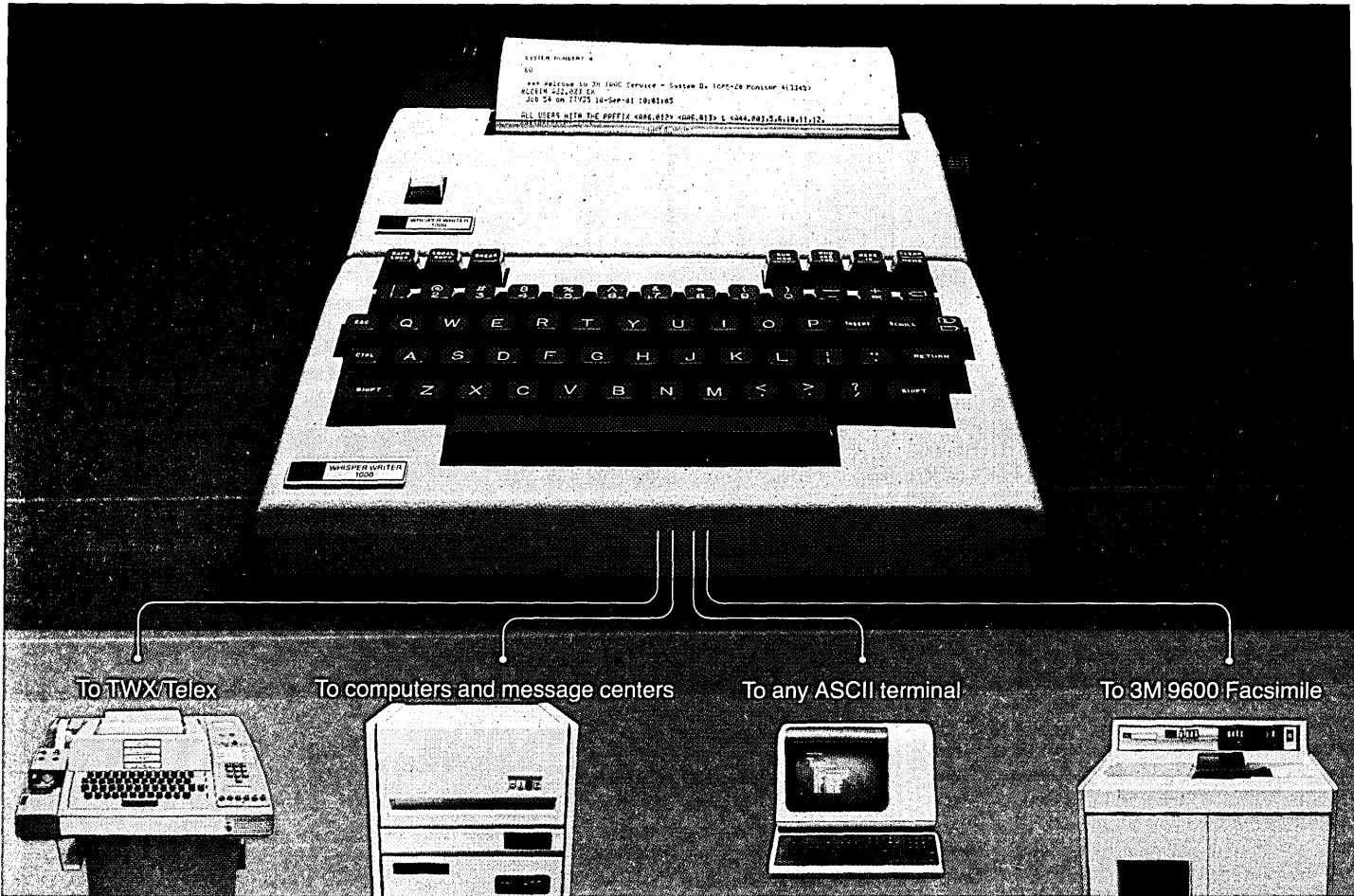
SAMPLE PROBLEM TEST PROCEDURE

TEST CASE	INPUT	OUTPUT
1	X=1, Y=2, Z=3	FLAG = 3
2	X=1, Y=2, Z=1	FLAG = 2
3	X=1, Y=2, Z=2	FLAG = 2
4	X=1, Y=1, Z=2	FLAG = 2
5	X=1, Y=1, Z=1	FLAG = 1

FIG 4

SAMPLE PROBLEM FLOWCHART





Whisper Writer 1000 communicates via phone lines at 300 baud, TWX at 110 baud, and Telex at a proprietary 110-baud/66-wpm rate.

The remarkable new Whisper Writer, from 3M.

Data communications, TWX, and Telex. All in one compact machine, at an astonishingly low price.

Make a modest investment in 3M's new Whisper Writer 1000, and you'll be able to communicate with your own mainframe computer, a DDP network, or a time-sharing service. You'll also have the ability to send and receive messages by TWX, Telex, phone lines, or electronic message center, along with transmission to 3M's 9600 Facsimile Transceiver. In short, you'll be getting both a desktop communications terminal *and* a portable DP terminal for less than the cost of most single-purpose machines.

In its standard configuration, the Whisper Writer comes with an internal modem, telephone jack, and programmable

automatic answering feature. Options include a carrying case with acoustic coupler and an automatic line selector that lets you leave your Whisper Writer connected to both a telephone and a TWX line. A special version is available with an RS-232 interface in place of the standard modem for direct hookup to a computer, external modem, or CRT terminal.

When ordering any Whisper Writer, you can specify either a 40-column or 80-column printer. The unusually quiet thermal printing mechanism prints sharp, black-on-white characters at 40 cps and is able to produce graphics under the control of a compatible computer.

Editing memory lets you prepare text off-line.

Whisper Writer's four-page dynamic memory and editing features allow you to get messages and data letter-perfect before you dial. The result: lower phone, TWX, and Telex charges, along with less tying up of communications lines.

Easy to learn, simple to use.

The separate keyboard module in the Whisper Writer 1000 has a conventional typewriter layout. Additional function keys reduce the need for memorizing special control codes.

Also available as a low-cost RO teleprinter.

Whisper Writer can be ordered without a keyboard as a

modem-equipped or RS-232-compatible, 40-column or 80-column printer. To add a keyboard later, merely buy the separate module and plug it in.

Reliability backed by 3M's national service network.

Whisper Writer's dot-matrix printer has already demonstrated its durability in more than 55,000 home and small business computer systems. Whenever maintenance is required, it's available from the same people who market and service 3M business products nationwide.

Phone 800-328-1684 toll-free or mail the coupon for literature or a demonstration. (In Minnesota, call 800-792-1072.)

Mail to: DTM1/008
3M Business Communication
Products Division
 3M Center — Building 220-9W
 St. Paul, MN 55144

Please send me a brochure on 3M's new Whisper Writer 1000.
 Call me to arrange a live demonstration.

Name _____
 Title _____
 Phone () _____
 Company _____
 Address _____
 City _____ State _____ ZIP _____

Business Products Center

3M Hears You . . .

CIRCLE 117 ON READER CARD



Each criterion has a set of metrics that contributes to its value, and each attribute has several criteria and each criterion several metrics. The other metrics also have equations that compute program quality. The combined outputs from these computations is a set of numbers that provide a quantitative measurement of program quality. The totality of tools, metrics, and criteria provides a verification technology that measures program quality.

HOW TO EVALUATE QUALITY

A quantitative analysis of program quality would proceed by the steps shown in Table V.

The characteristics of the system will dictate the priority of quality attributes:

- Identify critical criteria and metrics that measure critical attributes.
- Specify rating for each metric. This is usually a range of acceptability. If a program's quality is below the range's threshold value, it is flagged. If it is within the range, it is acceptable.
- Compute statistics from data provided from the automatic static analysis and the automatic dynamic analysis. This includes computing averages and standard deviations for the system and for individual programs.
- Compare results with threshold values and give a quantitative value of system quality and quantitative value for individual programs.
- Identify those programs below average quality and look to these for improvement.

It is important to note that the total process is almost completely automated. Thus, program portability verification is inexpensive, reliable, and predictable. Since the tools that measure portability are portable, then the verification capability is also portable, and can be moved to any configuration that supports an ANS compiler.

The evaluation phase uses the results of static analysis and dynamic analysis as input. It plugs these values into its equations for computing metrics and derives a number for each quality criterion. It compares this value against a criterion for quality and either accepts or rejects a system of programs or an individual program according to this criterion. A historical database of thresholds has been established by the U.S. Air Force and can serve as a reference for quality thresholds.

There are two aspects to program portability—program conversion and program quality—and both of these need to be verified to certify a system conversion. Traditionally, only the first of these aspects has been attempted and the results have not been satisfying. Program conversion verification certifies that the programs have been converted, the files translated, and the documentation updated. It draws no conclusions about the quality

FIG. 5

RELATIONSHIP AMONG PROGRAM QUALITY, PROGRAM QUALITY ATTRIBUTES, AND THE CRITERIA OF EACH ATTRIBUTE

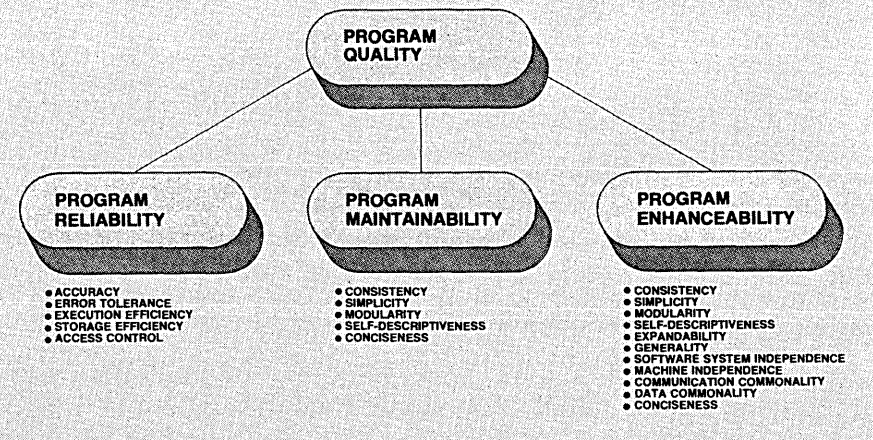


TABLE IV

DEFINITION OF PROGRAM QUALITY CRITERIA

CRITERION	DEFINITION
CONSISTENCY	Those attributes of the software that support uniformity.
ACCURACY	Those attributes of the software that support precision in calculations and output.
ERROR TOLERANCE	Those attributes of the software that support fault tolerance.
SIMPLICITY	Those attributes of the software that support understandable programs.
MODULARITY	Those attributes of the software that support independent modules.
GENERALITY	Those attributes of the software that support breadth of function.
EXPANDABILITY	Those attributes of the software that support expansion of capability.
SELF-DESCRIPTIVENESS	Those attributes of the software that support self-examination.
EXECUTION EFFICIENCY	Those attributes of the software that support optimizing processing time.
STORAGE EFFICIENCY	Those attributes of the software that support optimizing storage.
ACCESS CONTROL	Those attributes of the software that control access to program and data.
SOFTWARE SYSTEM INDEPENDENCE	Those attributes of the software that support program independence from the supporting software environment.
MACHINE INDEPENDENCE	Those attributes of the software that support program independence from the supporting hardware environment.
COMMUNICATIONS COMMONALITY	Those attributes of the software that support standard interfaces.
DATA COMMONALITY	Those attributes of the software that support standard data format.
CONCISENESS	Those attributes of the software that minimize the amount of code.

Meet the SLC-II. It's the perfect fit for any computer that yearns to be more intelligent. SLC-II is the robotic communicator you've been dreaming about for years. It's actually a microcomputer, with synthesized voice, and an autodial/auto-answer 300 bps modem. Its vocabulary is well over 300 words. And what it can't say, it'll spell out in English.

Our clever little SLC-II can easily be tailored to give your computer extra productivity and efficiency—without disrupting existing hardware or software. This intelligent communications controller can intercept messages from your computer, and then take specific, independent action—from

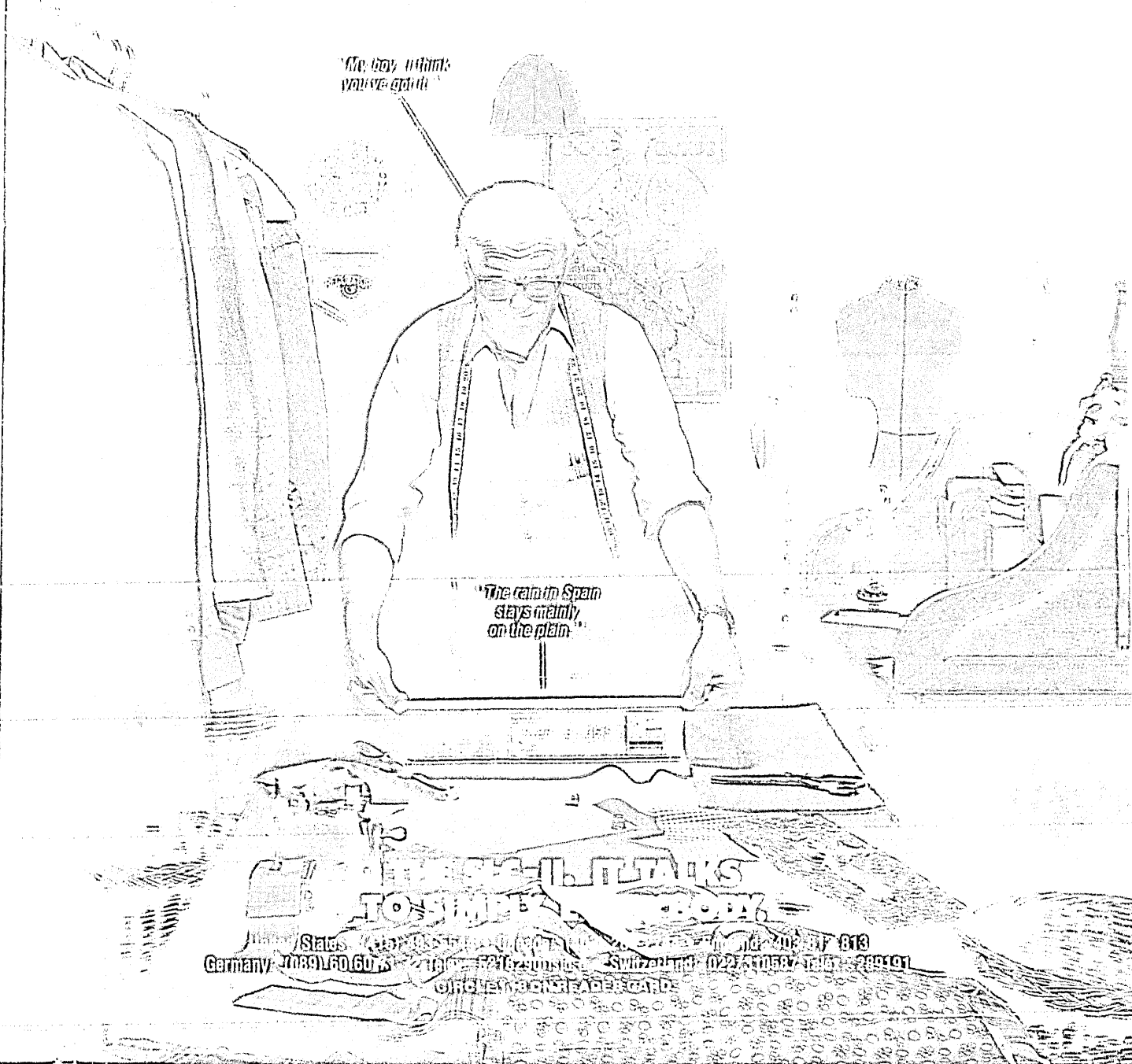
giving a wakeup call to hollering for the fire department.

SLC-II isn't just another "voice box" or a monitor that merely records events. It's a robotic marvel capable of acting on commands. And the exciting possibilities of how it's used are limited only by your imagination.

Think about giving your computer creation a voice in its future. The SLC-II. For more information, simply contact us today at: Digital Pathways, 1060 East Meadow Circle, Palo Alto, CA 94303, Telephone: (415) 496-5544, FAX: 910-379-5034.

**DIGITAL
PATHWAYS**

SLC-II. TAILOR IT TO MAKE YOUR COMPUTER A LOT SMARTER.



SLC-II TAKES TO THE AIR

Germany: 089/460603
 Switzerland: 022/50557-1
 022/50557-20001



THE KEY TO COMPUTER CITY.

DESNET™ BRINGS A WHOLE NEW CONCEPT TO LOCAL AREA NETWORK ACCESS: LOW PRICE.

Until now, you had to standardize on a single equipment vendor to build a local area network. Now you can build an efficient network around your in-place equipment. And add dissimilar equipment as you grow, at a price that's hard to believe: less than \$100 per device.

DESNET is available in your choice of stand-alone modules or boards that plug right into your computers. With DESNET, you choose the connection media that's best for you — from baseband (coax or twisted pair), broadband, fiberoptics, or modem. That's all it takes to share your expensive, high speed peripherals and data transmission facilities. Or implement your own electronic mail application.

DESNET is the only practical solution to the local area networking needs of systems houses and end users. Systems integrators and manufacturers will find DESNET's board-level version an economical alternative to developing their own networking capability. An S-100 version is now available in production quantities, and other standard formats will soon follow.

Call Destek at (415) 968-4593. And give all your computers the key to increased productivity: DESNET.

The DESTEK Group, 1923 Landings Drive, Mountain View, CA 94043

DESTEK

WE BUILD ACCESS TO PRODUCTIVITY.

TABLE V

QUANTITATIVE ANALYSIS OF PROGRAM QUALITY

1. Consider basic characteristics of the system for which the code was written:

PROGRAM CHARACTERISTIC	QUALITY ATTRIBUTES
Human lives affected (hospital, nuclear power plant, air traffic control, etc.)	Reliability ♦ Maintainability
Long life cycle (logistics, supply)	Maintainability ♦ Enhanceability
Dynamic environment (financial system which changes with changing tax laws)	Enhanceability ♦ Reliability

2. Make trade-offs among quality attributes considering the characteristics of the system:

FACTORS COMPARED	CONSIDERATION
Reliability vs. Maintainability	Efficient code seems harder to maintain; maintainable code introduces some processing and storage overhead. There is a conflict between optimizing efficiency and optimizing maintainability.
Reliability vs. Enhanceability	Efficient code seems harder to enhance; enhanceable code introduces some processing and storage overhead. There is a conflict between optimizing efficiency and optimizing enhanceability.
Maintainability vs. Enhanceability	No direct conflicts

of the programs. If the converted programs are of poor quality, then the transported system will be of poor quality and the conversion an expensive failure. This failed system, however, may have passed traditional verification methods with the highest approval. *

REFERENCES

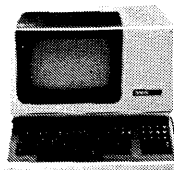
1. GSA/FCSC, *Conversion Products/Aids Survey*, Federal Conversion Support Center, Falls Church, Va., 1981. WBGEVAL, static analyzer; WBGTRAN, automatic program translator; WBGDOC, automatic program documenter; WBGV&V, program quality verifier. These tools are advertised as portable and reliable.
2. Panzel, D., "Automatic Software Test Drivers," *Computer*, IEEE Computer Society, April 1978.
3. Three excellent resources for software metrics information are: McCall, Richards, and Walters, "Factors in Software Quality," 3 Vols., RADC TR 77-369, Nov. 1977; McCall and Matsumoto, "Metrics Enhancements," RADC-TR-79, Aug. 1979; and Walker and Walker, "Evaluating Software Quality: A Paradigmatic Approach," WBG Inc., Vienna, Va., 1981.

Mr. Harrison is the director of the Management Technology Center, Sterling Systems, Inc., in McLean, Va. He is responsible for the development of SYSCON, a comprehensive software portability management technology.

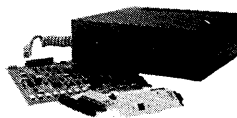
Dr. Walker is president of WBG, Inc., of Vienna, Va. He is the author of *Managing Software Reliability: The Paradigmatic Approach*.



VT 100. High-quality original. Can be upgraded.



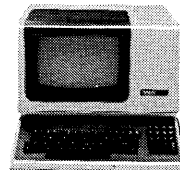
VT 101. Economical with VT 100 quality.



CP/M personal computing option for the VT100.



VT 125. Contains graphics pkg. Can be retro-fitted.



VT 131. Advanced video, printer port, block mode.

Digital chooses MTI for Authorized Terminal Distributor.

That's why MTI has all these new DEC terminals for you.

A lot of terminal dealers wanted to be DEC Authorized Terminal Distributors, but few were chosen. We're proud that MTI was one of the few. DEC knows MTI isn't a fly-by-night operation. We have been in this business for over 13 years and we are here to stay.

As an Authorized Terminal Distributor, MTI will always have the latest DEC terminals in stock, ready for delivery. And whether you are buying, renting or leasing, our prices are hard to beat. Plus, we have the expertise to match your needs to the right piece of equipment. We know what we're doing and we're proud that DEC knows it.

MTI is your one source for all the terminals, peripherals, systems, applications expertise and service you'll ever need.

See for yourself why DEC chose MTI to be one of its few Authorized Terminal Distributors. Call us. New York: 516/482-3500, 212/895-7177, 518/449-5959 Outside N.Y.S.: 800/645-8016 New Jersey: 201/227-5552 Ohio: 216/464-6688



Applications Specialists & Distributors, New York, New Jersey and Ohio. Intel, Texas Instruments, DEC, Dataproducts, Lear Siegler, Hazeltine, Diablo, Teletype, Racal-Vadic, Anderson Jacobson, General DataComm, Digital Engineering, Techtran, Cipher, Priam, SMS, Western Peripherals, Epson, Able Computer and Elgar.

CP/M is a registered trademark of Digital Research, Inc.

Fly through CICS testing without crashing.



Send your CICS productivity soaring with INTERTEST, the interactive testing and debugging software. INTERTEST's unique early detection feature lets you speed through application development and testing. It catches program errors before they crash the system and lets you correct them right away. No more crash, dump, analyze, correct, recompile. So with INTERTEST you spend more time testing and a fraction of the time correcting.

And INTERTEST's crash protection gives users more CICS

availability. They don't pay for programmers' errors in lost time. In fact INTERTEST lets you run testing and production simultaneously.

Over 500 major corporations use INTERTEST. Many report productivity increases as high as 85%.

Find out what INTERTEST can do for you. Contact On-Line Software International today for all the details. Because if you're looking to raise CICS productivity and availability, with INTERTEST the sky's the limit.



**ON-LINE
SOFTWARE
INTERNATIONAL**

65 Route 4 East
River Edge, NJ 07661
(201) 488-7770
Toll Free (800) 526-0272

CIRCLE 121 ON READER CARD

IN LOVE WITH LEARNING

A lot of people are trying to dream up ways to increase programmer productivity these days. J. Dwight Minkler II has been doing it for nine years.

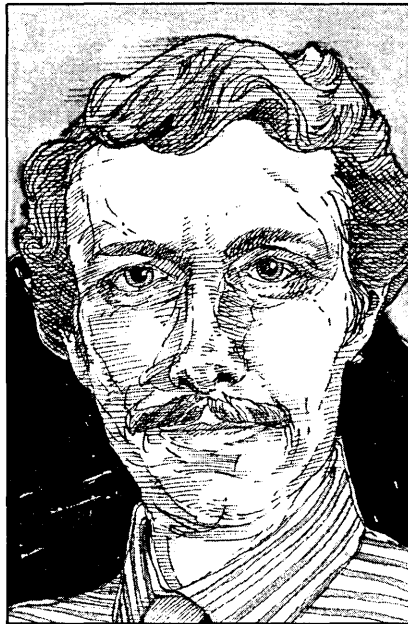
Minkler has been programming for 15 years, and he loves it. He didn't set out to become a programmer. He had one course in FORTRAN in college but his primary interests lay in math, psychology, and philosophy. "I skipped around a lot. I couldn't seem to think of anything to do that was important enough. I quit after three years when I realized I was only staying in to avoid the draft.

"I knew I wanted to live in New York City," so, at 22, armed with \$200 from his parents, he left his North Carolina home for New York where he landed a job with IBM's (then) Service Bureau Corp. There he learned to program in APT, the standard numerical control language. "I enjoyed programming from the very beginning."

After 1½ years with SBC he went into business for himself as a contract programmer. He taught himself COBOL. "One of my first programs was for a child care information system for a New York City agency. It was written in COBOL with me learning as I went along."

In addition to programming, Minkler's loves include psychology and junk mail. All three have a lot to do with what he's up to today—running the Foundation for Software Engineering in Tempe, Ariz. Part of his work is still contract programming. The rest is conducting structured COBOL Tools Workshops designed to increase programmer productivity.

"In 10 working days," proclaims his literature, "your programmers will create new programs at a rate exceeding 120



J. DWIGHT MINKLER: "I tell them [programmers] to forget about computer time entirely, that their time is more valuable."

lines of high quality code per day; enjoy their work as never before; never again complain about the drudgery of COBOL coding; eagerly maintain programs developed after the workshop."

A piece of junk mail took Minkler from New York to Arizona, a fourth love in his life. It was a flyer promoting a conference on Neuro-Linguistic Programming (NLP, which has nothing to do with programming computers) in Scottsdale in October 1979. He called a number on the flyer merely to get some information on NLP and found himself talked into attending.

"It was like coming home," said Minkler, who had been in Arizona only once before in his life, at the tender age of one year. "I knew this was where I would live." He wound up 12 years' worth of activity in New York in two weeks and moved west.

He took up NLP in a big way, becoming a licensed NLP practitioner. He currently

uses NLP in his foundation's workshops. Minkler describes NLP as a series of techniques that can be used to improve any kind of communication. "It's called reframing. It's based on a belief that all behavior is positively motivated and you have to separate intention from method." In his workshops he uses it to break down resistance he gets from more experienced programmers.

Part of Minkler's workshop package is a license to use his Speed COBOL, something he developed eight years ago and has rewritten five times. It consists of a number of reusable routines and trunks which, he says, cut programming time in half. But, he adds, "the quality improvement is greater than the speed improvement."

He teaches the use of "dinky data names. That enables them to be able to write more, to be more descriptive." Minkler said the hardest thing to get across is not paying attention to how long it takes the computer to do something. "I tell them to forget about computer time entirely, that their time is more valuable."

Minkler has two separate prices for his workshops—for in town and out-of-town. "I don't really like to go out of town." Phoenix area companies pay \$7,500 for the first workshop (Speed COBOL included) and \$4,500 for each additional workshop. For out-of-towners it's \$11,000 for the first and \$7,000 each additional.

More than one workshop per firm might be needed because Minkler works only with small groups of programmers, a maximum of six at one time. And a client company gets one or more of its production programs worked on at the same time.

Minkler puts the pleasures of programming ahead of systems analysis. Bored programmers often migrate to systems analysis, he says. But he feels his structured training course has a lot of analysis in it. "Very often programmers come out of the workshops being better analysts than the analysts."

Does Minkler prefer programming or teaching? "It's like asking me what kind of potatoes I like best. I like french fries and baked potatoes."

—Edith Myers



The Environment Is The Message

At Transaction Technology, Inc., our professionals design advanced systems that are shaping the future of banking in an environment that recognizes personal achievement as a measure of career success. Opportunities exist in the following areas:

APPLICATIONS SOFTWARE

A background in operating systems, real-time systems or related online applications. Assembly language or COBOL programming languages preferred.

TEST AND INTEGRATION

A background in software and systems testing methodology for large scale systems. 2 years programming experience preferred.

COMMUNICATIONS SOFTWARE

Requires networking internals and protocol definition experience, online systems.

SYSTEMS SOFTWARE

Requires systems programming on an online, transaction processing distributed network.

MICROPROCESSOR DESIGNERS

Requires prior experience in microprocessor programming and firmware design.

DATA BASE MANAGEMENT

Design and administer large distributed data bases and associated access mechanisms for use by continuous operation applications which process very large transaction volumes. A background in either development or utilization of Data Base Management Systems is required.

SOFTWARE TECHNICAL WRITERS

Requires prior data processing industry writing and editing experience with text processing systems.

PROJECT MANAGEMENT

A background in translating user requirements into technical design specifications as a Systems Analyst in an online business application environment. Banking or financial systems preferred.

TECHNICAL INSTRUCTOR

Requires prior instruction experience in software development environment.

LOGIC DESIGNERS

Requires 4-10 years experience in logic design, firmware design, testing and documentation.

TTI offers one of the finest salary, benefits, and vacation plans in the industry; medical, dental, financial services; van pool from most outlying areas of Los Angeles; and a special health club membership. If you're excited by the idea of creating the future of banking for the world, join the TTI professionals. Forward your resume in confidence to:

Professional Staffing
TRANSACTION TECHNOLOGY INC.
3100 Ocean Park Blvd., Dept. DM-1/82
Santa Monica, Calif. 90405

An Equal Opportunity Employer M/F/H

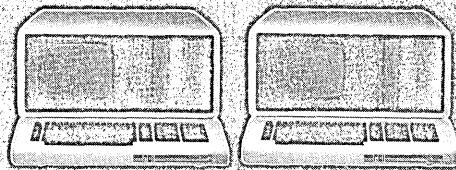
TTI

CITICORP

**TTI - Designing the future
of banking . . . for the world.**

CIRCLE 122 ON READER CARD

SOMETHING NEW FOR IBM AND XEROX TO COPY.



NBI revolutionizes the price/performance standards of the word processing industry.

They said it was impossible to develop a word processor that wouldn't become obsolete.

They said it was impossible to build a complete work station that retails for under \$8,000.

They said it was impossible to develop software that would make old word processors smarter with age.

Well, if what they say is true, NBI just achieved the impossible.

The new NBI DOCUWRITER retails for between \$6,900 and \$8,200, depending on volume.

Complete with work station and printer. And gives customers exceptional capability.

What's more, the new NBI DOCUWRITER can be upgraded in the field to become a new NBI System 3000S.

And the new NBI 3000S is the only word processor that can perform all the functions of the long admired NBI System 3000. And does it at a greatly reduced cost.

But the NBI revolution doesn't stop there.

Because we just introduced an advanced software package that not only gives new capabilities for new NBI systems, but gives new capa-

bilities for old NBI systems, as well. Without any additional cost.

So now old NBI word processors are actually twice as valuable as before.

At NBI, we make an entire family of office automation systems. Each can be made compatible with each other. So your system never has to be replaced to grow.

New NBI Software. The new NBI DOCUWRITER. And the new NBI System 3000S.

Three innovations from the word processor specialists, for the copier companies to try to copy.

For more information call 1-800-525-0844.

NBI
WORD PROCESSORS

NBI

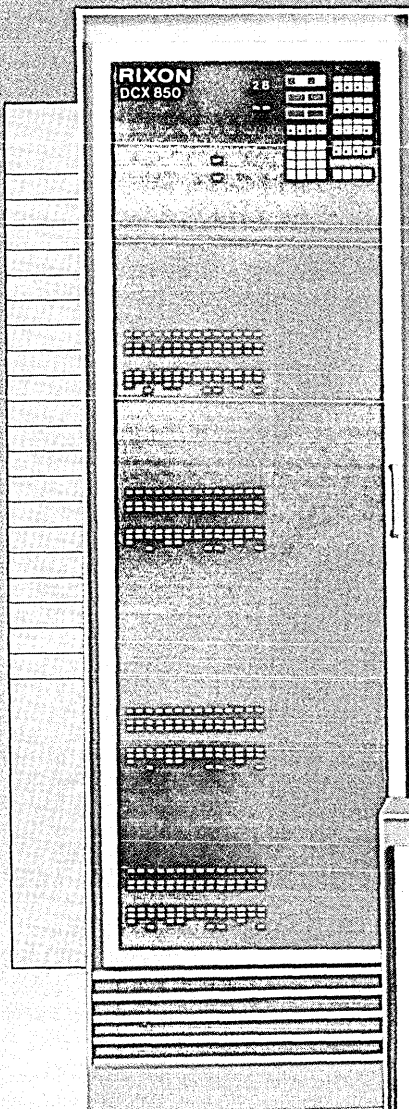
© 1981 NBI, Inc.

CIRCLE 123 ON READER CARD

Would you like a superior **STATISTICAL MULTIPLEXER** that allows you to: control your own data network, reconfigure it at will, have user controlled switching, have your traffic automatically rerouted if a telephone line fails, save money on modems and telephone lines, use port contention, experience error-free communication and be able to call

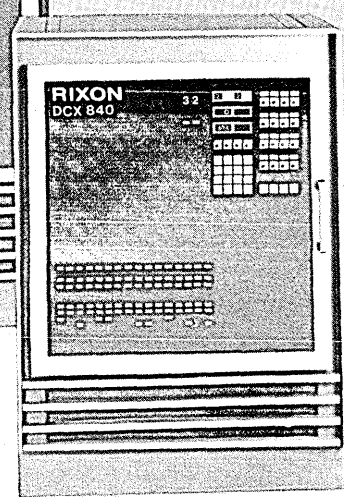
a remote statistical multiplexer test center that diagnoses your network problem free? If you would like to do this and more, call Ben Young at RIXON INC. today at (301) 622-2121 extension 471. System demonstrations and factory tours are conducted weekly. Schedule yours now. The DCX line of Statistical Multiplexers is sold and serviced worldwide.

STAT MUXES GOOD ENOUGH TO BE CALLED RIXON



FEATURES	DCX815 STAT MUX	DCX836 STAT MUX	DCX840 NETWORK MUX	DCX850 SWITCHING MUX
Total Compatibility	✓	✓	✓	✓
Input Channels	4 to 8	4 to 60	4 to 240	4 to 240
17 Input Speeds, 50 to 9600 bps	✓	✓	✓	✓
Composite Links	1	1	Up to 15	Up to 14
EIA Controls (4 FDX/Channel)	✓	✓	✓	✓
Automatic Baud Rate Detection	✓	✓	✓	✓
Down Line Loading	✓	✓	✓	✓
Flow Control	✓	✓	✓	✓
Buffer Overflow Control	✓	✓	✓	✓
Channel Test — Non-Interfering Validation	✓	✓	✓	✓
Buffer Size (BYTES)	5.5 K	64 K	256 K	256 K
Link Statistics Reporting			✓	✓
User Controlled Networking			✓	✓
User Controlled Switching				✓
Port Contention				✓
Automatic Rerouting				✓
Event Log				✓
Connection Statistics				✓
Network Supervisor Terminal				✓
Enhanced Network Statistics				✓

... and many more features are common to all of our DCX Statistical Multiplexers.



HARDWARE

OFF-LINE

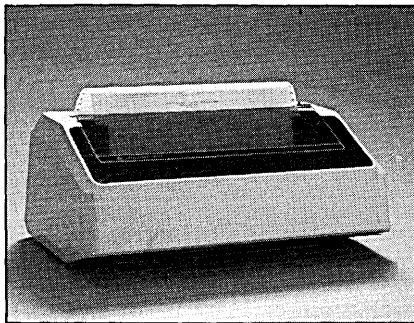
GE's Electronic Components Div. proudly announced the first six-pin dip optocoupler to meet the tough German VDE safety standards. Along with the announcement came a lovely 8 by 10 color photo showing a stein of beer, with a score or so of the optocouplers floating on the beer's frothy head. Hiding in the background: two bottles of Tuborg -- a Danish beer, also brewed in the States.

To protect its name and maintain a reputation for service and support, Apple Computer has cracked down on mail order outfits peddling Apples. Dealers have been required to sign contract modifications banning mail order sales. Those refusing the modification have had their dealership agreements revoked. "This action will benefit both Apple and its customers," states A.C. Markkula, Jr., president and ceo of Apple. "Mail order sales are neither suited to providing consumer education nor structured to provide the consumer satisfaction that has become associated with the Apple name. Accordingly, Apple will no longer sell to dealers engaging in mail order sales of Apple products."

Avco Computing Services of Wilmington, Mass., has added a second 3033 Attached Processor system to its existing complex. Avco says its dual configuration of 3033 APs will have a total processing speed of nearly 20 MIPs, doubling Avco's throughput capacity. An extra benefit seen by Avco is increased availability because of full mainframe redundancy.

COLOR PRINTER

The Prism Printer is Integral Data Systems' new entry into the color dot matrix impact printer market. The 132-column printer uses a four-color ribbon consisting of cyan, magenta, yellow, and black; output can be produced in as many as eight colors by combining the three process colors. The printer uses the 96-character ASCII upper and lower case character set, and includes provisions for inclusion of three additional character sets. Printing speed is 150cps, with characters formed in an overlapped, high density 24 by 9 cell. Variable pitch printing is provided at 10, 12, and 16.7 characters per inch; in the latter, densest mode, 220 characters can be printed across a 15-inch page. Proportional spacing in 1/120-inch incre-



ments and bold face printing are standard. Interfacing is RS232 with data rates ranging from 300bps to 9600bps; a Centronics-compatible parallel interface is also included. The Prism Printer sells for \$1,995. Additional features are planned, including an interface card for several personal computers—Apple II and III and the IBM Personal Computer. These interfaces are to have on-board graphics drivers. IDS also says it is working on software color graphics drivers for personal computers. INTEGRAL DATA SYSTEMS, INC., Milford, N.H.

FOR DATA CIRCLE 304 ON READER CARD

TEXT RETRIEVAL

GESCAN 2 is a high-speed, brute force text search and retrieval system made possible by a proprietary LSI text array processor that can literally scan through complete text several orders of magnitude faster than a software-based system. The unit dispenses with keywords, indexing, inverted files, and the like—it actually reads through an entire database looking for a pattern match. Exact match, fixed length "don't care," and variable length "don't care" are supported. If the application lends itself to partitioning documents, up to 256 partitions may be specified, and searches can be restricted to specified partitions. Additional search capabilities include Boolean logic, proximity search (i.e., 13th within 10 characters of Friday), and near-term match, which returns all documents containing at least n of m given search strings. Priced at \$249,750, including training and installation, the basic system consists of the text array processor, a 128KB minicomputer, an 80MB disk, two 10MB cartridge disk drives, a nine-track mag tape unit, a printer, and a user terminal. GENERAL ELECTRIC CO., Military and Data Systems Operations, Arlington, Va.

FOR DATA CIRCLE 302 ON READER CARD

COMPUTER

Altos Computer Systems has entered the 16-bit world with an eight-user, Intel 8086-based system that runs a choice of four operating systems, including Xenix, Microsoft's implementation of Bell Lab's Unix version 7 timesharing operating system. With 512KB of main memory, 10MB of fixed disk, and a floppy disk drive for backup, the ACS8600 sells for \$12,990. Other configurations are offered with more hard disk and either floppy or mag tape backup. In addition to Xenix, the system can operate under CP/M-86, MP/M-86, and Oasis-16. While predicting that Unix-like operating systems

HARDWARE

will become the standard for 16-bit systems, Altos offers these other systems to maintain compatibility with existing applications. Programming languages supported include FORTRAN, and several versions of COBOL, BASIC, and Pascal.

ACS8600 hardware centers around three processors: the 8086 for system and application processing, an 8089 for I/O and DMA, and, optionally, an 8087 for floating point arithmetic. Memory includes error detection and correction, and is addressed in blocks of 64KB up to a maximum of 1MB. A memory management unit treats the 1MB address space as 256 pages of 4KB. ALTOS COMPUTER SYSTEMS, San Jose, Calif.

FOR DATA CIRCLE 303 ON READER CARD

APPLE ACCESSORY

Not too long ago, a friend told us that he was about to install a fan in his fully stuffed Apple II because he was quite concerned about all the heat generated by his Z80 Soft-card, disk controllers, modem, printer interface, and other plug-ins. Tovatech may have a passive solution to his problem, in the form of the Ventop, a louvered, metal



cooling panel that replaces the standard plastic cover on an Apple II. Ventop, says the vendor, will take care of dissipating heat buildup without requiring the user to install a fan. The Ventop sells for \$45, plus \$3 for shipping and handling. TOVATECH, Mountain View, Calif.

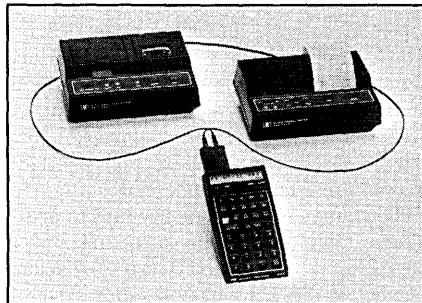
FOR DATA CIRCLE 306 ON READER CARD

HARDWARE SPOTLIGHT

INTERFACE LOOP

Hewlett-Packard has taken the basic listener/talker/controller philosophy of its HP-IB (aka IEEE-488 GPIB) and scaled it down from a high-speed parallel interface to a low power, low cost, portable serial Interface Loop dubbed the HP-IL (HP-Interface Loop). As an indication of the cost, power, and portability goals of HP-IL, Hewlett-Packard's first announced controller for the loop is the top of the line HP-41 handheld computer which can control a loop of up to 30 devices; HP-IL architecture will allow controllers to address as many as 960 devices. As with HP-IB, the new Interface Loop will become a corporate standard: HP's Instrument Division has announced its first HP-IL-compatible product, the \$695 Model 3468A Digital Multimeter.

HP-IL is a closed loop architecture in which messages traverse the entire loop at speeds of up to 5Kbps. For links of up to 10 meters, zip-cord cables are used; links of up to 100 meters are possible using shielded cables. Each device interfaced to the loop includes a repeater; each message is received, acted upon if the device is selected,



and passed on down the loop. Errors are easily detected because each message makes a complete circuit, returning to its point of origin. As with HP-IB, three classes of devices may be active on the loop: one controller, one talker, and one or more listeners.

To kick things off, HP has developed a number of HP-IL-compatible products. There are three interface modules, one for the HP-41 (\$125), one for the Series 80 personal computer (about \$295), and one for third parties, allowing them to interface their equipment with HP-IL. The third-party interface is offered in a prototyping kit for \$395, or \$1,295 for a 10-component pack. A digital cassette recorder, capable of storing 128KB on a miniature cassette, sells for \$550, and a 24-column thermal printer/plotter goes for \$495. The printer/plotter can print an HP-41 program in bar code readable by the currently available optical wand. To conserve power, the cassette drive and printer/plotter both have a standby mode that allows the controller to selectively power up or down the unit. New plug-in modules will be offered for use with the HP-41. The Extended I/O ROM supports the digital cassette drive, printer/plotter, and other I/O devices; it will become available in the second quarter for a price of \$75. The Time Module is a quartz clock that can be used to collect data at specified times or intervals; it sells for \$75. Additional HP-IL goodies in the works include an 80-column impact printer and interfaces for video monitors, RS232 devices, and GPIO devices. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR DATA CIRCLE 300 ON READER CARD

LOCAL NET ADDITIONS

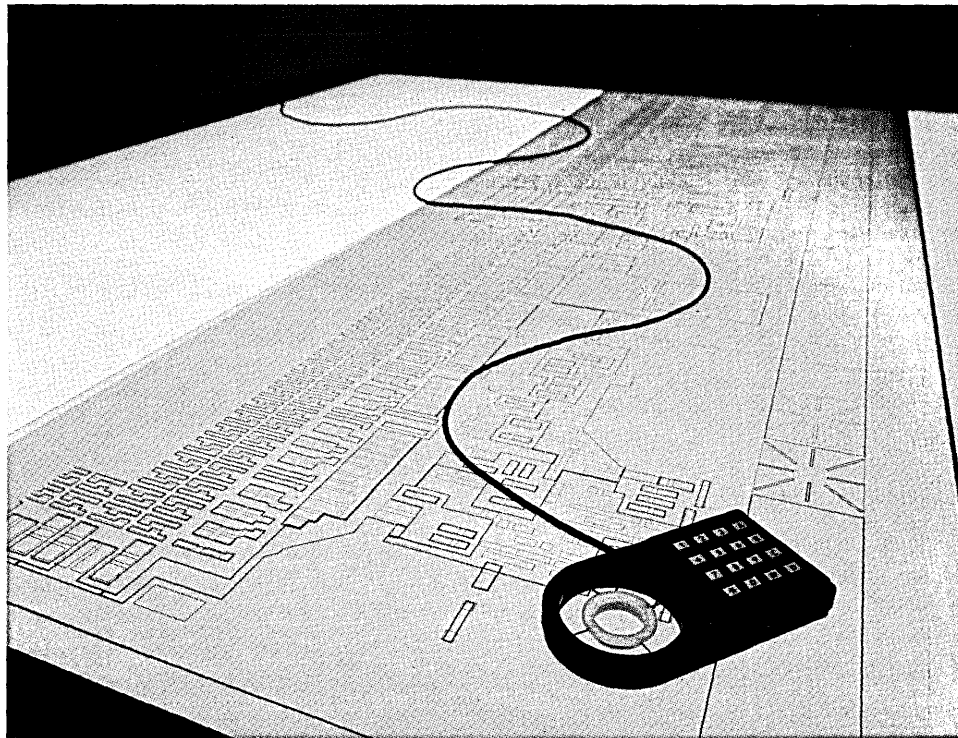
Datapoint's Attached Resource Computer system, which started out in 1977 looking like nothing more than an ingenious way to build an incremental network of small computers, seems today to be perhaps the most advanced offering in the "integrated office" marketplace, surpassing all contenders, including Ethernet, in currently available functions. Since the initial announcement, Datapoint has added voice and data communications support by integrating its Infoswitch equipment into ARC, provided word processing and document archiving and retrieval, and added a new high-end processor—the 8800—and a new operating system—RMS.

Three new functions are now offered for ARC: color graphics, laser printing, and multiprotocol facsimile. The 9680 Color Business Graphics (CBG) system is a turn-key system that lets network users create, modify, store, display, print, and photograph color graphics. The basic system comprises a 512 by 482 raster scan display, input tablet and stylus, and system controller; options include a color dot matrix printer, and two film recorders, one for 35mm format, and one combining 35mm and 8 by 10 Polaroid prints and transparencies. Each picture can include up to 16 colors (selected from a choice of 16 million). Images may be created from data entered at a keyboard or stored in ARC files, or entered freehand on the graphics tablet. Four predefined chart formats—word, bar, pie, and graph—are available for creating charts from input or stored data. Images may be stored in presentation sequences called scripts. Graphics may be stored in libraries in standard ARC file format. Output may be directed to the desired device, and entire scripts can be generated with a single command. The 9680, including controller, monitor, and tablet, sells for \$30,000. The 9694 color dot matrix printer sells for \$15,000; the 35mm film recorder is \$10,000, and the combined 8 by 10 and 35mm recorder is \$20,000.

While Datapoint's 9660 Laser Printer isn't the first or fastest on the market, it does have some features we haven't seen before. Printing at 20 surfaces per minute (roughly 1,300 lpm), the 9660 can intermix up to 32 fonts per page, select paper from any of five input drawers (selected by name, not address, as each tray is coded), and deliver output into any of up to 80 output bins. The 9660 also features secure output: output bins can hold lock boxes, and the machine is smart enough to make sure the lock box is in place before delivering confidential documents. The standard 9660 comes with 10 output bins, and seven additional sets of 10 may be added. The basic printer sells for \$65,000, with a \$420 maintenance charge, plus 2.6¢ per monthly copy in excess of 10,000.

Facsimile store-and-forward, protocol conversions, facsimile output of data

Most digitizers are pretty much alike... the New CalComp 9000 Series is the exception.



Most are priced alike... except the CalComp 9000.

The new CalComp 9000 Series Digitizer gives you the best performance features at the lowest price. Only the new CalComp 9000 allows you to customize application configurations by switch selectable character framing, data rate, operating modes and interfaces.

Most have the same features... except the CalComp 9000.

Check the specs and you will find that accuracy, resolution, digitizing surface sizes and even transducers are just about the same on most competitive models.

Then consider these CalComp digitizer features: You can choose a digitizing surface and transducer to fit your application. Solid or backlighted surfaces are available in sizes from 12" x 12" to 60" x 44". All have standard accuracy of ± 0.0105 inch and resolution of 1000 lines per inch. Transducer choices include a pen stylus, and 4, 12 or 16-button cursors.

The compatible 9000 Series lets you communicate simultaneously with several host computers and/or peripherals via multiple interfaces.

And, you can count on CalComp to keep your digitizer operating at peak efficiency. Each CalComp 9000 Series Digitizer carries a full one-year

warranty on parts and labor. Reliable, nationwide direct sales and service guarantee quick response time.

The new CalComp 9000 Series is an exceptional digitizer. Point for point, when it comes to price and performance, CalComp is the choice.

Call or write today for complete specs on the 9000 Series.

CALCOMP
A Sanders Graphics Company
SANDERS

California Computer Products, Inc.
2411 West La Palma Avenue
Anaheim, California 92801
Telephone (714) 821-2011

CIRCLE 125 ON READER CARD

HARDWARE

files, and local printing on the 9660 laser printer are possible with the 9498 Facsimile Communications Interface. The FCI connects to any Datapoint processor running the RMS operating system—either stand-alone or ARC connected. The unit accepts analog fax input, in any of three formats—US1, CCITT Group I or II—and sends it on to the Datapoint processor via an RS232 interface. CCITT Group III digital format is available as an option. Messages can be saved on disk for delayed transmission (such as after hours when the phone rates are lower) and transmission to multiple receivers. The unit is capable of reformatting the message when originating and receiving devices are of differing formats. The basic 9498 sells for \$4,950; with CCITT Group III capabilities, the unit is known as the 9498/0111 and sells for \$7,450. DATAPOINT CORP., San Antonio, Texas.

FOR DATA CIRCLE 301 ON READER CARD

COMMUNICATIONS INTERFACE

The IF-11/3780 is a microprocessor-based communications interface for linking PDP-11s (and VAXs in emulation mode) to IBM mainframes. The unit plugs into the PDP-11's back plane, and provides two independent 2780 or 3780 output channels that can run at data rates of up to 9600bps. IF-11/3780 handles code conversion, translating ASCII to and from EBCDIC, and includes an optional "transparent" binary data transfer mode. The interface takes care of 2780/3780 processing, including line interrupts, block check sums, space compression and expansion (for 3780 operation), multiple record transmission and reception, and automatic retry and retransmission. Data transfers between the PDP-11 and the interface are made through DMA. The IF-11/3780 operates under the control of RSX-11M and a driver program supplied with the unit. A single IF-11/3780 sells for \$8,000. ASSOCIATED COMPUTER CONSULTANTS, Santa Barbara, Calif.

FOR DATA CIRCLE 307 ON READER CARD

TERMINALS

Lear Siegler has rolled out three new crt terminals: the \$695 ADM 21 editing terminal packaged in the company's "clamshell" enclosure; the \$895 ADM 24 with ergonomic packaging and extended ADM 21 functionality; and the ANSI-compliant, \$1,195 ADM 36 which offers a 24-line display of either 80 or 132 columns.

Both the ADM 21 and 24 operate in either conversational or block mode, and offer editing capabilities including clear screen, erase line or page, character insert and delete, and line insert and delete. Both communicate at standard data rates ranging from 75bps to 19.2Kbps. Either can be had with a green or white phosphor screen—the standard size is 12 inches (15 inches, optionally, on the ADM 24). Programmable



function keys are provided on both models. The 24 also offers a 48-line display memory, horizontal split screen, and smooth or jump scrolling. Limited graphics capabilities are available for both models.

The ADM 36 also comes in an ergonomic package, with detached keyboard and a choice of 12-inch or 15-inch screens. In addition to U.S. ASCII upper and lower case characters, the ADM 36 includes seven separate European character sets. Other features include editing functions, double high and double wide characters, keyboard setup of operating parameters, and VT-52 code compatibility. LEAR SIEGLER, INC., Data Products Div., Anaheim, Calif.

FOR DATA CIRCLE 305 ON READER CARD

COMPUTER

Apple Computer has essentially re-released its trouble-plagued Apple III personal computer, having doubled its main memory capacity to 256KB and created a new release of the shaky SOS operating system. At the same time, the company has added a 5¼-inch Winchester disk subsystem, and added or enhanced available applications software. Apple III pricing also has been pared back from the figures originally announced. The



new price for an Apple III with 128KB of memory and the revised SOS 1.1 operating system is \$3,495; with a monitor and Business BASIC, the price is \$3,940.

The Profile Personal Mass-Storage System is a 5MB, self-contained unit with an intelligent controller. It uses Winchester technology, includes its own power supply, and comes with interface card and driver software. It requires an Apple III with at least 128KB of main memory, and SOS 1.1. Profile sells for \$3,495. APPLE COMPUTER INC., Cupertino, Calif.

FOR DATA CIRCLE 308 ON READER CARD

EIGHT-INCH WINCHESTERS

Shugart Associates has come out with its second series of eight-inch Winchester disk drives, which offer faster access to data while maintaining an upgrade path from the existing SA1000 series. The new SA1100 line initially has two models: the SA1104 (two platters, 20.3MB unformatted, 16MB formatted), and the SA1106 (three platters, 33.9MB unformatted, 26.6MB formatted). The SA1100 series uses a new head positioning system which provides a 35msec average access time (compared to the SA1000's 70msec average access time). The new drives are physically and electrically compatible with the SA1000 series, and, like the SA1000s, they are command bus compatible with Shugart's SA801/851 line of eight-inch floppies. Additional key specs of the SA1100 series include 4.34Mbps transfer rate, 10msec track-to-track access time, and 70msec maximum access time. In lots of 500, the SA1104 sells for \$1,550, and the SA1106 is \$1,875. SHUGART ASSOCIATES, Sunnyvale, Calif.

FOR DATA CIRCLE 309 ON READER CARD

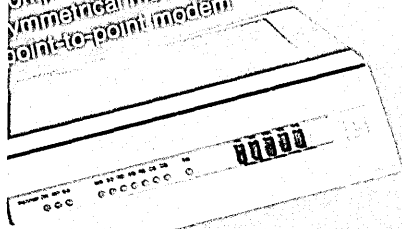
DESKTOP COMPUTER

Monroe Systems For Business coined a new term to describe its initial entry into the small business microcomputer market, the Occupational Computer model 8820. Designed and manufactured by Monroe, the 8820 comprises a Z80-based cpu with 128KB of RAM, amber-phosphor nine-inch (diagonal) screen formatted as 24 lines of 80 characters, 93-key keyboard including typewriter, function, cursor control, and numeric keys, and integral dual-floppy drives (total on-line capacity: 640KB). The OC 8820 also has three RS232 ports with programmable protocols; one is for communications, while the other two are for attaching peripherals. Monroe includes its own operating system, extended BASIC, and ISAM file management package with the 8820; CP/M and Pascal are available as options as well as adaptations of WordStar, DataStar, InfoStar, and SuperCalc. Sold through Monroe's 350 branch offices, the OC 8820 lists at \$4,385. MONROE SYSTEMS FOR BUSINESS, Morris Plains, N.J.

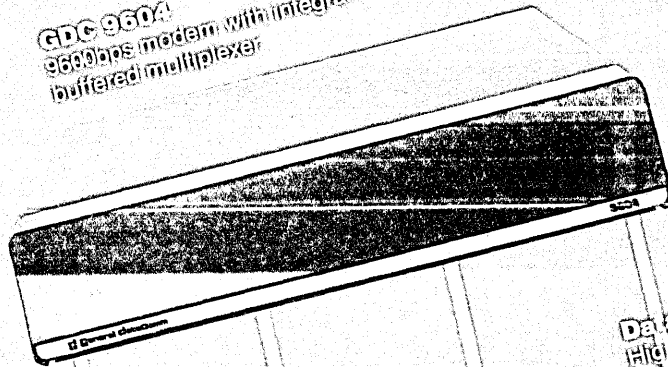
FOR DATA CIRCLE 310 ON READER CARD

HIGH SPEED HIGH TECH LOW COST

DataComm 9600 MD
Compact 9600bps
symmetrical multipoint or
point-to-point modem



GDC 9604
9600bps modem with integral 4-channel
buffered multiplexer



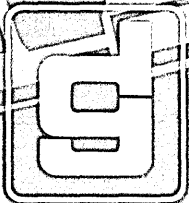
DataComm 9600
High reliability 9600bps
point-to-point modem



GDC High Speed Modem Systems
more revolutionary
systems products from
The Networking Company.

These new high speed modems combine
advanced technology with proven systems
experience to make GDC the value leader in
networking solutions. Contact the experts for
more information about these user-oriented
products designed to meet today's and
tomorrow's demanding networking requirements.

Building a total datacomm network is as easy as GDC.



General
DataComm

General DataComm
Industries, Inc.
One Kennedy Avenue
Danbury, CT 06810
(203) 797-0711

General DataComm
Industries (Canada) Ltd.
Suite 410 West
2255 Sheppard Avenue East
Willowdale, Ontario M2J 4Y5
(416) 498-5100

General DataComm (UK) Ltd.
Trentham Road
Wotton Bassett, Berkshire
RG40 5DN, England
(0734) 791 424

U.S. Sales Offices: Atlanta, GA (404) 955-0682; Chicago, IL (612) 293-1811; Dallas, TX (214) 930-0303;
Detroit, MI (313) 440-4110; New York, NY (212) 423-5080; San Francisco, CA (415) 369-3115; Santa Ana, CA
(714) 957-0244; Washington, D.C. (601) 596-0888; U.S. Telecomm Sales: Atlanta, GA (404) 971-5914;
Chicago, IL (612) 658-9262; Green Valley, IL (609) 852-6420; Santa Ana, CA (714) 957-0244; Dallas, TX
(214) 241-5938; Indianapolis, IN (317) 849-7118; Seattle, WA (206) 355-1300.

CIRCLE 126 ON READER CARD

DILOG NUMBER 1 FOR DEC 11*

With LSI 11/PDP 11 Software Compatible Disc/Tape Controllers Offering Single Board Low Power μ P Based Design and Low Cost...

Plus Many Other Good Reasons!

The reasons start with DILOG'S (Distributed Logic Corp's.) full time engineering and design staff. *Not outside suppliers.* That means when you contact DILOG for product selection or after sale service, you'll get "first hand" assistance... along with years of experience manufacturing μ P based controllers that interface with DEC 11 CPUs.

The intelligent products you'll discuss all utilize common proprietary architecture and DILOG automated design techniques—products with exceptional reliability and cost efficiency... mostly available from stock. And

when you plug a DILOG controller into your DEC CPU it's ready-to-run because it's *fully operating system software compatible.*

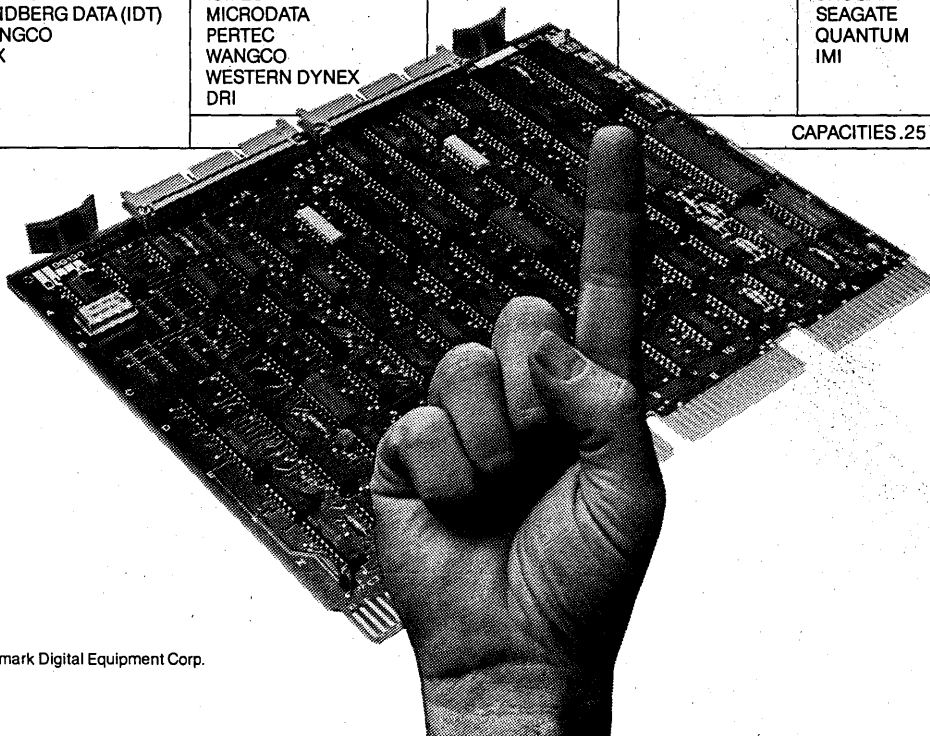
These high performance data storage interface products also feature • minimum bus/space requirements • up to 60% less power • 10 to 50% lower cost • automatic self-test... and numerous other features for easy system integration.

Consult the DILOG/disc-tape compatibility table for your needs. Then ask for detailed data on existing, or future products from DILOG... #1 in single board DEC 11 compatible disc/tape controllers.

Distributed Logic Corp., 12800-G Garden Grove Blvd., Garden Grove, CA 92643, Phone: (714) 534-8950 • TELEX: 681 399 DILOG GGVE

DISC/TAPE DRIVE MANUFACTURER COMPATIBILITY CHART

MAGNETIC TAPE		DISC				
1/2" REEL-TO-REEL STD. & STREAMER	2315/5440/RK05 CARTRIDGE CLASS	CMD CARTRIDGE MODULE	SMD STORAGE MODULE	WINCHESTER 5 1/4", 8" OR 14"	1/4" TAPE CARTRIDGE	FLOPPY DISC DRIVE
AMPEX CIPHER CONTROL DATA DIGI-DATA KENNEDY MICRODATA PERTEC TANDBERG DATA (IDT) WANGCO TDX	AMPEX CAELUS CENTURY DATA CONTROL DATA DEC DIABLO IOMEC MICRODATA PERTEC WANGCO WESTERN DYNEX DRI	AMPEX CONTROL DATA	AMPEX CENTURY DATA CONTROL DATA BALL COMPUTER MITSUBISHI	BASF CONTROL DATA FUJITSU KENNEDY MEMOREX PRIAM SHUGART SEAGATE QUANTUM IMI	DEI KENNEDY PEREX QUANTEX	BASF DECITEK MICROPOLIS PERTEC REMEX SHUGART
CAPACITIES .25 TO 300 MB						



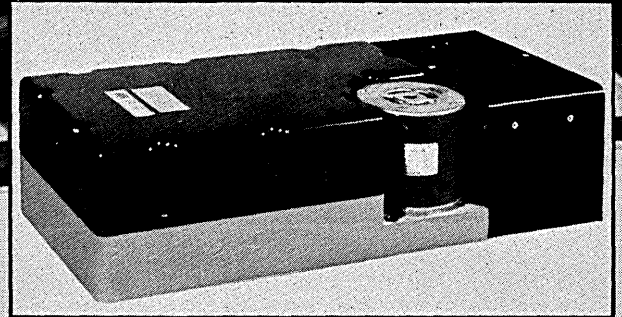
**DISTRIBUTED
LOGIC CORP.**
DILOG

CIRCLE 416 ON READER CARD

*Trademark Digital Equipment Corp.

7.3 to 83 Megabytes

IN AN 8-INCH WINCHESTER-TYPE DRIVE
WITH PROVEN CHEYENNE RELIABILITY



- ANSI, SMD and FLOPPY interfaces.
- Capacities of 7.3, 22, 36.7, 52 and 83 megabytes.
- Closed loop track following positioning system with rotary voice coil positioner.
- Daisy chain control with option for up to 8 drives.
- Microprocessor-based modular electronics package; can be remotely operated.
- Built-in self-diagnostic program.
- Patented sealed air system.

**Making it more reliable
...every bit!**

SLI
INDUSTRIES
21040 Victory Blvd.

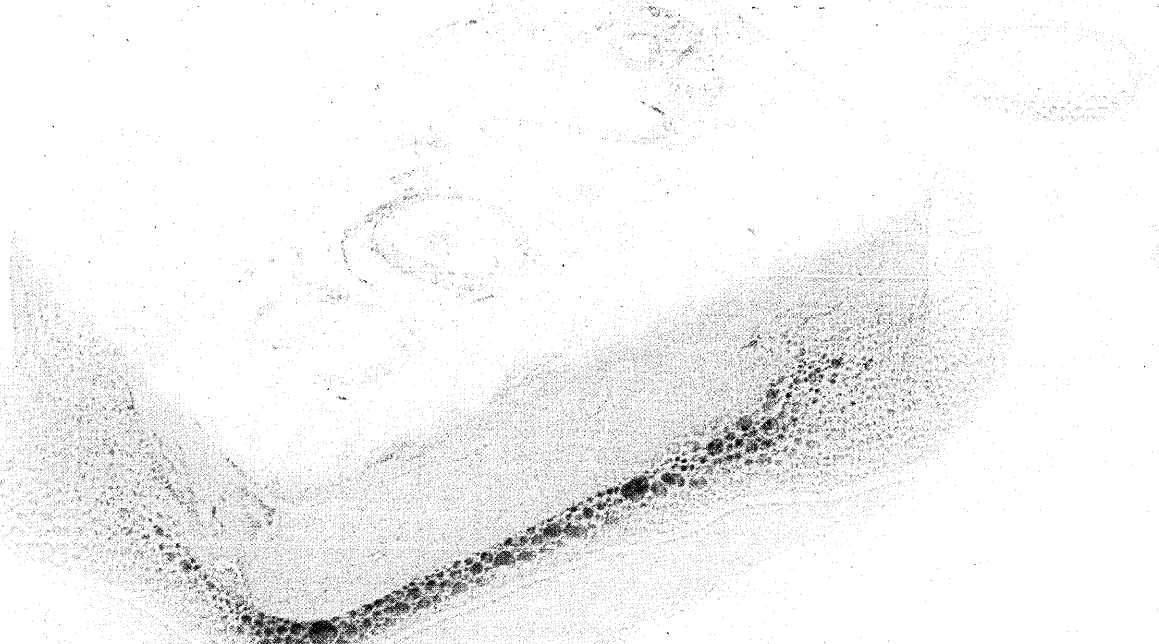
Woodland Hills, Calif. 91367 / Phone: (213) 884-7300 / TWX: 910-494-2696

CIRCLE 415 ON READER CARD

NCR *Paper**

BRAND OF CARBONLESS PAPER

STOP YOUR SECRETARY FROM WASTING TIME AT THE BAR



CLEAN UP HER ACT WITH CARBONLESS

NCR Paper brand of carbonless paper lets your secretary spend more time on her work, less on cleaning carbon smears and smudges.

You won't hear complaints about dirty hands, or soiled clothing, from messy carbon paper.



You won't pay for lost time in extra trips to the washroom.

You will see smiles, rather than frowns, and you'll certainly increase productivity in your office.

NCR Paper brand — the carbonless paper that cleans up your problems.

APPLETON PAPERS INC.

GENERAL OFFICES: P.O. BOX 359, APPLETON, WI 54912

*NCR Paper is a trademark of NCR Corporation licensed to Appleton Papers Inc.

CIRCLE 128 ON READER CARD

SOFTWARE AND SERVICES

UPDATES

Quietly, a Japanese company has begun exporting a COBOL documentation generator to the U.S. Japanese giant Hitachi has concluded a distribution agreement with Syncsort of Englewood Cliffs, N.J., for Sydoc, as the productivity tool is known. It became available to IBM and compatible mainframe users last October.

First Bank System, Inc. of Minneapolis/St. Paul has selected the French videotex system, known as Télétel, to provide what is claimed to be the "first fully transactional videotex system in this country." Test plans call for the installation of 285 terminals, some in the suburbs of the Twin Cities, but most in agricultural areas around three North Dakota cities: Fargo, Wahpeton, and Valley City. Fargo got 15 pilot terminals in December, with the rest to be installed over a three-month period.

RCA's Government Systems Div. has given Plessey Peripheral Systems the nod to supply \$2.5 million worth of front-end data communications systems for use in the Postal Service's Electronic Computer Originated Mail (E-COM) service. Scheduled for service this year, E-COM will let mailers send communications over common carriers to 25 Serving Post Offices around the country. At the SPOs, messages will be automatically printed, stuffed into first class envelopes, and delivered. The P.O. claims that E-COM will provide two-day service anywhere within the continental U.S. The Plessey front end will accept messages in IBM 2780/3780 protocol or CCITT X.25.

MICRO APPLICATIONS

Instant Software has a pair of interesting new programs, one for the TRS-80 Models I and III, the other for the Apple. For Radio Shack users, the cassette-based Electronic Breadboard provides an automatic aid to designing and verifying analog circuits. Technicians, engineers, and students can evaluate voltages, currents, impedance, and frequency responses by using the program, thus avoiding the time-consuming task of actually building and then debugging a breadboard. The package requires a

16KB computer. The program comes on cassette tape and includes a provision for saving designs on tape. It is priced at \$49.95.

FOR DATA CIRCLE 325 ON READER CARD

In an entirely different vein, the Apple package teaches Russian. The diskette-based package includes two sets of programs. The first teaches the Cyrillic alphabet, initially introducing those characters that have English counterparts, then presenting the more alien characters bit by bit. The second set of programs helps develop

SOFTWARE SPOTLIGHT

OFFICE AUTOMATION

DEC is the latest mini maker to enter the combined office and data processing markets with the introduction of its Office Plus concept, combining data processing with word processing, electronic mail, and phototypesetting functions in VAX-hosted systems and networks. Office Plus is bound together with DECmail, a VAX electronic mail system; it also includes the previously announced DECmate, DECword, DECword/DP, and DECType wp systems, and DECset, an electronic publishing system that can drive phototypesetters or laser printers.

Comprising text editing (a subset of the DECword, DECmate, and ws200 word processing editors), electronic mail, and filing capabilities, DECmail is designed to operate on the 32-bit VAX series of computers. It is for offered \$20,000 fully supported or \$12,000 for a license only; DECmail also can be had for use with VT100w word processing terminals, with prices ranging from \$20,180 for software license and four terminals to \$183,680 for the software with support for up to 96 terminals. Deliveries are slated for February. While the VT100w is DEC's terminal of choice for use with DECmail, any of the firm's word processors,

printing terminals, and the entire VT100 family can be used to access DECmail. The system is designed for both neophytes and experienced personnel, since it offers both direct command-mode operation as well as menu-driven use. Computer-based training and a HELP function that can be called up with two keystrokes simplify bringing new users up to speed.

DECmail uses the "electronic file cabinet" concept in which each user has an electronic file drawer containing a number of "folders." Each user has an "unread" file for incoming messages, and an "unsent" folder for messages created but not yet mailed. Once sent, the message moves into a "sent" folder in the originator's file drawer, and the unread folder in the recipient's file drawer. The user can create other folders as needed; old memos can be recalled from the file and incorporated into new messages. A search and editing facility allows users to set up tickler files by date. Each user also has a "wastebasket" where discarded messages go; these messages can be retrieved until the user dumps his wastebasket. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 332 ON READER CARD

SOFTWARE AND SERVICES

the student's Russian reading ability and increase his or her vocabulary. The package sells for \$24.95. INSTANT SOFTWARE, Peterborough, N.H.

FOR DATA CIRCLE 326 ON READER CARD

DECISION SUPPORT

Present is Data General's software package to support management needs for data selection, manipulation, computation, and presentation. Users may interactively request information from a database or system file using multiple selection criteria. Requests can generate output in the form of new data files, screen-displayed text, printed reports, and both screen and hardcopy graphics. Present combines in one package for the business professional the functions generally handled by separate graphics, query, report writing, and data extraction programs. DG also says that Present should help dp professionals build applications, such as periodic business reports or ad-hoc graphics, without resorting to conventional programming languages. Present works in conjunction with DG/DBMS, the company's CODASYL-compliant database system, and operates under AOS or AOS/VS. Graphics capabilities are optional, requiring the Trendview graphics package. Communications—both local and remote—are available to Present users whose systems have DG's Xodiac network management software. Depending

on configuration, Present licenses for \$3,000 to \$11,000—\$3,000 for Present, \$6,000 for Present with the DMBS option (both for AOS systems). For AOS/VS systems, the respective prices are \$4,000 and \$11,000. DATA GENERAL CORP., Westboro, Mass.

FOR DATA CIRCLE 327 ON READER CARD

CP/M COMMAND

A command file from Stok Computer Interface allows CP/M users to specify a string of multiple CP/M commands for execution in sequence. With DO.COM, the user can type a command stream, then walk away and let the machine process each command—as opposed to typing a command, waiting for it to complete, then typing the next command, etc. An example would be DO ASM PROG1; LOAD PROG1; ASM PROG2; LOAD PROG2. DO.COM is supplied with 8080 source code on 8-inch standard CP/M soft sector diskette or Superbrain 5¼-inch diskette for a price of \$29. STOK COMPUTER INTERFACE, Woodside, N.Y.

FOR DATA CIRCLE 328 ON READER CARD

BUDGETING

Easy-Plan is a simplified, on-line budgeting tool for use with MSA's General Ledger System. Designed to make budgeting a less tedious task for accountants and financial managers, Easy-Plan allows users to enter

budget values, review budget spreadsheets, and pose "what if?" questions, with updated results displayed interactively. English-like planning calculations can be entered by financial users to define budget models, specify relationships, and perform automatic projections using data already held in current General Ledger Budget files. Once the manager is satisfied with his or her proposed budget, the resulting figures can be entered into the G-L database. Easy-Plan is offered with the MAS G-L system for IBM OS and DOS-VSE environments. It operates with a number of on-line monitors, including TSO, ICCF, and CMS. Pricing ranges from \$20,000 to \$25,000, depending on options selected. MANAGEMENT SCIENCE AMERICA, INC., Atlanta, Ga.

FOR DATA CIRCLE 333 ON READER CARD

COBOL CONVERSION

Arkansas Systems has developed a COBOL conversion utility to make transferring COBOL programs between IBM mainframes and System/34s a simpler task. Most syntax differences are detected and corrected automatically. The COBOL conversion package runs on the System/34, and currently supports mainframe COBOL compilers operating in a DOS or DOS/VSE environment. The package sells for \$850. ARKANSAS SYSTEMS, INC., Little Rock, Ark.

FOR DATA CIRCLE 330 ON READER CARD

A NEW METHODOLOGY FROM YOURDON PRESS

DEVELOPING STRUCTURED SYSTEMS: A METHODOLOGY USING STRUCTURED TECHNIQUES, by Brian Dickinson, is

different from the existing "standards-oriented" methodologies that have too many volumes and unnecessary details. It encourages readers to tailor its suggestions to their own particular system requirements.

Developing Structured Systems stresses iterative cycling and presents a full set of leveled data flow diagrams with data dictionary entries and process descriptions. 360 pages; \$49, hardcover; ISBN: 0-917072-24-3.

TO ORDER OR FOR MORE INFORMATION, USE THE COUPON OR CALL STEVE BROWN TOLL FREE, 800 223-2452, EXT. 681. To order by mail specify quantity per title. Prices include 75 cents per book for shipping & handling. Residents of California, New York & Washington states, add applicable sales tax. Orders must be prepaid in U.S. funds.

- Developing Structured Systems, \$49.75
- Managing the Structured Techniques, by E. Yourdon, \$23.75
- Teams in Information Systems Development, by P. Semprevivo, \$19.25
- People & Project Management, by R. Thomsett, \$14.25
- Tell me about Ed Yourdon's forthcoming Software Development Methodology.
- Add me to your New Book Mailing List.
- Send me your book catalog.

Name: _____

Company: _____

Bus. or Home St.: _____

City: _____ State: _____ Zip: _____

Bus. or Home Telephone: (____) _____

mation1/82

YOURDON PRESS 1133 AVENUE OF THE AMERICAS NEW YORK, N.Y. 10036 (212) 730-2673

CIRCLE 130 ON READER CARD

JOB COSTING

Kommand Online Costing (OLC) is an additional capability of Pace Applied Technology's Kommand family of costing and chargeback systems. Capable of operating standalone or in conjunction with the Data Acquisition System of the Kommand Job Accounting System, OLC automatically attaches cost information to jobs and job steps as they run, both on-line for TSO sessions and at the end of batch jobs. OLC provides users and management with a better picture of where the money is going, and it can help programmers identify and correct bottlenecks in their systems. As an add-on to the Job Accounting System, OLC sells for \$3,000; as a standalone program it goes for \$6,000. PACE APPLIED TECHNOLOGY, INC., Manassas, Va.

FOR DATA CIRCLE 329 ON READER CARD

FINANCIAL MODELING

Since their introduction, financial modeling systems for microcomputers have become perhaps the most popular business applications in the realm of micros. Unfortunately, real memory constraints have limited the size of the models appropriate for such systems—it gets mighty aggravating to spend several hours setting up a model, only to run out of memory just as you are adding the final few model statements. Ferox Microsystems now offers a package with virtu-

al matrix capabilities, allowing the definition of spreadsheets of up to 32,000 cells. Dubbed Micro-DSS/Finance, the package handles such chores as "what if" financial analysis, new venture analysis, financial statements, budgets, and the likes. Written for the Apple II with 64KB of memory and Pascal, the package also includes report generation, command files, and color graphics support. It sells for \$1,500. FEROX MICROSYSTEMS INC., Arlington, Va.

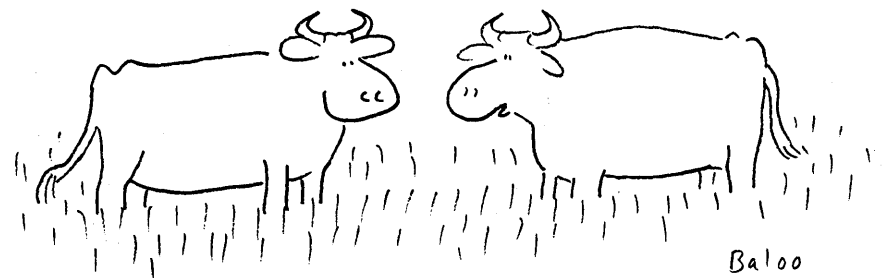
FOR DATA CIRCLE 331 ON READER CARD

HASP COMMUNICATIONS

MDS/Mohawk Data Sciences has a new HASP Multileaving/Interleaving Terminal Emulator package for use on its Series 21 line of distributed processing systems. The

emulator can communicate (at up to 9600bps) with hosts running a compatible RJE system, such as HASP 4, RES, JES2 or JES3. EBCDIC transmission—with or without transparency—is supported. Other features include message blocking/deblocking for records of up to 4,096 characters, and data compression and decompression. Local spooling is also supported. Multileaving allows the concurrent operation of up to five I-O devices: console, reader, printer1, printer2, and punch; interleaving allows simultaneous bidirectional communication. The package is offered for \$25 a month per system, or \$2,500 per customer for unlimited use. MDS-MOHAWK DATA SCIENCES, Parsippany, N.J.

FOR DATA CIRCLE 334 ON READER CARD



"Pawn to rook four."

CARTOON BY REX F. MAY



GET IN ON THE START OF SOMETHING BIG !

MICOM, one of the fastest growing major firms in data communications, needs sharp Marketing and Product Management professionals immediately. Our first-generation data concentrators became the world's most popular. Now our new generation of concentrators — plus a host of other fresh new products — need the same development and marketing support. If you have a strong Data Communications background, you can help introduce them to the world. We need:

- Sales Support Managers (Int'l./U.S.)
- Product Managers (Data Concentrators)
- Certification Engineers

These positions are located at MICOM's new corporate headquarters in Chatsworth, California. We offer excellent salaries, benefits, and relocation assistance. Call Tom Ryan now at (213) 998-8844, or send him your resume today.

MICOM SYSTEMS, INC.

20151 Nordhoff Street, Chatsworth, CA 91311

An equal opportunity employer M/F

CIRCLE 144 ON READER CARD

INCREASE YOUR CICS PROGRAMMING PRODUCTIVITY BY 25% IN 5 DAYS.

Our CICS courses are tough, but they're worth it. Because SysEd's challenging, "hands-on" training immediately increases CICS programming productivity by 25% or more—for both programmers new to CICS and experienced CICS programmers. And that's productivity you'll really need to make your conversion or implementation efforts successful.

How do we do it? With true-to-life case studies, specially prepared reference manuals recognized as the best in the field, and individual attention from highly qualified instructors. We invite students to bring in their own projects, and group courses can be tailored around specific case studies.

SysEd's courses include CICS Command Level, Macro Level, Internals, Application Design and VSAM. Classes are held regularly at our classroom/computer facilities in New York City, or customized course offerings are available for on-site sessions at company installations.

For information, call Dave Shapiro (212) 889-3386.

SYSED™

ONE PARK AVENUE, NEW YORK, NY 10016 • (212) 889-3386
A Division of INTEGRATED COMPUTER SOFTWARE, INC.

CIRCLE 145 ON READER CARD

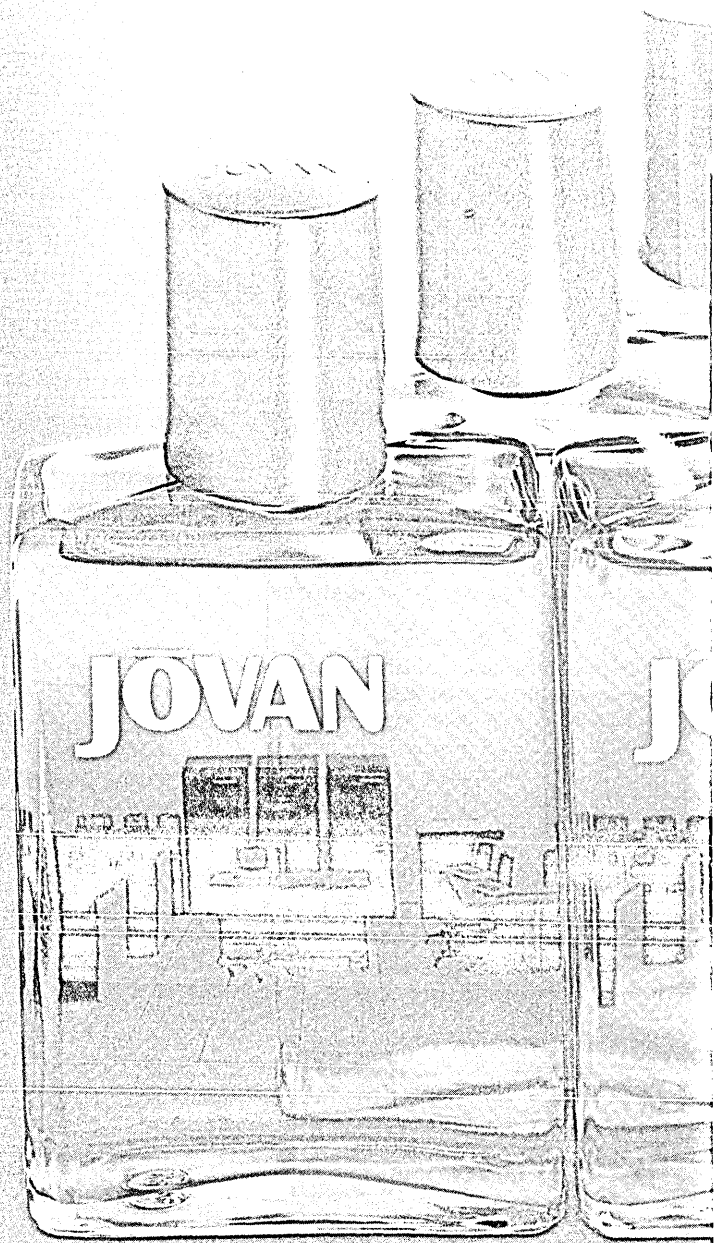
"Jovan has tripled productivity and cut order processing time in half through the unique capabilities of the Tandem NonStop System."

Ronald J. Trzaskus, Director of Information Systems,
Jovan, Inc.

"Our Tandem NonStop System runs right through a failure that would shut down other systems. That fact enables us to utilize a high-speed automatic pick-pack warehouse system and we are able to service all orders within 24 hours—from order entry through truck loading, including all shipping and inventory documentation. Loads and routes are consolidated automatically, maximizing efficiency and minimizing freight costs. And we can give customers instantaneous information about their order.

"The whole computer-warehouse system was installed and fully operational eight months from date of order. We then added an order entry/sales system at corporate headquarters, twenty miles away.

"We've added to the system to accommodate our own incredible growth, adding companies, a record number of new product lines and multiple locations without any reprogramming, whatsoever."



The NonStop System. Uniquely expandable to a worldwide network providing up-to-the-minute information to help you run your business better.

The NonStop Company, Tandem. Fully supported by a worldwide sales, training, service and manufacturing organization.

For more information, call your local sales office or Tandem Computers Incorporated, 19883 Vallec Parkway, Cupertino, California 95014. U.S.A. 800-533-3114 or (408) 725-6000.

TANDEM
NonStop Computing Systems

CIRCLE 132 ON READER CARD

© 1988 Tandem Computers Incorporated

SOURCE DATA

BOOKS

A HISTORY OF COMPUTING IN THE TWENTIETH CENTURY edited by N. Metropolis, J. Howlett, and Gian-Carlo Rota

The making of history, as the late professor Kenneth O. May notes in this volume, is somewhat different than the actuality of events. While theoretically we should all be concerned with the invention of computers, as May reminds us, it is the development of computers and computing that is the really important happening.

Prof. May was speaking at the International Research Conference on the History of Computing, held at the Los Alamos Scientific Laboratory, June 10-15, 1976. The original papers from that conference have been polished, tightened, shined up beyond belief, and reprinted in this delayed but thoroughly useful collection of essays. In the intervening years, some of the participants have retired, a few have died, and a great deal of additional material about the history of computing has appeared. But this conference was the first to look at the history in a major conference with heavyweight participants. One cannot help but wonder if the editors have helped or hindered the growth in awareness of computer history by the long delay in putting this book together. It is clear, however, that a serious awareness of computer history can be said to have truly begun that week in 1976.

It would be almost impossible to go through the 38 papers in the book and offer yeas or nays about each. Some are long; others are short. Some are highly academic articles that deal with the inner workings of now long-forgotten machines or languages; others are extremely personal memoirs that offer some of the character of the people involved.

One of the strong points of the book and the conference was the special effort to bring out the international flavor of the early developments. While most Americans know about the work of Aiken, Eckert,



Mauchley et al., few are very familiar even today with the developments in the U.S.S.R., or with Zuse's work in Germany. In point of fact, it was at this conference that a great many supposed experts were startled to find out just how far the U.K. had come with its COLOSSUS systems. For those who have forgotten, the U.K. apparently made a decision to keep COLOSSUS secret, and this attitude carried forward until just a few years ago. Thus, knowledge of a monumental landmark was confined to just a handful of people, mostly those who had worked at Bletchley Park on code breaking during World War II.

If you are looking for a final, definitive statement regarding the role of John von Neumann, you won't find it in this book. It is clear that von Neumann was a carrier, a transmitter of ideas. What he picked up in one laboratory would be left to ripen in another. It will never be clear just how much of von Neumann's thinking was original and how much was mere reshaping of the ideas of others. There's no final answer here to the stored program controversy, nor will there ever be.

If your particular pleasure is programming languages, the almost "Olympian" (as the editors describe it) survey of early programming languages by Knuth is highly recommended. It is a detailed, carefully written, well-documented piece worthy of careful reading.

Everett's short paper describing WHIRLWIND really doesn't do justice to the massiveness of the effort, nor does it describe in any detail the way Forrester switched the project from a flight simulator to digital computation. But the thousands of SAGE graduates still in the industry can read it to find out where the concepts originated. Bits of the WHIRLWIND still exist in Maynard, Mass., thanks to Ken Olsen, now president of DEC but long ago the designer of the memory circuitry on WHIRLWIND.

Did you think remote computing was invented in the 1950s at MIT? Wrong. See the Stibitz paper on early relay computers at Bell Labs. In September 1940, A Teletype at Dartmouth was connected to a computer in New York.

How did IBM build machines in the early years? See Hurd's extremely interest-

SOURCE DATA

ing paper tracing IBM's less than orderly plan from Mark I through SSEC to, eventually, the 701, originally known as the Defense Calculator. It is clear now, many years later, that IBM's commitment to computers was much less than 100% in those days. It wouldn't have taken much for the other competitors to have emerged as the giants of the field. Just willpower, a commodity apparently lacking in many of those who fell (or may yet fall) by the wayside.

Robertson's paper on the ORDVAC and ILLIAC appeared coincidentally with a notice that the last of the ILLIACS was about to be disconnected. How far we have come since the logbook notations made by Robertson in the summer of 1952 during the ILLIAC checkout. Now we expect the circuitry to work as planned.

These brief remarks on a few papers should not be taken to mean that the others are less worthy. Far from it. Almost all make a contribution to our understanding of how some of the early computers were built. Perhaps in fairness, the rather grandiose title could have been restated as "Computing from 1940 to 1955" but that is a minor quibble. Even the fading, slightly out-of-focus pictures culled from private collections all over the world add to the value of this book. Academic Press, New York (1980, 659 pp., \$29.50).

—Philip H. Dorn

BOOK BRIEF

MICROELECTRONICS AND SOCIETY edited by Trevor Jones

There is a continual dialog in Scandinavia, Japan, and the U.K. over the impact of microelectronics on contemporary society. This slim volume is a set of brief essays by leading U.K. authorities with something to say about the social issues surrounding microelectronics proliferation.

In the United States there has been almost no discussion of such subjects as the decline of long-term, high employment industries (steel or automobiles), the potential impact of continued high unemployment on basic social structures, the way in which education should integrate computing, and the possible dangers of artificial intelligence gone out of control.

For American readers not familiar with the issues and the critical trade union responses, the Cockroft essay is especially recommended, even though the author assumes some understanding of the U.K. union establishment.

Atherton's piece dealing with the penetration of microcomputers into secondary education is highly recommended for educators and school officials. Even with tight budgets and the ongoing pressure to

reduce expenditures, much can be done without heavy investments. American readers will be startled by the picture of an unbalanced U.K. Like this country, Great Britain has some school districts forging ahead while others fall behind.

Miche's brief and somewhat complicated discussion of the AI world and its potential dangers to society has some of the now predictable AI advertising and public relations cant. Little is said to justify the expenditures of the past two decades. On the other hand, Miche describes some of the more promising developments from this computing stepchild and is more than willing to own up to potential dangers.

It will surprise many readers to note the number of important references and suggested readings included with these essays. To an American, it may be a great shock to discover how few U.S. publications are cited. These issues, important as they are, do not seem to attract much attention on this side of the Atlantic except for the outraged screams of technocrats demanding more and more progress. DATAMATION has twice published pieces suggesting that there may be some problems. Prof. Bruce Gilchrist of Columbia in his 1980 IFIP paper indicated some of the difficulties, but by and large, American references are conspicuous for their absence.

National economic bases are chang-

COBOL-PLUS

- Highest performance COBOL for PDP-11's
- Enhanced Screen handling
- Shared Run time under TSX-PLUS
- Automatic program segmentation runs mainframe programs on PDP-11's
- Self reorganizing multi-key ISAM
- Symbolic interactive debugger
- Runs under RT-11, TSX and TSX-PLUS

s&h computer systems, inc.



1027 17th avenue south • nashville, tn 37212
(615) 327-3670 • twx 810-371-1486

CIRCLE 133 ON READER CARD

TERMINALS FROM TRANSNET

PURCHASE PLAN • 12-24 MONTH FULL OWNERSHIP PLAN • 36 MONTH LEASE PLAN

DESCRIPTION	PURCHASE PRICE	PER MONTH		
		12 MOS.	24 MOS.	36 MOS.
DEC				
LA36 DECwriter II	\$1,095	\$105	\$ 58	\$ 40
LA34 DECwriter IV	995	95	53	36
LA34 DECwriter IV Forms Ctrl.	1,095	105	58	40
LA120 DECwriter III KSR	2,295	220	122	83
LA120 DECwriter III RO	2,095	200	112	75
VT100 CRT DEscope	1,695	162	90	61
VT101 CRT DEscope	1,195	115	67	43
VT125 CRT Graphics	3,295	315	185	119
VT131 CRT DEscope	1,745	167	98	63
VT132 CRT DEscope	1,995	190	106	72
VT18XAC Personal Computer Option	2,395	230	128	86
TEXAS INSTRUMENTS				
TI745 Portable Terminal	1,595	153	85	58
TI785 Bubble Memory Terminal	2,595	249	138	93
TI Insight 10 Terminal	695	67	37	25
TI785 Portable KSR, 120 CPS	2,395	230	128	86
TI787 Portable KSR, 120 CPS	2,845	273	152	102
TI810 RO Printer	1,695	162	90	61
TI820 KSR Printer	2,195	211	117	80
LEAR SIEGLER				
ADM3A CRT Terminal	595	57	34	22
ADM5 CRT Terminal	645	62	36	24
ADM32 CRT Terminal	1,165	112	65	42
ADM42 CRT Terminal	1,995	190	106	72
DATAMEDIA				
DT80/1 CRT Terminal	1,695	162	90	61
DT80/3 CRT Terminal	1,295	125	70	48
DT80/5L APL 15" CRT	2,295	220	122	83
TELEVIDEO				
920 CRT Terminal	895	86	48	32
950 CRT Terminal	1,075	103	57	39
NEC SPINWRITER				
Letter Quality, 7715 RO	2,895	278	154	104
Letter Quality, 7725 KSR	3,295	316	175	119
GENERAL ELECTRIC				
2030 KSR Printer 30 CPS	1,195	115	67	43
2120 KSR Printer 120 CPS	2,195	211	117	80
HAZELTINE				
Executive 80/20	1,345	127	75	49
Executive 80/30	1,695	162	90	61
EPSON				
MX-80 F/T Printer	745	71	42	27
MX-100 Printer	895	86	48	32

FULL OWNERSHIP AFTER 12 OR 24 MONTHS • 10% PURCHASE OPTION AFTER 36 MONTHS

MICROCOMPUTERS

APPLE • COMMODORE • HP85 • DEC LSI 11

ACCESSORIES AND PERIPHERAL EQUIPMENT

ACOUSTIC COUPLERS • MODEMS • THERMAL PAPER • RIBBONS • INTERFACE MODULES • FLOPPY DISK UNITS



TRANSNET CORPORATION

1945 ROUTE 22 • UNION, N.J. 07083 • (201) 688-7800
TWX 710-985-5485 800-526-4965 OUTSIDE N.J.

CIRCLE 134 ON READER CARD

SOURCE DATA

ing. Traditional manufacturing is giving way to service- and information-based economies. It is past time for Americans to begin to consider such fundamental cultural questions as the meaning and importance of work, the structural changes resulting from the decline of labor-intensive manufacturing, and the impact of microelectronics on society. This brief set of readings can help create some solid underpinnings for any such discussion. The Open University Press, England; or Methuen Publications, Agincourt, Ontario (1980, 240 pp., \$18.75).

—P.H.D.

USING COMPUTERS— A MANAGER'S GUIDE by Malcolm Peltu

Malcolm Peltu, London correspondent for this magazine, has written a book "aimed at any person with responsibility for putting computing power to effective use in any organization, big or small. It assumes no previous computing knowledge, and explains why good management practices rather than technical expertise are the key to the success of a computing project." Although the book is written for a British audience, the advice should travel well. Section I, "Computing in Perspective," offers an introduction to the technology, a sketch

of the industry, and some lessons on things like human factors and the importance of standards. Section II explains how to go about setting management objectives. Section III details how the reader can prepare for computer service; chapter titles include "Feasibility Studies" and "Technical Evaluation and Specification." The fourth and final section, "Providing the Computing Service," gives specifics on things like systems implementation, postimplementation evaluation, and computer service management. The volume also includes a glossary of terms and abbreviations. National Computing Center Publications, Manchester, England (1981, 199 pp., \$20). American distributors: International Publications Services, Inc., New York.

REPORTS & REFERENCES

ADAPSO ON TAXATION

The Association of Data Processing Service Organizations (ADAPSO) has published a 129-page survey of the state sales and use tax laws covering computer and computer services transactions in the U.S. The "ADAPSO Sales and Use Tax Survey" is written to ensure that any purchaser or vendor of remote processing services, computer hardware, software, professional services, custom programming, raw computer time, integrated computer hardware/soft-

ware systems and computer maintenance is paying the right amount of tax for each transaction. Non-ADAPSO members will be charged \$150 for the survey; members will receive it automatically. Contact ADAPSO, 1300 North Seventeenth St., Arlington, VA 22209, (703) 522-5055.

DATAPRO REPORTS

"All About Japanese Computers" is a 74-page report containing comparative information on over 200 Japanese-manufactured computers. The report covers 47 minicomputers from 11 vendors, 124 small business computers from 32 vendors, and 35 personal computers from 20 vendors. Prices, specifications, options, hardware, software, and support services are included. The report was excerpted and translated into English from the 3400-page "Nikkei Datapro Computer Files" study, and it is the first in a series of reports on the Japanese computer industry by Datapro. The price is \$29; contact Datapro Research Corp., 1805 Underwood Blvd., Delran, NJ 08075, (800) 257-9406.

GLOBAL DATABASE SERVICE

Arthur D. Little Decision Resources is venturing in a new direction by offering a subscription service founded on data gathered for three world telecommunications studies conducted by ADL for the years 1970

GLITCH HUNTERS

The diligent duo. Minichek is Astrocom's original, unique pocket-size BERT data test set. Maxichek is a more sophisticated, handheld microprocessor-based data analyzer. Each is, within its range of problem-solving capability, the simplest, least expensive glitch hunter on the market. Minichek provides the field engineer with a handy tool for quick diagnosis and isolation of data communication problems. Maxichek is a more comprehensive error tracer for installing and servicing terminals, multiplexers and modems; it has all the capability of test kits far more expensive and bulky. Both testers are battery powered, eliminating power-supply problems. And like all Astrocom products, both are human-engineered for easy use with minimal training. The basic Minichek is \$335 (rechargeable battery kit, \$49.50 extra). The most fully equipped Maxichek is \$995.

For more information, write or call:
Astrocom Corporation, 120 West Plato Blvd.,
St. Paul, MN 55107. (612) 227-8651.
Or call toll-free 1-800-528-6050, ext. 1103.

astrocom corporation
Delivering solutions in data communications.



CIRCLE 136 ON READER CARD

New from Timeplex:

Multiplexing with switching, for a more economical network.



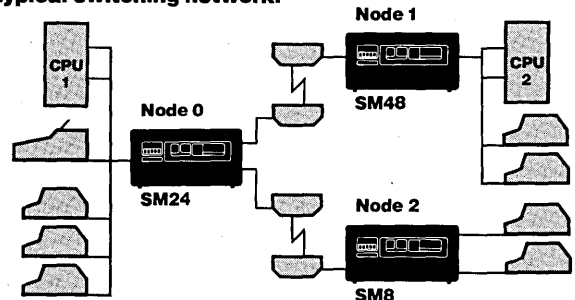
The SWITCHING MICROPLEXER gives you the economies of statistical multiplexing, port contention and port selection.

Timeplex puts all three together in a new 8-, 24- and 48-port SWITCHING MICROPLEXER family. You get all the line-saving benefits of statistical multiplexing, *plus* dramatic reductions in computer port and terminal costs.

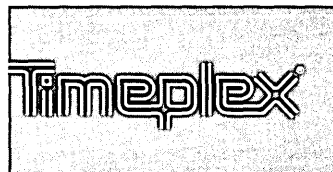
Fewer computer ports. Port contention permits you to have more terminals than computer ports. And the SWITCHING MICROPLEXER gives you both remote and local contention, for more efficient transaction processing.

Fewer terminals. At the same time, port selection lets you reduce the overall number of terminals required in your network. The SWITCHING MICROPLEXER functions as a Data PABX, allowing users to access all system resources. Think of it as the basic building block of a distributed data switching network with 1, 2, or 3 nodes—for up to 144 switchable ports.

A typical switching network.



Write or call us today for free literature:
Timeplex, Inc./One Communications Plaza/
Rochelle Park, N.J. 07662/Phone: 201-368-1113
Attention: Corporate Communications

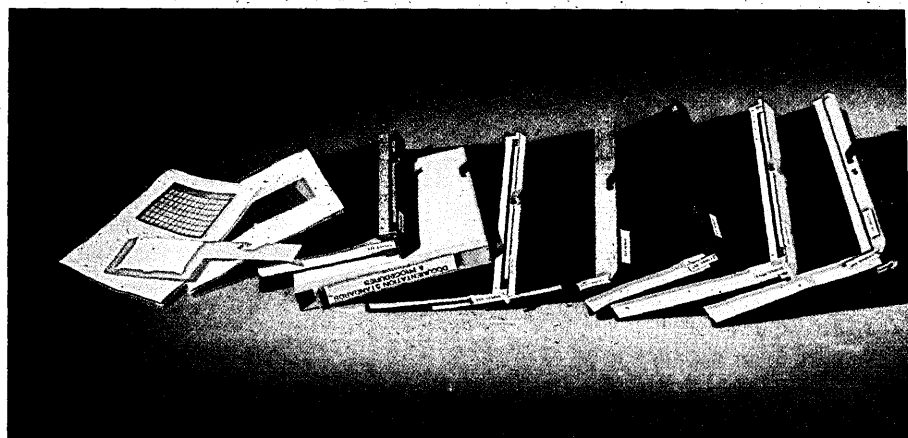
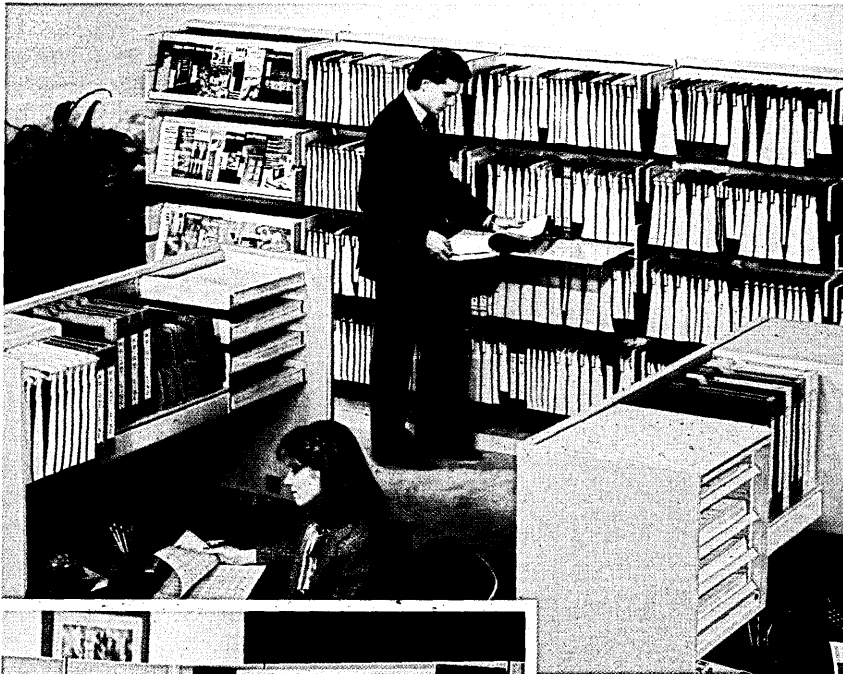


The technology leader
in data communications

CIRCLE 138 ON READER CARD

Programmer Productivity.

You can improve it by getting better organization of completed documentation and work-in-process.



DOCU-MATE® filing systems for all D.P. Documents

This specialized line of filing devices and equipment makes it possible to build sensible systems for the physical management of data processing documentation at work stations, group libraries and central libraries. It can help you to avoid the costly and unnecessary task of recreating lost documentation, unacceptable delays in getting program changes or corrections on-line and tedious unproductive clerical work by systems analysts and programmers.

Get complete details along with a copy of our helpful booklet "Guidelines 1 — Organizing and Controlling D.P. Documentation." Circle the readers' service number or clip and mail the coupon today.

Wright Line Inc., 160 Gold Star Boulevard, Worcester, Massachusetts 01606



Wright Line Inc.
160 Gold Star Boulevard
Worcester, Massachusetts 01606

Please send me a copy of "Guidelines 1 — Organizing and Controlling D.P. Documentation" plus complete details on DOCU-MATE filing systems.

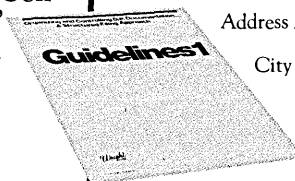
Name _____ Title _____

Organization _____

Address _____

City _____ State _____ Zip _____

Telephone () _____



There are two leaders in 32-bit minicomputers.

Perkin-Elmer is the one with the most affordable system ever. Announcing the new 3210.



The new 3210—a complete 32-bit minicomputer system for \$49,900.

Perkin-Elmer, the company with the second largest installed base of 32-bit minicomputers, has just set a new pricing standard in the 32-bit marketplace—introducing the new 3210 at \$49,900 (U.S. only). Our 3210 competes effectively with 16-bit top-of-the-line systems and offers much more performance.

Just 30 inches high, the 3210 is a complete computing system. Its integrated cartridge disc drive, with both fixed and removable storage, offers complete capability for software distribution, on-line file flexibility, data transfer and system backup. And the 3210 can support up to 32 terminals, with provision for field expansion.

You get as much as 4MB of directly addressable memory. And the 3210 runs all our system software including such high-level languages as FORTRAN, COBOL, Pascal,

Basic II and RPG II. Application and software development packages, such as UNIX* and RELIANCE, as well as hundreds of third-party application packages can save you time and money.

And Perkin-Elmer offers the high-level service and support you'd expect from a \$1 billion, multinational, Fortune 500 company.

There may be two leaders in 32-bit minicomputers. But Perkin-Elmer is the one that gives you the most. In performance. In software. In overall value. Call or write for details.

Perkin-Elmer, Oceanport, NJ 07757.

Tel: 800-631-2154. In NJ 201-870-4712.

*A trademark of Bell Telephone Laboratories, Inc.

We're the one.

PERKIN-ELMER

SOURCE DATA

through 1990. The service is called the World Telecommunications Information Program (WTIP), and Edgar A. Grabhorn, ADL's resident telecommunications expert, is in charge of it. As he describes it, "WTIP provides subscribers with continuous access to a global database available nowhere else in the world. It covers both fixed and mobile telecommunications in areas that comprise 97% of the world market." In addition to database access, subscribers will receive special reports, research letters, one-on-one consulting, and meetings—including those for database users and ADL's international telecommunications forums. The annual subscription rate is \$30,000 for the entire package, but ADL is flexible. Subscribers need not take the whole thing. Contact Arthur D. Little, Inc., Acorn Park, Cambridge, MA 02140, (617) 864-5770.

PERIODICALS

INTERNATIONAL SECURITY JOURNAL

Computers & Security makes its debut this month with the first of three issues for 1982. The journal is devoted to the study of the financial and technical aspects of computer security and is written for business managers, accountants, attorneys, bankers, insurance company executives, and computer specialists. Dr. Harold Joseph High-

land is the editor-in-chief, with an international editorial board consisting of members from industry, education, and government. The publisher is offering the first issue free to interested parties. Send requests on company letterhead to Han van Eybergen, Journal Manager, North-Holland Publishing Co., P.O. Box 103, 1000 AC Amsterdam, The Netherlands.

DIAL 'N' READ

Digital Publications, Inc. has announced an electronic magazine, *Digital Digest—IBM*, that is available via a 300 baud dial-up using any terminal. The magazine includes an IBM hardware and software directory, electronic mail, a free software exchange, and 18 other departments geared toward the needs of the IBM computer user. For more information, contact DPI, Dept. S, 5952 Peachtree Industrial Blvd., Suite 14, Norcross, GA 30071.

VENDOR LITERATURE

DATACOM HANDBOOK

The 76 pages of "Data Communications—A User's Handbook" are arranged into eight chapters: the telephone system, telecommunications networks and services, the role modems play, interfacing terminals to the network, modes and protocols, types of modems, automatic calling systems, and network diagnostics. The actual text is

minimal, leaving most of the explanations highly visible in charts, diagrams, and graphs. RACAL-VADIC, Sunnyvale, Calif.

FOR DATA CIRCLE 350 ON READER CARD

DOUBLE DOSE

Corvus Systems, Inc., is offering two pieces of literature: a product catalog/price list, and a brochure called "Intelligent Solutions," which tells how to "transform the microcomputer into a more powerful business, professional, or educational system." CORVUS SYSTEMS, INC., San Jose, Calif.

FOR DATA CIRCLE 351 ON READER CARD

CLIMB ABOARD

This vendor's software catalog lists over 200 computer programs available in 80 different formats for business, professional, and personal use. Lifeboat Associates' selection of system tools, telecommunications, languages, and word processing systems and aids are included in the catalog, along with many other types of products. LIFEBOAT ASSOCIATES, New York, N.Y.

FOR DATA CIRCLE 352 ON READER CARD

AEGEAN AUGURY

Delphi Systems offers a brochure on Oracle, a financial forecasting system said to be able to answer "what if" questions. DELPHI SYSTEMS, N. Hollywood, Calif.

FOR DATA CIRCLE 353 ON READER CARD



General Motors Research Laboratories

COMPUTER SCIENCE DEPARTMENT

has current openings for

RESEARCH AND DEVELOPMENT

in

- **COMPUTER GRAPHICS**—Develop new software and hardware techniques for fast efficient representation and display of full color shaded raster images.
- **COMPUTER VISION**—Develop new techniques for visual control of robots and automatic inspection.
- **ROBOTICS**—Develop vision, force, and range-controlled robot systems for part transfer and assembly operations.
- **ENGLISH QUERY SYSTEMS**—Conduct research in natural language information systems and expert consulting systems for manufacturing, engineering and business applications.

For candidates with a PhD or MS in applied mathematics, computer science, electrical engineering or equivalent; a broad background in computer science; and an interest in industrial research.

Interested candidates should contact:

Dr. George G. Dodd, Head
Computer Science Department
General Motors Research Laboratories
Warren, Michigan 48090
(313) 575-3012

The General Motors Research Laboratories' staff consists of about 360 PhD, 180 MS, and 200 BS professional employes and 780 supporting employes.

Candidates must have citizenship or visa status which permits them legally to accept permanent employment under U.S. Immigration Laws.

An Equal Opportunity Employer

CIRCLE 142 ON READER CARD

SOFTWARE/ SYSTEMS DEVELOPMENT/ MIS PROFESSIONALS

Robert Kleven and Co. has been providing confidential and industry-knowledgeable placement for software development/ systems development/MIS professionals since 1969.

Our clients, some of the top companies in the industry, are seeking solid professionals with in-depth knowledge of these disciplines: Programming, Systems Analysis/Design, Data Base Applications, Applications Programming, Compiler Development and Language Design.

We have a variety of positions available for professionals who possess experience in applying the latest techniques in one or more of these areas: Software Design and Development; Technical Support; Computer Sciences; Assembly or Block Structured Languages such as PASCAL, ALGOL, "C" LISP, PL/1; Higher Level Language Programming; Data Base Design; Compiler and/or Operating Systems Design; Technical Writing; Microprocessor Programming; Software QA; Software Tools and Methodology Development, Computer Architecture, Computer Performance Measurement, Firmware, Microprogramming.

Let Robert Kleven and Co. enhance your career. We will provide you with career path counseling and no-cost resume preparation. Client companies assume all fees.

Robert Kleven and Co., Inc.
INDUSTRIAL RELATIONS MANAGEMENT CONSULTANTS
181 Bedford Street, Lexington, Massachusetts 02173



Member:
Massachusetts Professional Placement Consultants
National Computer Associates,
(Office Nationwide)
Representing Equal Opportunity Employers M/F

CIRCLE 143 ON READER CARD

The Marketplace...

ADVERTISERS' INDEX

SOFTWARE & SERVICES

Amcor Computer Corp.178
 Atlantis Management Sys, Inc.178
 Atlantic Mgmt. Systems, Inc.178
 Central Canada
 Software Research177
 C-S Computer Systems, Inc.177
 Dataware, Inc.177
 Dataware, Inc.177
 Dataware, Inc.177
 Duquesne Systems, Inc.176
 Duquesne Systems, Inc.178
 J.D. Edwards & Company176
 EEC Systems177
 Evans Griffiths & Hart, Inc.178
 Federated Consultants, Inc.177
 Plycom Services, Inc.176
 S-Cubed Business Systems176
 Software Design & Development . 178
 Telecon Systems176
 Viking Software Services, Inc.178

TIME & SERVICES

Electronic Interface
 Associates, Inc.178

DP MARKETPLACE

Computer Economics Report180

PERSONAL COMPUTING

Micro Management Systems,
 Inc.179
 Pan American Electronics, Inc.179

BUY SELL LEASE

Northern Telecom179
 C.D. Smith & Associates, Inc.179
 Thomas Business Systems, Inc.179

JOB MARKETPLACE

Exeter Associates180
 Federal Energy Systems, Inc.180
 RSVP Services180
 Wilkinson & Associates, Inc.180

SOFTWARE SERVICES

PERFORMANCE MANAGERS AND ANALYSTS . . .

You've tried solving your performance problems with hardware monitors, sampling software monitors, unsatisfactory billing systems, SMF and RMF inadequacies, simulators . . . Now, try the premier product in the industry! QCM. QCM is the only complete system that precisely monitors ALL hardware and software processes, accurately bills ALL operations and IMPROVES performance . . . ALL on a full-time basis. Let us show you how QCM has meant control, efficiency, confidence and dollars to our customers.



**DUQUESNE
SYSTEMS INC**

TWO ALLEGHENY CTR.
PITTSBURGH, PA 15212
PHONE 412-323-2600
TELEX 902 803

CIRCLE 500 ON READER CARD

C beyond assembly language
with
C compilers and cross compilers
for minis and micros.

Now, do your development in a high level structured language.

- Can be provided to produce code for the Host processor or cross compile to a different target processor.
- Produces assembly language, of the target processor, with C source statements intermixed.
- UNIX* compatible.
- Implements the full C language as described in "The C Programming Language" by Kernigan and Ritchie.

You receive the compiler, with complete installation and operating instructions, and the C source for many standard library functions.

Compilers for many processor types are ready, now.

Includes free updates for 1 year.

*UNIX is a trademark of Bell Laboratories.

TELECON SYSTEMS
90 E. Gish Road, Suite 25
San Jose, CA 95112
408-275-1659

CIRCLE 501 ON READER CARD

The Effective Solution for DETAILED JOB COSTING

J.A.M.I.S.

(Job Cost & Management Information System)

Integrates:

- Job Cost
- Payroll
- Accounts Receivable
- Accounts Payable/
Purchase Orders
- General Ledger
- Inventory/Order Entry
- Fixed Assets



S-Cubed Business Systems
Box 1620, La Jolla, CA 92038
PH: (714) 755-7237; 453-0060

CIRCLE 502 ON READER CARD

CUSTOMIZED HP-3000 software

- Written in COBOL or COBOL II using IMAGE & V/3000.
- GUARANTEED installation period of 12 weeks or you pay NOTHING!!!
- All programs are CUSTOM designed, there will be NO CANNED PROGRAMS.
- ACCOUNTING and MANUFACTURING systems
- FREE modifications and updates.
- FREE in house training (2 classes).
- FREE 100 consulting hours (after installation).
- FREE 18 months service on all software installed.

If you give us the CHALLENGE all you have to gain is a complete Accounting or Manufacturing system, in 12 weeks.

Contact Barron-Phillips for more information that will prove ALL you will ever get from us is the best software money can buy at a price and installation time frame that is unbelievable.

**BARRON-PHILLIPS, 6300 Variel Ave.
Suite 1, Woodland Hills, CA 91367
(213) 710-1422**

CIRCLE 503 ON READER CARD

ELEGANT SOFTWARE

For IBM S/34 Computers

- Order Processing
- Inventory Management
- General Ledger
- Accounts Payable
- Accounts Receivable
- Mailing Lists
- Payroll/Personnel
- Oil and Gas

All systems are:

- Interactive
- Flexible
- Easy to Install

J.D. Edwards

& COMPANY

Architects and Builders of Information Systems

Two Denver Technological Center
Englewood, Colorado 80111
(303) 773-3732

CIRCLE 504 ON READER CARD

FIXED ASSETS SYSTEM

A complete solution. Includes all the forms, procedures and programs necessary to give management full control over the asset reporting function. Features:

- Easy to Use Menu Orientation
- Book and Tax Depreciation
- Interface to General Ledger
- Audit Reporting
- Disposal Reporting
- Property Tax Reporting
- Asset Movement Reporting
- Depreciation Forecasting
- Acquisition Reporting
- Multi-Division/Company Reporting
- For DEC PDP-11's Using RSTS/E

Plycom services, Inc.

P.O. Box 160
Plymouth, Indiana 46583
(219) 935-5121

CIRCLE 505 ON READER CARD

LET US STOCK YOUR DEC® SPARES

You know the value of adequate spares. In these times you should also be looking for ways to reduce your company's cash outlay for these spares. We have offered our old customers a plan in which you may be interested. In effect our customers send us a list of DEC equipment they are servicing or need spares for. We in turn do an analysis of probable and known failures for the equipment and recommend what parts you should keep on hand. We then purchase all of the spare parts and ship those items selected by the customer. The balance of the spares is kept in our inventory. We have guaranteed delivery to any city in the country within 24-hrs via Air Courier Service. What better way to cut costs of those expensive back-up modules. And exactly how much will this service save you? 90%! At that savings, it makes sense to look into this program as others already have. Your 10% deposit on spares can hold thousands of dollars of inventory immediately available. To a lot of people that is a better alternative than tying up capital in spares to gather dust in a closet. When you consider the replacement costs charged by repair and other service companies, the small deposit pays for itself very quickly. After you call us and we deliver your spare, send us your repairable module and we will only charge you for the rental time involved. Why not tear this ad out now and pass on to your service people. They will thank you for it as this is the only service of its kind in the country specializing in genuine DEC modules and parts. For more information please use our reader inquiry number or call any of the offices below.

(214) 428-5300 "Brier"
(214) 840-3239 "S. Few"

(214) 278-4031 "24hr line"
(305) 272-8753 "East-Jenny"

(214) 271-9407 "Linda"
(415) 796-7368 "West-Chuck"

FEDERATED CONSULTANTS INC.

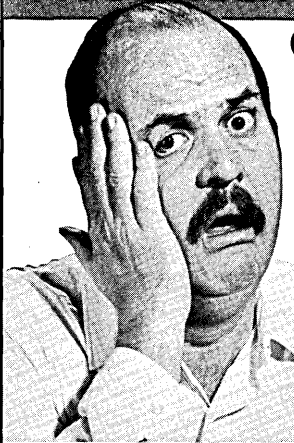
1218 South Ervay, Dallas, Texas 75215



• Trademark of Digital Equipment Corporation

CIRCLE 506 ON READER CARD

1401 EMULATION? IN YOUR 1982 BUDGET?



CS-TRAN IS THE ANSWER... ONCE AND FOR ALL.

CS-TRAN converts your 1401 *object* programs directly to ANS COBOL. Any mainframe, any mini. It's the *only* translator that accepts your *object* programs, patches and all. Yet CS/TRAN allows you to include full COBOL paragraph names and record definitions.

This unique approach, proven on over 85,000 programs, extends the value and utility of your original program while adding the maintainability, portability and expandability inherent in COBOL.

The COBOL programs generated by CS-TRAN:

- Run up to 300% faster than emulation
- Are up to 50% smaller
- Look as though they were COBOL originally
- Assure ANS, or any subset you define

For over 600 users, CS-TRAN has eliminated 1400-series hardware and program maintenance costs . . . once and for all.

If you'd like more details about new life for your 1401 programs just call or write Russ Sandberg.



C-S Computer Systems, Inc. 90 John Street, New York, NY 10038 (212) 349-3535

CIRCLE 507 ON READER CARD

SOFTWARE CHANGE CONTROL

Universal Cross-Reference Program Automatically Generates Installation Wide Cross-References Between Main-Lines And External Sub-Routines.

When a sub-routine changes it is essential to find out what other programs are calling it because they all have to be re-linked or re-compiled!

Files used and macros called references are also generated.

Now available for COBOL and PL/1 shops with OS or VM setups.

**CENTRAL CANADA
SOFTWARE RESEARCH
P. O. BOX 425
STREETVILLE STATION
ONTARIO CANADA L5M 2B9
(416) 826-8473**

CIRCLE 508 ON READER CARD

LEX-11 WORD AND DATA PROCESSING FOR VAX, PDP-11 AND LSI-11

- Integrated word, data list processing
- Supports RT-11, TSX-PLUS, RSX-11M, RSTS/E, UNIX, IDRIS, IAS, VMS
- Fast, friendly, flexible
- Calculator, Graphics
- Spelling Dictionary, Forms
- Custom modification easy
- ASCII Formatted Files
- Report Writer, Data Entry
- OEM Discounts

EEC Systems, Dept. DAM
286 Boston Post Road
Wayland, Mass. 01778
Phone 617-358-7782 or 443-6376

CIRCLE 509 ON READER CARD

Dataware Software Translators

RPG to COBOL

Converts RPG and RPG II programs to the industry standard ANS COBOL (DOS or OS). The translator achieves an extremely high percentage of automatic conversion (approaching 100%) of the source code.

RPG to PL/1

Converts RPG and RPG II programs to an optimized PL/1 (DOS or OS). The translator achieves an extremely high percentage of automatic conversion (approaching 100%) of the source code.

For more information, call or write today.

The Conversion Software People
Dataware, Inc.
2565 Elmwood Avenue
Buffalo, New York 14217
(716) 876-8722 • TELEX: 91519



CIRCLE 510 ON READER CARD

COBOL to COBOL

One of the many successful Translators offered by Dataware is our COBOL Converter, a table-driven conversion system designed to convert COBOL programs from one vendor or operating system to another.

This converter plus our other conversion tools meet the needs of a changing computer industry.

Our conversion approach provides the major solution to management's conversion problems and facilitates the recovery of the initial capital investment in systems development.

For more information, call or write today.

The Conversion Software People
Dataware, Inc.
2565 Elmwood Avenue
Buffalo, New York 14217
(716) 876-8722 • TELEX: 91519



CIRCLE 511 ON READER CARD

PL/1 TO COBOL

Dataware's Software Translator automatically converts from IBM PL/1 to ANS COBOL (DOS or OS). The Translator is capable of handling IBM OS or DOS (48 or 60 character set) source programs as input.

For more information on this translator or the others listed below, please write or call today.

- EASYCODER/TRAN to COBOL
- BAL/ALC to COBOL
- AUTOCODER/SPS to COBOL
- COBOL to COBOL

The Conversion Software People
Dataware, Inc.
2565 Elmwood Avenue
Buffalo, New York 14217
(716) 876-8722 • TELEX: 91519



CIRCLE 512 ON READER CARD

BEING ROBBED

by ineffective systems development?



"Some" companies are! One recent news item described a \$1.5 million effort in systems development as a total disaster.

IS THIS HAPPENING TO YOU?

- Is the phased approach for systems development criticized as too costly and time-consuming?
- Do some people want to skip the study & planning phases?
- Is the Project team permitted to violate development procedures in an effort to meet demands?
- Do you have effective Systems Development Controls in place to protect your organization and yourself?

If you have any doubts whatsoever . . . contact us today. Our Structured Systems Development & Project Management Systems will help you implement the necessary controls to avoid costly consequences!



Atlantic Management Systems, Inc.

(formerly Atlantic Software)

320 Walnut St., Philadelphia, PA 19106, 215-922-7500

CIRCLE 513 ON READER CARD

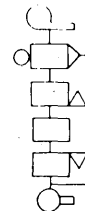
GPSS

General Purpose Simulation System

for **digital** systems

The discrete simulation language operating under:

- RSX*-11M and RSTS*/E
- VAX*/VMS* native mode
- DECsystem-10* and DECsystem-20*



for information contact:

**SIMULATION SOFTWARE
DESIGN AND DEVELOPMENT**
760 Headley Dr., London, Ontario
Canada N6H 3V8

*Trademarks of Digital Equipment Corp.

CIRCLE 514 ON READER CARD

RSTS/E & RSX-11M SOFTWARE PACKAGES

KDSS multi-terminal key-to-disk data entry system

TAM multi-terminal screen-handling facility for transaction-processing applications

FSORT3 very fast record sort for RSTS/E

SELECT convenient, very fast extraction of records that meet user-specified criteria (RSTS/E only)

BSC/DV a DV11 handler for most bisynchronous protocols (RSTS/E only)

COLINK links two RSTS/E systems using DMC11s

DIALUP uses an asynchronous terminal line to link a local RSTS/E system to a remote computer system

Evans Griffiths & Hart, Inc.

55 Waltham Street
Lexington, Massachusetts 02173
(617) 861-0670

CIRCLE 515 ON READER CARD

ATTENTION SHARED DASD AND SHARED TAPE USERS ... YOU NEED SDSI/STAM

SDSI Shared Dataset Integrity

- SDSI protects data integrity by guarding against concurrent update from multiple CPUs.
- SDSI automatically improves system performance by eliminating device RESERVES.
- SDSI eliminates RESERVE LOCK-OUTS
- SDSI provides operator and TSO users information about dataset conflict conditions.
- SDSI requires no system or user program modifications and installs in minutes.

STAM Shared Tape Allocation Manager

- STAM automates the sharing of tape and DASD devices thus allowing allocation decisions to be made faster and reducing the possibility of human errors.
- STAM makes more efficient use of tape pools thus allowing you to reduce tape drive requirements.
- STAM provides global operator commands and control.
- STAM eliminates JOB re-runs due to multiple tape drive allocation errors.
- STAM requires no system or user program modifications and installs in minutes.



**DUQUESNE
SYSTEMS INC**

TWO ALLEGHENY CTR.
PITTSBURGH, PA 15212
PHONE 412-323-2600
TELEX 902 803

CIRCLE 516 ON READER CARD

VAX DATA ENTRY

THE VIKING Forms Manager Conquers All

- ▲ Programmer Productivity
- ▲ End User Friendly
- ▲ Systems Maintainability
- ▲ Computer Performance

Whether integrating data capture and validation into complex applications or developing stand-alone systems, VFM conquers all. Software tools for forms development and testing. Subroutines for program development. A complete data entry system where that is the need. All with performance in mind. OEM and end user licenses available. Call or write for free literature today.

Mr. John Haley

VIKING SOFTWARE SERVICES, INC.
2800 Center Building
2815 East Skelly Drive, Suite 816
Tulsa, Oklahoma 74105 • 918-749-2296

CIRCLE 517 ON READER CARD

dtm

DEC RSTS APPLICATION SOFTWARE

ACCOUNTING SYSTEMS:
• ACCOUNTS RECEIVABLE
• PAYROLL PAYABLE
• GENERAL LEDGER
FINANCIAL
MANAGEMENT

BUSINESS CONTROL
SYSTEMS:
• ORDER PROCESSING/BILLING
• INVENTORY CONTROL
• SALES ANALYSIS

DEC GOLD STAR RATED
1CP MILLION
DOLLAR
AWARDED

amcor computer corp.

1900 Plantside Dr. Louisville, KY 40299 502/491-9820
Regional Offices - Atlanta, GA / Campbell, CA



CIRCLE 518 ON READER CARD

TIME & SERVICES

VAX/VMS TIME SHARING

FULL COMMUNICATIONS

EXPERT ASSISTANCE

MODERATE FEES

GOOD TOOLS



38 East 29th Street
New York, NY 10016
(212) 683-9100

CIRCLE 519 ON READER CARD

SYSTEMS • PERIPHERALS • PARTS

Why your competitors are attending Datamation Seminars

Reason #7.

Hard-hitting

"This program has been an eye-opener."
Lloyd McJunkin, District Engineer AT&T Long Lines

Want to learn more?

Send this coupon, or call Joan Merrick, the Datamation Institute for Information Management & Technology, 850 Beylston Street, Suite 415, Chestnut Hill, Massachusetts 02167. Tel. (617) 738-5020

Please rush detailed information about the following as it becomes available:

- The schedule of 38 public seminars on Information Management & Technology at convenient locations in 13 major cities. — By far the most comprehensive curriculum in the country.
- In-house presentations tailored to my organization and schedule, and the significant cost savings they can provide.
- Datamation's National Conferences and Spotlight Briefings for 1981-82.

Name _____
 Title _____
 Company _____
 City _____
 State _____ Zip _____
 Telephone _____

CIRCLE 520 ON READER CARD

DG

Phil Thomas
305/272-2339

DEC

Bryan Eustace
305/272-2338

Jennifer Eustace

TELEX 807-219

BUY • SELL • TRADE • LEASE

THOMAS BUSINESS SYSTEMS, INC.

CIRCLE 521 ON READER CARD

DEC

SYSTEMS & COMPONENTS

C.D. SMITH & ASSOCIATES, INC.
12605 E. Freeway, Suite 318
Houston, TX 77015
713-468-2384

CIRCLE 522 ON READER CARD

FOR SALE

USED DEC

**PDP11/55's AND PDP11/40's
DEC MAINTAINED
1 TO 3 YEARS OLD**

**PHONE LEN PEARCE,
(416) 792-3877**

CIRCLE 523 ON READER CARD

PERSONAL COMPUTING



TM - TANDY CORPORATION
FREE COPY OF WARRANTY
UPON REQUEST

**TRS-80™
DISCOUNT
DIRECT
PRICES**
WRITE FOR
**FREE
CATALOG**

1-800-841-0860 Toll Free

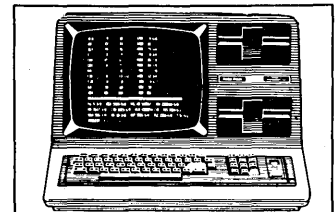
**YOUR TRS-80
COMPUTER** Learn To "Do It Yourself" And Save Money
Headquarters

**MICRO MANAGEMENT
SYSTEMS, INC.**
DEPT. NO. 17

Downtown Plaza Shopping Center
115C Second Ave. S.W. • Cairo, Georgia 31728
912-377-7120 Ga. Phone No.

CIRCLE 524 ON READER CARD

Save On Hewlett-Packard & TRS-80™ Computers



For the best deals on Hewlett Packard HP-85, HP-125 and Radio Shack® TRS-80 Computers, CALL OR WRITE US:

**Pan American
Electronics**

Dept. 73 • 1117 Conway • Mission, TX 78572
Telex Number 767339

Toll Free Order Number 800/531-7466
Texas & Principal Number 512/581-2766
TM — Trademark of Tandy Corporation

CIRCLE 525 ON READER CARD
JANUARY 1982 179

**Professional Data Processing
Placement**

Specializing In



Installations

Positions Available
Nationally & Internationally
All Replies Confidential

For Information Call:
1-800-238-6885
(In TN 901-372-8356)
Or Send Resume To:
P.O. Box 28827 • Memphis, TN 38128



CIRCLE 526 ON READER CARD

**Computer Systems Consultancy
Analysis, Design,
Project Management**

Computer Systems professional,
English, 15 years varied practical
experience, MBCS, is seeking a
short to medium term contract in
Canada. French fairly good.

Ron Snape
CSC, Oman.
P.O. Box 81
Telephone 602875.
Telex 3416.

CIRCLE 527 ON READER CARD

**SKI
COUNTRY
IS FOR
COMPUTER
PEOPLE**

**INTERVIEW &
HIRING COSTS
(INCL. RELO.)
PAID BY
COMPANIES**

TOLL-FREE 1(800) 258-7328

Exeter Associates

NATIONAL RECRUITING CONSULTANTS
COMPUTER PARK P.O. BOX 623
HAMPTON, NEW HAMPSHIRE 03842
(603) 926-6712
A COMPONENT OF EXETER INTERNATIONAL, INC.

CIRCLE 528 ON READER CARD

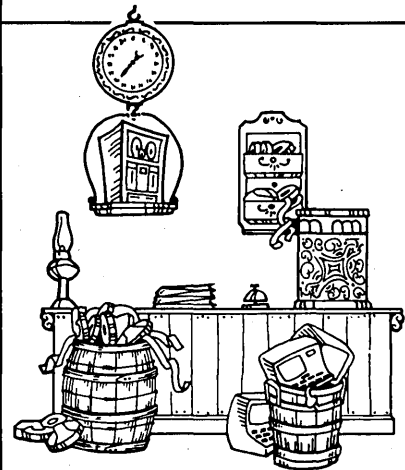
INVESTMENT OPPORTUNITY

Exclusive franchise in America's most profitable
and dynamic industry is being offered for the
first time in this area. International company will
place qualified individual in "turn key" busi-
ness, train key people, provide inventory, fi-
nance your customers, and pay you thousands
of dollars "up front" on orders where your cus-
tomers pay only on future energy savings. Exist-
ing customers of our franchisees reads like
"Who's Who" of Fortune 500.

If you qualify, you will be flown to Los Angeles
for a tour of installations and personal interview.
Minimum investment of \$40,000 to \$100,000.
Call president at 1-800-323-6556, ext. R-137 or
write: Federal Energy Systems Inc., Suite 200,
336 N. Foothill Rd., Beverly Hills, California
90210

CIRCLE 529 ON READER CARD

**MOVE
THE
GOODS.**



DP MARKETPLACE

**COMPUTER
ECONOMIC\$
REPORT**

The financial advisor of DP users

The source of financial information
in data processing:

- Price/Performance Charts • Residual Value Forecasts • Methods to Increase Productivity • New Products Forecast
- Analyses of New Product Announcements • Used Equipment Prices • Lease versus Purchase Analyses

For your complimentary copy,
use reader card or write:
COMPUTER ECONOMICS REPORT
Dept. D, 150 Fifth Avenue,
New York, NY 10011

**FREE TRIAL
ISSUE**

CIRCLE 531 ON READER CARD

**EMPLOYMENT SERVICE FOR
PROGRAMMERS AND ANALYSTS**

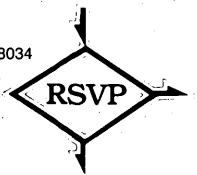
National Openings With Client Companies
and Through Affiliated Agencies

- Scientific and commercial applications • Software development and systems programming • Telecommunications • Control Systems • Computer engineering • Computer marketing and support

Our client companies pay all our fees. We guide;
you decide. Write or call:

RSVP SERVICES, Dept. M
Suite 700, One Cherry Hill
P.O. Box 5013
Cherry Hill, New Jersey 08034
(609) 667-4488

Suite 230, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595



RSVP SERVICES

Employment Agents for Computer Professionals

CIRCLE 530 ON READER CARD

**USE THE
DATAMATION
MARKETPLACE
ADVERTISING
SECTION**

**CALL KATHY
800-223-0743
OR SHIRLEY**

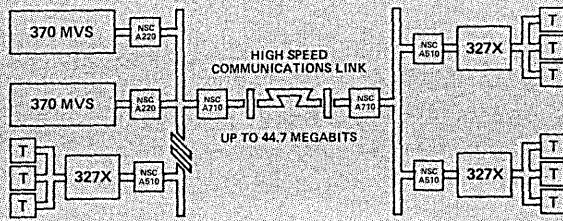


Local access from remote locations

Enhanced MVS/370 terminal support

HYPERchannel™, the high-performance local networking facility from Network Systems Corporation, now offers 3270 terminal support to IBM MVS/370 users.

The HYPERchannel MVS/370 package provides "local" attachment performance for 3270 terminals in remote locations.



HYPERchannel extends the 370/303X data channel via its 50 megabit-per-second coaxial trunk system. Regional extension is also possible via wideband links such as private microwave, fiber optic links or telco circuits. HYPERchannel maintains standard peripheral I/O unit support including OLTEP.

The HYPERchannel MVS/370 package is a complete hardware and software system. It is available now.

For more information, write us. Or call our Marketing Services Department at (612) 425-2202.

We want to help you bring your computer rooms up to speed.



7600 Boone Avenue North, Minneapolis, MN 55428. TWX 910-575-1153

Sales offices: Atlanta, Boston, Chicago, Dallas, Denver, Detroit, Houston, Huntsville, Los Angeles, New York, Philadelphia, Providence, San Francisco, Seattle and Washington, D.C.

CIRCLE 150 ON READER CARD



We designed them to meet two standards.



Ours. And the industry's.

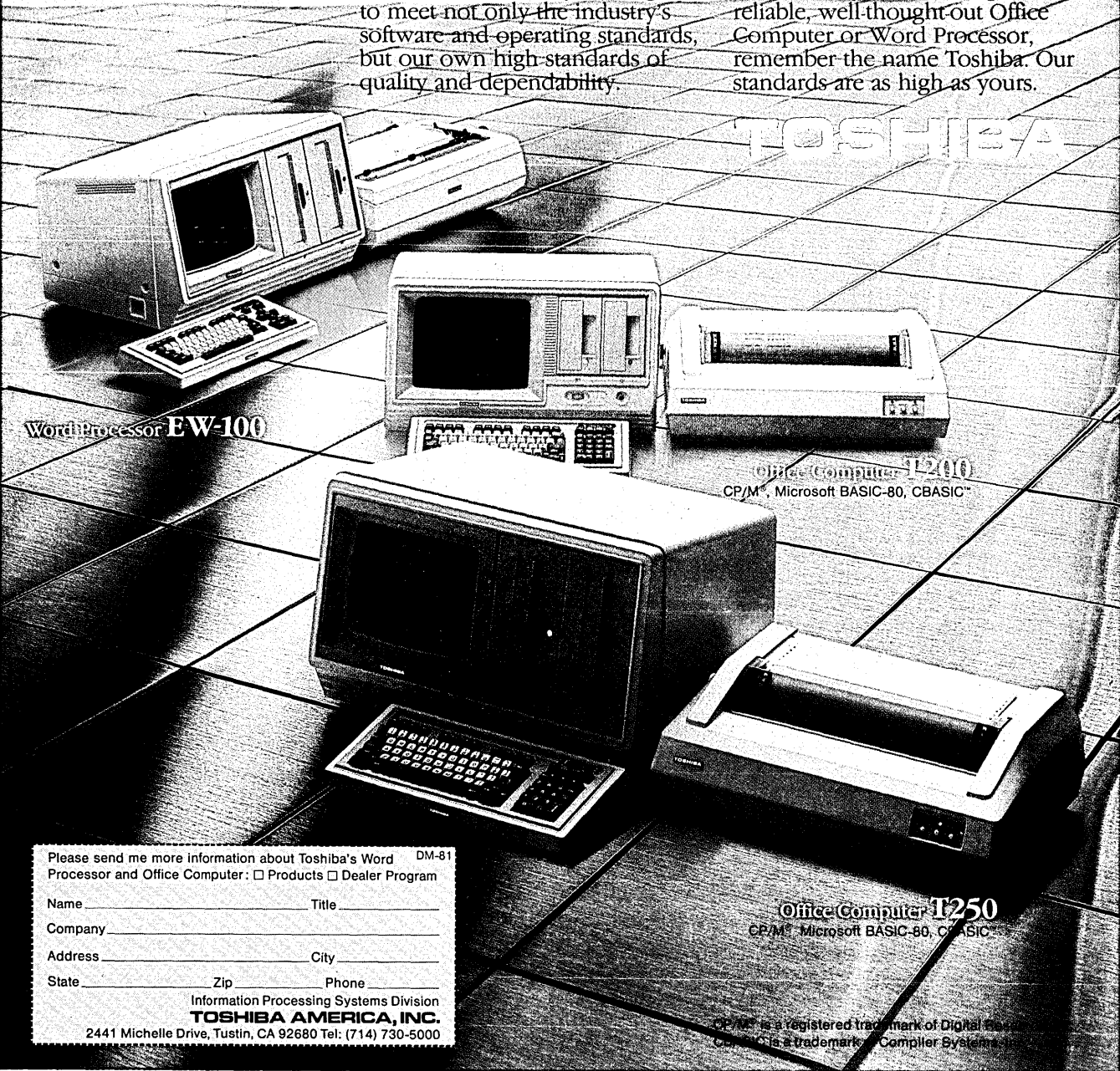
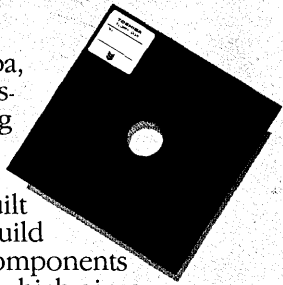
With a Toshiba Office Computer or Word Processor, you'll never worry about obsolescence and reliability.

That's because they're designed to meet not only the industry's software and operating standards, but our own high standards of quality and dependability.

With Toshiba, you can rest assured knowing you'll get day-in, day-out dependability built right in. We build most of the components ourselves . . . which gives us complete control over quality, reliability, and performance every step of the way.

And Toshiba now offers you a fully developed and comprehensive dealer program based on our high standards of quality, reliability, and deliverability. Which means you can build your product line . . . and your profits.

So when you're looking for a reliable, well-thought-out Office Computer or Word Processor, remember the name Toshiba. Our standards are as high as yours.



Word Processor EW-100

Office Computer 1200
CP/M[®], Microsoft BASIC-80, CBASIC[™]

Office Computer 1250
CP/M[®], Microsoft BASIC-80, CBASIC[™]

Please send me more information about Toshiba's Word Processor and Office Computer: Products Dealer Program DM-81

Name _____ Title _____

Company _____

Address _____ City _____

State _____ Zip _____ Phone _____

Information Processing Systems Division

TOSHIBA AMERICA, INC.

2441 Michelle Drive, Tustin, CA 92680 Tel: (714) 730-5000

CP/M[®] is a registered trademark of Digital Research Corporation. CBASIC[™] is a trademark of Compiler Systems, Inc.

INTERFACE '82 DATA COMMUNICATIONS AND BEYOND



INTERFACE '82 IS YOUR ONE CHANCE OF THE YEAR TO FIND OUT WHERE DATACOMM IS GOING.

For 10 years, the INTERFACE conference and exposition has kept data communications specialists on the industry's leading edge. Today, data communications is rapidly growing beyond its original applications. It's at the heart of all business and industrial information flow. Datacomm is the base for the local area network that makes office automation possible. And, for the office of the future, data communications will fundamentally integrate information processing and voice communications.

of the latest equipment and software developments. With over 250 "hands-on" displays in 1000 booths. Plus outstanding conference sessions presented by more than 150 leading datacomm experts. They will give you the answers you need to carry you into tomorrow.

THE PLACE: Dallas Convention Center.
THE DATES: March 22-25, 1982.

That's why McGraw-Hill's **BusinessWeek** joins **DataCommunications** Magazine in co-sponsoring **INTERFACE '82**. It reflects the broader knowledge base that every data communications specialist needs to grow.

YOUR TICKET TO THE GREAT BEYOND

THE INTERFACE GROUP
P.O. Box 927, 160 Speen St., Framingham, MA 01701

You're right. INTERFACE '82 is the place I have to be on March 22-25, 1982. I've marked my calendar. Now send me information.

At INTERFACE '82, you'll find exciting exhibits

Name _____
Company _____
Address _____
City _____ State _____ Zip _____



THE INTERFACE GROUP

P.O. Box 927, 160 Speen Street, Framingham, MA 01701
(617) 879-4502 Outside Mass. (800) 225-4670

Producers of
INTERFACE, FEDERAL DP EXPO, COMDEX, COMDEX SPRING,
COMDEX EUROPE, THE COMPUTER SHOWCASE EXPOS

Co-Sponsored by **BusinessWeek** and **DataCommunications**

ADVERTISERS' INDEX

data processing

Oregon

THERE'S A WHOLE NEW CENTER OPENING AT FREIGHTLINER

They call us The Efficient Machine because it's our business. Developing, manufacturing and sales of the best diesels on the road. But, what we're looking for right now is data processing expertise. Our brand new center (IBM 3033 Mainframes) has dynamic opportunities for the right people. We'd like you to get in on the start-up of our exciting new center and keep us rolling. Check where you might fit in with us - some of the positions are listed below. Introduce your skills and talent where they'll be used to the fullest - and be appreciated.

Senior Data Base Analyst

Will assume non-routine and challenging IMS DB/DC responsibilities to include: consultation to applications personnel, physical Data Base design, IMS systems performance and tuning, and the implementation of Data Base applications. Several years IMS DB/DC experience and the ability to code IMS control blocks.

Senior Operating System Software Programmer

Will provide software support for

MVS/SP JES2, TSO/SPF, IMS DB/DC, CICS, APL and CADAM. The successful candidate will possess 3-5 years of System Software Programming experience in most of these Sub-Systems.

Senior Communications System Software Programmer

Will provide software support for ACF/VTAM, ACF/NCP, NCCF, NTO, NPDA, NPA and MSNF. The successful candidate will possess 1-3 years of System Software Programming experience in most of these Sub-Systems and will possess 3-5 years of over-all system software programming experience.

Freightliner offers excellent benefits and salary commensurate with experience and education. Relocation to Portland, Oregon is paid.

Qualified candidates interested in a creative, positive working environment should call 503-283-8927 or send resume in confidence to Paul Fulton, Freightliner Corporation, P.O. Box 3849, Portland, Oregon 97208.

Equal Opportunity Employer
No Agency Referrals Please

FREIGHTLINER
FREIGHTLINER CORPORATION

Acme Visible.....99
AES Data Ltd.....186
Alex Brown & Sons.....92
*Amplex.....160-24
Anderson Jacobson.....86
Appleton Papers, Inc.....162
Astrocom.....170
AT&T Business Sales.....28-29
AT&T Long Lines.....37

BBN Computer Corporation.....64
BTI.....12
Burroughs.....32-33

Calcomp.....157
Centronics.....80
CGA Software.....26
Computer Devices.....77
*Computer Memories.....160-19
Comtech Data Corp.....128
Control Data Institute.....126
*Control Data Institute.....160-12
Cullinane.....9
Cylix.....73

DASD.....191
*Datacq.....160-8
Datapoint.....102, 103
*Dataproducts.....160-16, 160-17
Decision Data Computer Corp.....121
*Delta Data.....160-26
The Destek Group.....148
Digilog.....132
Digital Communications.....172
Digital Equipment Corporation.....53, 54, 55, 56, 122, 123
*Digital Microsystems.....160-18
*Digital Pathways.....147
Dysan.....94, 95

*Four Phase Systems.....160-25
Freightliner.....184

General DataComm.....159
General Electric Terminus.....80-E
General Motors Research.....175
Gould Datac.....106

Henco.....62
*Hewlett Packard.....160-15
Hewlett Packard Business Computers.....70-71
Hewlett Packard Terminals.....82, 83
Hughes Aircraft.....66, 80F

IBM.....116, 117
Infodata.....80-G
Informatics.....15, 190
Infotron.....81
Innovation Data Processing.....192
Intel.....10, 11
International Data Sciences.....60
Intertec, Inc.....46
Intel.....100
C. Itoh.....19

CIRCLE 154 ON READER CARD

AM Jacquard.....	1
Kennedy Co.....	Cover 2
Robert Kleven.....	175
Lee Data Corp.....	127
Lexacon.....	78, 79
Liebert.....	189
Lifeboat.....	107
List Processing.....	136
Macmillan Book Clubs.....	48, 48A, 48B, 49
*Mannesman Tally.....	160-9
Memorex Communications.....	38
Methods Research.....	47
Micom.....	165, Cover 3
*Micro Peripherals, Inc.....	160-5
*Micropolis.....	160-6, 160-7
Modular Computer.....	44, 45
Mohawk Data Sciences.....	138
MSA.....	80B, 80C
MTI.....	149
Nashua Corp.....	20, 21, 134
National Advanced Systems.....	5
National Trade Productions.....	89
NCR.....	27
Network Systems.....	181
On Line Software.....	150
Oregon Software.....	16, 17
Paradyne.....	139
Perkin Elmer Corp.....	174
Phillips Petroleum.....	59
Planning Research.....	85
PRC of America.....	80D
Precision Visuals.....	84
Prime Computer.....	22
Printacolor.....	72
*Printronic.....	160-23
Racal Vadic.....	109
Radio Shack.....	137
Rair.....	2
Rational Data Systems.....	188
Rental Electronics.....	57
Rixon.....	154
Rusco.....	129
SAS Institute Inc.....	43
S&H Computer.....	168
Signal Technology Inc.....	4
Snowmass Technical Seminars.....	80
Software AG.....	30
Sperry Univac.....	41
Sun Info Services.....	87
Sysed.....	165
*SLI Industries.....	161
Systime, Inc.....	25
Tab Products.....	135
Tandem Computers.....	166
*TEC.....	160-21
Tektronix.....	6, 7, 91
Teletype.....	Cover 4
Televideo.....	125
Teltone.....	61, 63, 65, 67, 69
Tesoro Petroleum.....	108
Three M.....	93, 145
Three Rivers Computer.....	68
Timeplex.....	76, 171
Toshiba.....	182
Transaction Technology.....	152
Trans Net.....	168
University Computing Co.....	74, 75
Victor Systems, Inc.....	47
Wang Institute.....	185
Wang Labs, Inc.....	80A
Wrightline.....	173
Xerox Printing Systems.....	169
Yourdon.....	164
*Zilog.....	160-10, 160-11

*OEM Demographic Edition

IMAGINE WHAT COULD HAPPEN IF THE BEST SOFTWARE ENGINEERS IN AMERICA STUDIED TOGETHER UNDER ONE ROOF.

When professional software engineers work together, everyone benefits.

We know, because we're proving it. At the Wang Institute of Graduate Studies, our students work together to pursue an unprecedented educational opportunity: earning a Master of Software Engineering (M.S.E.) at a graduate school which combines the challenge of academics with the highest standards of industrial practice.

Moreover, students at the Institute master advanced software technology and methodology as well as technical management.

And when professional software engineers gain this kind of experience, everyone - their colleagues, their supervisors, their companies and their industry - benefits.

Find out why some of the best software engineers in America are taking advantage of the best software engineering program in America.

Applications from full- and part-time candidates are currently being accepted for September, 1982. Graduate assistantships are available for qualified full-time students.

For more information, call Cynthia Johnson, Corporate Liaison, or mail the request below.

WANG INSTITUTE OF GRADUATE STUDIES

Wang Institute of Graduate Studies DN012

Tyng Road
Tyngsboro, Massachusetts 01879

Please send me additional information about the Wang Institute of Graduate Studies.

NAME _____

ADDRESS _____

COMPANY _____ TEL. _____

ADDRESS _____



CIRCLE 155 ON READER CARD

Communication Software Development

IF you have design and/or implementation experience in:

- Open System Interconnection;
- computer/computer communication;
- X.25;
- SNA;
- 3270;
- HDLC/SDLC;
- TELETEx/INFOTEx.

OR you can demonstrate strong software engineering ability,
AND you are interested in moving into the computer
communication field

THEN AES is interested in talking with you.

FI

GRAPHICS SOFTWARE DEVELOPMENT

In order to strengthen our graphics software development team, we have immediate requirements for software implementors at all levels of responsibility.

If you have strong software development ability and are interested in computer graphics then AES is interested in talking about your career development.

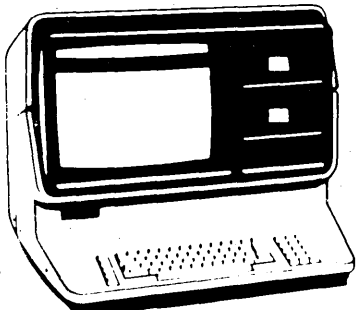
AES is a Canadian owned world leader in the development of electronic products for the office of the future. Tens of thousands of systems are installed world-wide. Our current rate of expansion creates ideal career-growth opportunities for talented people.

AES offers excellent salaries and benefits together with tremendous personal growth potential in a fast-paced industry.

Telephone Irene Stielow for application, or send your resumé, in complete confidence to:

AES

Irene Stielow
AES DATA LTD.,
3rd Floor,
5955 Airport Road,
Mississauga, Ontario
L4V 1R9.
or call collect at:
(416) 678-7020.



CIRCLE 156 ON READER CARD

ADVERTISING OFFICES

Sales Manager: **John M. Gleason**
New York, NY 10103
666 Fifth Ave.
(212) 489-2579

Eastern District Manager:
Francie Bolger
New York, NY 10170
420 Lexington Ave.
(212) 682-7760

New England District Mgr.: **William J. McGuire**
Newton, MA 02159
181 Wells Ave.
(617) 964-3730

Mid-Atlantic District Mgr.: **John A. Bartlett**
Plymouth Meeting, PA 19462
Plymouth Plaza, Suite 201
(215) 825-4410

Southern District Mgr.: **Warren A. Tibbetts**
West Palm Beach, FL 33406
7621 West Lake Dr., Lake Clark Shores
(305) 964-6298

Midwest District Mgr.: **Joseph P. Gleason**
Chicago, IL 60601
3 Illinois Center Building, 303 East Wacker Dr.
(312) 938-2926

Western District Managers:
Alan Bolte, Jr., William M. Wilshire
Los Angeles, CA 90035
1801 S. La Cienega Blvd.
(213) 559-5111

James E. Filltraut
Mountain View, CA 94043
2680 Bayshore Frontage Rd., Suite 401
(415) 965-8222

U.K., Scandinavia, Benelux
Tullio Giacomazzi, Martin Sutcliffe
Technical Publishing Co.
130 Jermyn Street, London, SW1 4UJ, England
Tel: 01-839-3916, Telex: 914911

Germany, Austria
INTER MEDIA Partners Gmbh
Ludwig-Uhland-Strasse 7
5828 Ennepetal, West Germany
Tel: 0233-76008/9, Telex: 8592207

France, Spain: **Gerard Lasfargues**
32 rue Desbordes Valmore
750 16 Paris, France
Tel: (1) 504 97 94, Telex: 250302

Italy: **Luigi Rancati**
Milano San Felice Torre 7
20090 Segrate, Milano, Italy
Tel: 2-7531445, Telex: 311010

Switzerland: **Andre Lehmann**
ALAS AG, CH-6344
Mäierskappel/LU
Tel: (042) 64 2350, Telex: 864958

Japan: **Shigeru Kobayashi**
Japan Advertising Communications, Inc.
New Ginza Building, 3-13 Ginza 7-chome
Chuo-ku, Tokyo 104, Japan
Tel: (03) 571-8748, Telex: J22745

Israel: **Igal Elan**
Daphna Str. 24, Tel-Aviv
Tel: 268020, Telex: 341667

James B. Tafel, Chairman
John K. Abely, President
Robert L. Dickson, Exec Vice President
John R. Emery, Senior Vice President
Calverd F. Jacobson, Vice President-Finance
Walter M. Harrington, Vice President and Controller

Technical Publishing

TEB a company of
The Don & Bradstreet Corporation

READERS' FORUM

THE TOLL OF A NEW MACHINE

The early sun broke through the trees lining the drive that led to a small cluster of buildings. Shivering in the chill of the New England fall, Buzz North, Toasta General's top engineer, guided his Audi into a parking space. He asked the fuzzy dice hanging on the rear view mirror: "When is a literary hotshot going to write a bestseller about me and my machine?"

Let's backtrack for a moment.

Toasta General was the brainchild of the gutsy, unpredictable Benito DeBatista. Since 1967, the feisty company had been jabbing a thorn in the side of the polite but staid New England Chef Corp. That thorn was TG's powerful little 16-slice unit, which could toast NEC's brand of whole wheat faster than NEC's own machine. DeBatista liked to boast at annual meetings (held in a circus tent near Manchester) that Toasta General made a machine that could "beat the pants off NEC, then sell them back, allowing for shrinkage and inflation simultaneously."

But now it was 1981. The toaster industry was getting crowded and the company was managing to hold its own only because of its hungry young whiz kids ("no lunch, period"), the cutthroat ethics of its marketing/jugular division, and the binary management philosophy of "All work and no pay makes Jack a company boy."

Now, Toasta General desperately needed a winner: a 32-slice supermini that could walk out the door in jig time, like a Harold Robbins' novel doing a two-step out of a suburban book mart. DeBatista believed in, and also systematically tortured, Buzz North.

As a child prodigy, North had taken apart and repaired his family's DeSoto, transforming it somehow into a two-door Studebaker. The man made things happen, the kids said near the coffee maker, which often contained 30 doses of gun-grade Benzedrine. He inspired fanatical devotion from his team of engineers, the so-called Ellipsis Group. He nevertheless remained an enigma to the youngsters, seldom speaking to them in the halls, preferring instead to use complicated hand signals.

His hardware team, the Spin and Martys, worked in tandem with Tom and the Thumbs, the deft and subtle promulgators of the mystical microcoder. North promised Ellipsis members stock in the company if the new machine, the Parakeet, became a success. "Stock, a great toaster, and your name in a goddamn bestselling book," he told his protégés.

The Ellipsis Group worked double shifts over the winter. While the basement maze hummed during the day, North barricaded himself in his office. Frantic, and hallucinating about royal-

ties, he called the offices of New York mega-agents: "You don't understand, Sheldon, I'm quotable. The stuff of electrical legends. I'm a question mark, even to my wife. You've got to hook me up with a Smart Guy Writer so he can observe me at close range. We're talking *New Yorker* excerpts. I'm talented, eccentric, yet self-effacing. Damn it! I'm good copy."

At night, North tossed in bed. Nightmares about the Parakeet Project. Bloated faces of electronics teachers from the past. All of them. Laughing at *him*.

"I hear the demons," he said to his wife over coffee. "They say I'm wasting pots of Toasta General greenbacks on a pipe dream of a machine. I should have stayed in the hat business. *Wall Street Journal* reporters are always doing stories on guys with colorful things to say about the decline of the fedora."

But the Spin and Martys knew that they were building a device that made other 32-slice toasters perform like the Rockettes on seconal. Tom and his Thumbs worked 18-hour shifts writing the mind-boggling microcode. A few of them burned out. Daryl "Mr. Nichrome" Webster used cream cheese to scrawl a message for the group on his personal toaster. North found it the next morning:

I'M CRAZEE, NOT ALWAYS FUNCTIONAL
AND OFF TO DEEPEST MEXICO

Ferguson took over for Webster and dashed off hot, effortless microcode.

North was enraged by an article in *Quest* magazine about an Indiana beekeeper with real pluck. "Pluck! I'm the real item! Who needs this pointy-head jerk who gets stung all the time!" That February, when the snow dusted the windowsills, the playful DeBatista sent North a hangman's noose via interoffice mail.

In March, the whiz kids were starting to bounce off the walls. The Spin and Martys were busy debugging the supermini. If Parakeet was to work, North reasoned, they would have to throw out the rule book. DeBatista was beginning to put the hammer down. Toasta General's Tuscaloosa plant was rushing along with the Romulus 3000, a machine that could process Roman Meal at unimaginable speed. The whole industry was watching and hoping to see the upstart company fall flat. DeBatista said that if New Hampshire couldn't cut the marmalade, he'd put North to work designing extension cords.

North pleaded for more time. Then, he stepped out of line and requested a reporter who "could eat nuance for breakfast."

"You don't understand," he told DeBatista, who was playing with his cattle prod. "I'm the stuff of good paperback deals. The public is missing page after page of *bon mots*. Book clubs are quietly weeping."

DeBatista merely grunted.

The Thumbs finished their microcode. The circuit boards were completed. North knew that the Ellipsis Group could wrap up the whole Parakeet Project in a month. He became more taciturn than ever. His young wizards avoided him. In the lab, he took to striking heroic poses over the two prototypes.

What's on your wish list for a DG screen editor?

- True Screen Orientation
- Easy-To-Use Single Mode Design
- Doesn't Require Data General CRT
- Uses Features of Intelligent Terminals
- Good Dialup Performance
- Optimized Display Rewriting
- Random Access To Pages
- Usable by Non-Programmers
- Literal Search/Change
- Token Search/Change
- Pattern-Match Search/Change
- Features for Document Preparation
- Case Sensitivity Control
- Margin Control
- User-Definable Keystrokes
- Macro Capability

**Your wish
has come true.**

SCRED AOS AOS/VS
 RDOS DOS MP/OS

**SCRED—the text editor from
Rational Data Systems**

Rational Data Systems

205 East 42 Street New York City 10017
212-697-5855 TWX 710-581-6016

READERS' FORUM

Finally, all the bugs in Parakeet were found. The Group threw a series of parties to celebrate their success and ward off postcreation blues. They had beaten the money men in Tuscaloosa by three months. The Romulus 3000 had developed circuit board problems and could barely heat Pop Tarts. The Parakeet Project had drawn unanimous praise and promised to make the bottom line black as night.

In New York, at a press conference/breakfast at the St. Regis, Toasta General execs and engineers sat with reporters and nibbled salmon, eggs, and the most beautifully browned triangles of Wonder Bread anyone present had ever seen. North, feeling his oats, grandly accepted congratulations from the circuitry groupies at his table.

Across the room, DeBatista slipped the busboy a sawbuck. The busboy crept to the pedestal where the sleek, 32-slice supermini was displayed and jammed an oversized cheese danish into one of the slots. The machine buzzed and sparked, filling the air with acrid smoke.

North found himself shoved to the front. DeBatista bel-lowed: "You built the kludgy thing. Now *fix it!* It's turning that danish into another Piltdown Man." North plucked a serving fork from a nearby buffet table and jabbed furiously at the offending pastry. The tines struck the painstakingly constructed electronic grid that was the soul of the new machine, and 6,000 volts of Con Ed's finest raced through North's body. He ended up on the floral arrangement at the center of the *Business Week* table and, later in the week, on the cover of that magazine.

He was famous.

—Tim McGinnis
New York, New York

THE TROUBLE WITH NETWORKS

Computer networks are in everyone's future, the prophets tell us, and will bring about new styles of communication. How will the changes affect us? The following, a personal case study in the sociology of computer networks, may provide a few clues.

One weekend, when I should have been doing something else, and when I had once more made a minor error while working at my computer terminal, I collected my frustrations together into the paper "The Trouble with UNIX" (November, p. 139). Little did I know that I was thereby setting into motion a chain of events that would occupy me for many months. A draft of my article was circulated on a national computer network, and soon brought me fame and insult.

My computer is part of a hardwired campus network of computers that use the UNIX operating system. This local campus network is, in turn, part of a statewide telephone UNIX network that interconnects many campuses of the University of California. The campus network is connected to a nationwide dial-up network of UNIX users, which was started, I believe, by people at various Bell Laboratories in New Jersey and elsewhere. The campus network is also connected to the Defense Department's packet-switching network (ARPANET). In addition to distributing messages, manuscripts, programs, and documentation, the net also provides a number of "bulletin boards." These are collections of messages constructed so that people who are interested in related topics can hold discussions, ask specialized questions of one another, and pass on information thought to be of general interest.

One day, someone logged onto my computer, found the file in which the paper was located, and distributed it through the network bulletin board called "UNIX-wizards." From there it was distributed over at least one other bulletin board, and probably over many individual messages and to many different locations. Thus,

CIRCLE 157 ON READER CARD

SUPPORT SYSTEMS

COMPUTER

BY LIEBERT

The mini-MATE™ A cooling system designed for the mini.

Because mini-computers generate heat, cooling is necessary to insure the up-time of both equipment and personnel. Here is the perfect solution.

The mini-MATE is a precision spotcooler, complete with humidity control. It is compatible with any mini-computer installation. Each unit is a self-contained, modular system, flexible to meet any growth requirement. The mini-MATE is controlled by solid state electronics to insure precise, maintenance-free operation. A unique compact design offers one-man installation and service to minimize cost.

Space required for installation? *NONE*—It is mounted completely recessed overhead, within the 2' x 4' opening of a standard ceiling tile. To

further reduce costs, the need for ductwork has been eliminated.

Contact Liebert... world's leading manufacturer of power conditioning and environmental control systems for data processing systems.

SUPPORT SYSTEMS BY LIEBERT-COM

BY LIEBERT-COMPUTER

Liebert Corporation
1050 Dearborn Drive
P.O. Box 29186, Columbus, Ohio 43229
Phone 614-888-0246 Telex 246-655 Liebert WOGN

Please send further information on the mini-MATE™

Name: _____

Title: _____

Company: _____

Address: _____

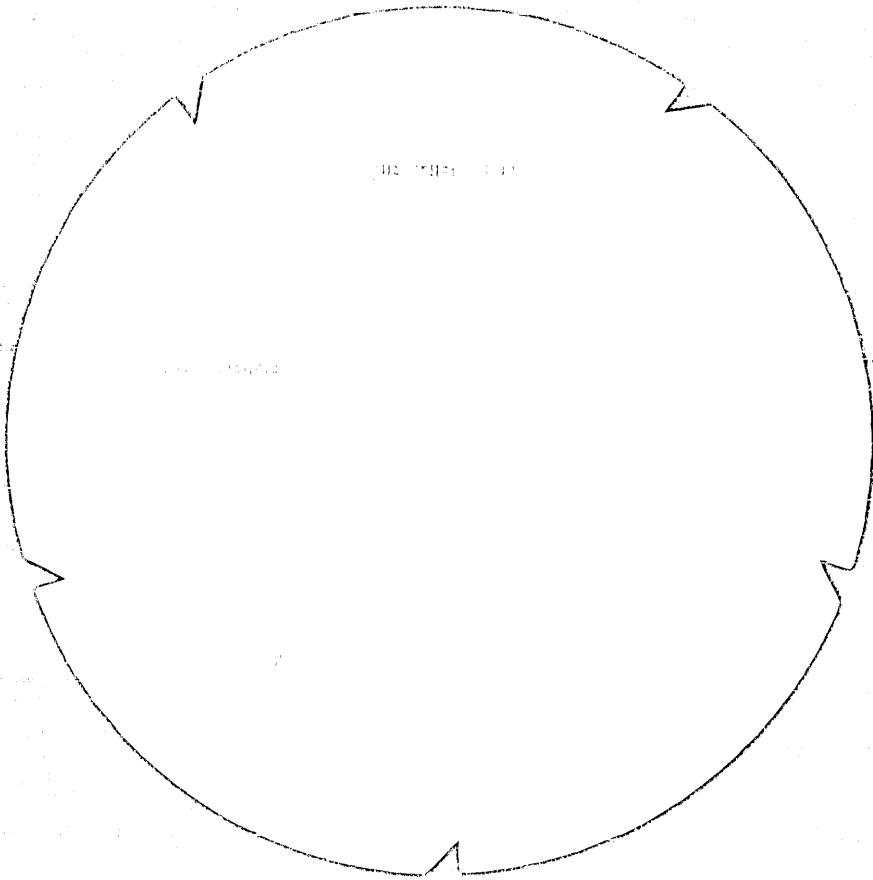
City: _____ State _____ Zip _____

Have salesman call.



We help make your computer investment pay off.

CIRCLE 158 ON READER CARD



Why settle for computer talk, when you can do business with a company that speaks your own industry's language? Together, we can manage it.

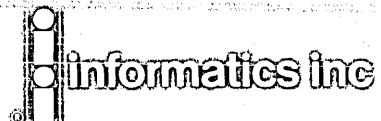
Together, because Informatics® knows your business. The data you need to be profitable. The information flow which is the lifeblood of your organization.

We know your business because we're big enough to be both specialized and diversified. Not just in terms of software products and services, but also in talent. The kind of talent which allows us to serve your special needs. We know your problems because our people have been there. We can provide solutions because we've already solved such problems for other companies in your industry.

We serve, in effect, as partners to our clients. This close relationship has helped to make Informatics one of the largest independent software companies in the world. Over 2,600 employees. Software and services in over forty countries. A full-line supplier of professional services, software to run on your computer hardware, a communications network and remote computing centers strategically located throughout the nation.

We'd like to be your partner. Give us a call, or write us at 21031 Ventura Boulevard, Woodland Hills, CA 91364, (213) 837-9040.

Your Information Management Partner.



READERS' FORUM

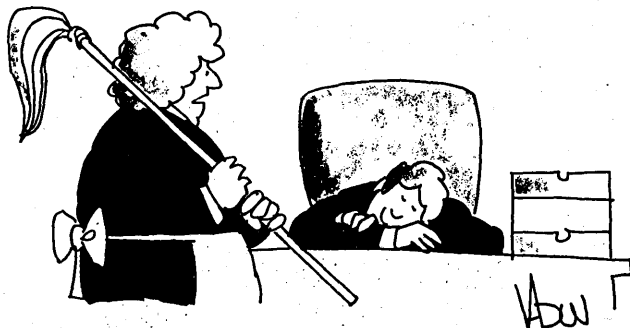
the paper was sent all over the country, to large numbers of sites and possibly thousands of readers. This was done without my knowledge (and therefore, without my permission, although I would have granted permission had I been asked). In addition, the culprit managed to disguise the transmission so that the source could not be identified.

How did that happen? Well, we run an open computer facility, and users are allowed to look over other people's files. We can and do protect confidential material. The rule is that people may look freely, and if users wish some things to be private, they must protect the access to those files. The location of my paper was well known because I had asked people to read it and give me feedback. The thief was probably someone authorized to use our machine, and probably an expert systems person who had the knowledge and authorization to disguise the source of the transmission.

The first news I had that my paper had been distributed was when a local systems programmer sent me a copy of a message he was sending in response to someone at Bell Labs, agreeing with the Bell Labs person that my article was appalling. The only part of the original message from Bell Labs that I was allowed to see said, "Who is Don Norman and why is he saying those terrible things about me?"

From that point on, things got hectic. A flurry of comments appeared on several of the bulletin boards. The article was a disaster, said one. Another person agreed with many of the observations, but thought "the paper should not be a criticism of UNIX itself, but rather a criticism of how people use UNIX." Some people said the piece was correct. Others claimed it was all wrong, and that anyone who had problems with UNIX didn't deserve to be using it in the first place. Eventually, people discovered my proper network address and began sending mail directly to me, bypassing the bulletin boards. I was flooded with comments. "DATAMATION readers are typically IBM users," said one note, "and they will now say 'You see? UNIX is poorly designed, this psychologist says so. Wake me up when you have an operating system better than IBM's.' . . . I hope that both of you live happily ever after." From Texas, Utah, Toronto, from the various Bell Labs, from California, from Massachusetts—the notes kept coming. Soon I was spending over an hour each morning just reading the previous day's accumulation and answering them. When I printed out all the messages that I had received on a hardcopy terminal, it took 32 single-spaced pages.

The majority of these comments were laudatory. Several people wanted advice on systems they were working on. I had useful interchanges with them and, in the process, clarified my own understanding of the issues. A manager of a major system—call it System X—gave me a computer account on X (and promised to send the manuals), asking me to do a similar analysis on it so that his team could improve it. He did lay down the restriction that I not write a new article called "The Truth About System X." Although we are not yet finished with our analysis (the manuals haven't arrived yet), interaction like this is quite gratifying—the kind of thing one hopes for.



"You've overslept, Mr. Baker.
All the others have gone home."

© DATAMATION

Choose the proven conversion software.

Choose DASD.

Don't take chances with your conversion. Choose DASD Conversion Software. It's proven itself time and again on actual conversions.

Our software library is comprehensive, well-designed, thoroughly developed. It offers a full range of proven conversion tools, plus specifically designed utilities.

DASD personnel are tops in the field, fully qualified and experienced in all major hardware, languages and applications. We're fully staffed, able to go anywhere, any time you need us. And we'll handle either partial or turnkey conversions. On time and within budget.

Let us help with your conversion. Circle the appropriate number on the Reader Service Card and return it today.

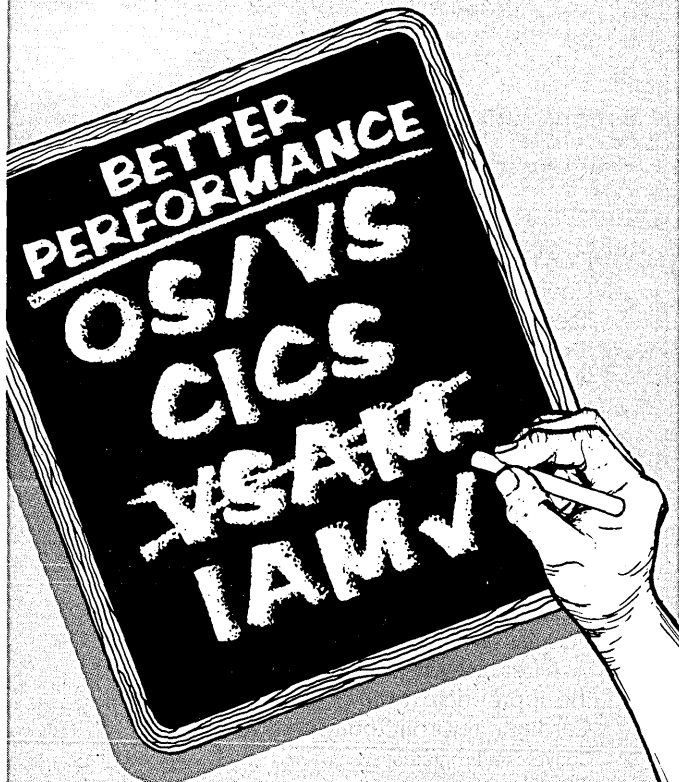
Conversion Programs Available	Reader Service Number
RPG/RPG II to COBOL	Circle No. 160
NEAT/3 to COBOL	Circle No. 161
DIBOL to COBOL	Circle No. 162
COBOL to COBOL	Circle No. 163
FORTRAN to FORTRAN	Circle No. 164
DOS ALC to OS ALC	Circle No. 165
MAP to COBOL	Circle No. 166
COBOL ISAM to COBOL VSAM	Circle No. 167
CCP to CICS	Circle No. 168

Other products also available:
Job control language translators; MAPGEN on-line CICS
Productivity Aids; Business Graphics

DASD®

PEOPLE/PRODUCTS/RESULTS
DASD Corporation • Corporate Services Center
9045 North Deerwood Drive • Dept. 228
Milwaukee, WI 53223 • 414-355-3405

Don't Make The Same Mistake



IAM IS THE CORRECT ANSWER

- Transparent to Application Programs
- A Better Choice For Online and Batch Systems

The makers of FDR and DSF
INNOVATION
DATA PROCESSING
970 Clifton Ave., Clifton, NJ 07013 • 201-777-1940

CIRCLE 169 ON READER CARD

READERS' FORUM

The most positive interactions, however, took place with people at Bell Laboratories—people who had been on the receiving end of my criticisms. After a somewhat hesitant start, our dialog became quite useful. We have discussed a number of issues and agreed upon some points that need further treatment. I sent them the box describing UNIX that was published alongside my article, and they rewrote it to clarify points and correct errors. They sent me the rebuttal they were writing, and I thought it a good one (it too was published alongside my article). I sent them several papers that I was working on and they sent me reprints of their published papers on UNIX. One of our current graduate students sent descriptions of the menu-driven command interpreter for the UNIX shell that he was developing, and so on. These interchanges have helped clarify issues on all sides, eventually leading all of us to a better understanding of the constraints on system design and release, and to an awareness of the needs and limitations of a wide variety of users.

The weaknesses and the strengths of computer networking derive from the same feature: it is easy to send messages to anyone who has access to the network. Because a new message is so easily generated, it can be composed immediately upon the receipt of one that has aroused the emotions. But if a message is composed in the heat of passion, the passion may distort it, so that the result is not always as effective as one might hope.

The ease with which people can generate additions to the bulletin board and messages to others has another major drawback: electronic junk mail. Many of my colleagues and I have stopped reading the network news and bulletin boards because we cannot afford the time to do so every day. (I did not know my paper had been distributed and would not have discovered the flurry it created had others not alerted me to it.) This will be less of a problem when we have intelligent programs that can aid in browsing through tables of contents, perhaps with intelligent keyword or content specified searches to winnow through the accumulation. Perhaps we can put together some quasi-intelligent text-understanding systems that can help sort through the material. However, until something is done to improve the organization, the very success of these message systems and bulletin boards will threaten their usefulness.

Another interesting social phenomenon that may occur within an organization possessing an effective computer mail system is that people will tend to use it in preference to talking. Computer mail is much more efficient than telephone calls or visits because you can generate it whenever you wish without concern for whether the recipient is in. Similarly, the recipient can read and answer messages at leisure. It is better than postal mail or interoffice memos because it is easier, less formal, and can be almost instantaneous if the recipient wishes it to be. In our laboratory, this sometimes leads to strange behavior. It is not unheard of for one person to see another in the hall and to say "I am going to send you a message," and then go do so, forgetting that the information could simply have been spoken.

The positive side of these networks overcomes the negative. People can communicate their ideas to others across the country, quickly and effectively. In turn, the recipients can respond, criticizing, sharing, and improving the product. The network communications keep me informed on a variety of issues from substantive research topics to trip and conference schedules. I can count on my colleagues who do read the bulletin boards to alert me to relevant articles, just as I pass on the interesting messages that I receive. Small communities of people with shared concerns can quickly be formed to hold constructive discussion about an issue. The interchanges can be quite effective, in part because of the rapidity with which messages are generated and sent: it only takes a few hours for a comment to spread out over the community.

The unauthorized distribution of my paper has been a useful sociological experience—a true test case of what will indeed be in all our futures: interactive journals, computer bulletin boards, and readily available computer message systems.

—Donald A. Norman
La Jolla, California

ADLC™ from MICOM®

Data Communications for Minicomputer Users

If you use minicomputers and 'dumb terminals', you probably have a very cost-effective system. But those 'dumb terminals' are a bit of a gamble when you connect them to your computer over telephone lines. They have no retransmission-on-error (for example), so any phone line 'glitch' makes your CRTs go crazy, and since they cannot be addressed or polled, you need to install an expensive phone line for each one.

The terminals used with mainframe computers don't have the same problems but they cost a lot more, and they need complex software to support the communication protocol they use.

MICOM's data communications products provide *add-on* communication protocols to minicomputer-based 'dumb terminal' configurations *without requiring any changes to existing hardware and software*. We call this unique concept **ADLC™** — **A**dd-on **D**ata **L**ink **C**ontrol. MICOM **ADLC™** products eliminate transmission errors, save computer ports, and allow low-cost 'dumb terminals' to be

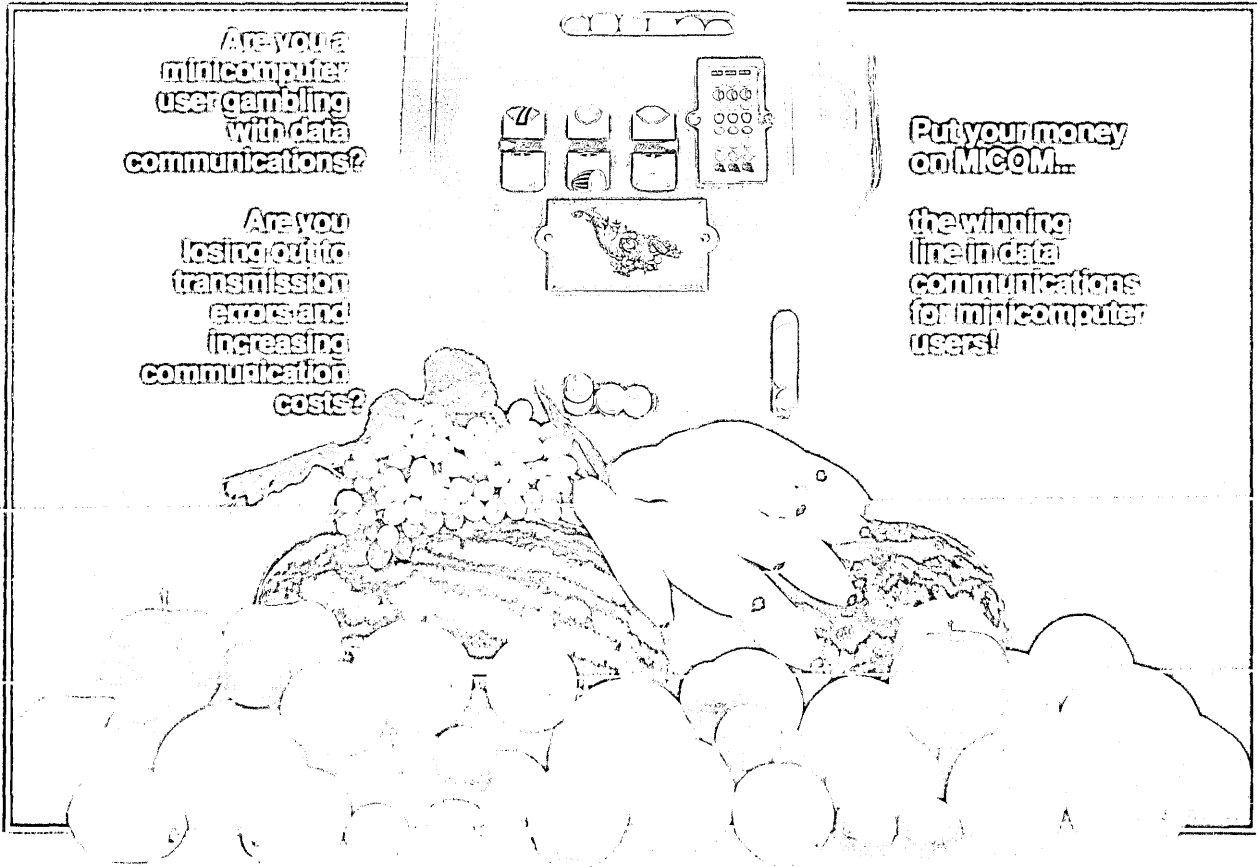
clustered, multidropped and polled on a single telephone line *with no special software*.

To complement the **ADLC™** products, MICOM offers a range of low-cost data transmission devices, including short-haul local datasets and long-haul modems, all specially designed to meet the asynchronous communication requirements of the minicomputer user. And for the user with multiple minicomputers, or the minicomputer system running short of ports, MICOM's innovative Port Selector provides a unique solution.

Send for complete details today... and if you would like to learn more about the subject of data communications, ask about our *tutorial seminars* designed specially for the minicomputer user. MICOM seminars are offered nationwide throughout the year.

If you're installing remote terminals, whether as a consultant, systems house, or OEM, don't take a chance... talk to MICOM, the one-stop shop for all you need, or need to know, in data communications for the minicomputer user.

25¢



Are you a minicomputer user gambling with data communications?

Are you losing out to transmission errors and increasing communication costs?

Put your money on MICOM...

the winding line in data communications for minicomputer users!

MICOM *Microcomputers for Data Communications*

MICOM SYSTEMS, INC. • 20161 Northolt Street • Chatsworth, CA 91311 • Telephone (214) 998-8824 • TWX 910/492-4910
 Regional Sales and Service • Eastern Woodbridge, NY (201) 750-1120 • Central St. Louis, MO (314) 676-7626
 Regional Sales Offices • Atlanta, GA (404) 486-2999 • Boston, MA (617) 235-8870 • Dallas, TX (214) 258-0774
 MICOM-BORER LTD. • 81 Court 16 Gredock Road • Reading, Berkshire RG20 1T, England • (0734) 866801 • Telex 8274135

CIRCLE 20 ON READER CARD

WE DESIGN TERMINALS SO YOU WON'T HAVE TO REDESIGN HUMAN BEINGS.

More than a decade ago, before many of our competitors even existed, we recognized an important fact. A terminal that causes operator tension and fatigue is an inefficient terminal.

So we started designing terminals that are adapted to human beings instead of the other way around.

Like the Teletype® 4540. We started with conveniently located controls and indicators. And five adjustable keyboards that keep everything within easy reach. With sculptured keys for fingertip control and comfort, and tactile feedback to keep operators in touch.

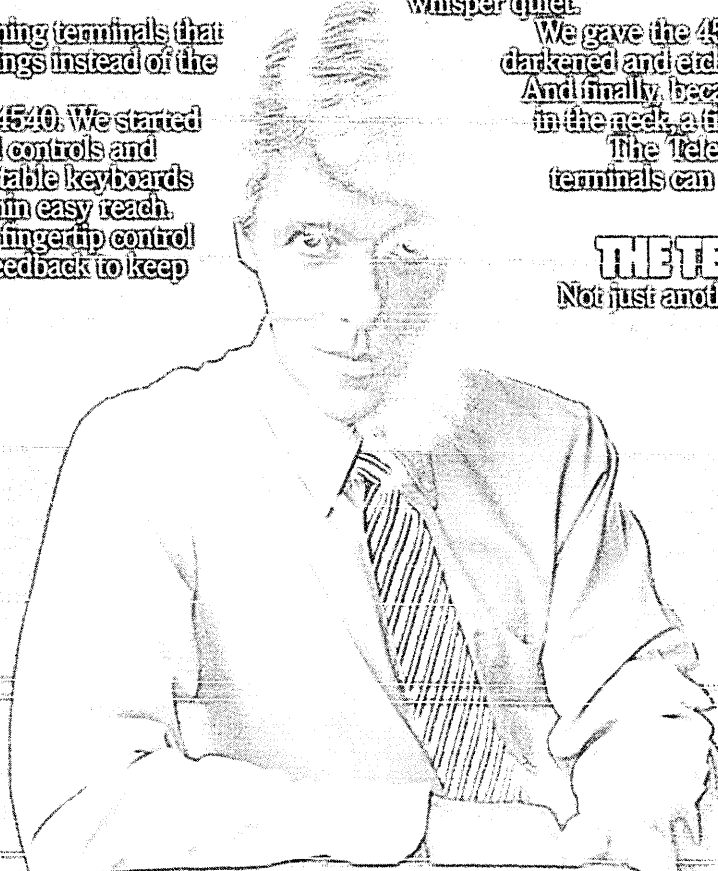
The 4540 has a reverse image cursor that keeps both itself and data highly visible. And a broad choice of printers, including one specially designed to be whisper quiet.

We gave the 4540 smudge-resistant glass, darkened and etched to diffuse reflections. And finally, because glare can be such a pain in the neck, a tilt screen.

The Teletype 4540. Proof that terminals can adapt to life on earth.

THE TELETYPE 4540.

Not just another 3270 compatible tube.



Tilt Screen.

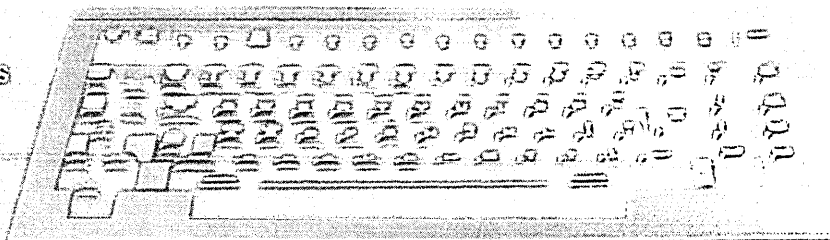
Highly visible
reverse image cursor.

Large, clear dot matrix
characters.

Darkened, etched glass.

Contoured keys
and keyboard.

Simple controls
and indicators.



Teletype Corporation, 5555 Touhy Ave., Dept. 3212A, Skokie, IL 60077 Tel (312) 932-2000.
Teletype® is a registered trademark and service mark of Teletype Corporation.

CIRCLE 3 ON READER CARD