

**DATAMATION** <sup>82</sup> **N**®

MAY/4.00 U.S.A.

**SPRING CATALOGUE**

# APPLICATIONS SOFTWARE



# SURVEY

INCLUDING

OVER **2200** USER  
RESPONSES

**50**  
PACKAGES RATED

ALSO

**RIGHT-BRAIN COMPUTING:  
THE BIOLOGICAL IMPERATIVE**

**ARE YOU LEARNING  
AS FAST AS YOU CAN?**

**NCC PRODUCT PREVIEW**

# We'll back up our disks— and anyone else's.

That's right. 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.

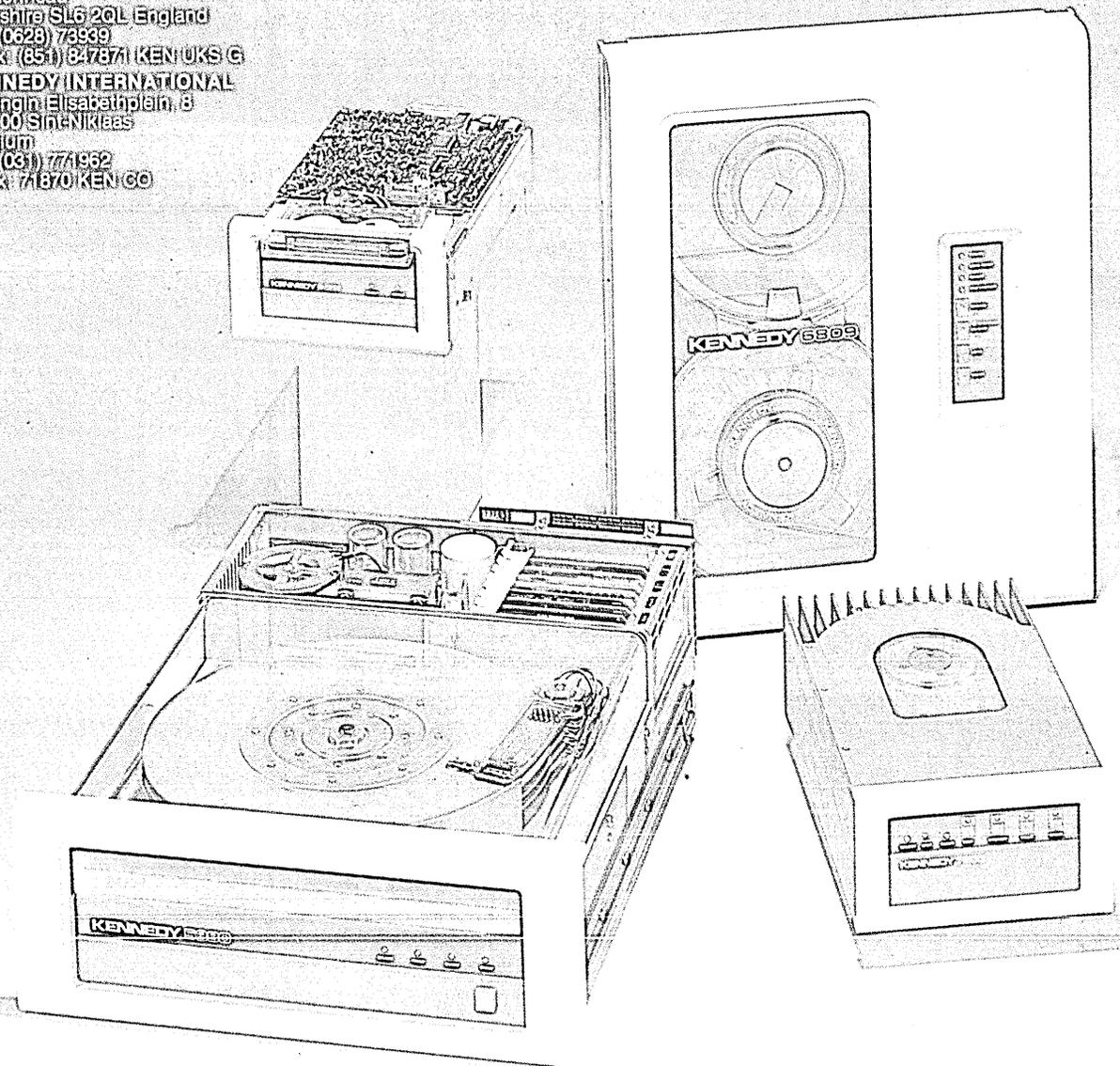
UK, and Scandinavia  
McCraw Hill House  
Shoppenhangers Road  
Maidenhead  
Berkshire SL6 2QL England  
Tel: (0628) 73939  
Telex: (851) 87871 KEN UKS G

## KENNEDY INTERNATIONAL

Koningin Elisabethplein, 8  
B-2700 Sint-Niklaas  
Belgium  
Tel: (031) 771932  
Telex: 71870 KEN GO

## KENNEDY

An Allegaedy International Company  
680 Shamrock Ave. Monrovia, CA 91016  
(213) 357-8881 TELEX: 472-0116 KENNEDY  
TWX: 910-535-6219



# Modems are all the same. True or False?

If you think modems are all alike, you're right, mostly. But if you have dumb terminals on a minicomputer from DEC, Hewlett-Packard, Prime or anyone else, you'll have to agree that MICOM's modems are very different.

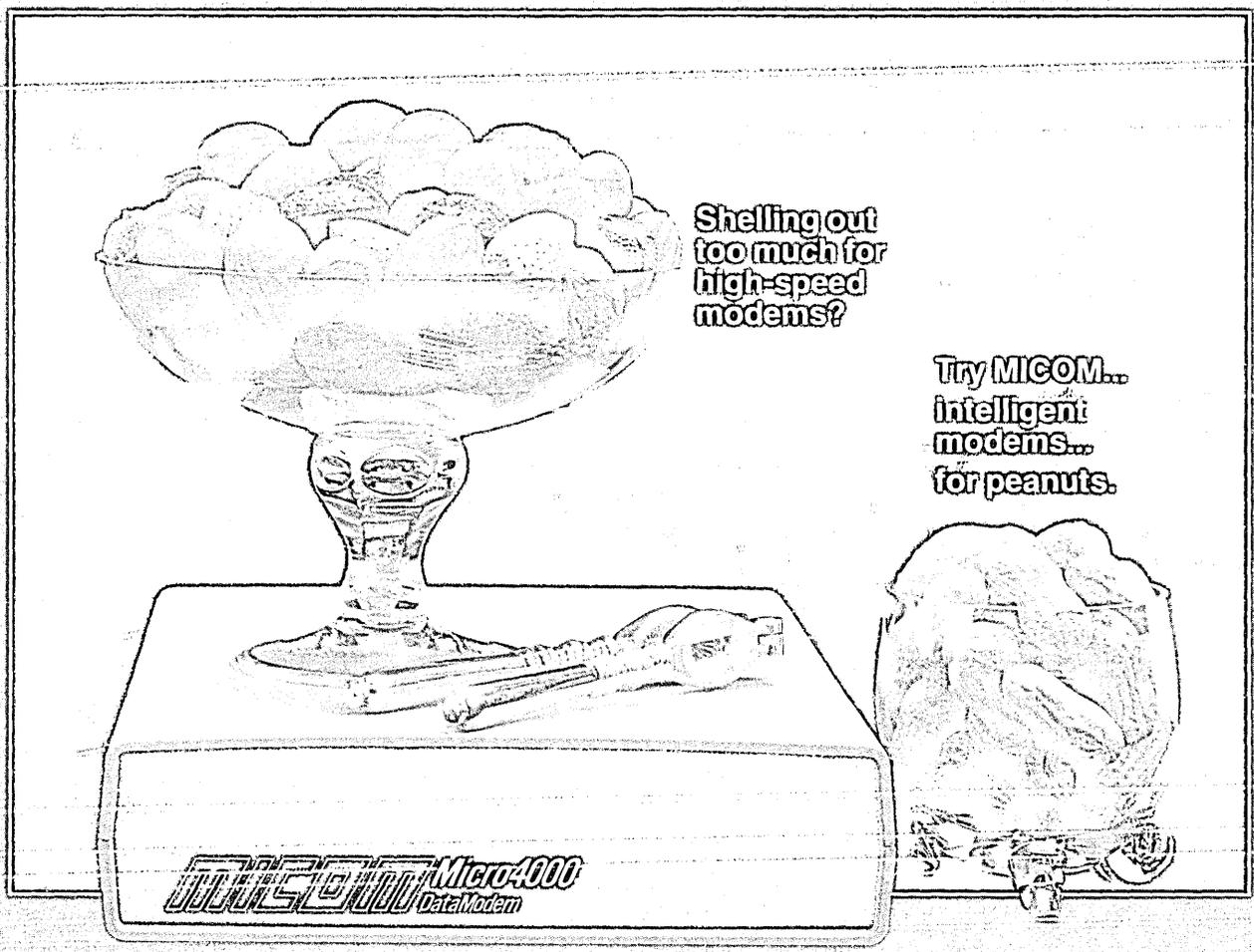
For example, would you like to run your minicomputer terminals at 2400 bps? Try the Micro4000. It's small, reliable, doesn't cost much—and it has an asynchronous terminal interface designed for use with dumb terminals. That's different.

Or consider the Micro5000 Intelligent Modem and its unique retransmission-on-error feature. It automatically recovers from those phone line "glitches" that drive your CRTs crazy, transmitting perfectly, even lines with error

rates worse than 1 in 1000 bits, even through total line outages of several seconds. That's different, too.

Want to cut phone line costs? Check out the Micro8000 Concentrator Modem. It will allow you to support clusters of asynchronous and synchronous terminals with a single phone line. Some models can even *multidrop* your dumb terminals, transparently. And that's very, very different.

There are 4800 and 9600 bps models of all of these, too, with industry-leading price/performance. But don't believe what you read in an ad. Make us prove it. Start by calling or writing today for literature on how MICOM's modems will work in your applications.



Shelling out too much for high-speed modems?

Try MICOM... intelligent modems... for peanuts.

**MICOM Micro4000 Data Modem**

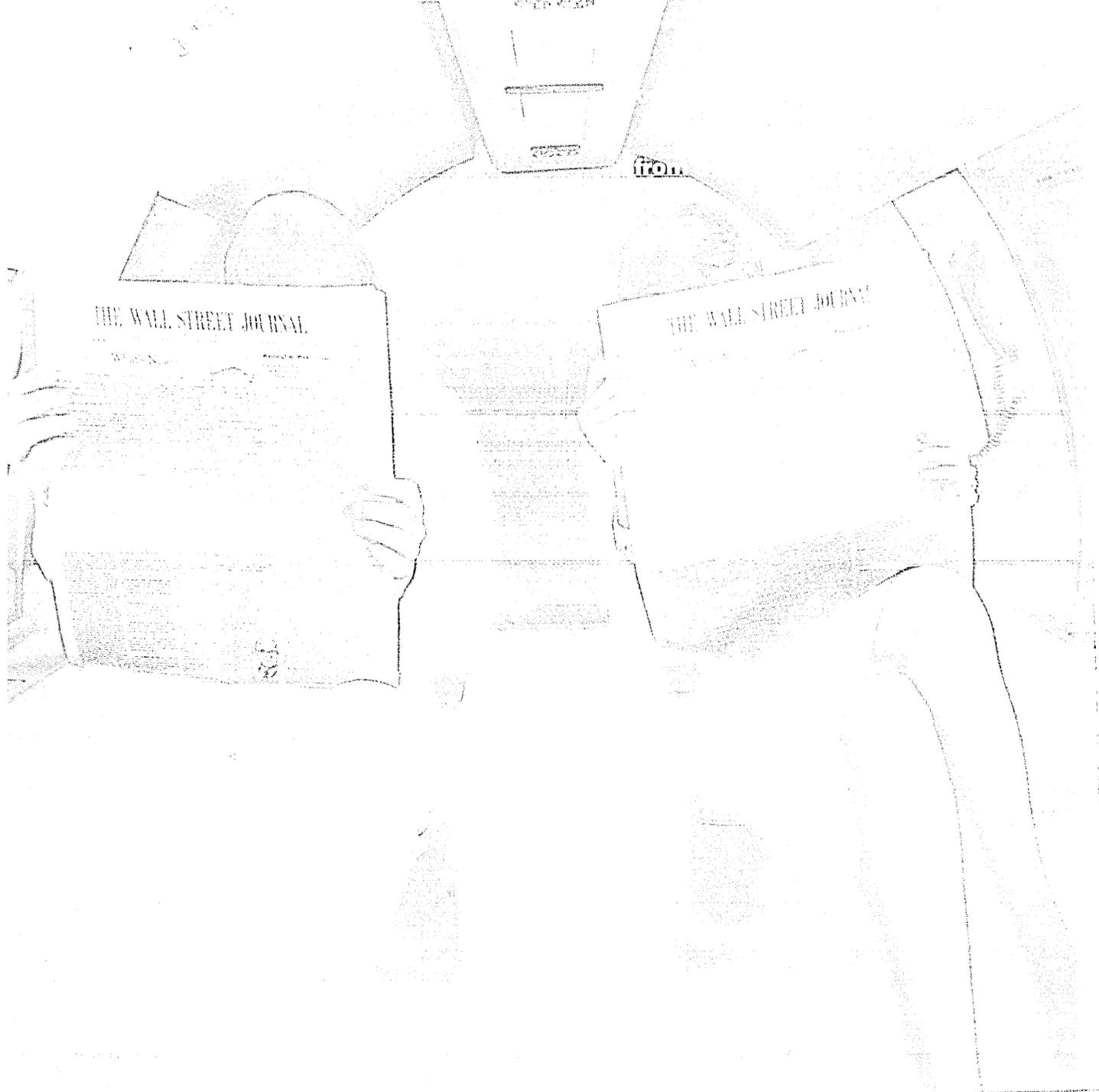
## MICOM MicroComputers for Data Communications™

MICOM SYSTEMS, INC. • 20151 Nordhoff Street • Chatsworth, CA 91311 • Telephone (818) 938-8844 • TWX 910/494-4910  
 Regional Sales and Service • Boston, MA • (617) 527-4010 • St. Louis, MO • (314) 576-7626 • Woodbridge, NJ • (201) 750-1120  
 Other Regional Sales Offices • Atlanta, GA • (404) 485-2999 • Dallas, TX • (214) 258-0774  
 MICOM-BORER LTD. • Bel Court • 15 Gradock Road • Reading, Berkshire, England • (0764) 866801 • Telex 847185

Available now from these stocking reps:

- AK - Anchorage (907) 276-5616 • AL - Birmingham (205) 789-3316 • AL - (800) 327-8800 • AR - (501) 320-1150 • AZ - (602) 324-5000 • CA - Anaheim (714) 336-7800 • (909) 360-1851
- San Diego (619) 595-1557 • San Jose (408) 293-7230 • CO - Colorado Springs (303) 592-0880 • Denver (303) 777-8070 • CT - (203) 223-4231 • DE - (609) 779-0200
- FL - (800) 322-4880 • GA - (800) 327-6600 • HI - (808) 523-8881 • IL - (402) 395-5850 • ID - (801) 466-3522 • IN - (312) 255-4820 • IOWA - (319) 274-2531 • KS - (913) 252-3700
- NY - (516) 261-2501 • VA - (800) 327-6600 • MA - (617) 235-5320 • MD - (301) 261-3522 • MI - (616) 251-5520 • MN - (612) 425-4455 • MO - Independence (816) 252-9700 • St. Louis (314) 721-0200 • MS - (601) 827-6600 • TX - (800) 465-3522 • OK - (800) 327-6600 • ND - (612) 425-4455 • OH - (616) 235-5520
- NC - North (412) 657-2455 • South (803) 776-0200 • NM - Albuquerque (505) 292-1212 • Las Cruces (505) 524-3699 • NV - (714) 336-7600 • NY - East Aurora (716) 355-4222
- Worcester (617) 459-3351 • New York City (212) 637-2455 • Rochester (716) 425-5521 • OH - Cleveland (216) 237-0245 • Dayton (614) 482-5001 • OK - (214) 252-1551
- OR - (503) 224-5441 • PA - Harrisburg (717) 492-2000 • West Chester (610) 399-2950 • RI - (619) 228-2281 • SC - (800) 327-6600 • SD - (612) 425-4455 • TN - (800) 327-6600 • TX - Dallas (214) 252-1551 • El Paso (915) 542-1787 • Houston (713) 358-7726 • UT - (801) 465-3522 • VA - (800) 261-4822 • VT - (617) 235-5520 • WA - (206) 384-8800 • WI - (617) 724-9379
- WV - East (801) 261-4822 • West (612) 892-2552 • WY - (800) 327-6600 • DC - (202) 261-4822 • Guam (671) 636-7230 • Puerto Rico (809) 723-3689

CIRCLE 4 ON READER CARD

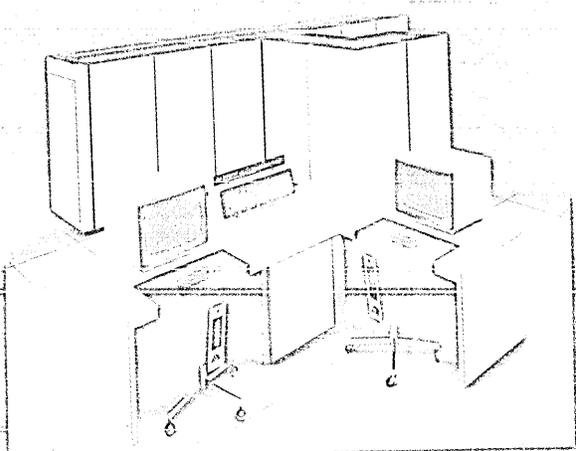


At National Advanced Systems, we offer the utmost in long-term value and price/performance. One might be tempted to think of value only in terms of price/performance. But a sound investment also implies increased productivity which is a direct result of increased reliability. We provide state-of-the-art technology, longer product life, higher residual values, and the end of planned obsolescence.

Value means guaranteed compatibility of your IBM operating systems, application programs, and peripherals. And it means complete, world-wide support.

At NAS, we offer a broad line of compatible computers, peripheral memory, and software. As well as the advanced technology essential to any advanced system.

Value is your reward for selecting the Complete Computer Company.



**National Advanced Systems**

# DATA MATION®

MAY 1982/\$4.00 U.S.A.  
VOLUME 28 NUMBER 5  
This issue, 161,445 copies

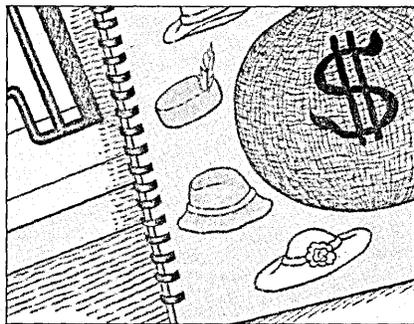
## FEATURES

### 34 IN FOCUS

CUT  
There are tough times ahead for IBM's mainframe competitors, reports John W. Verity in the "1982 Cpu Market Survey." The results come from more than 5,500 responses to a survey conducted by DATAMATION.

### 94 APPLICATIONS SOFTWARE SURVEY

**Data Decisions**  
Ratings of 59 applications software packages based on more than 2,000 responses from active users.



### 113 I'M LEARNING AS FAST AS I CAN

Today's dp execs must be both technology gurus and management whizzes. There's a wide variety of seminars, courses, workshops, and literature to help them keep up.

### 122 CONVERSATIONS WITH AN INTELLIGENT CHAOS

**Vincent Rauzino**  
According to the author's home-grown biological imperative, computers will evolve into machines with the characteristics of the right hemisphere of the human brain.

### 139 INTERNAL DATABASE MANAGEMENT

**R.A. Baker**  
A technique for meeting the needs of programs too large to do without data management but too small for a complete DBMS.



### 148 NCC PRODUCT PREVIEW

Sneak a peek at more than 50 products that will be on view for the first time at Houston's Astrodome June 7 to 10.

### 167 SERVICE OR PROFIT CENTER?

**Alton R. Wheelock**  
A company's structure and management philosophy determine which way its computer services will be organized.

### 180 AN MIS MODEL FOR CHANGE

**Harvey Gand**  
A new model that adjusts to the pressures of immediate needs while never losing sight of essential internal department stability.

### 233 READERS' FORUM

A day at the races according to Raymond Onion is detailed in "Smart Money." Edward R. Lawrence then describes how software can both teach and be taught in "The Pygmalion Approach." Warren Eberspacher then takes us "Through the Looking Glass."

COVER ILLUSTRATION BY MICHAEL DORET

## NEWS IN PERSPECTIVE

- 48 **ASSOCIATIONS**  
A voice of the industry.
- 50 **MAINFRAMES**  
Full court press.
- 57 **RESEARCH**  
Look inside Cray.
- 61 **SERVICES**  
Citicorp free for dp entry.
- 64 **SUPERCOMPUTERS**  
Seeking speedy software
- 73 **TELECOMMUNICATIONS**  
RCA Globcom.
- 77 **STRATEGIES**  
Cautious Texans regroup.
- 80 **EMPLOYMENT**  
Brain drain again.
- 88 **WORKSTATIONS**  
Mark IV for the masses.
- 88 **GRAPHICS**  
Tek eyes market openings.
- 90 **PERIPHERALS**  
Printers for the office

## DEPARTMENTS

- 8 **LOOKING BACK**
- 13 **LOOK AHEAD**
- 18 **CALENDAR**
- 23 **LETTERS**
- 31 **EDITOR'S READOUT**  
Thoughts about nuclear war.



- 193 **PEOPLE**
- 197 **HARDWARE**
- 205 **SOFTWARE & SERVICES**
- 209 **SOURCE DATA**
- 220 **MARKETPLACE**
- 230 **ADVERTISERS' INDEX**

## OEM SUPPLEMENT

- 192-4 **OEMS: WHO THEY ARE, WHAT THEY DO**
- 192-23 **WHY DO YOU PAY YOUR SALESPEOPLE?**
- 192-34 **HOT CHIPS! DON'T GET BURNED!**
- 192-41 **SINGLE-BOARD COMPUTERS: THE INDUSTRY'S WORKHORSE**

# What if you're having to clean floppy drive heads too often?



Ask for SYNCOM diskettes, with burnished Ectype® coating and dust-absorbing jacket liners.

As your floppy drive writes or reads, a Syncom diskette is working four ways to keep loose particles and dust from causing soft errors, dropouts.

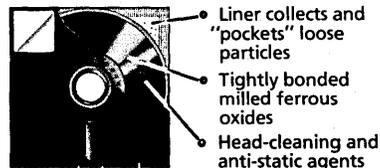
Cleaning agents on the burnished surface of the Ectype® coating actually remove build-up from the head, while lubricating it at the same time.

A carbon additive drains away static electricity before it can attract dust or lint.

Strong binders hold the signal-carrying oxides tightly within the coating.

And the non-woven jacket liner,

more than just wiping the surface, provides thousands of tiny pockets to keep what it collects.



To see which Syncom diskette will replace the ones you're using now, send for our free "Flexi-Finder" selection guide and the name of the supplier nearest you.

Syncom, Box 130,  
Mitchell, SD 57301.  
800-843-9862; 605-996-8200.

## SYNCOM

Manufacturer of a full line of flexible media

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  
**Copy Editor** Florence Lazar  
**Associate Editor** Kenneth Klee  
**Assistant Editor** Deborah Sojka  
**Assistant Copy Editor** Jill Grossman  
**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** Howard Bromberg,  
 Philip H. Dorn, Bruce W. Hassenyager,  
 David Hebditch, John Imlay, Terry G.  
 Mahn, 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:** 875 Third Ave., New York, NY 10022. 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

875 Third Avenue, New York, NY 10022

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

## Technical Publishing

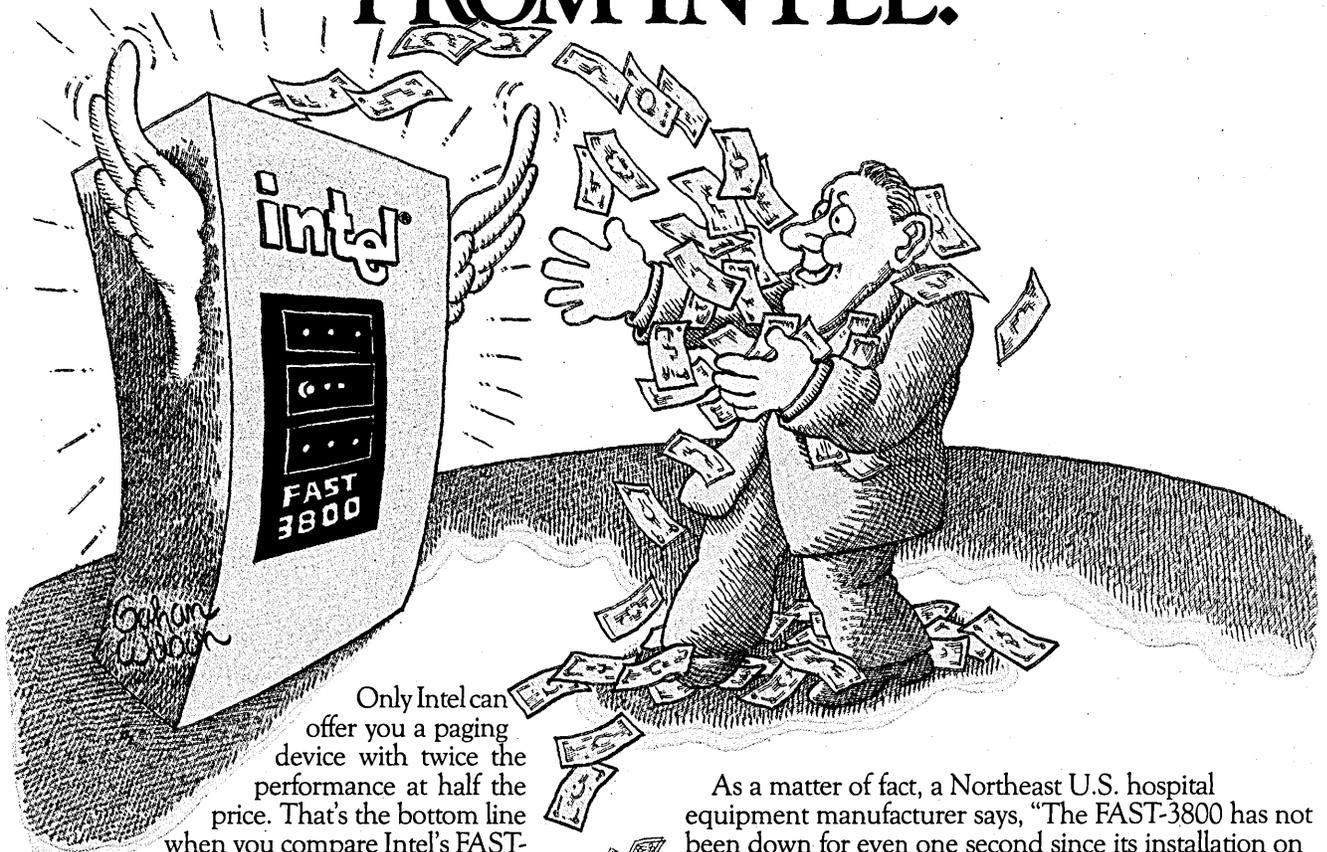
**BB** a company of  
The Dun & Bradstreet Corporation

**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 July, which is semimonthly. 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, 875 Third Ave., New York, NY 10022. 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. (01)422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Second-class postage paid at New York, NY 10001 and at additional mailing office. ©Copyright 1982 by Technical Publishing Co., a Division of Dun-Donnelley Publishing Corp., a company of The Dun and Bradstreet Corp. All rights reserved. "Datamation" registered trademark of Technical Publishing Company. Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Brown Printing Co., Inc. POSTMASTER: Form 3579 to be sent to Technical Publishing Company Circulation Office: 875 Third Avenue, New York, NY 10022. Single copy: \$4.00 in U.S.A.

# CACHE-IN ON FASTER PAGING PERFORMANCE FROM INTEL.



Only Intel can offer you a paging device with twice the performance at half the price. That's the bottom line when you compare Intel's FAST-3800 family of semiconductor disk paging devices to IBM's 3880 model 11.

Here's how you cache-in on this great deal from Intel.

Unlike the 3880 model 11, Intel's FAST-3800s typically provide 100 percent coverage of page data sets. That means you get at least twice the performance. For less cash. Because the data sets are there—not out in another disk unit—when the CPU requests them.

You can also benefit from Intel's experience with the microprocessor. (We introduced it in 1971.)

The heart of the FAST-3800s is Intel's iSBC™ 86/12 single-board computer. The microcomputer selected by many major DP manufacturers for use in their systems. It is this high-performance microcomputer which other paging devices lack, that uniquely enables the FAST-3800s to either emulate a 2305 or run in VM Native Mode.

Or to perform under DOS/VSE or MVT/VSE\* operating systems.

Or function as a data base assist processor with Intel's SYSTEM 2000® data base management system.

And even emulate various direct access storage devices. This adds up to greater performance from a microprocessor-based design. Where software compatibility is no problem.

You can further profit from the FAST-3800s' dependability. The FAST-3800 semiconductor disks are self-healing to ensure the device is virtually fail-safe.

As a matter of fact, a Northeast U.S. hospital equipment manufacturer says, "The FAST-3800 has not been down for even one second since its installation on our 4341 in August, 1981." Dependability is a key part of our performance.

If a problem should arise, Intel product service offices are located in some 60 U.S., Canadian and European cities.

Why pay twice the cash for half the cache? Contact Intel's Marketing Information Office at 800/531-5304. In Texas call 512/258-5171. Or return the coupon today.

**intel**® delivers solutions

Name \_\_\_\_\_  
 Organization \_\_\_\_\_  
 Address \_\_\_\_\_  
 City/State/Zip \_\_\_\_\_  
 Phone ( ) \_\_\_\_\_  
 CPU/Operating system \_\_\_\_\_

Return to Intel Marketing Information Office, P.O. Box 9968,  
 Austin, TX 78766.

\*Developed by Software Pursuits, Inc.

CIRCLE 7 ON READER CARD

# "THERE'S THING AS IN THE SHIP DEPARTMENT

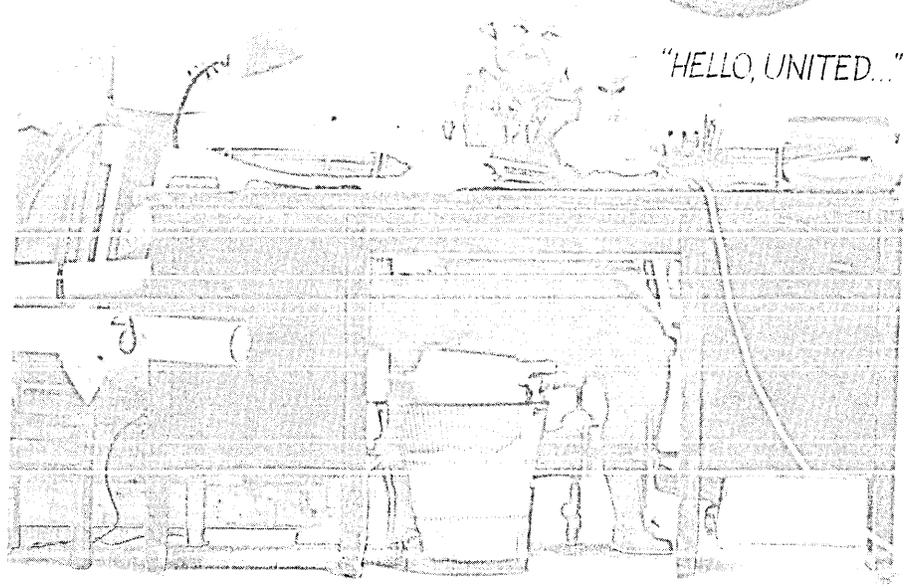
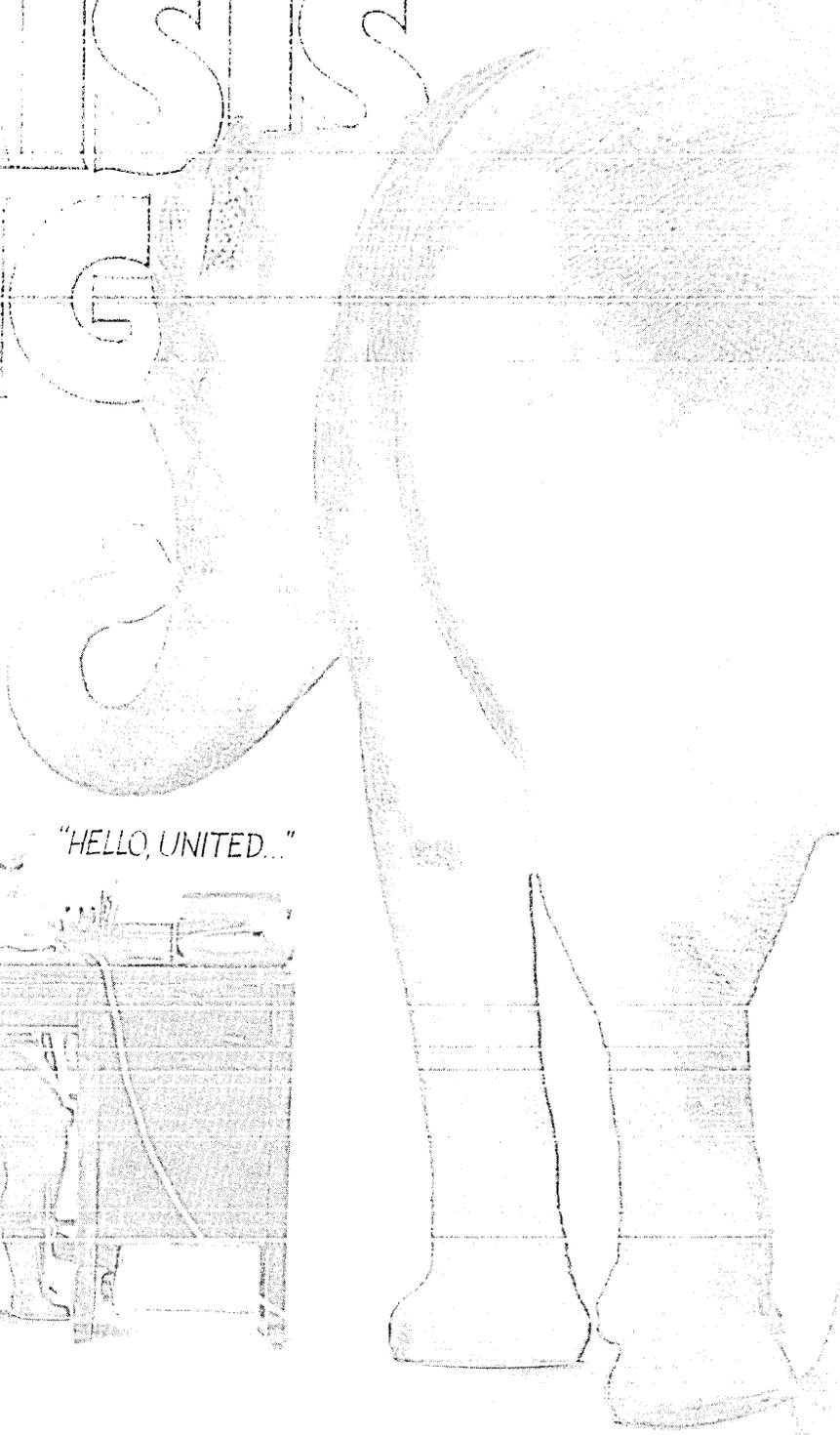
Ever wonder what makes the guys in shipping so smart?  
So cool? So free of stress under fire?

Very simple. They know that no matter what you send them, they can move it out by picking up the phone and saying two words, "Hello, United?" That call sends **ANYTHING**... doesn't matter how big, small, fragile, clunky, strange... **ANYWHERE**... whether that's Cincinnati, Ohio or Canton, China. (If it's Canton, we'll arrange the connecting flights, deal with tariff regulations, foreign customs, everything.) **ANYTIME**... next week. Tomorrow. Even next flight out today. So no matter what you're sending, just send it to the guys in shipping and quit worrying. They've got everything under control.



# ANYTHING GOES

NO SUCH  
A CRISIS  
PPING  
NTW



UNITED AIR CARGO

CIRCLE B ON READER CARD

# Cavri's Interactive Video System

## A training tool

For any of your training needs, Cavri's electronic system will be totally in tune with the learner's ability. Faster, more efficient and cost-effective than any other method.

## A talking file

Extensively documented software files and retrieves computer and related audiovisual information. Quickly and efficiently to produce a far greater ROI.

## A living catalog

Create a video maintenance manual, for example. Then pinpoint a problem instantly and solve it by following a prescribed, step-by-step repair procedure.

Whatever your training, filing or cataloging needs, we have the hardware and the software. And the experience to serve you completely. Call Cavri today.

*The interactive video specialists.*



26 Trumbull Street  
New Haven, CT 06511  
203/562-4979

***It's all we do.  
So we have to do it better.***

**CIRCLE 9 ON READER CARD**

Twenty Years Ago/Ten Years Ago

# LOOKING BACK

## TOO MANY LANGUAGES

*May 1962:* "The proliferation of 'machine independent' programming languages has two well-known and pernicious effects: it inhibits the communication of information processing procedures between people and computers, and what's worse, it distracts attention and effort from that which is to be communicated—namely, procedures for solving real, worthwhile problems." Such were the sentiments of Christopher Shaw, senior programming analyst with System Development Corp. Some of yesterday's contenders for the language popularity contest have dropped out of the spotlight (MAD, JOVIAL, and NELIAC), while others (COBOL, ALGOL, Ada, and FORTRAN) kept on pushing for recognition.

Why so many languages? Besides the fact that "everybody wants to get into the act," said Shaw, "the main reason is that none of the presently available languages is adequate as a general purpose standard." Therefore, new languages keep coming, but none satisfy the overall problem. So we know that many slightly different languages are not the answer, but is one language enough? "Almost," answered Shaw. He believed it was technically feasible to develop a single, procedure-oriented programming language to handle just about any production application, and added that "a language with the capability for self-defined growth could handle most nonproduction applications as well."

Shaw, however, did not expect complete standardization to occur, especially not in the foreseeable future. "The best that can soon be expected is a triple standard: ALGOL, COBOL, and a language suitable for systems programming." To make matters worse for standards seekers, he concluded, continual developments in hardware and programming techniques could make a standard "less than optimum" even before it was accepted.

## WHO WAS WHO AT IBM

*May 1972:* After 16 years with IBM, Robert W. McGrath left to establish his own sales training and marketing consulting business. This turnover cycle, so common to Big Blue, got McGrath thinking. Wouldn't these people who had worked together for years, all over the world, be interested in

knowing where their contemporaries were now located? Thus, the idea for the IBM *Alumni Directory* was born.

The first step was to write 25 letters to old friends still at IBM, outline his project, and ask each of them for the names and addresses of former IBMers. Although he did encounter some resistance ("What! This could cost me my job!" and "I can't help you, this is confidential information"), he eventually gathered 717 names, and the first issue was published.

By spring of '72 the fifth edition, containing almost 1,500 names and addresses, was on the presses. In this issue, McGrath included portions of the IBM *Song Book*, dating back to pre-World War II days. The songs, sung at dinners, receptions, and company meetings, bore titles like "March On With IBM," "Hail To The IBM," and the "IBM School Song."

What began as a "labor of love" turned into a hobby for McGrath, and quite a profitable one at that. Copies of the directory sold for \$10 each, or \$25 for a year's subscription (four issues). We know that the 1,500 alumni received copies at discount rates, but McGrath would not say how many other copies were purchased—that remained a secret between him and the post office. Because more than a third of the people listed in the directory had titles of president, vice president, or chairman of the board, McGrath's list was something more than a nostalgia item.

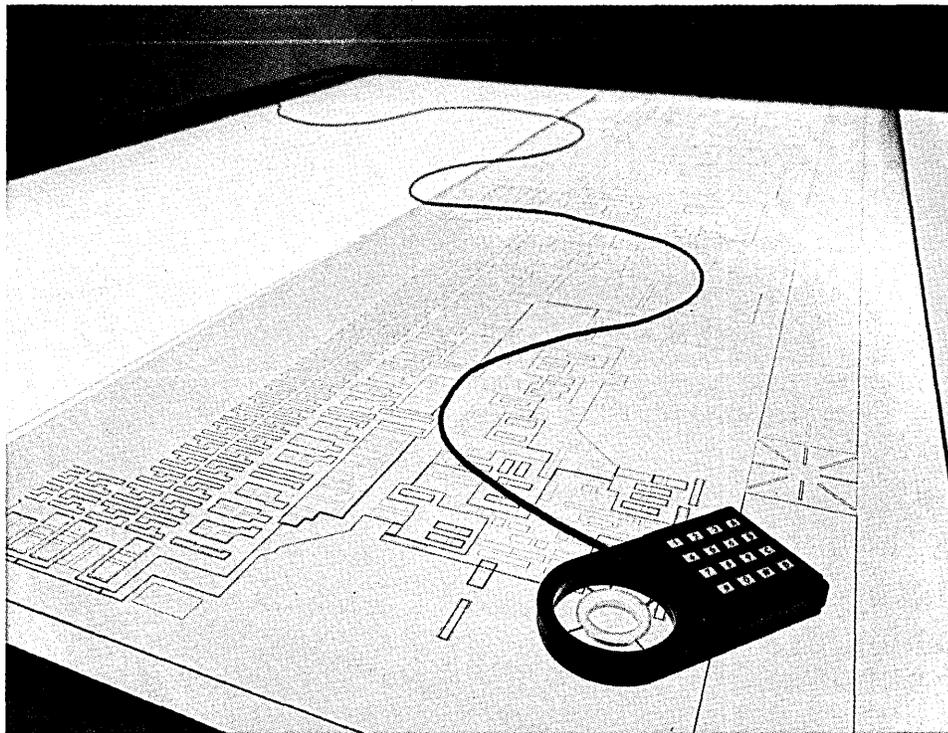
If you're wondering what IBM's official reaction to the directory was, there was none. McGrath simply received a purchase order from the Armonk, N.Y., corporate headquarters' library.

## EASTERN PHILOSOPHY

"Already victims of groupthink, the Japanese may be first with computerthink." In 1972 a Japanese Computerization Committee proposed a "major revamping" of schools, businesses, and government to prepare for "The Information Society of the '80s." Recommendations included computer education at the primary and junior high school levels, emergency and rural medical information systems, automated traffic control, air and water pollution alarm systems, and automated supermarkets.

—Deborah Sojka

# 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  $\pm 0.0105$  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.

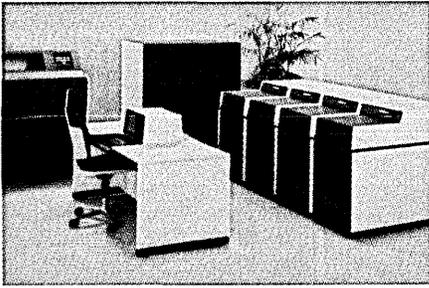
**CALCOMP**  
A Sanders Graphics Company  
**SANDERS**

California Computer Products, Inc.  
2411 West La Palma Avenue  
Anaheim, California 92801  
Telephone (714) 821-2011

**CIRCLE 10 ON READER CARD**

# New!

## The NCR V-8500 II computer series for even better price/performance.



**More systems, larger memories than ever — for faster transaction processing.**

The new V-8500-II Series now offers an even wider range of systems. Seven models, including a new, smaller, entry-level system and two new, larger computers, all provide virtual operation, increased memory and expanded performance.

**Sharply increased price/performance** — This new series now offers more power per dollar invested. More than 40 percent better than NCR's already highly competitive price/performance levels.

**Lower entry level** — The new V-8535-II is a 32-bit processor with cycle time of 112 nanoseconds and a memory of one megabyte. It employs NCR's powerful Virtual Resource Executive (VRX) operating software.

**Expanded memory** — For most of the enhanced systems in the new series, potential memory is increased from 50 to 100 percent. Maximum memory now ranges from one megabyte for the V-8535-II to eight megabytes for the dyadic V-8595-II.

**New dyadic systems** — The NCR V-8500-II Series now includes three dyadic systems. Systems that combine symmetrical, tightly-coupled dual processors in a single cabinet. Both processors share all system resources equally with continuous dynamic load leveling.

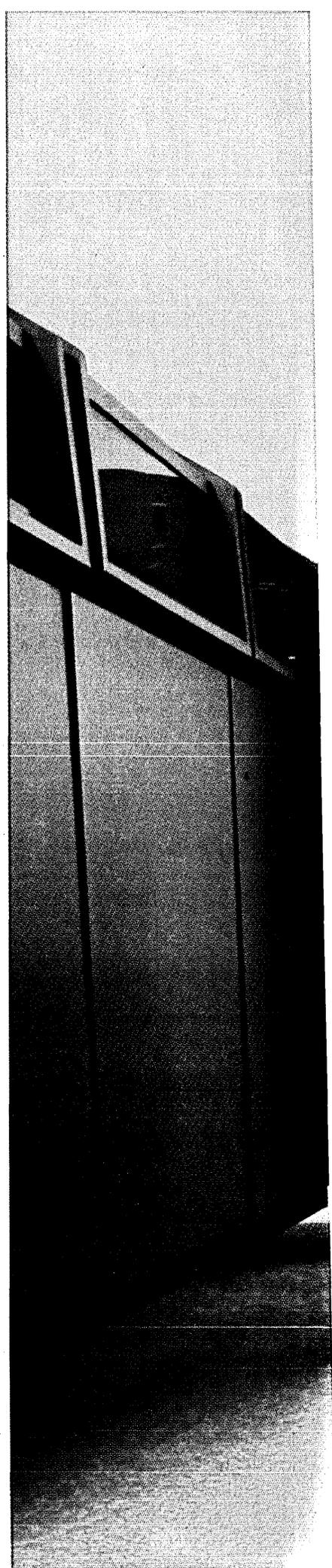
**Migration Path Engineering** — As always, NCR provides easy transition from one system to the next without difficult conversion of software.

For more information, just call toll free (800) 543-8130 (in Ohio, 800-762-6517). Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

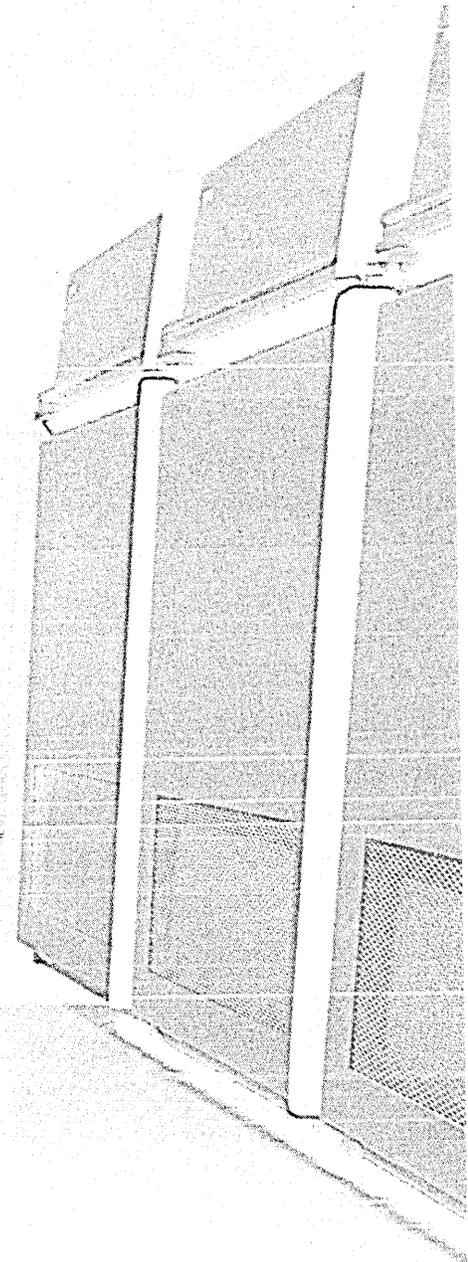
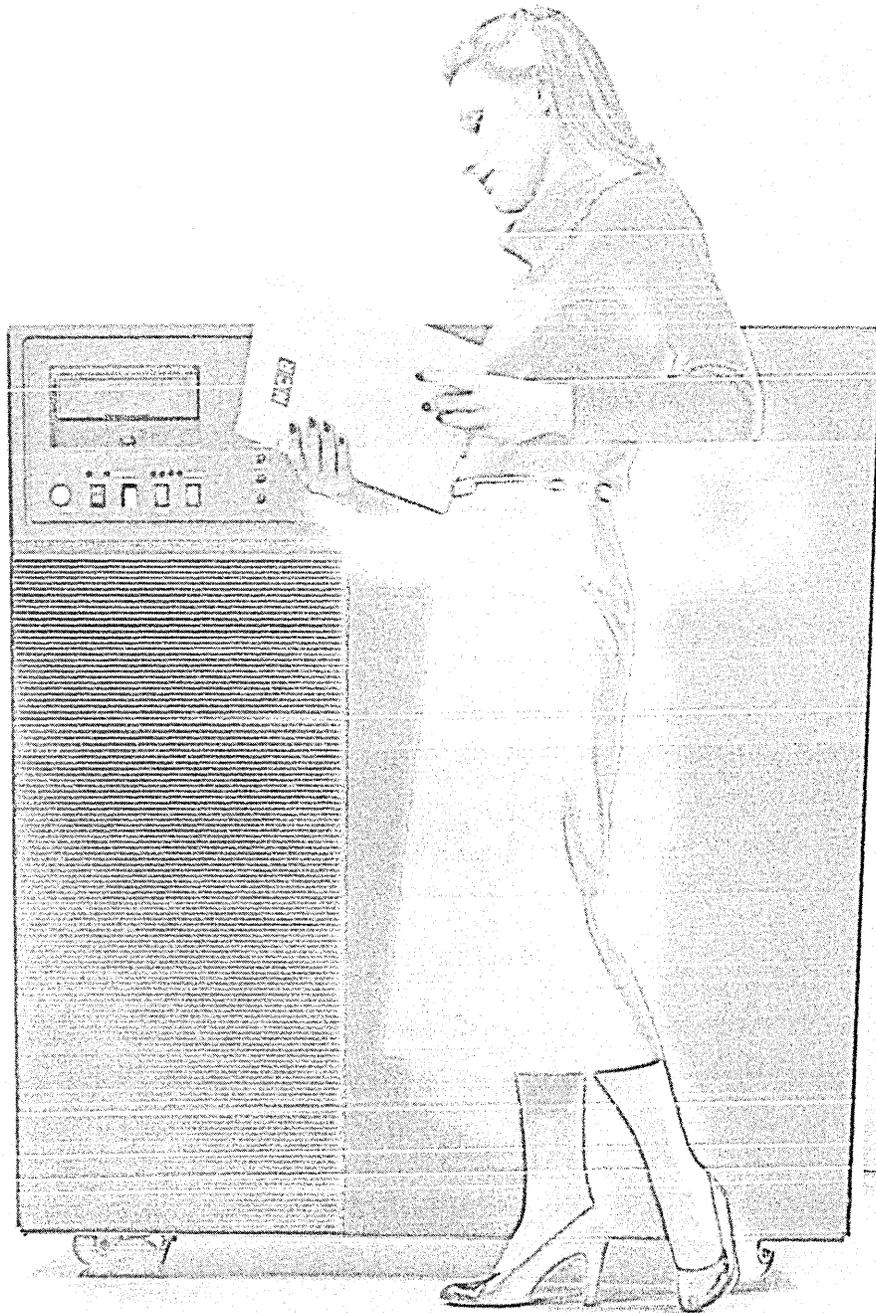
### **NCR**

98 Years Experience  
in Business Systems

**CIRCLE 11 ON READER CARD**



See the  
NEC V-8500-II at the  
National Computer Conference,  
Booth 1127.





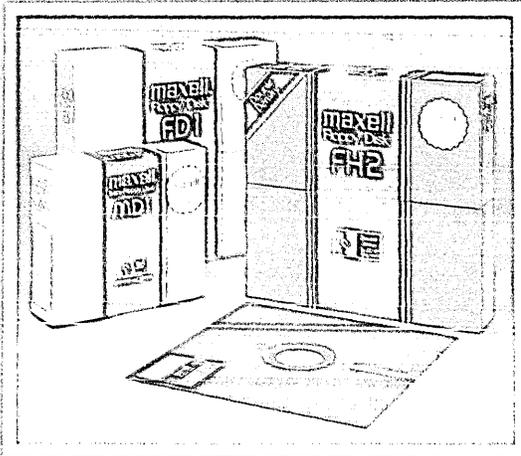
In an age when new standards are constantly emerging,  
one disk consistently meets or exceeds them all.

## Maxell. The Gold Standard.

Not all disks are created equal. Some are better than others. To find out what's best for you, look for Maxell disks. They now carry the Gold Standard symbol of quality. It's your assurance Maxell disks meet or exceed every definition of quality. No matter who establishes it. We've earned this universal superiority by never relaxing our uniquely demanding quality control. Every aspect of manufacturing is checked, then checked again.

Your benefits are many. Take the perpetual problem of drop-outs. A drop-out is a tiny defect that wastes time and degrades computer accuracy and performance. Now that you understand what a drop-out is, forget it. Maxell disks don't have any. Each disk comes to you certified

drop-out free at the time of manufacture. You can depend on this quality protecting your valuable programs and programming time, indefinitely. We've run disks over ten million passes under conditions designed to find weak points and wear. We couldn't. And you won't.



There is a Maxell disk for the floppy system you use, or plan to use. Check your computer's instructions. Or write for our complete, highly informative brochure.

When you set the Gold Standard as your level of quality, you'll benefit from improved disk performance. Immediately Bank on it.

**maxell**

Maxell Computer Products Division, 60 Oxford Drive, Moonachie, N.J. 07074, 201-410-8020

Circle 20 on Reader Card

# LOOK AHEAD

EVER HEARD  
OF HONEYBELL?

Hot off the rumor mill: AT&T is instigating acquisition talks with Honeywell, recent Honeywell defectors tell us. Some of these sources even say the reason they're leaving Honeywell is they don't want to work for Ma Bell. But both companies have decried the rumor. (Honeywell said "the company has no comment"; AT&T said, "It's not true.") AT&T is, of course, looking for a computer challenge to IBM and, sources say, just may prefer to throw its vast resources around a Honeywell mainframe rather than having to tow the IBM compatibility line. But then, who knows if HoneyBell is more than a rumor? As the AT&T spokesperson told us, "All in one month, we've been linked with DEC, UPI, and now Honeywell. And it just ain't so."

AMDAHL HAS  
BIG AMBITIONS

Look for Amdahl's Tran operation to branch out from its traditional business shortly with a large communications system that sources say will do what AT&T's scotched ACS would have done. The system is understood to be based on Tran's XPRO X.25 switch, which will be outfitted to connect different terminals and computers, convert protocols, and open gateways to public and private networks.

Meanwhile, Amdahl is readying a line of thin-film disk drives that will compete with IBM's 3380. Using head-disk assemblies (HDAs) built by partner Fujitsu, Amdahl's drives will be 3350-compatible and thus won't require reblocking of data files as does migration to the 3380.

NONSTOP  
ANNOUNCEMENTS

Big news from Tandem this month: a comprehensive information management system plus satellite capabilities. The new software products will provide an architecture for information management, combining the traditional transaction processing capabilities of Tandem's NonStop systems with text handling, electronic mail, and fax -- all on a datacom backbone net that will provide Tandem users with a single integrated corporate information resource. What's more, the system provides gateways for a wide variety of currently incompatible technologies. Through a joint business pact with American Satellite Tandem will offer a satellite link for integrating the computer/communications network.

CAN SEE IT NOW

Development of an optical disk storage product is on schedule at Storage Tech, which plans to introduce its first product in late '83. Two

# LOOK AHEAD

machines are on the drawing boards -- one that reads and writes and a smaller, "very low-cost" read-only unit designed for ddp applications.

Meanwhile, STC hasn't forgotten the magnetic disk. It's planning another kicker for the aging 3350 disk, plus three new tape drives -- one for oems, one to match IBM's expected high-end drive, and a general purpose medium-performance unit. First of the tape drives should appear in June

And the firm's cpu plans are on track; coming soon is a CMOS-based dual processor with 7 to 8 MIPS performance. Following an improvement in chip density, a 10 to 14 MIPS machine will debut.

## WITH A LITTLE FORESIGHT

The Business Information Products Division of United Telecom Computer Group, San Diego, next month will introduce a microcomputer version of its popular Foresight financial package, which has been around in a variety of versions since '69. Micro-Foresight will run on the Vector-Graphics 3005, the IBM Personal Computer, and Apple computers.

## ON THE THRESHOLD

Voice recognition a losing market? Not for much longer, says Threshold Technology, a pioneer in the field. Unlike Heuristics, Centigram, and Exxon, all of which bailed out of that market, Threshold has stuck with it and now is banking on being profitable by mid-'83. Its moneymakers? Auricle, a two-chip set containing the processor for the Delran, N.J., firm's voice system which will be on the market by year-end, and a display unit due out in June of '83.

## RUMORS AND RAW RANDOM DATA

Word has it that at least 30 new graphics offerings will be announced and shown for the first time at the annual National Computer Graphics Assn. conference, scheduled for June 13-17 in Anaheim....Come the first of June, CDC's Cybernet users can tap into the power of a 205 supercomputer via the data services net....Watch for SEL/Gould to get into the OA market with an engineering workstation concept that would include CAD/CAM features as well as electronic mail, text processing and the like....Also eyeing the OA market is Boeing, which is considering offering office automation features such as electronic mail via its own data services net....Personal investing and the brokerage business are two markets Tandy is rumored to be pushing into with its snazzy PC-2 personal computer....Several members of the 820 project at Xerox's Office Products Division are getting the ax, including W. Dal Berry, project head and head of the business unit, and three of his top people.





# IS YOUR INVENTORY MARKET?

*The ability to respond quickly to rapidly changing market conditions can mean the difference between getting rich and getting stuck.*

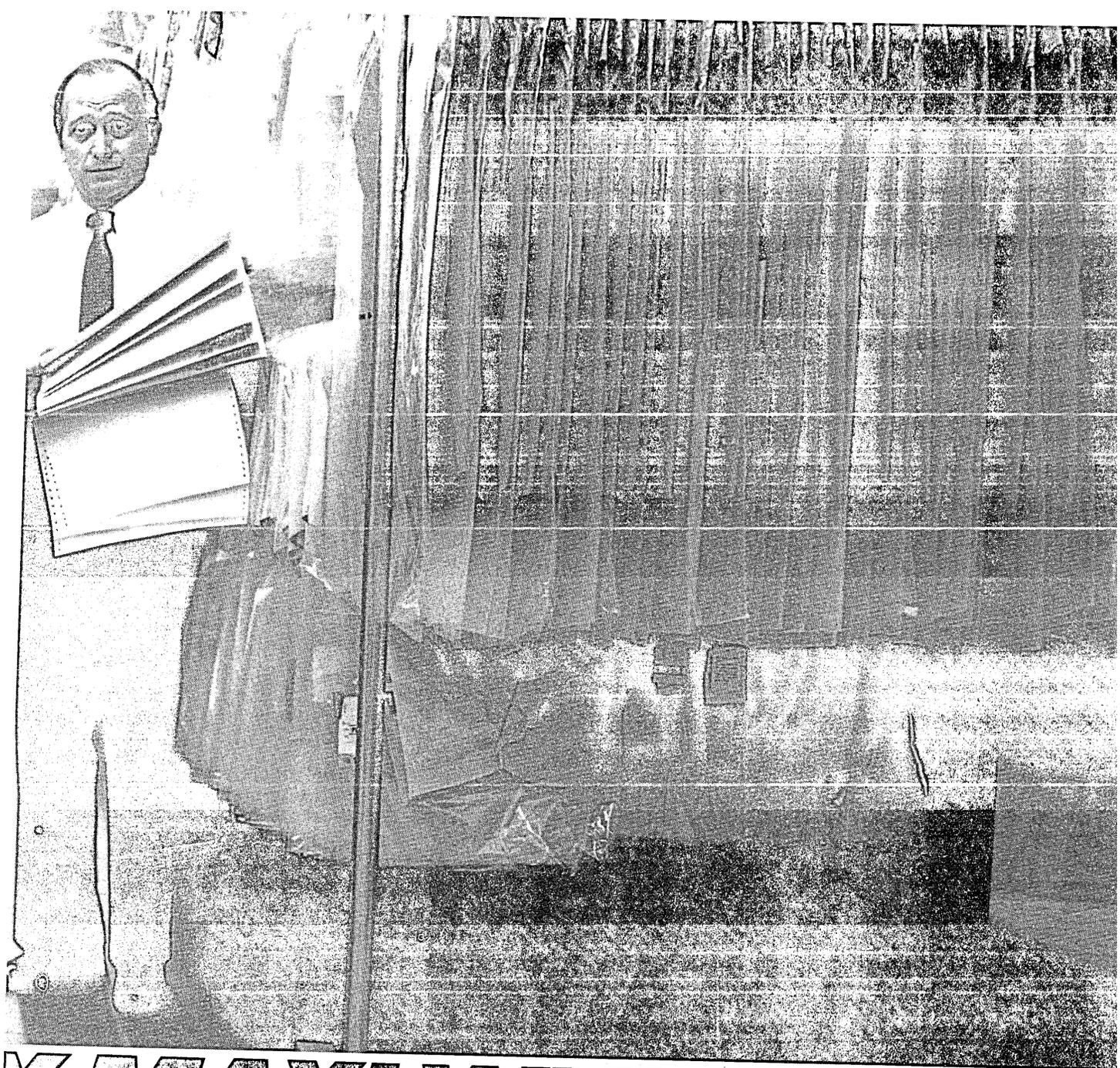
*But in order to make quick business decisions, you need up-to-the-minute information instantly. And you need it in a form that you, the decision-maker, can use.*

*Precisely why Sperry Univac created System 80 ESCORT.*

*ESCORT is software that lets you use the computer to get immediate answers to your questions. Without learning computer language. And without a programmer.*

*What's more, with ESCORT you can design your own applications. Even add new information to the computer's data base. All by yourself.*

*And you can do all this even if you've*



# Y MAXI WHEN THE 'S MINI?

never seen a computer before.

Providing, of course, that the computer you use with ESCORT is the Sperry Univac System 80. Which happens to be the ideal computer for medium-to-large companies anyway.

So if you're not getting all the information you need to make quick business decisions, decide right now to call your Sperry Univac marketing office for a free demonstration.

Or write to Department 100, P.O. Box 500, Blue Bell, PA 19424, for our product brochure.

And we'll show you how Sperry Univac System 80 ESCORT can minimize your problems. While maximizing your profits.

**SPERRY UNIVAC**  
The computer people who listen.

CIRCLE 136 ON READER CARD

# CALENDAR

## MAY

### **Europe Software '82, May 25-27, Utrecht, The Netherlands.**

The show is limited to software and services, with hardware only permitted to demonstrate the software. Again this year there will be a separate U.S. exhibition. Contact John Ferchak, U.S. Department of Commerce, International Trade Administration, Foreign Commercial Service, American Embassy, Lange Voorhout 102, 2514 EJ, The Hague, Netherlands.

## JUNE

### **ACM SIGMOD Conference, June 2-4, Orlando, Florida.**

The annual international conference deals with computer database-related problems and research. Contact Don Batory, Computer & Information Sciences Dept., University of Florida, 512 Weil Hall, Gainesville, FL 32611, (904) 392-2371.

### **NCC, June 7-10, Houston.**

More than 600 exhibiting firms and 80 technical sessions will be found this year at the Astrodomain. Pioneer Day will honor the developers of FORTRAN. Contact AFIPS, 1815 N. Lynn St., Arlington, VA 22209, (703) 558-3610.

### **NCGA '82, June 13-17, Anaheim, California**

The National Computer Graphics Association's third annual conference and exposition will offer over 120 exhibitors in the graphics field in more than 17 application areas. Contact the National Computer Graphics Association, 2003 M St. NW, Suite 330, Washington DC 20036, (202) 466-5895.

### **World Computing Services Congress III, June 20-23, Copenhagen, Denmark.**

Computer service firm reps from around the world will gather to discuss issues relating to the computer services industry and participate in workshops on international trade, management, and technical issues. Contact Thomas Farewell, ADAPSO, 1300 N. 17th St., Arlington, VA 22209, (703) 522-5055.

### **Syntopican X, June 21-24, Kansas City.**

For Syntopican's 10th anniversary, the conference will focus on the key role of the new information manager. Contact IWPA, Conference Services Dept., 1015 N. York Rd., Willow Grove, PA 19090, (215) 657-6300.

### **COMDEX/Spring '82, June 28-30, Atlantic City.**

This annual event is especially geared toward the needs of small system vendors and their ISOs (independent sales organizations). Contact the Interface Group, P.O. Box 927, 160 Speen St., Framingham, MA 01701, (617) 879-4502.

### **Videotex '82, June 28-30, New York City.**

The conference will examine the several areas deemed most important for videotex expansion. Special emphasis will be placed on meeting the challenge of marketing videotex in the U.S. Contact E. R. Dawe, On-Line Conferences, Ltd., Argyle House, Joel St., Northwood Hills, Middlesex, England, 011-44-9274-28211.

## JULY

### **International Manufacturing Systems Conference '82, July 11-15, Buffalo, New York.**

The conference theme is "The Technology of Productivity." Exhibits, vendor presentations, plant tours, and seminars will comprise this year's show. Contact IMSC '82, 186 North Water St., Rochester, NY 14604, (716) 232-3950.

### **ACM SIGGRAPH '82, July 26-30, Boston.**

The first two days of SIGGRAPH will feature courses on computer graphics from introductory to advanced levels, while the last three days will concentrate on technical sessions. Contact Elaine Sonderegger, P.O. Box 353, Derby, CT 06418, (203) 735-9980.

## AUGUST

### **10th IMACS World Congress, August 8-13, Montreal, Canada.**

This year's theme is "Systems and Simulation and Scientific Computation." Contact Prof. S. Sankar, Concordia University, Department of Mechanical Engineering, 1455 de Maisonneuve Blvd. W., Montreal, Quebec H3G 1M8, Canada.

### **Second International Computer Engineering Conference and Show, August 15-19, San Diego, California.**

The technical presentations will include graphics, CAD/CAM, robots, database management, and human-machine interfacing. Contact the American Society of Mechanical Engineers, United Engineering Center, 345 E. 47th St., New York, NY 10017, (212) 644-7740.

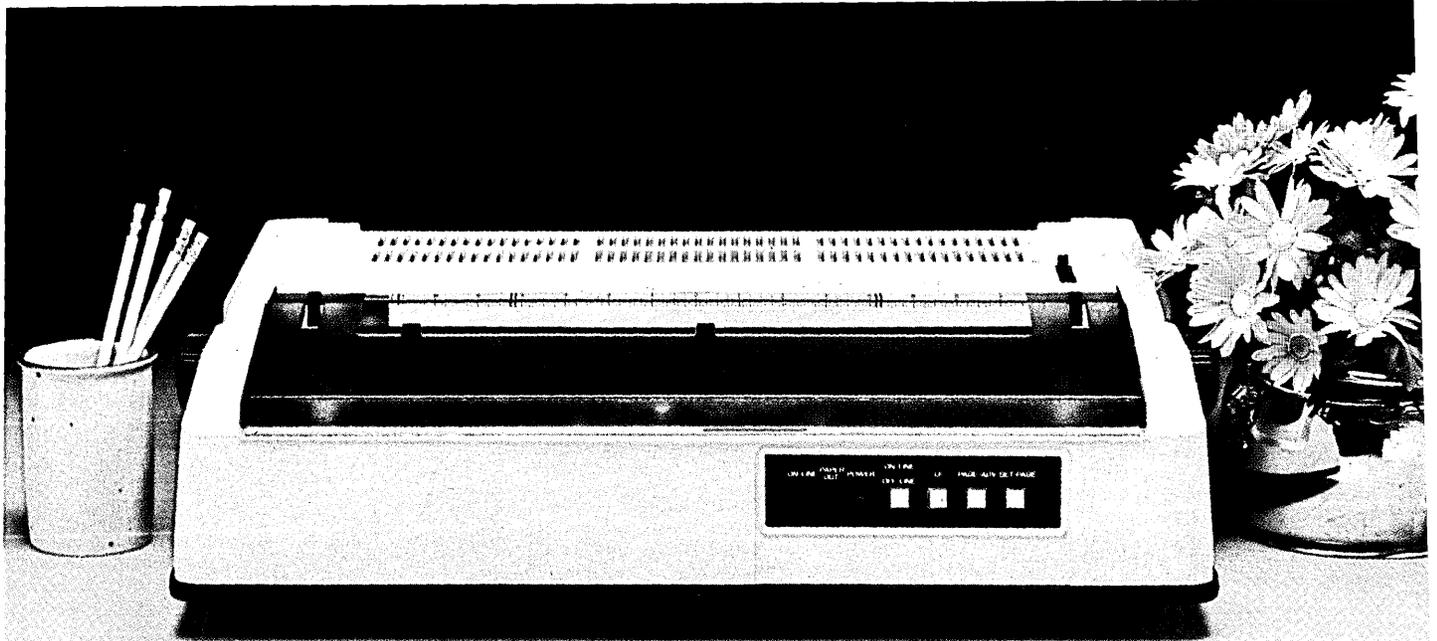
## SEPTEMBER

### **ICCC '82, September 7-10, London.**

The Sixth International Conference on Computer Communication is hosted by British Telecom and sponsored by the International Council for Computer Communication. Contact ICC '82, P.O. Box 23, Northwood Hills, HA6 1TT Middlesex, England, 44-9274-27511.

### **Swissdata '82 and Ineltec, September 8-12, Basel, Switzerland.**

These two shows are blended into an industrial electronics and computer sciences trade fair by the Foreign Commercial Service at the American Embassy in Bern. Contact Kurt Gross, American Embassy, P.O. Box 1065, 3001 Bern, Switzerland, 031-43-70-11.



C. Itoh's new *F-10 Printmaster* Daisy-wheel printer is the compact beauty you can easily get attached to. Just look at what you get:

1. Small footprint, low-profile design (only 6" high) fits easily into your system.
2. Downloading wheel and impact sequences allow use of a variety of unique wheels and permit OEM's to tune the printer to specific needs.
3. Comes in two Shannon-text-rated speeds. 40 CPS and 55 CPS.
4. Industry-standard parallel or RS 232-C interfaces and ETX/ACK, XON/XOFF protocols provide maximum OEM flexibility and installation ease.
5. Extensive, built-in word processing functions allow easy adaptability and reduced software complexity.
6. Uses mono and dual-plastic wheels. (Unlike metal wheels, dual-plastic provides superior print quality over the entire life of the wheel.)
7. Field proven, firmware intensive technology for increased reliability.
8. Cast aluminum base plate with high quality metal parts provide lasting dependability.
9. Low-noise operation is ideal for office environment.
10. Choice of friction feed or bidirectional tractor feed for precise print positioning of tabular and graphics data.
11. Uses industry-standard wheels and ribbon cartridges available from multiple sources at low prices.
12. Universal power supply is standard and allows worldwide power source compatibility.
13. FCC approved and under 50 lbs. in weight for fast shipments and sales.
14. Easy-to-load wheels with tested and proven method of wheel support (spring loaded with positive detent).

We could go on. But quite frankly, once you see Printmaster perform, you'll never look at another Daisy.

Printmaster is fully backed by C. Itoh's warranty and complete support organization. Contact C. Itoh Electronics, Inc. 5301 Beethoven St., Los Angeles, CA 90066 (213) 306-6700.

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

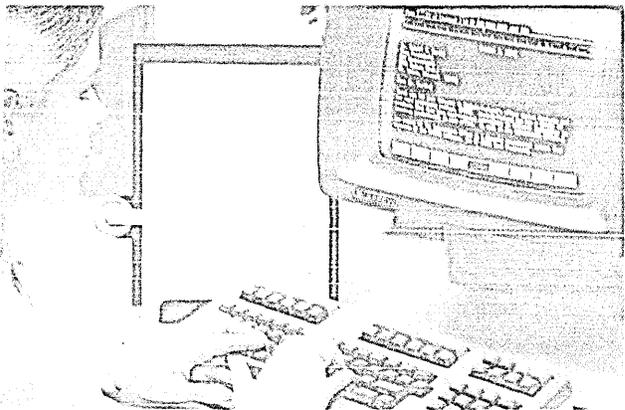
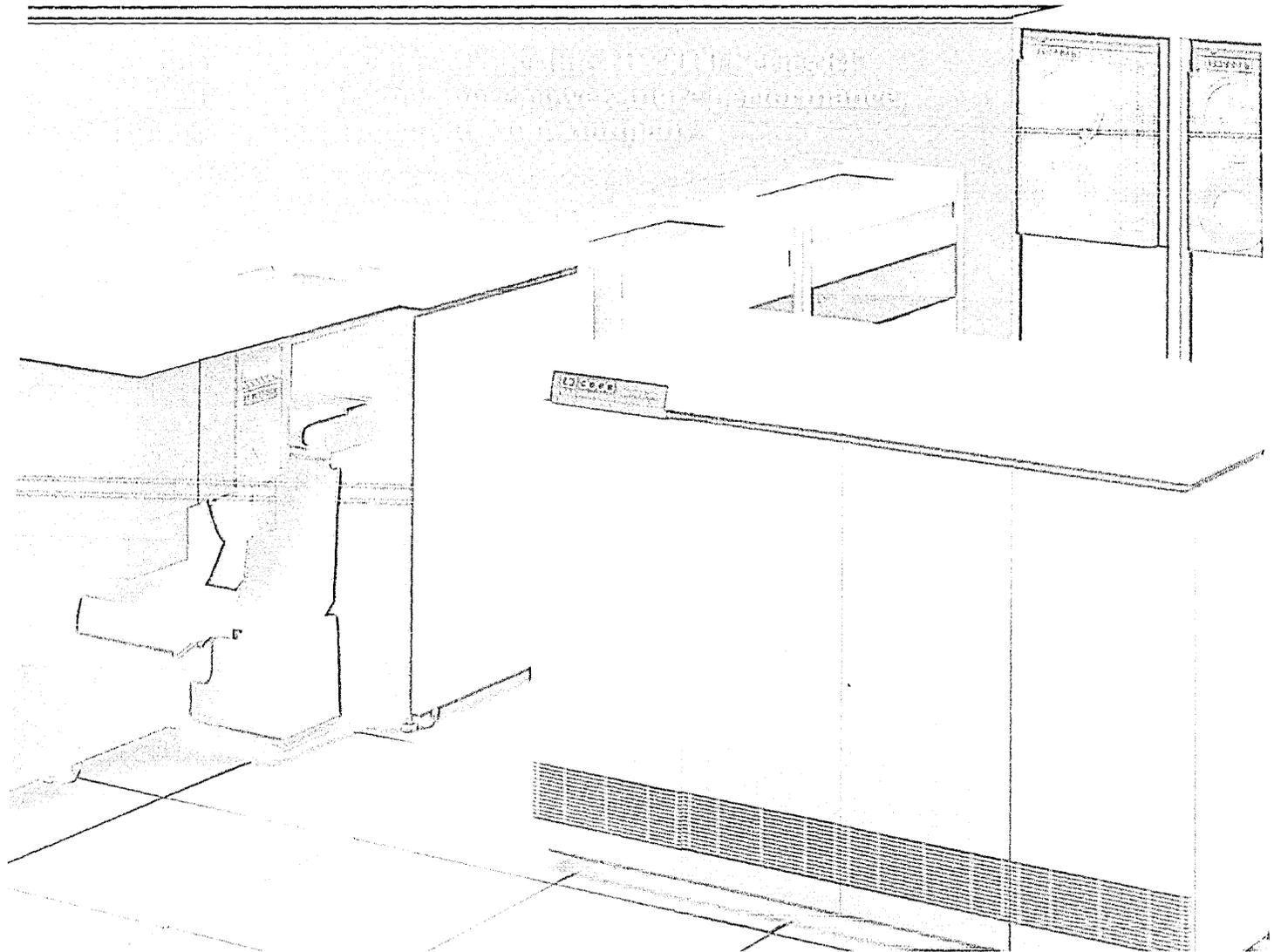


# HOW DO I LOVE YOU? LET ME COUNT THE WAYS.

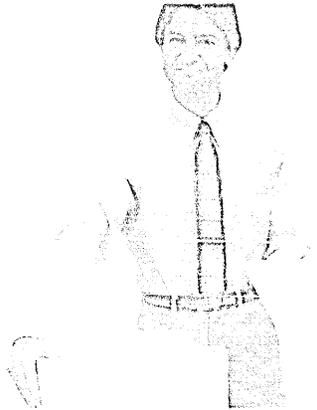
CIRCLE 15 ON READER CARD

See us at NCC Booth #5012

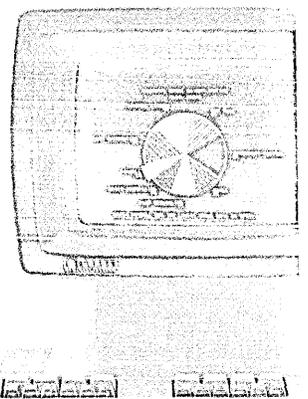
# More pov



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

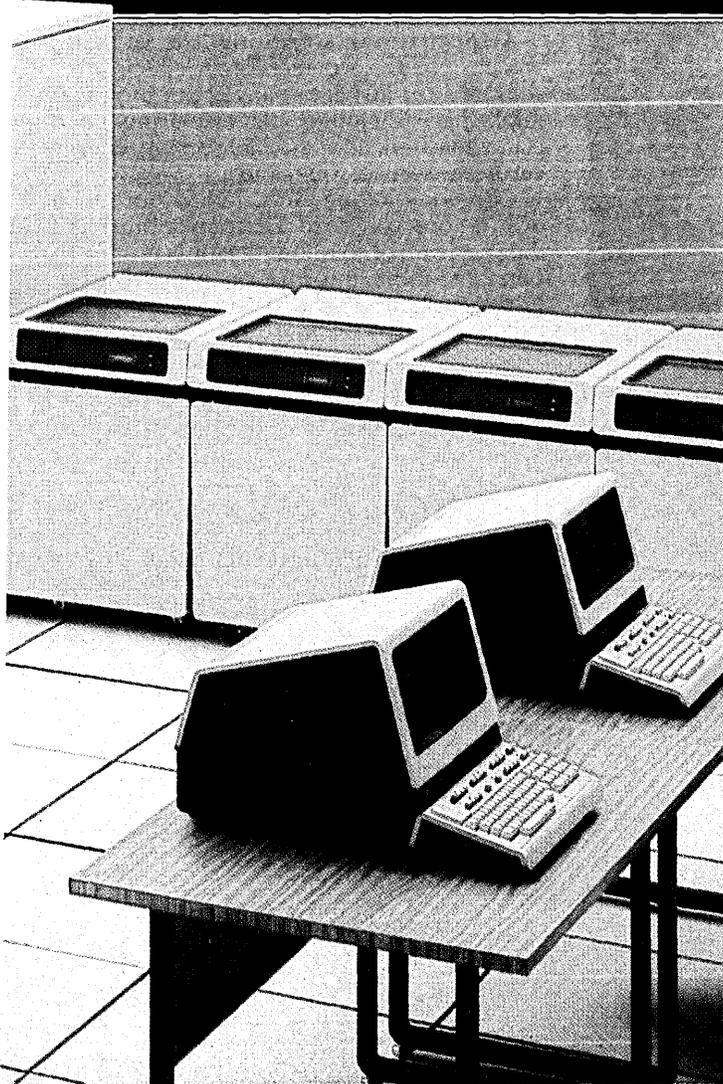


**Applications development time** can be slashed from years to months with our new RAPID/3000 programming tools.



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

# ver 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.

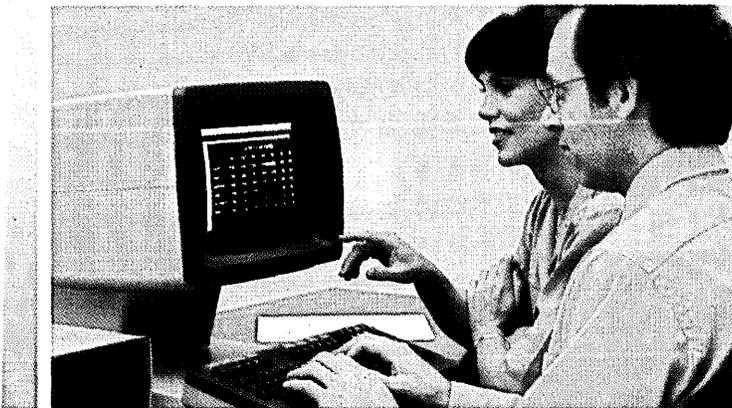
But that's not all. With our new RAPID/3000 programming tools, you can develop business applications in much less time. By automating many routine computer instructions, RAPID/3000 lets you concentrate on the really important jobs.

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 404 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.

## Read all about it.

For more information, send for our new brochure on the HP 3000 Family. Write Hewlett-Packard, Attn: Bob Bond, Dept. 04124, 11000 Wolfe Rd., Cupertino, CA 94015. Or if you'd like to see our systems in action, call 800-227-9750 (in California, 415-857-7257) for the date and location of the Productivity '82 Seminar coming to your area.



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**

**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.

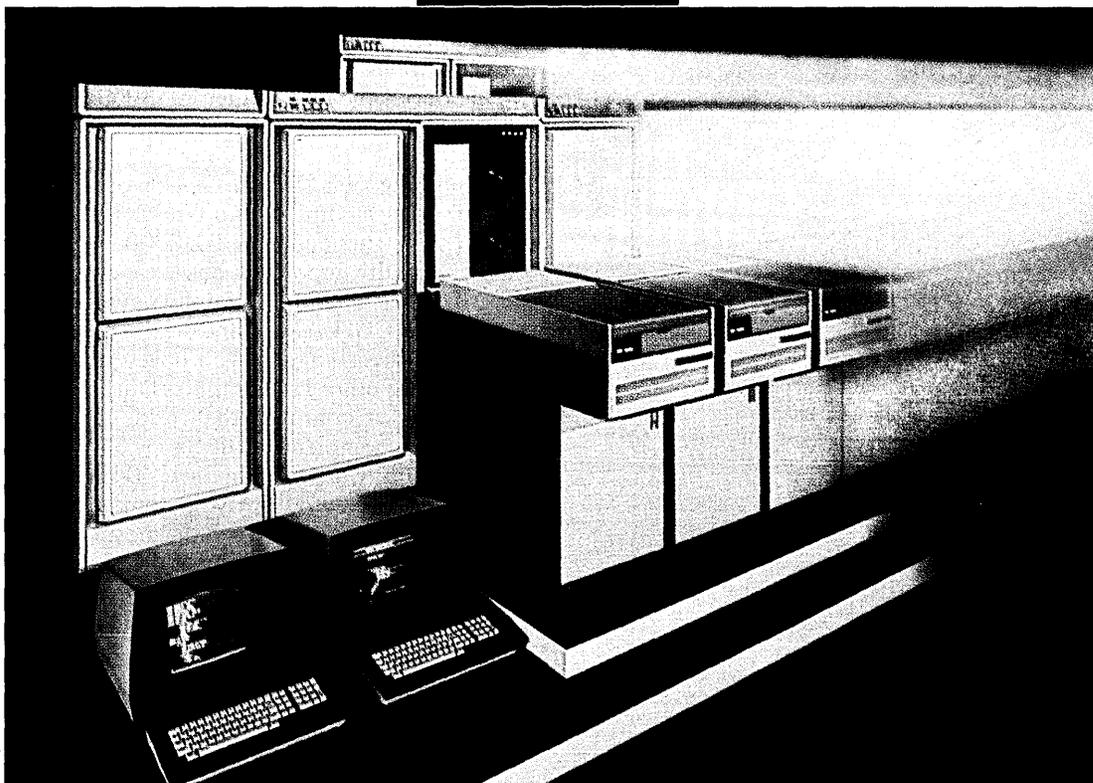
**The economy of compatibility.** The Prime 50 Series is designed around a single operating system, which makes all systems compatible with each other. So you can easily and economically move up to a larger system, or expand to any number of small, remote systems. And you'll have nothing new to learn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

CIRCLE 20 ON READER CARD



Visit us at NCCC, Booth #2103, June 7-10

# LETTERS

## RIFKIN: PRO AND CON

Merrill Cherlin's article, "Waste Not, Want Not" (In Focus, February), eloquently expresses Jeremy Rifkin's argument for the forces of entropy and chaos. Here are a few ideas in support of life and order.

While it is true that entropy rules most of the universe, driving it from high organization toward low, from order to chaos, that's not the whole story. Life is an entropy pump! A plant makes leaves from dirt, a fish makes fins from plants, a bear makes fur from fish. The very process of life is to convert low organization to high, to reverse entropy on a local scale. Whether you attribute the fact to evolution, or to the direct hand of the Creator, our food chain makes Man from the earth!

Man is a toolmaker. The ball-peen hammer isn't much compared to a rose, but the metal and wood in that hammer are more organized than in their natural state because of man. The computer isn't much compared to the mind of a child, but it's a lot smarter than the sand it's made from. And man made it.

So what? So let's not turn away from our tools, our science, our computers. Let's recognize that life is a process of more organization, not of less. Let's preserve our present space in the universe, but let's get out there and find other spaces that can support us, help us grow, help us discover, help us live.

If the universe doesn't belong to the living, it belongs to death. Maybe it's true that death will win in the end. But life has a few billion more years to run. Choose life. Let chaos take care of itself.

R. E. JEFFRIES  
Vice President  
Information Systems Division  
Comshare, Inc.  
Ann Arbor, Michigan

The Entropy law states that matter and energy can only be changed in one direction—from usable to unusable, and that we're soon going to have only the unusable left. Mr. Rifkin's seeming evenhandedness in saying that this problem is equally attribut-

able to capitalist and socialist countries seems disingenuous given one of his recommendations: "We don't want to face it because to face it means we'd have to do a lot of things. Like we'd have to start sharing resources with each other. We'd have to have some more equitable approach to how we divvy up all the endowment here that's been left to us."

Some light may be shed on Mr. Rifkin's thinking by examining some of his recent work. Mr. Rifkin was the organizer of, and chief spokesman for, the People's Bicentennial Commission, which, in the period leading up to the 1976 American Revolution Bicentennial, he motivated by stating, "The left must take up this challenge and turn the Bicentennial celebration into a campaign designed to create a mass revolutionary consciousness in tune with the revolutionary legacy of 1776. . . . A genuine understanding of revolutionary ideals links Thomas Paine, Sam Adams, and Benjamin Rush, and the American people with Lenin, Mao, Che Guevara, and the struggle of all oppressed people. . . ." Upon discovering that the American people were not sufficiently mature in 1976 to rise up and overthrow their oppressors, Mr. Rifkin has, apparently, changed his approach. He now attempts to turn one of the principal justifications of capitalism, i.e., that free markets and individual initiative produce growth that benefits everyone, on its head by stigmatizing growth itself.

That a presumption of severely limited resources implies a necessary redistribution of the remaining wealth is highly questionable. Even more fundamental, however, is Mr. Rifkin's assertion that the world's resources are about to dry up. Mr. Rifkin supports his thesis almost entirely with the observations that a) ". . . there's a general recognition that we have reached the top of the bell curve, if you will, for the age of fossil fuels and stored sun," and b) ". . . the industrial age is really just a metaphor for the use of stored sun." He also puts some basic metals on the down side of this "bell curve."

These facile explanations ignore a

considerable body of thought and research which indicates that the earth's resources, rather than being finite and limited in the near term, are more closely approximated by assuming infinite availability. Precisely because the future is unknown to us, coming innovations in energy supply and materials use cannot be predicted. Just one possibility, however, that of nuclear fusion power (not, by the way, a use of "stored sun") may well eliminate energy problems for centuries to come. It also seems likely that in the next century man will expand into space, if not to the point of finding new worlds to inhabit, at least to the point of finding new supplies of resources.

Upon reading and accepting as truth Mr. Rifkin's predictions, the truly caring reader might be expected to sit still in his chair, dying and decomposing in place, to avoid contributing to the further disordering of the universe. The second law of thermodynamics, of course, cannot be dismissed. It is, however, cruel and unwarranted to raise the importance of inanimate objects to such a level that every human is expected to suppress his natural drives to build, to create, and to seek pleasure. Indeed, for the individual to be denied any chance to achieve greatness in his or her own way is to condemn all humanity to oblivion.

PAUL E. BUTTERFIELD  
New Carrollton, Maryland

In the future, please try to spare your readers pap like "Waste Not, Want Not." Mr. Rifkin, who appears to be a leftover leftist from the sorry '60s, is described as a "prophet of . . . survival," with "the awful sound of truth." He is allowed to sully your pages with condemnations of our society as "absolutely insane."

Among other pronouncements, this "awful truth"-teller tells us that the second law of thermodynamics proves that we will come to the end of our ropes soon unless we reform (presumably this means unless our government adopts socialistic practices which force everyone to give up modern civilization). The second law sort of says this—except that it applies to nuclear power

## LETTERS

as well as fossil power (thus yielding a "soon" of approximately 50 billion years, long after our sun will run out!), deals with entropy increases on a cosmic scale that totally dwarf any human-scale action on earth, has nothing whatsoever to do with human "waste" or "values," and, to top it all off, is very likely wrong in that it will not even apply in the future if gravitation, in effect, reverses the second law in the proposed cosmological "big crunch" to come!

Of course, man, if he adheres to reason in all his activities as he has done with regards to the sciences in the past, will find substitutes and alternatives to replace (and improve upon) anything he has consumed in the past, and need not concern himself with the possible death of the universe billions of years into the future. Our modern scientific technology, a great deal of which is discussed in your magazine, clearly affirms the truth of that.

But what is far worse in this article is the sickening call for self-sacrifice inherent in this man's call for "less consumption." You have given a throwback to the Middle Ages, calling for a return to primordial nature, a soapbox in a magazine allegedly devoted to the latest advances in one of the greatest sciences ever developed by scientific, rational, consuming, selfish man in all of human history—the science of computers. Shame on you!

The more goods and energy and natural resources men can consume, the better, since the more this consumption will have the potential for improving man's happiness on earth. And if you are against happiness on earth for man, then why do we need computers? And if we do not need computers, then why do we need your magazine?

DAVID SOLAN

President

Objective Programming Inc.  
Norwalk, Connecticut

### SEXISM?

It was disappointing to see the ad run by Appleton Papers, Inc. in January. You are carrying on the old assumption that:

1. a secretary must be a "her"
2. "she" usually makes various trips to the washroom
3. "she" belongs to a boss (e.g., — "your" secretary)

Ads such as these should have been discontinued several years ago. They are discriminatory and limit the potential of many people. Appleton Papers should not have submitted it, and DATAMATION should not have run it.

MITCHELL DARER

Manager

Distributed Data Processing  
Flexi-Van Financial Service Corp.  
Secaucus, New Jersey

### THE SPIRIT OF STRETCH

As a Stretch alumnus I was delighted with your excellent piece, "Fastest in Its Time" (In Focus, January), as it brought back pleasant memories of work at Poughkeepsie and then at Los Alamos, Aldermaston (U.K.), the U.S. Weather Bureau, and other bastions of number-crunching. Naturally, I thought your article gave short shrift to the many Stretch software innovations, but modesty and brevity compel me to reveal just one: the acronym retrofit. I believe it was Jim Havender and the undersigned who first dubbed the 7030 Stretch (Super Tool, Relentlessly Endeavoring To Compute, Hard).

K. ERIC KNUTSEN

Principal

Cresap, McCormick and Paget, Inc.  
New York, New York

I want to thank you for the excellent job you did on the article. It was well written, interesting, and presented the real spirit of the project very well.

I have heard from many old friends and colleagues as a result of the article, including Fred Brooks, Erich Bloch, and George Monroe. They all expressed favorable comments about the article.

HARWOOD G. KOLSKY  
Palo Alto, California

# THERE'S ALWAYS ROOM FOR ANOTHER VIEWPOINT

## VIEWPOINT



### For End Users:

The ADDS computer display terminal any business person can afford. In fact, you could own three of our terminals with full-size, two-position tilt screens, moveable typewriter-like keyboards—all in a smaller, space-saving cabinet—for the price of two ordinary terminals.

## VIEWPOINT/3A PLUS



### For End Users:

Offering the same reliability as the original Viewpoint—and at the same list price—our 3A PLUS is also compatible with the Lear Siegler ADM3A and other competitive terminals.

## NOW, VIEWPOINT/60



The smart editing terminal you have been looking for. With its small size, moveable keyboard, elaborate

visual highlighting, programmable function keys, and line drawing graphic mode, it is the lowest cost product offering these outstanding features. It also offers a migration path from ADDS' Regent® 60 and 40.

®Regent is a registered trademark of Applied Digital Data Systems Inc.

**ADDs**  
Applied Digital Data Systems Inc.

See us in Houston,  
June 7-10,  
at NCC booth 1127.

**SOMETHING EXTRA IN EVERYTHING WE DO**

For more information, call or write: Applied Digital Data Systems Inc., 100 Marcus Blvd. Dept. MCV, Hauppauge, N.Y. 11788 (516) 231-5400

CIRCLE 21 ON READER CARD

# Wang announces the most important step in managing information since the computer. WangNet.

Business people have an unlimited appetite for information. Which explains the dazzling array of office equipment being created to handle it. And WangNet lets you link all that equipment together, into one network everyone can share.

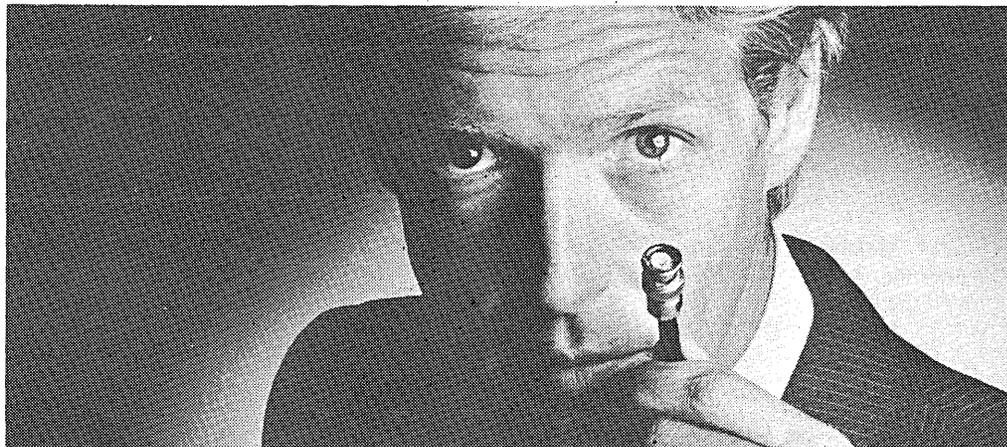
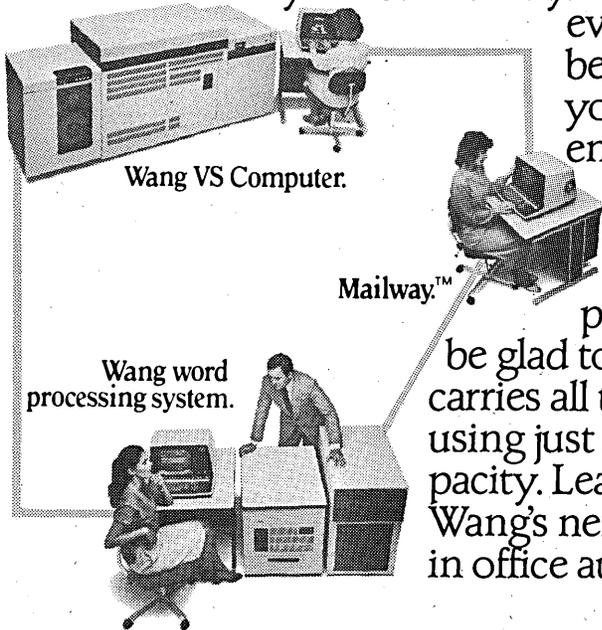
## An information pipeline.

WangNet works something like your electrical system: you put outlets where you need them, then just plug in your equipment.

The WangNet cable can connect Wang computers, word processors, and electronic mail. As well as information processing equipment made by *other* companies. WangNet even handles microwave and satellite communications. Video conferencing. Graphics. Security. And energy control.

What does all this mean? It means anyone in your office can get any information they need. Instantly. From another department, another floor, even another country. Resulting in faster, better decisions. Less frustration. And saving your company enormous amounts of money.

And since it's always wise to plan ahead, you'll be glad to know WangNet carries all this information using just a part of its capacity. Leaving room for Wang's next breakthrough in office automation.



For a WangNet presentation, 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 ( ) \_\_\_\_\_

A309



The Office Automation Computer Company

# THE DATAMATION INSTITUTE

## JUNE

*June 1-2, Writing Skills for DP Professionals*, New York City, Harvard Club  
*June 7-8, Management of Software Engineering*, Atlanta, Southern Conference Center  
*June 7-8, Integrating DP and WP*, New York City, Harvard Club  
*June 7-8, Project Management*, Washington, D.C., Shoreham  
*June 9-10, Improving Your Leadership and Management Skills*, Ft. Lauderdale, Hilton Inn  
*June 9-10, Management Skills for First-Line DP Professionals*, Cleveland, Bond Court  
*June 11, Decision Support Systems*, New York City, Harvard Club  
*June 14, Financial Management's Use of Computer Graphics*, Washington, D.C., L'Enfant Plaza  
*June 14-15, Data Base Management Systems*, Atlanta, Southern Conference Center  
*June 14-15, DP Center Operations: Lowering Costs Through Improved Productivity*, New York City, Harvard Club  
*June 14-15, Strategic Planning for Office Automation*, Cambridge, Faculty Club  
*June 14-15, Local Area Networks*, Washington, D.C., Sheraton Washington  
*June 16, Electronic Communications: Mail, Message, Data*, Cambridge, Faculty Club  
*June 17-18, Demonstrating DP Performance to Non-DP Management*, Calgary, Alberta, The Westin  
*June 17-18, DP Concepts for Management and Users*, Cambridge, Faculty Club  
*June 17-18, Structured Programming, Analysis, Design and Testing*, Chicago, The Palmer House  
*June 18, Management's Use of Computer Graphics*, New York City, Harvard Club

*June 21-22, Data Communications: Regulation, Analysis, Design*, Cambridge, Faculty Club  
*June 21-22, Computer Graphics*, Chicago, The Palmer House  
*June 21-22, Data Communications: Concepts/Management Overview*, Cambridge, Faculty Club  
*June 23-24, Strategic Planning For Information Systems*, Cambridge, Faculty Club  
*June 23-24, Distributed Systems: Technology, Networks, Design*, Cambridge, Faculty Club  
*June 23-24, Distributed Systems: Concepts/Management Overview*, Cambridge, Faculty Club  
*June 24-25, The CAD/CAM Revolution*, Chicago, The Palmer House  
*June 28, Toward the Factory of the Future*, New York City, Vista International

## JULY

*July 12, Financial Management's Use of Computer Graphics*, San Francisco, The Pacific Plaza  
*July 15-16, Applications Software Packages: Evaluation and Selection*, Chicago, Center for Continuing Education  
*July 16, Management's Use of Computer Graphics*, Los Angeles, The Los Angeles Hilton  
*July 19-20, Data Communications: Concepts/Management Overview*, New York City, Vista International  
*July 19-20, Administration and Control in a Data Base Environment*, San Francisco, Holiday Inn Financial District  
*July 19-20, Data Communications: Regulation, Analysis, Design*, New York City, Vista International

*To receive further information, please contact Jill Kemp at the Datamation Institute Seminar Center at 850 Boylston Street, Suite 415, Chestnut Hill, MA 02167, or call (617) 738-5020.*

## LETTERS

### MIP-PICKING

I enjoyed "IBM-Compatible Giants" (December), but would like to draw the author's attention to the following points:

1. A single value of MIPS is associated with each system. This is first of all a drastic simplification, since the actual performance notoriously spans a more or less wide range.

In the second place, the values may seem arbitrary: on page 36 of the same issue, for instance, the IBM 3081 system is quoted as a 13 to 14 MIPS machine and not as a 10.4 MIPS machine (p. 97).

2. The power costs formula may have been applied correctly but is spelled out erroneously: a conversion factor is needed ( $1 \text{ BTU} = 2.929 \times 10^{-4} \text{ kWh}$ ) and the kVA term is dimensionally not homogeneous with the other term.

3. The extrapolation of reliability results from previous systems is at best hazardous due to the different technologies involved in the systems described.

4. Some definitions in the glossary should be reviewed: for correctness (e.g., Cpu Cycle Time, TCM) or for adherence to international standards (kWh instead of kWh, Nsec instead of ns).

PROF. ING. ARRIGO L. FRISIANI  
Istituto Di Elettrotecnica  
Genova, Italy

Our attention has been directed to the misuse of our unregistered trademark UNIX in your January issue.

Please be advised that the term UNIX is our trademark, which we use to identify our particular brand of operating system—namely, that operating system developed by Bell Laboratories.

In order for us to protect our interest in our trademark, we must request that others use it properly in their writings and advertisements. Thus, the mark should always be used as a proper adjective, made typographically distinctive and should also identify the owner.

An example of the correct usage would be:

UNIX\* operating system or UNIX\* programs

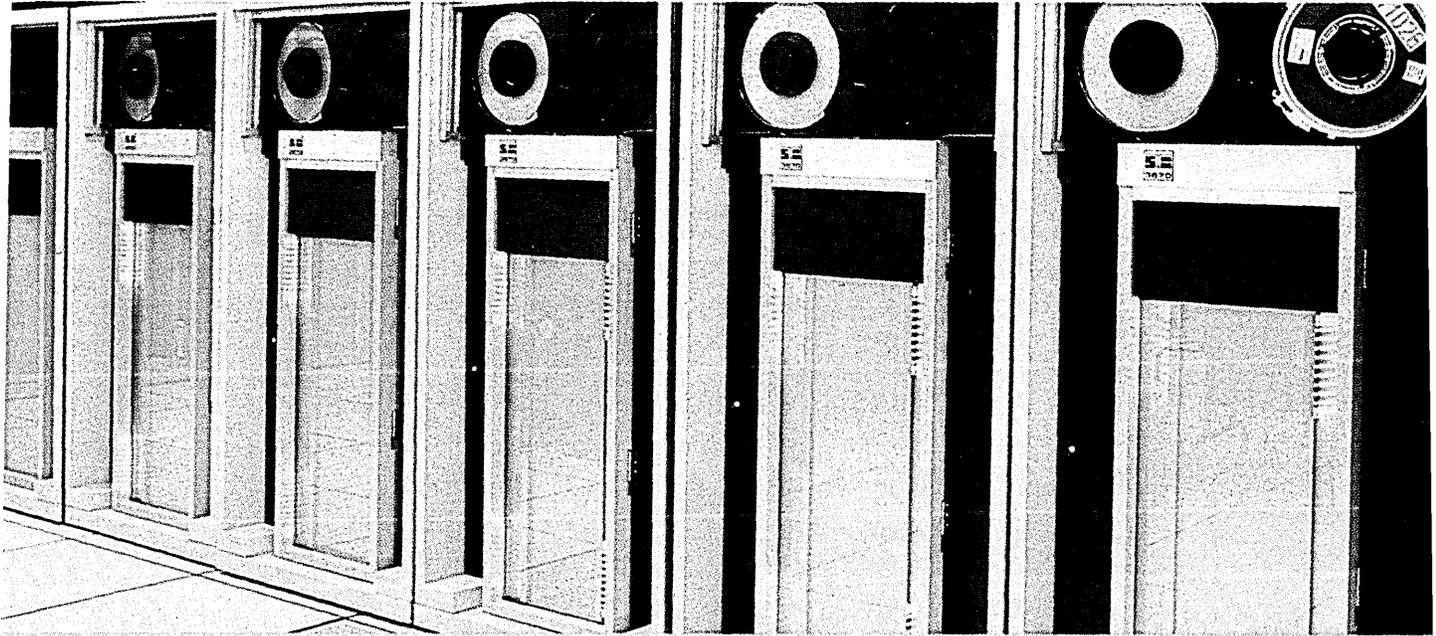
\*UNIX is a trademark of Bell Laboratories.

We appreciate your cooperation and await your timely reply.

JOHN W. FISHER  
Attorney  
Bell Laboratories  
Whippany, New Jersey

*One of the problems with DATAMATION, registered trademark of Technical Publishing Co., mentioning trademarks each time we talk about a product like \*UNIX, a trademark of Bell Laboratories, is that by the time we get finished listing registered trademarks there won't be room to say anything else in the article.—Ed.*

*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.



**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-144  
1300 One Tandy Center, Fort Worth, Texas 76102

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

**CIRCLE 24 ON READER CARD**

# Distributed

# Data Processing...

**Paradyne's RESPONSE merges Word Processing and Distributed Data Processing...with the most efficient communication network available.**

Paradyne's communication network (PIXNET) enhances the Distributed Data Processing capability of **RESPONSE** by making all peripherals and terminals appear as locally attached devices to any processor in the network.

**PIXNET** provides your remote terminal operator with application and CPU switching. A terminal on **RESPONSE** appears local to any IBM host in the network and provides user access to such applications as CICS, IMS, TSO and CMS. The result is cost effective performance from all remotely located devices.

**RESPONSE's** teleprocessing monitor is integrated into the operating system.

This greatly reduces the overhead normally associated with transaction processing, providing improved response time and increased throughput.

### **Response Offers You:**

#### **DISTRIBUTED DATA PROCESSING WITH NETWORK FUNCTIONS...**

**RESPONSE's** Network Interactive Transaction Communication (NIT-COMM) gives you the ability to initiate a 3270 formatted message from an application program to another processor in the network to retrieve data.

**BULK FILE TRANSFER** ... provides mass transmission of data files over communication lines to another processor in the network.

**FULL SCREEN DISPLAY EDITOR AND MAPPING** ... provides online program and screen format development.

**COBOL COMPILER** ... full ANSI 74 Level 2, minimizes the training requirements for applications programmers familiar with coding COBOL.

Paradyne



# and Much More!



**INTERACTIVE DEBUG** ... monitors and controls the execution of a COBOL program and enables the programmer to detect and trace program errors.

**DATA MANAGEMENT** ... provides the system capabilities to create, store and retrieve files in an efficient manner supporting disk, tape, terminal, printer and card devices. Security is assured at user, program, and file levels.

**ONLINE DATA ENTRY** ... a complete system for entry, editing, formatting,

verification and storage of data through interactive terminals.

**WORD PROCESSING** ... an easy to use system totally integrated into the network, allows the transfer of documents throughout the network. **RESPONSE WORD PROCESSING** uses an intelligent, multi-functional terminal. In the word processing mode the editing software is down-loaded into the terminal so processing is much faster than with most conventional systems. The same terminal can be used for other data processing functions.

**DBMS** ... Data Base Management System, with Query/ Report Writer, Menu Processor and Transaction Processor, provides security at the functional and data element levels. Data element specifications, transaction and report formats are interactively defined by the end user.

**RESPONSE** ... can be introduced into remote environments without the need of highly-skilled support personnel required by most distributed systems. All programming support and maintenance activities can be accomplished from the central site or any

location suitable to the needs of your organization.

Prompt service assures our customers receive the outstanding performance that Paradyne products are designed to produce. Our fast network installation is a big cost advantage compared to other systems which may take months to get running.

## World Wide Sales and Service

Understanding that data communications means going where the data needs are, Paradyne products are marketed and serviced by our own personnel in the United States as well as the United Kingdom, West Germany, Japan and Canada.

We're **PARADYNE**...THE Data Communications Company of the 80's. If you would like to know more about our products, write on your letterhead or call:

**PARADYNE**, Box 1347, 8550 Ulmerton Road, Largo, Florida 33540, (813) 530-2000, Telex 8499943

**Paradyne Canada Ltd.**, (416) 494-0453

**Paradyne (U.K.) Ltd.**, (07535) 56712

**Paradyne Japan**, (03) 245-0431

**Paradyne G.m.b.H.**, (West Germany), (0221) 491078

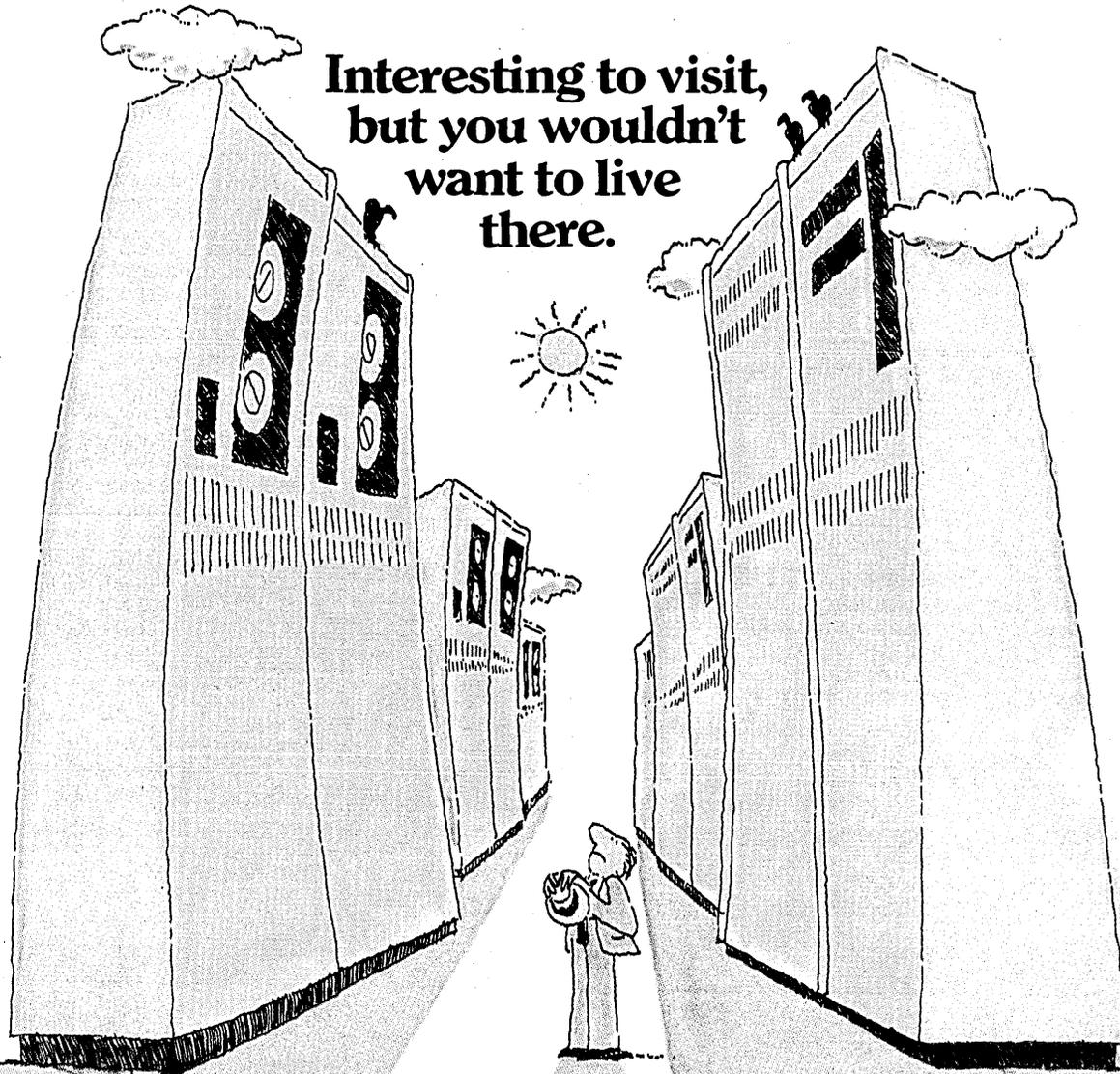
**CIRCLE 25 ON READER CARD**

# paradyne

See us at NCC  
(Island 5018)  
Houston, Texas June 7-10



# Some data base management systems are like a trip to the Grand Canyon.



Interesting to visit,  
but you wouldn't  
want to live  
there.

Viewing some data base management systems can be a breath-taking experience. The endless panorama of features (that often appear to be closer than they really are). The layer upon layer of closely linked data structures and access methods. The awesome, almost uncontrollable, power of the system to reshape the flow of information throughout your organization.

If you get the urge to move to such grand surroundings, stop and think what it will be like to live with such a system day after day, for several years to come. At Software AG we provide a DBMS that does more than make a good first impression. Compare our ADABAS system to any other DBMS for IBM or compatible processors and you'll see why.

In the time it takes to discover all the intricacies of other systems, you could be up and running with ADABAS. Instead of forcing you to get involved with the internal structure of the system, ADABAS lets you focus on something much more important: your applications. And with ADABAS you never have to worry about getting there and back. It's a totally integrated system that provides a full complement of development and support tools, including an online data dictionary.

In short, ADABAS can satisfy your desire for a state-of-the-art system while at the same time giving every level of your organization DBMS resources that are easy to use, adaptable to change, and fully supported by a world-wide organization. Use the coupon to arrange a guided tour of ADABAS, or to attend a free management seminar.

Software AG of North America, Inc.  
11800 Sunrise Valley Drive  
Reston, VA 22091  
(703) 860-5050

- I would like a guided tour of ADABAS. Please send information.  
 Please send information on your free DBMS seminars.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Zip Code \_\_\_\_\_ Telephone (\_\_\_\_\_) \_\_\_\_\_

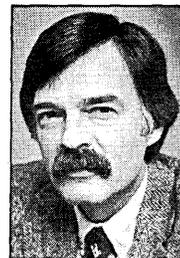
CPU \_\_\_\_\_ Operating System \_\_\_\_\_

**SOFTWARE AG**  
OF NORTH AMERICA, INC

CIRCLE 26 ON READER CARD

DM 0582

# EDITOR'S READOUT



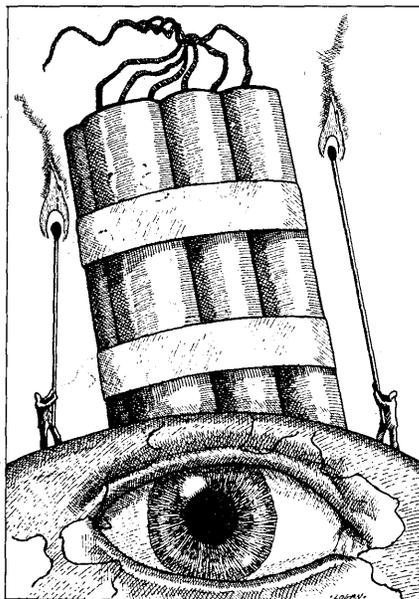
## MUTUAL ASSURED MADNESS

If you open your eyes to May, you are reminded more vividly than at any other time of year that the earth is a sentient organism and we humans are as much a part of this larger being as the myriads of microscopic creatures that inhabit our own bodies are a part of us.

Any harm that we do to this planet or its inhabitants is an act against ourselves, as cruel and immediate as driving a knife into our own hand.

And that's why the nuclear arms policy of Mutual Assured Destruction (MAD) is so odious; it is a strategy that will inevitably lead to planetary suicide. It is a strategy that has caused the United States and Russia to construct nuclear arsenals that make the term "overkill" seem an understatement. It is a strategy of offense, not defense, a mind-set that permits the unthinkable not only to be thought, but to be rehearsed in war games like last March's worldwide "Ivy League" exercise, or simulated by macabre models that compute the amount of death and destruction that can be expected for each megaton of yield.

The rationale for the construction and deployment of nuclear weapons is the hope that nuclear supremacy will deter anyone in his right mind from making an attack against you. It works well as long as your opponent is in his right mind. But history makes this a very shaky assumption. That is why MAD will eventually lead to the undoing of mankind and perhaps this entire



fragile planet. Because we are all involved we cannot afford to be passive. We must search for alternatives and exert whatever influence we may have, no matter how minuscule, to bring about a solution that does not result in mutual destruction.

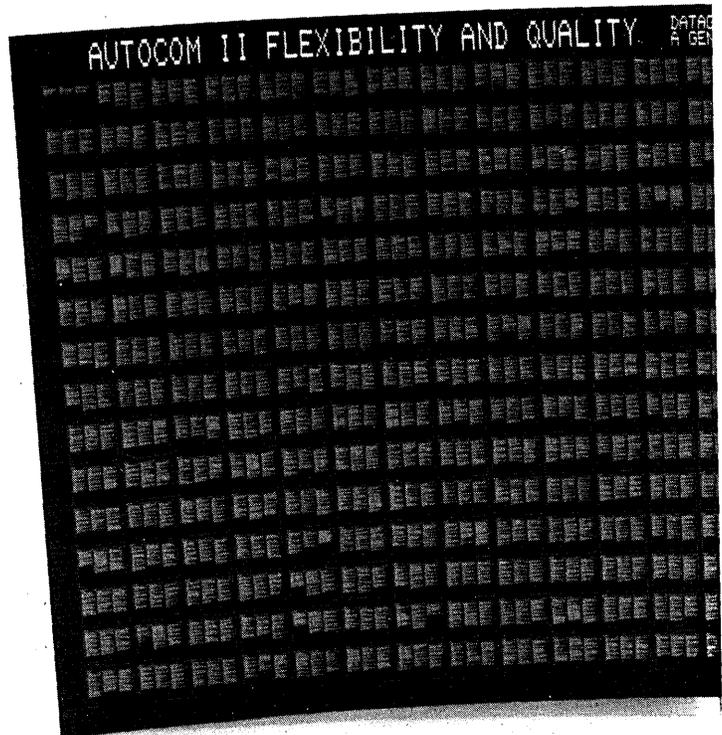
An example of one man's wrestling with this problem is in a remarkable book, *Disturbing the Universe*, by an equally remarkable man, Freeman Dyson. It is a book that should be read by everyone connected with the sciences and technology—a category that includes all readers of this magazine.

Dyson writes, "Somewhere between the gospel of nonviolence and the strategy of Mutual Assured Destruction there must be a middle ground on which reasonable people can stand, a ground which allows killing in self-defense but forbids the purposeless massacre of innocents. . . . The ground on which I will take my stand is a sharp moral distinction between offense and defense, between offensive

and defensive weapons." He argues that such a moral distinction would "not forbid the use of tanks and aircraft in local counteroffensive operations. It would forbid the building of grand strategic forces of tanks and aircraft designed primarily for offensive warfare. And above all, it would forbid purely strategic offensive weapons, such as intercontinental missiles and missile-carrying submarines, for which no genuinely defensive mission is conceivable."

Dyson says the scientists have convinced us that the need for supremacy of offensive weapons is an unalterable scientific fact. "But their basic dogma is in fact a falsehood. It is not true that defense against modern weapons is impossible. Defense is difficult and expensive, and tedious and complicated, and undramatic and unreliable. But it is not hopeless. If we were to make the political decision to switch from an offense-dominated to a defense-dominated strategy, to redirect our weapons procurement and research and development, together with our diplomacy, toward the ultimate nullification of offensive weapons, there is nothing in the laws of physics and chemistry that would prevent us from doing so. We have drifted into the trap of Mutual Assured Destruction only because we have lacked the will and the moral courage to escape from it."

Although not everyone will agree with Dyson's point of view, a reading of the book will show that he has given the issue decades of thought. His stand is the result of deeply felt ethical and moral convictions and he has openly expressed that stand. It is this kind of conviction and action that we must all bring to what could be the final problem for humanity and the earth that cradles it. \*

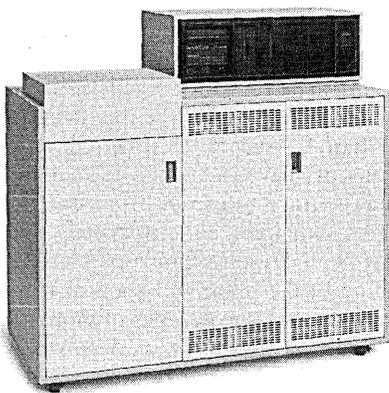


# WET OR DRY.

As an information management and retrieval system, computer output microfilm gives you control of massive amounts of information in a small amount of space. In fact, each microfiche can contain up to 288 times more data than a printed computer page.

For almost 30 years, companies have been turning to DatagraphiX for their COM needs. Because our systems give them a return on investment that simply can't be equalled

by other methods of output. A minimum of 35% should be attained in the first year alone. Plus, we give you something other COM companies don't: choice.

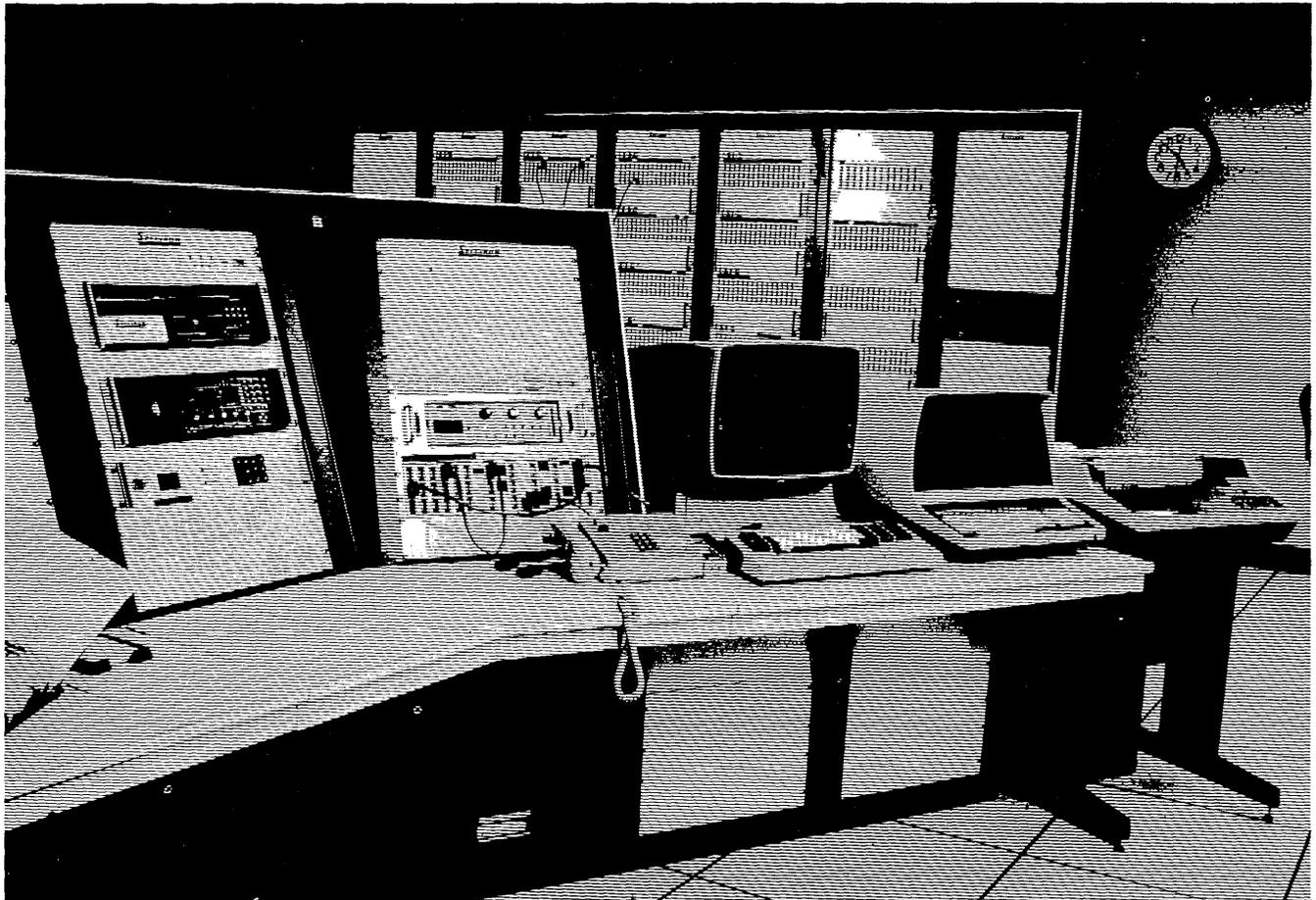


Whether you want the archival benefits of wet process systems, or the convenience of dry process systems, DatagraphiX is the source to come to. Our AutoCOM systems are the world's most popular COM recorders — easy to use,

# The Leader in Network Performance Management

---

---



---

## 3709 NPM Features:

- Monitors networks of 4 to 4096 lines
- Color graphic displays and color printer
- Complete performance database—no sampling
- All performance data available to host
- Remote line data display with alarms trapping on all lines
- Comprehensive real time alarms and network status reporting
- Network Operations Reports Package Software
- Network Performance Analysis Package Software

## Locates all network performance problems:

- Applications software maintenance
- Vendor responsibility
- Response time control
- Network growth and productivity

ESP Digital's 3709 NPM system provides actable information for all levels of company management, with color displays and color hardcopy analysis.

If your company requires total network performance management solutions, contact us at 800-247-2530 or 515-287-2578.

**ESP Digital Systems Corporation**



4600 SW 9th St., Des Moines, Iowa 50315

CIRCLE 29 ON READER CARD

# DATA SECURITY

The first in a series of messages on advanced technologies from Honeywell Information Systems.

**Preventing unauthorized access to data stored in computers is no longer an esoteric, back-room problem. The data is so valuable an asset that to have its integrity destroyed, altered or in some other way violated unintentionally or by artful programming can cause irreparable—even fatal—harm to an organization.**

With any large, general-purpose timesharing system, the easy sharing of both programs and data would seem incompatible with security. Yet the three-dimensional data security mechanism in the Honeywell Multics system not only makes controlled sharing possible and convenient, but has earned Multics a reputation as the most secure, general-purpose system on the market.

## **The Standard Defense**

Data security usually is provided by specialized (i.e. incremental to the basic system) operating software that controls the sharing of computer resources, programs and data. To prevent unauthorized access to data or programs, this

operating software can use a set of tables listing the authorized users along with their access rights—such as read, write, execute. The operating system scans this table on each reference to a block of data. In theory, it's an unbreachable defense.

In practice, it's vulnerable, largely because operating systems—composed of many complex programs with frequent modifications and patches—contain errors. The more complex the system, the more patches and alterations it has and the more susceptible it is to exploitation.

## **Honeywell's Approach**

Honeywell has reduced the complexities of the final software system. Multics was designed and developed so that its security mechanisms could grow without reorganization. Assuming at the outset that it was impossible to foresee all problems at the design stage, the Multics software was written to be easily redesigned (rather than patched) should problems crop up upon implementation.

Functions were added as subsystems, rather than modifications. As a result of these and many other design decisions, exploitable design flaws in Multics, for all practical purposes, are nonexistent—even though the current operating system has matured over many iterations.

## **Discretionary Access**

As the first defense, Multics provides a discretionary access control mechanism consisting of a table that lists the names of those authorized (and denied) access to each and every file. This table, called the Access Control List (ACL), also lists the access modes—read, write, execute—allowed each user.

All authorized users also have a unique personal identification (ID) plus a project identification. The personal ID is authenticated by an encrypted password stored in the system. The encryption algorithm, however, is a one-way algorithm so there is no algorithm for recovering the encrypted password in clear form. When at log-in, the system requests the user's password, his terminal print mechanism or screen is automatically turned off

The call bracket defined by the ring numbers associated with each program is used to restrict the sequences in which programs can execute. In this example, the user operating in ring 6, references in turn programs A, B, C, and D, with ring numbers (6,6,6), (4,4,6), (2,5,6), and (0,0,4). When program A calls program B, the user's ring changes to 4, the highest and only ring number in program B's execute bracket. When B calls program C, the user's ring number remains the same. When B calls C and C calls D, the ring number changes temporarily to 0. The ring numbers of these pro-

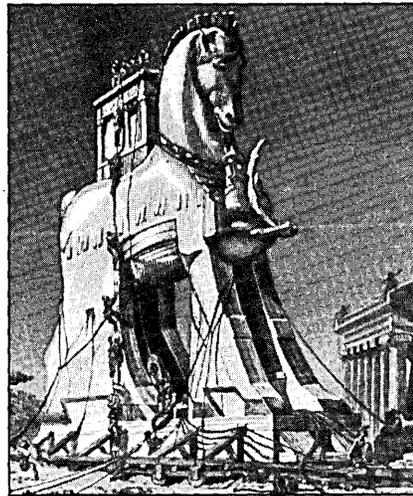
grams prevent program A from calling directly to program D. The user must pass through program B, called a gate, to reach program D. The ACL and AIM settings on gates can be used to control access to inner ring programs and data, making it much easier to protect them from misuse. The bottom line is that the user is secure in the knowledge that the hardware and software mechanisms of Multics protect his programs and data from unauthorized access.

or masked, so that the password is never displayed. Passwords are controlled and can be changed by each user. Software tools can force users to change their personal passwords within a given time.

### **Non-discretionary Access**

To prevent inadvertent (or intentional) release of data, the system also provides an extended access control system called Access Isolation Mechanism (AIM).

AIM protects against unauthorized release of data by assigning levels of classification to data files and levels of clearance to the user. It then matches clearances and classifications. For "read" and "execute" access modes, the user's clearance must be higher or equal to the classification of the data block. For "write" access, the clearance must match the classification.



**AIM defeats the "Trojan Horse" ploy whereby a programmer hides within a legitimate, often-used program some additional code completely unrelated to the documented function of that program. That code, for instance, might search the storage system for data to which the programmer has no access.**

### **Hardware Rings**

The two security mechanisms are protected and further enforced by specialized hardware, called the Ring Mechanism, which makes Multics a uniquely secure repository. Files dwell within rings, numbered from 0 to 7. The lower the number, the more privilege is conferred on the executing program and its associated files. A special hardware register keeps track of the ring number in which each user's application is executing. The ring number increases or decreases within the access mode limits set for each user as the application references different files. The limits set for each user are implemented in ring brackets: the read, write, and execute/call brackets.

User access to files is determined by all three mechanisms: ACL, AIM, and the ring brackets. The user can process a file only if he is permitted the kind of access authorized by the security mechanisms.

The ring mechanism also protects itself from attack. Ring numbers of files can be changed only by authorized users. The operating system checks every attempt to modify ring numbers to assure that the attempt is legitimate. The rings also protect the users' subsystems.

### **User Control**

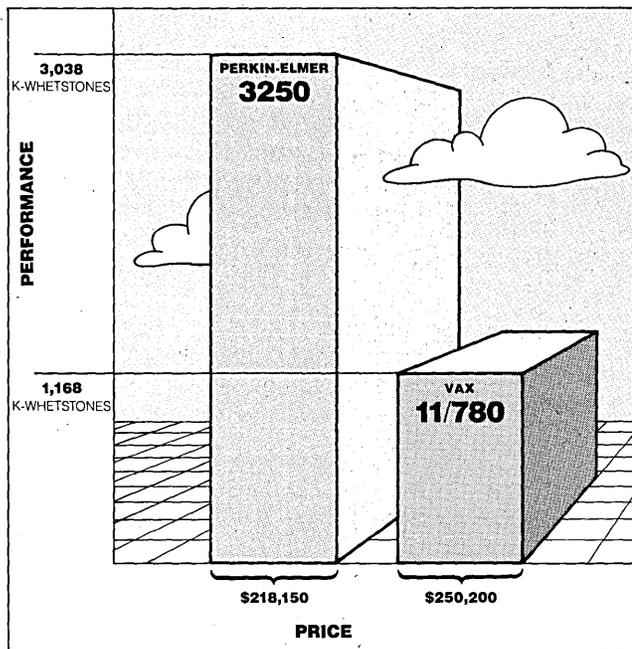
When an authorized user changes the protection modes on a file, these changes are reflected to all users of that file immediately. That is, access permissions and denials are dynamic and are re-calculated by the hardware with no loss in system performance during the execution of every computer instruction.

### **More on Data Security**

For an in-depth paper on Multics Data Security call our toll free number 800-343-6294 (in Massachusetts call 617-552-2264) or write Honeywell, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.

# There are two leaders in 32-bit minicomputers.

## We're the one with the new 3250— half the size, twice the speed for 10% less than VAX.



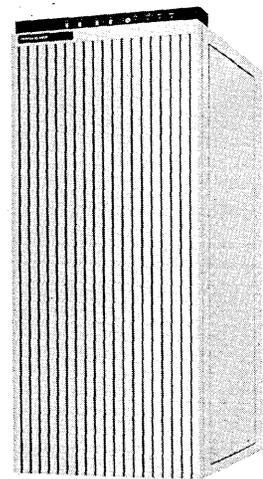
Based on comparable configurations, the new 3250 with FORTRAN VII Z delivers more performance for less money than VAX 11/780.

The new Perkin-Elmer 3250 tops the VAX 11/780 in every critical category: processing power, system capacity and throughput. At prices starting as low as \$150,000 with 2MB of memory.

Example: Teamed with Perkin-Elmer's new FORTRAN VII Z—the industry's first universally optimizing compiler—the 3250 yields 3,038 single-precision K-whetstones per second. DEC's VAX 11/780, by comparison, can perform only about 1,200 per second.

Utilizing state-of-the-art 64K RAM technology, the 3250 packs up to 16MB of directly addressable memory in a single 24" wide x 56" high cabinet. DEC doesn't offer that much memory in *four* cabinets.

The 3250's dual 32-bit memory bus delivers 40MB/second I/O bandwidth and 64MB/second peak system throughput rate. It can handle up to 115 gigabytes of on-line



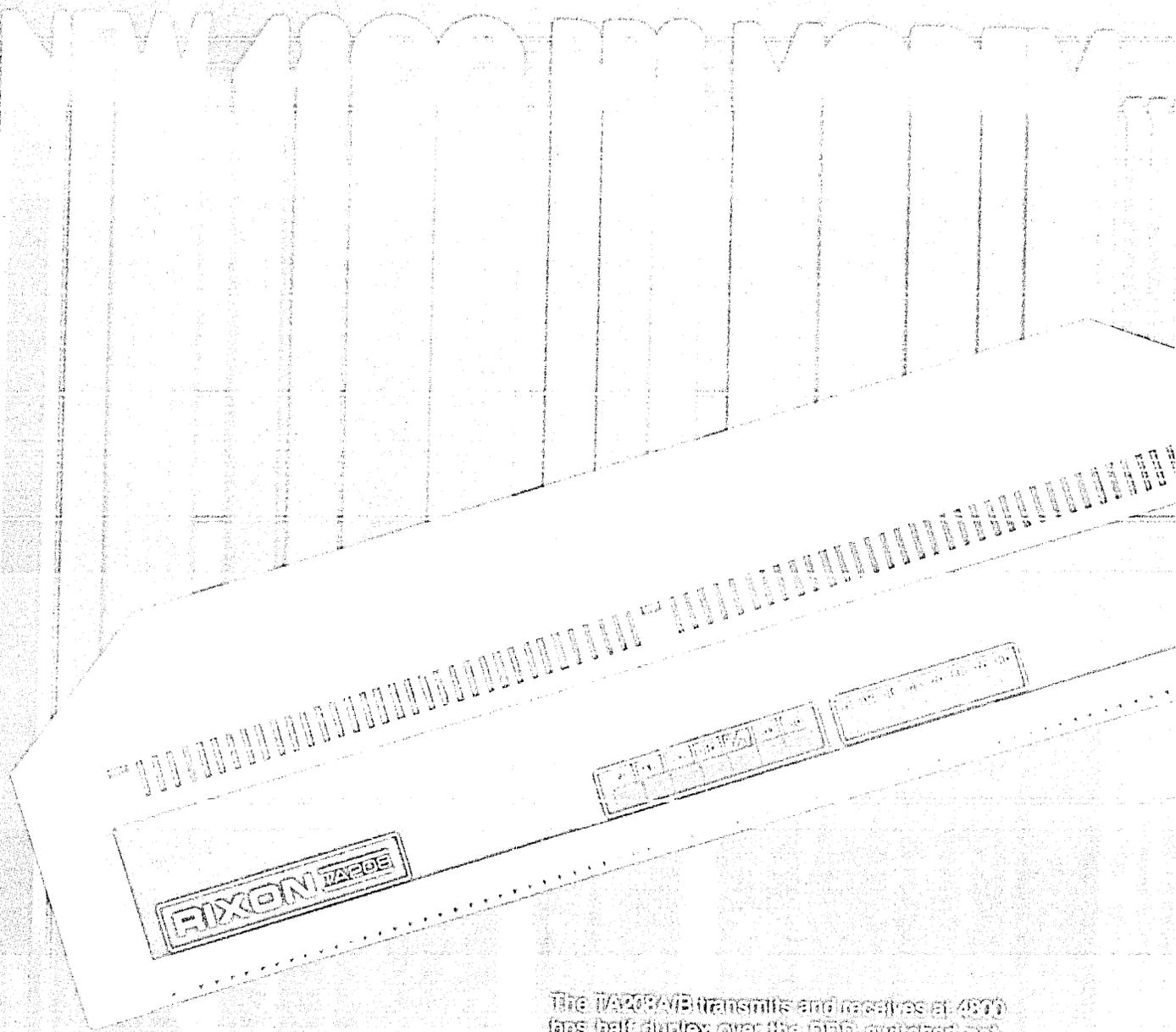
storage and control over 1,000 I/O devices. VAX, with its single bus architecture, just can't touch these specs.

Looking for a high-performance 32-bit minicomputer? Look to Perkin-Elmer—the company with more installed 32-bit minis than any other company except one. We're the one that gives you more. More performance. More support. More value. Call or write today for details on the new 3250. Perkin-Elmer, Oceanport, NJ 07757. Tel: 800-631-2154. In NJ 201-870-4712.

## We're the one.

### PERKIN-ELMER

CIRCLE 31 ON READER CARD



**THE NEW WA2034B**  
**THE NEW WA2034B**

Now priced for the most economical local and international

**PERFORMANCE** this full featured Bell compatible modem surpasses the competition with efficiency and benefits.

**LOW ENERGY** the LSI design and Rixon's exclusive modulation efficiency program make it unquestioned in the data communications industry.

Protect your investment with the world's industry leader.

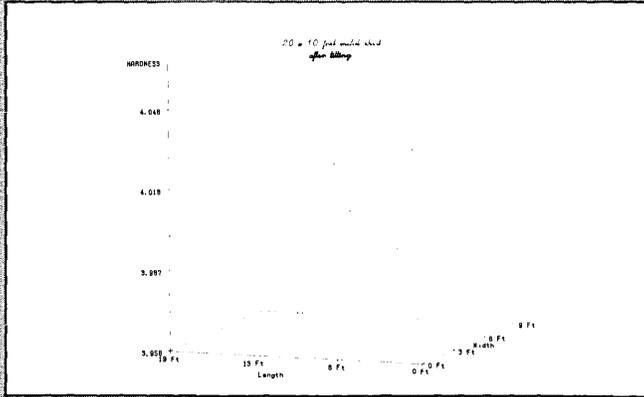
The WA2034B transmits and receives at 4800 bps half duplex over the BELL switched network or full duplex over four wire private lines. Because the WA2034B is a fully equipped Bell compatible modem, standard features include auto answer with a 99% acceptance rate, automatic call compatibility, satellite delay option, and echo timer.

Rack mountable card versions may be intermixed with RIXON statistical multiplexer assemblies as an integral modem option in the RMB RACK MOUNT UNIT.

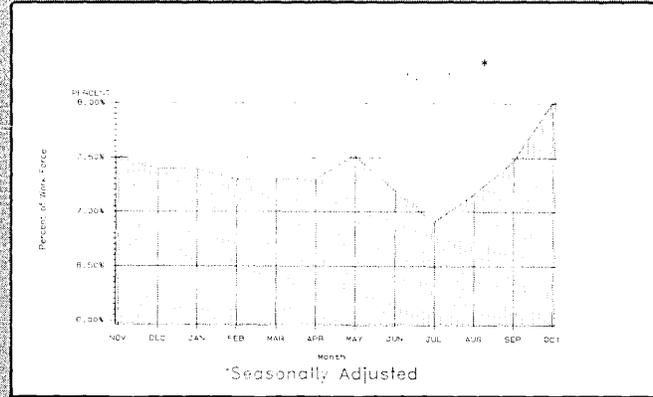
Call Don Ely today at RIXON INC. at 301-622-2421 ext. 472. Let Don explain to you the cost effectiveness of a WA2034B modem in your data communications system.

**ANOTHER  
 MODEM  
 GOOD ENOUGH  
 TO BE CALLED  
 RIXON**

# SAS/GRAPH saves time on IBM 3279, Tektronix 4027, HP 7221, Zeta 1453...



Zeta 1453



Hewlett-Packard 7221

and more.

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

As graphics hardware evolves, so does our software. With SAS/GRAPH, you don't need a different software system for each of your different graphics devices. The same SAS/GRAPH system supports ADI, Calcomp, Chromatics, Hewlett-Packard, IBM, ISC, Ramtek, Servogor, Tektronix and Zeta equipment. SAS/GRAPH also provides a universal driver that can be easily linked with vendor-supplied software for most other devices. And as new devices and features are introduced, you can count on support from SAS/GRAPH.

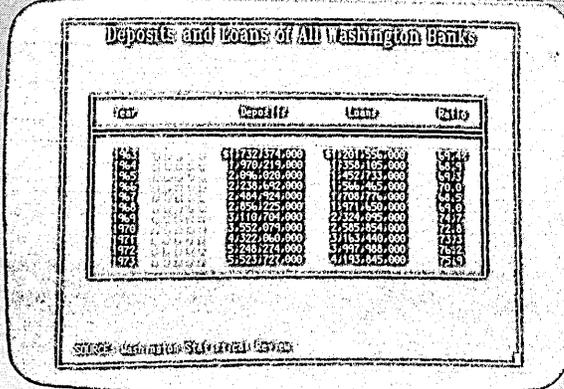
Whatever device you use, in batch or interactive mode, you can produce sophisticated charts, plots, maps and three-dimensional displays with just a few simple statements. And that adds up to a big time-savings.

Best of all, SAS/GRAPH is integrated into SAS, so you get the benefit of the full SAS system—analysis, now saving time in coding, editing, statistical analysis, data management and a full-featured programming language in more than 3000 KY, 65, 45 and 400 CHR5 sites.

As part of the full SAS package, you get a total system that gives you more with less. It's the only time-saving system that does it.

For more information, contact SAS Institute Inc., Box 7000, SAS Campus Drive, Cary, NC 27513. Phone (919) 677-8000. Telex: 740000 SAS.

© 1977 SAS Institute Inc. All rights reserved. SAS and SAS/GRAPH are registered trademarks of SAS Institute Inc. in the United States and other countries.

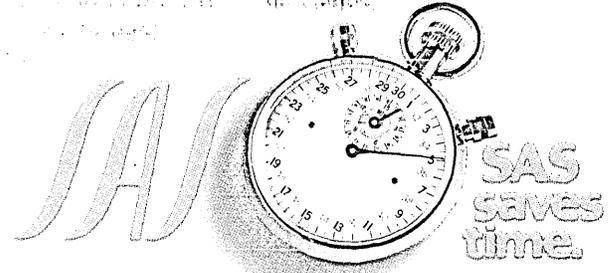


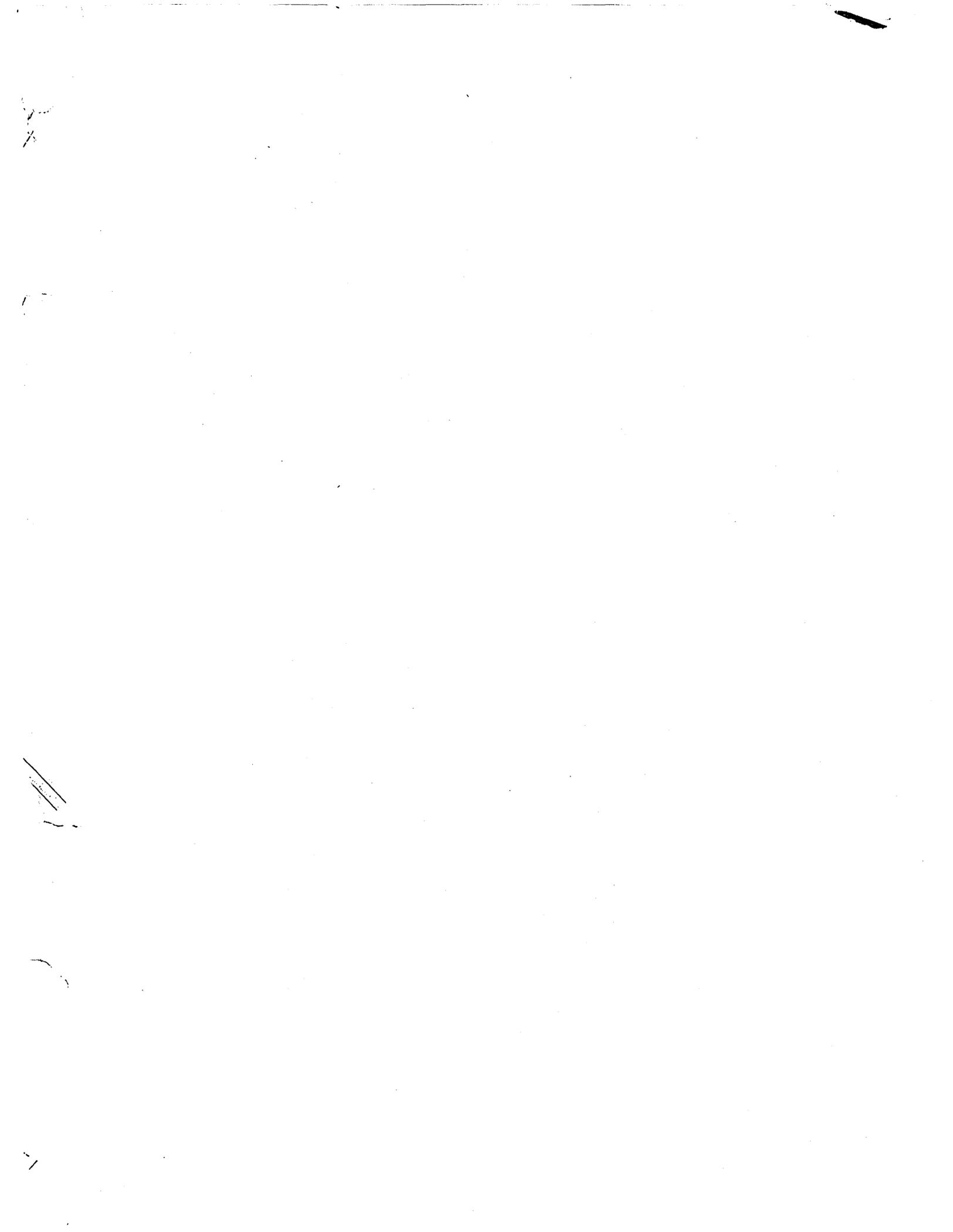
IBM 3279



IBM 3279

CIRCLE 33 ON READER CARD





# NEWS

## IN PERSPECTIVE

### ASSOCIATIONS

## A VOICE FOR THE INDUSTRY

**Sperry Univac's Glen Haney has challenged CBEMA and other industry associations to speak in unison.**

On a list of Washington's most pressing needs, another association would surely be near the bottom. Associations of one sort or another already occupy three columns in the District's phone directory, and yet there's a man of some influence who'd like to see one more listing. The C&P Telephone Co. is hereby forewarned to save the space.

"Our challenge is to take a cold, objective calibration of our industry and the direction it's clearly headed and put together an association whose objective is to reach out to the breadth of our business and to represent it," said Glen Haney, chairman of the Computer and Business Equipment Manufacturers Association (CBEMA) as he addressed the group's spring meeting.

Haney, who spends most of his time as vice president for strategic planning and development at Sperry Univac, would have the myriad groups now involved in the information processing industry join forces under one umbrella organization that would have political clout equal with the industry's enormous economic power. (Those doubters of the industry's financial muscle might note the \$7 billion trade surplus it racked up in 1981.)

"I suggest a broader association whose goal is to counter resistance to computing, to foster the benefits flowing from the information revolution and to better influence the inevitable regulations," Haney proposed. "Let's not forget the growing effectiveness of Japan Inc.'s thrust into the U.S. markets.

"This industry can no longer afford to splinter its power into an ever increasing number of trade associations and groups. I want this group to become the information processing industry association. The concept fits CBEMA. None of the others have our clout. Given the proper vision and leadership, we can do it. Our industry should have a tremendous voice, and we don't. No one speaks for the industry."

Perhaps the converse is more correct. Everyone speaks for the information processing industry. Of course, it is most often in defense of their particular piece of the expanding and profitable business. Therein lies the genesis of Haney's propos-

al. Divided, the disparate groups probably would not fall nor would their voices be stilled. But united, they surely would stand and be heard.

"Who is responsible to see that we exercise the power and influence commensurate with our significance?" Haney asked his members. "Who is responsible to coalesce us into a form in which we can communally discharge our business citizen responsibility to help articulate the future?"

"Is it ADAPSO, CCIA, SIA, CBEMA, ACCT, ICA, IDCMA, IIA, CDLA, ACM, etc., etc.? The answer, I think, is that it's all the foregoing and that it is not any of them. The answer is also that I am responsible, you are responsible, we are responsible."

Read "we" as "CBEMA" and you get Haney's drift.

"Start with the conceptual notion that the industry is not being accommodated by any association," he said. "That's real and logical. This group would be the nucleus from which associations could address multifaceted issues. We could be the catalyst in doing that."

For the enlightenment of the attendees, CBEMA outlined its five-year plan. It was somewhat less revolutionary than those promulgated by Joseph Stalin, but an ambitious program nevertheless: 1) achieving

### **CBEMA appears ready to take the lead in creating a voice for the information industry as a whole.**

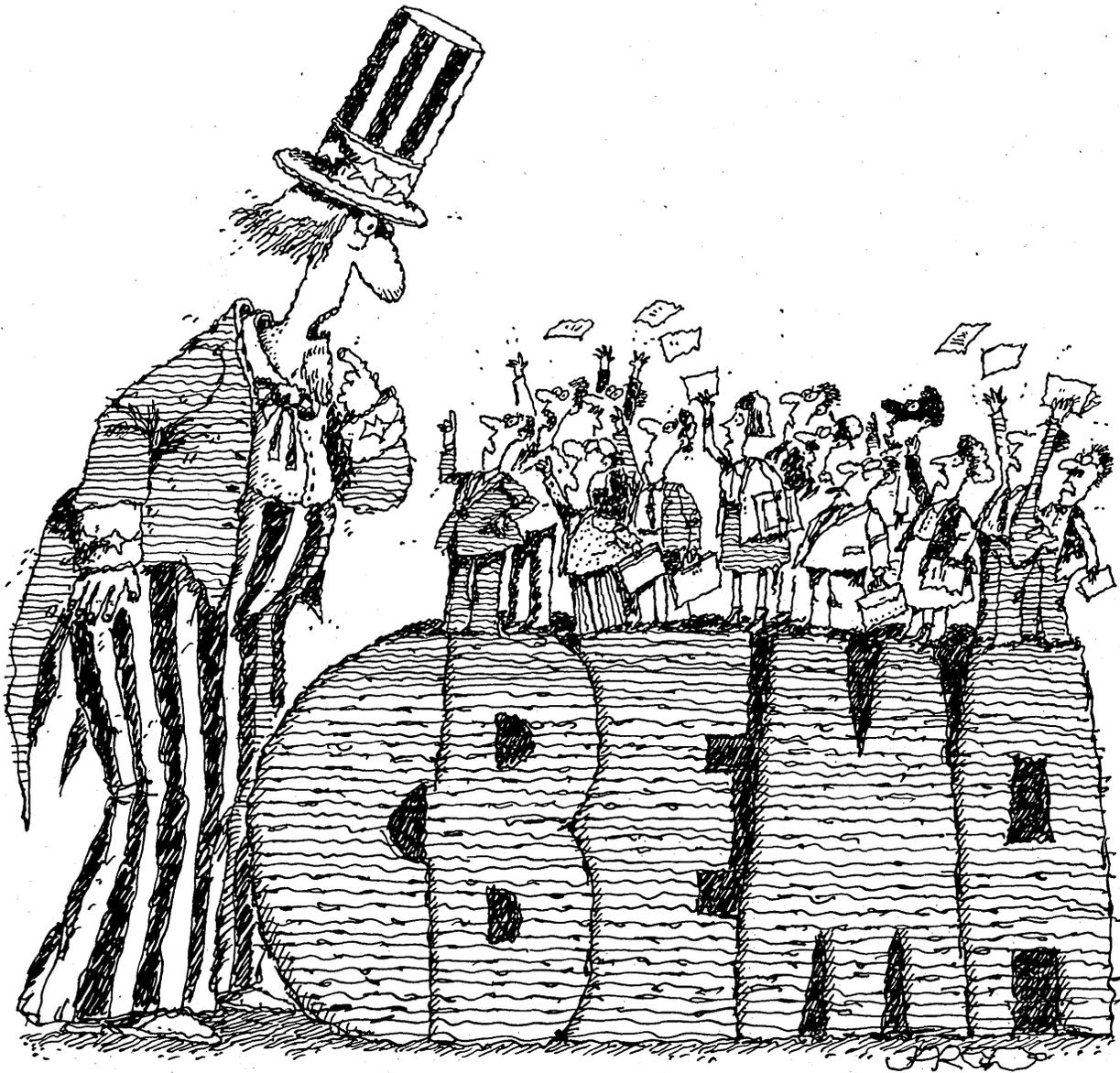
passage of telecommunications legislation, 2) obtaining the free flow of transborder data, 3) simplifying the government procurement process, 4) removing export barriers, 5) achieving uniform acceptance of voluntary standards, 6) remedying the shortage of scientific and technical personnel, and 7) removing disincentives to research and development.

Then came the accomplishments: 1) helping secure passage of the Paperwork Reduction Act, 2) achieving active involvement and influence in the telecommunications legislative struggles, and 3) convincing the Labor Department to grant the industry an exemption from the requirements of the Service Contract Act. End of list.

"When you list your accomplishments and there are three things on the screen," Haney said, "and they're the Paperwork Reduction Act, telecommunications legislation, and the Service Contract Act, that's obviously not enough. We clearly are not doing enough for the industry as a whole and for the companies we represent. We definitely need to do more."

Thus cometh the new association. Feasible in theory, it will be particularly difficult in reality.

"I'm open-minded to discuss any way to make it workable," said Jack Bidle, president of the Computer and Com-



munications Industry Association (CCIA). Haney originally proposed the new organization to CCIA at that group's recent ninth annual caucus.

The members expressed interest, but no one has been ringing Haney's phone off the wall. It is conceivable that no one will, including CBEMA's members, a few of whom responded positively at the meeting to their leader's initiative. Other leaders, such as ADAPSO's president, Jerome Dreyer, have consistently maintained that the interests are sufficiently diffuse to prevent any reconciliation.

"You've got a number of different voices representing different segments of the industry," Biddle said. "There's no question that greater coordination is needed to educate Congress on the industry's prob-

lems. Given our economic stature, we certainly should have a voice comparable to that of the tobacco and auto industries."

But how to get it? Aye, there's the rub. Without an enemy all love to hate, i.e., AT&T, each association generally believes

**Some would like to see the information industry's combined force be as strong as those of the auto and tobacco industries.**

the other 11 speak with forked tongues. Begin with skepticism, advance to distrust, and you have the current atmosphere among the rivals.

To find a common language, one must start with the general, then move gin-

gerly toward the specific. It might be possible to forge an agreement on relatively innocuous issues where vested interests are negligible. But groups formed along the lines promulgated by Haney rarely reach a consensus on controversial subjects.

The same principle would appear to apply to the information processing industry. It can unite on the need for telecommunications legislation, but one cannot imagine CBEMA and CCIA huddling under the same federal I/O standards umbrella. The former has fought the regulations valiantly, with four of its members taking the government to court (and losing); the latter has defended them passionately. Even in the telecommunications area, much of the work in the trenches is being performed by ad hoc bodies such as the National Coali-

ILLUSTRATION BY JARED LEE

## NEWS IN PERSPECTIVE

### SPRINGTIME FOR CBEMA

It was billed as "CBEMA in a Revolutionary Environment," but the manufacturers' group spring meeting proved bloodless and nonviolent. World trade and the perils of America therein dominated the two days, but AT&T and the information industry got their share of the action.

The first morning, at an hour when most attendees could barely see, much less eat, AT&T vice president Archie McGill strode to the podium. His mission: convince his audience that his organization and theirs ought to be friends. (They will soon be. Bell is set to join CBEMA. All that remains is to find an agreeable date).

The mission, while not impossible, was no picnic, even for a marketing man as skilled as the former IBMer. McGill tried to make CBEMA see the error of its way in supporting immediate passage of telecommunications legislation, instead of waiting until U.S. District Court Judge Harold Greene disposes of the antitrust settlement, as AT&T would prefer.

"The bills in Washington (H.R. 5158 and S. 898) treat our business as it was, not as it is about to be under the decree," McGill contended. "Clearly, legislation need not be pushed through *now*; not before the effect of the decree—and a possible FCC review of the Computer II order that takes into account the decree—has become apparent."

The subsequent questioning made it apparent that McGill had swayed few of his listeners. "It escapes me why you want us not to own transmission equipment," he told one questioner. "I challenge you to run a business under that bill (H.R. 5158) with 148 pages of regulations," he told another. No one volunteered to try.

Joseph Boyd, chairman and chief executive of Harris Corp., left little doubt as to his position on reciprocity. "We sub-

sidize Japan's entire defense budget, and then they don't let our products into the country," he complained. Harris is among the companies hardest hit by the Japanese success in semiconductors. "In many ways we subtly subsidize their products. I know of no reason why we should spend money to protect Japan. Let them spend it themselves. They owe us something for that after we created a country equal in technology to ours."

Under Secretary of Commerce for International Trade Lionel Olmer was somewhat less nationalistic, emphasizing reliance on GATT (General Agreement on Trade and Tariffs) as the most appropriate method to resolve American international trade issues. Olmer was supported by Billy Christensen, vice president and general manager of IBM World Trade Corp. Dressed in what he called "my Armonk uniform"—a dark suit, despite the Miami heat—Christensen warned of "the darkening cloud of protectionism as a threat to an equitable trade system."

There was much speculation about "Future Winners and Losers in Information Technology," an address by Stephen McClellan, vice president of Salomon Brothers. He reportedly was going to name names, which had more than a few in the audience hoping theirs wasn't going to be called. After listing seven factors that would determine future winners and losers, he reminded his listeners of the composition of the DATAMATION Top 10 in 1980, then offered the McClellan Top 10 of 1990: IBM, DEC, Storage Technology, Wang, Hewlett-Packard, CDC, Burroughs, Electronic Data Systems, AT&T, and Japan Inc.

No one left the room with head bowed, but there was much food for thought.

—W.S.

tion for Fair Rates and Competition.

"I really don't know if this is feasible," Biddle said. "IBM is not going to play anyplace where it's not dominant. Then the dwarfs feel uncomfortable if IBM's not in there so they can rub shoulders with it."

Were the groups to begin talks, they would have to aim, as Haney suggests, at forming an organization to act as a coordinating entity with a super voice. Then perhaps the subsections or subgroups could focus on specific issues.

But who shall lead them out of the Washington wilderness? The officers of CBEMA's and CCIA's and ADAPSO's members? There is some risk involved in being first and foremost with an idea that may never fly. Preliminary research would be done, to be sure, but corporate executives nonetheless might be somewhat reluctant to have their names used.

"It won't be easy," Biddle admitted. "At CBEMA, what IBM says, goes.

We're not dominated by a single organization like that, and I don't think anyone in a superorganization would want that. And people would feel very threatened about who would be president."

"Would we be taking a chance? Absolutely," Haney said. "But it's cerebral, not financial. I think this is a clear and present need which will be filled by someone.

"CBEMA serves as a model. We've united corporations with diverse thrusts and interests and demonstrated that harmony, although at times uneasy, can be achieved," he added. "It would be beneficial for the industry and country if we had cohesion and consensus."

Such a utopia will not develop next week or next month. So what is its promulgator going to do while waiting?

"I think I'll let it bubble for a while," Haney said. Bet that when it boils, he'll be ready.

—Willie Schatz

## MAINFRAMES

# FULL COURT PRESS

**With the introduction of three low-end H Series machines, IBM is applying severe pressure to Amdahl Corp.**

On the surface, IBM's trio of new 3083 mainframes looks to many observers like three nails in the coffin of the plug-compatible industry, rather than just three fillers in its H Series line.

IBM already enjoys long—and somewhat unaccustomed—delivery lead times against the PCMs in both central processors and peripherals. And a recent DATAMATION survey (see p. 34) shows that hefty backlogs for the first H Series machine, the 3081 model D, are flowing through to shipments in a big way. More than 700 of the machines should reach customer sites this year, according to the study.

The survey shows that despite the sharp decline in 303X volume and the still

**One saving grace for Amdahl may be problems that IBM's dyadic design is said to have with certain software.**

heavily lease-oriented 4300, the 3081 will provide a big boost to IBM's cash position, making it certain that IBM—if no one else—will thrive in this recession year. Some analysts expect IBM to declare its biggest dividend for four years.

As if all this weren't enough, the fates have already intervened twice this year to add more sunshine to IBM's victory parade. IBM started the year by getting off scot-free in its long-running antitrust trial. And now another unexpected act of kindness has followed from IBM's most dangerous PCM rival in the U.S., Amdahl. According to one source, the Sunnyvale, Calif., company has already spent \$15 million in this first quarter to correct an engineering problem in its 3081 challenger, the 580. As a result of a faulty I/O processor that has been running too slowly, Amdahl's 5860 now will not reach customer sites until August, several months late, according to the company's head, Gene White.

Prices for the trio—which fit between IBM's 4300 series and the 3081—range from \$1.1 million to \$3.2 million. Buyers of the 3083 will also be offered the choice of air or water cooled systems when

# It's no coincidence that American Can and National Can both chose the same financial software company.

After years of competing in the container industry, they both have their own idea about what makes a good package. But American Can and National Can clearly agree on at least one package. Their financial software package from McCormack & Dodge. Both companies use our general ledger system, GL PLUS, to achieve fast, flexible reporting, efficient journal processing, comprehensive editing and extended capacity for budget control.

It's one of five McCormack & Dodge packages in use at over 1,000 top companies in virtually every major industry. Banking, consumer products, food and beverage, health care, insurance, manufacturing, natural resources, paper products, publishing, transportation, and more. Companies whose data processing departments face such demanding workloads that any system but the fastest and most powerful is simply out of the question. Whether it's for general ledger, accounts payable, purchase order, capital project analysis or fixed assets.

Whether the hardware requirement is a massive mainframe or an affordable IBM System 34, HP 3000, or Prime 50 Series minicomputer.

American Can and National Can are two of our top users. But please ask your McCormack & Dodge representative to show you the complete list. It will tell you a lot about who we are and how we operate. Not just in designing the most advanced software, but in teaching user personnel to make it work.

All over America, prospects who sit down and talk to McCormack & Dodge do more than just talk. They become customers. Which has made us the



fastest growing financial software company in the world.

We'd like to show you why.

Please call for a schedule of free seminars, plus information on:

- |   |   |
|---|---|
| <input type="checkbox"/> General Ledger   | <input type="checkbox"/> Purchase Order           |
| <input type="checkbox"/> Accounts Payable | <input type="checkbox"/> Capital Project Analysis |
| <input type="checkbox"/> Fixed Assets     |   |
| <input type="checkbox"/> Human Resources  |   |

**McCormack & Dodge**

The best financial software. The best financial people.

560 Hillside Avenue, Needham Heights, MA 02914

**(800) 343-0325.**

**In Mass. (800) 322-1098**

## NEWS IN PERSPECTIVE

the machines are shipped next year, thus eroding another PCM advantage.

As Amdahl prepares to lay the foundation of its new computer series, IBM has already begun filling out its line. With the announcement of the three new machines—the 3083 models E, B, and J—IBM's customers can look forward to unbroken upgradability on site from 3 MIPS to 14 MIPS in no more than eight hours, IBM claims.

One might be forgiven for asking, along with many top analysts, whether anything can mar IBM's victory parade this year. Are there any clouds in view? The answer, relayed from sources at IBM user sites and within the company, is yes.

As DATAMATION revealed (January 1981), IBM has had numerous problems developing its largest H Series uniprocessor, a 7.5 MIPS machine known internally as Lookout 2. IBM's main concern has centered around the cooling of its TCM (Thermo Conduction Module) logic chips, which are the building blocks of all seven H Series machines that IBM is expected to announce. The advantages of TCM for IBM are that the chips are easy to build systems with and keep its production costs down. But in comparison with the more advanced ECL chips, which are being used in Amdahl's 580, the TCM logic is slow and generates much more heat when pushed to higher MIP levels, as in the Lookout 2 processor.

"Though it makes economic sense for IBM to use the TCM logic across its H range," says top Arthur D. Little analyst Ted Withington, "it makes IBM vulnerable

### Purchase price cuts on the 3033 machines will help put the squeeze on Amdahl.

when it upgrades to the higher states of the art."

Robert Fertig, head of Enterprise Information Systems Inc. in Greenwich, Conn., says that the ideal across the current 3 MIP to 14 MIP range would be two or perhaps three types of logic. "But IBM's advanced packaging of its TCM allows it to substitute additional performance logic chips, such as ECL, should it wish," says Fertig.

An Amdahl spokesman countered, "There is no way that IBM could insert ECL or other 'foreign' chips into its TCM packaging as it stands."

He added, "If it built its own ECL and packaged those in, it wouldn't be able to cool them with current means."

Though rumors now persist that IBM has had trouble from helium gas leaks on its TCM chips, sources say that the company has brought its cooling problems under control as long as it stays within the limits of its 7.5 MIP Lookout 2 processor.

This processor in its dual or dyadic form is known within IBM as Marcy, and will be shipped later this year as the top of

the line 3081 model K. IBM privately claims this configuration will deliver 14 MIPS. Late this year or early in 1983, IBM should announce both three-processor and four-processor variants of Lookout 2. The former (known internally as Baldwin) should deliver 21 MIPS and the latter (Sentinel) could weigh in at 28 MIPS, say sources.

These two machines, plus the five already announced, will complete the H Series line. Sources claim that by the end of 1984, IBM will be ready to announce its first ECL mainframe and the first of a new Future Series (FS) family, now known internally as Trout, which will take IBM up in the 50 MIP range.

This is the expected plan, but the reality that is emerging from the first few hundred 3081 sites is something different. Clearly the only thing that could put a crimp in this rosy picture would be the failure of the 3081 model D to perform as IBM claims it will.

Says one source, "There are usually problems when a manufacturer launches a major, large-scale product line: examples are ICL with its 2980, Honeywell with its 66/85, the Burroughs 7800 and the canceled BSP, and Sperry Univac's 1110 and 1100/80. This time IBM with its dyadic processors is no exception."

Industry reports indicate that several large users, including some within IBM's Yorktown Heights development area, have found the dyadic 3081 to perform at only 1.3 to 1.7 times the 3033 in certain applications. This is said to be far from the doubling in performance promised by IBM at the machine's introduction.

Industry sources say the lag in throughput is primarily due to the dyadic nature of the model D and its being mismatched to certain large software that run serialized jobstreams. "Many workloads are not appropriate to a dual-processor," says one IBM watcher. "High-volume, real-time transaction processing works best using only one processor at a time."

Two processors, it was explained, can degrade each other's performance under certain conditions. For example, when a jobstream runs through the cache of one of the processors, that cache has to communicate with the other cache to see if the data are there as well as looking in the main store. This is said to cause extra overhead and performance degradation.

Sources say IBM's CICS commercial transaction processing package and the high throughput Airline Control Program (ACP) operating system are two systems that have been vulnerable to improper matching with the model D's dyadic architecture. IBM is said by industry sources to be currently working on new versions of CICS and ACP that will work more closely with the dyadic machine and its successor, the dyadic model K.

A March 1982 survey of more than

fifty 3081 users taken by the Gartner Group of Greenwich, Conn., showed the users to be very satisfied with the machine's performance. A spokesman for the consultancy pointed out that there could be problems from high CICS usage because to his knowledge IBM did not benchmark that software on the 3081.

In any other year, the fact that a 3081 running CICS can often perform only 10% to 15% better than a 3033 uniprocessor would provide all the ammunition Amdahl would need to raid IBM's user base—especially as the company has concentrated on building a 12.5 MIPS uniprocessor for such applications.—Amdahl, however, has slipped its delivery schedule, giving IBM what one observer called "manna from heaven."

Sources add that IBM's ACP redesign effort is "not working very well." They also stress that because of CICS's basic

### Ulric Weil of Morgan Stanley says Amdahl's in for two "nasty" years in competition with the fierce new IBM.

structure a rewrite of this package will be very difficult for IBM.

IBM has taken pains to stress that the new three-model 3083 line—running at 3.5, 5.5, and 7.5 MIPS, according to outside observers—will all support ACP when they are shipped next year. Currently troubled 3081 users are said to be going back for 3033 machines to meet their throughput needs. So next year these users may want to add the 3083 model J (which is simply the 7.5 MIP Lookout 2 processor) until they get the new software packages they need. Or they could turn to Amdahl.

Sources close to Amdahl say the company could be planning to ship an 8 MIP processor next year to compete with the model J. It's not known if the company has decided to abandon the level below 8 MIPS in which it has competed with its now obsolete 470 line. But the company is definitely readying a line stretching from 8 MIPS to 25 MIPS, insiders claim. An Amdahl spokesman would not comment on future plans.

For this year, at least, Amdahl faces very heavy weather.

"Now that IBM has announced the trio of 3083 machines, you can expect to see a glut of used 303Xs hit the market as residuals decline," says Fertig.

As part of its strategy of pushing the remaining 303Xs from lease to purchase, IBM has cut some of the 3033's price a further 17%.

"Even with this price cut," says Fertig, "3033 users can expect to get 55% to 60% of list price on the current used market." He added that 3032 users could get 20% to 25% of list. He said he had no figure for the 3031.

Fertig and other analysts believe

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).

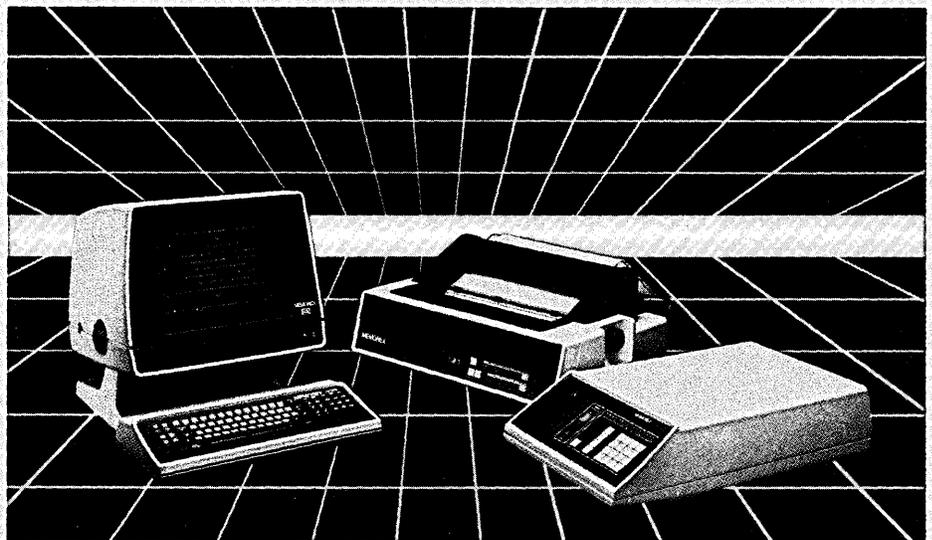
**Product Specifics: The 2078 Display Station** is built for flexibility, operating in bisynchronous as well as SNA/SDLC environments. It is built compactly to conserve space and even features a monitor that detaches for shelf placement. It is built to conserve energy, with efficiency features that allow the 2078 to operate on 58% less power while generating 41% less heat than its IBM equivalent. It weighs just 55 pounds, some 47% 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 95014-0784. 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

CIRCLE 36 ON READER CARD

A Burroughs Company

# DATA SWITCH BUILDS CONFIGURATION MANAGEMENT SYSTEMS FOR MULTIPLE PERIPHERAL SWITCHES

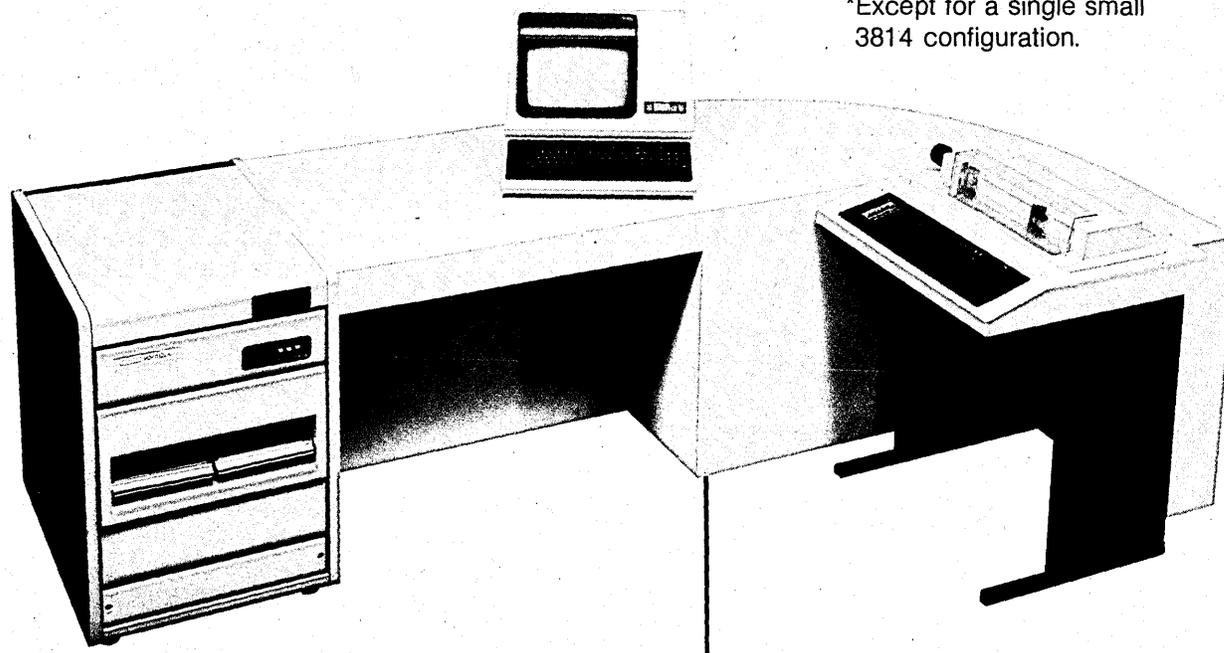
*IBM doesn't\**

Now you can automatically manage all your computer/peripheral switching systems from one centralized location. Each switch may have as many as 384 crosspoints (16 x 24).

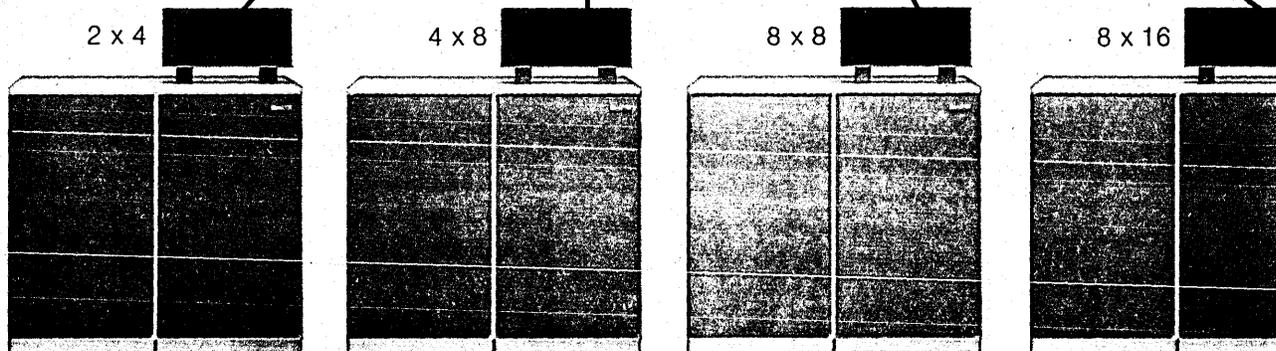
A powerful Mini-Computer controls all channel configurations with the efficiency of a "COCKPIT" COMMAND CONSOLE.

Computer peripheral status is displayed, monitored, altered, and recorded—providing the most complete source of information for daily management decision making and on-line computer room back

\*Except for a single small 3814 configuration.



Peripheral Switch Systems



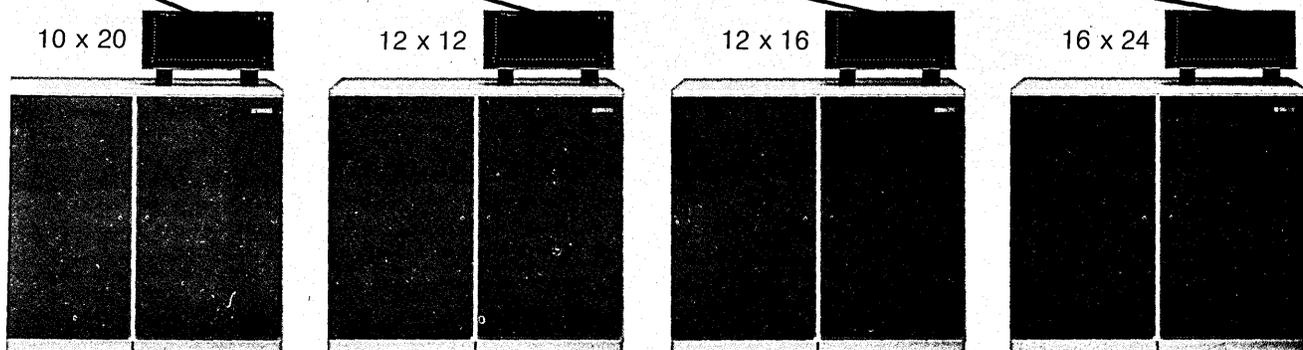
# DATA SWITCH CORPORATION SYSTEM 1100/1150

444 Westport Avenue, Norwalk, Connecticut 06851 (203) 847-9800 TWX 710-468-3210

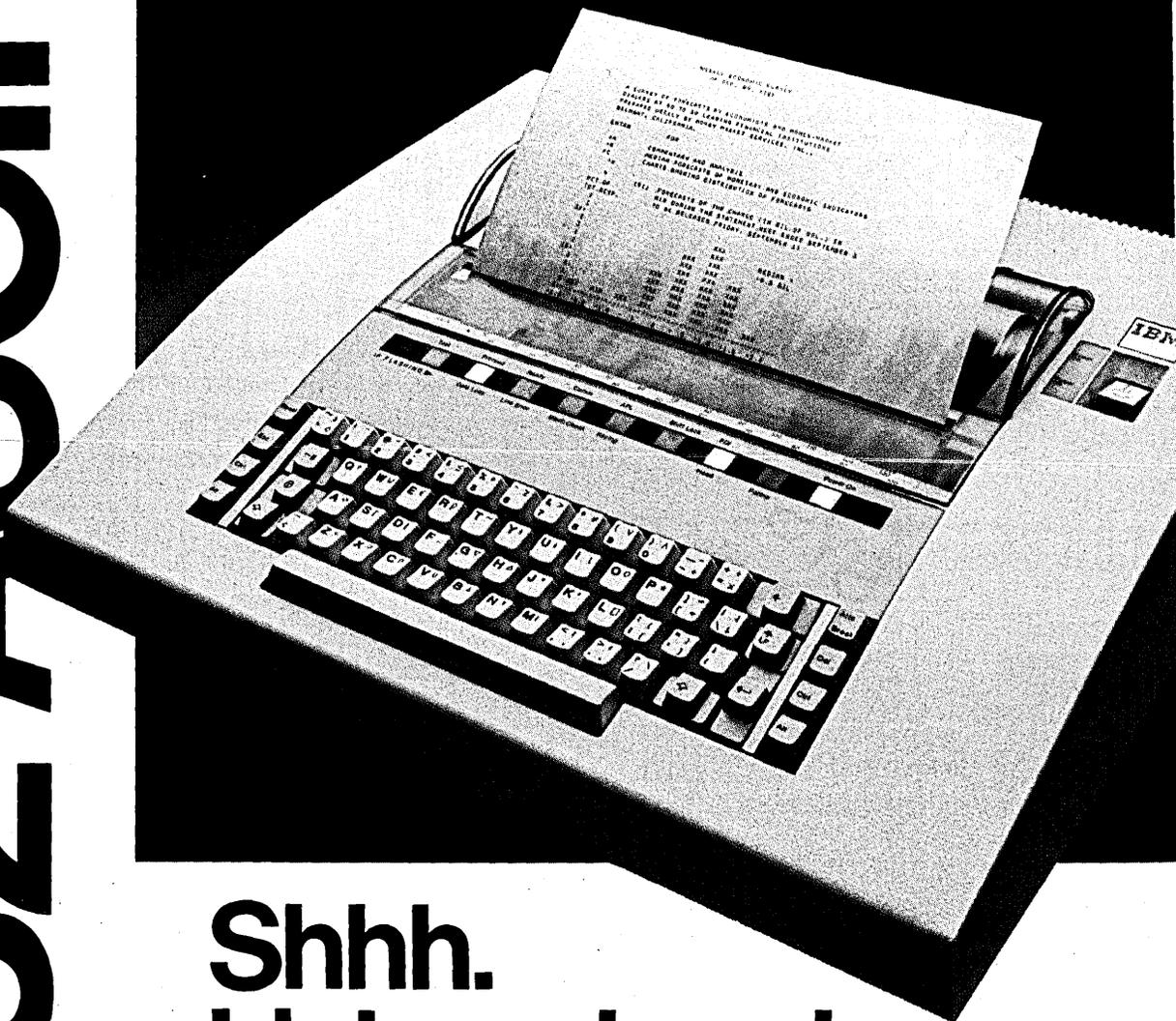
## Only Data Switch Offers All These Features:

- High Speed Reconfiguration
- Automated Control with Manual Back-Up
- Single Display of Up to 16 x 24 Switch Configurations
- Hard Copy of Computer/Peripheral Arrangements
- Software Controlled Crosspoint Interlocks
- Automatic Updating of Manual Changes
- Dual Operator Controls from either CRT or PTR Keyboards
- Multi-Level Password Security Codes
- Pre-Programmed Multi-Switch Configurations
- High Level Programming Language
- Multiple Command/Reporting Stations
- Unmatched Price/Performance Ratio

**When you choose a Data Switch System 1100/1150 you will get more performance features and reliability for your money. Automated centralized control eliminates the need to purchase a micro-computer for each peripheral switch.**



# IBM 3232 ASCII



## Shhh. Listen closely and you can hear it.

It's a pleasant sound. No clicking or clacking. Little more than a gentle rustle that's usually masked by other ambient noises. The IBM 3232 Model 51 has a non-impact, multi-element matrix print head. Instead of banging away at the paper, imaging is done by electronically removing dots from the special aluminum-coated paper, exposing easy-to-read characters.

Low decibels don't mean low speed. The IBM 3232 gives you burst speeds of up to 450 characters a second.

You can operate the 3232 as a

desk-top work station for interactive ASCII environments, or as a standalone printer. And the power of interactive computing—including a standard APL character set—is at your fingertips.

And now, to top it off, you can order the IBM 3232 through our IBM-authorized distributor network. This means you can have one on your desk fast. It's the kind of thing we'd like to shout about, but making a lot of noise doesn't seem appropriate for the quietest high-speed terminal we've ever offered for the money.

The IBM 3232 Model 51 is available at over 100 IBM-authorized distributor locations across the country. Contact any of the distributors listed below.

**American Computer Group, Inc.**  
617-437-1100

**Arrow Electronics, Inc.**  
Call your local Arrow office

**Carterfone Communications Corp.**  
214-630-9700

**David Jamison Carlyle Corp.**  
800-526-2823  
800-421-3112

**Hall-Mark Electronics Corp.**  
800-527-3272  
214-343-5079 Texas

**Hamilton Avnet Electronics**  
Call your local Hamilton Avnet stocking location. Or call Hamilton Avnet Microsystems 213-615-3950

**Kierulff Electronics, Inc.**  
Call your local Kierulff division

**Pacific Mountain States Corp.**  
800-423-2853  
800-272-3222 California

**Schweber Electronics Corp.**  
800-645-3040  
516-334-7474 New York

**Wyle Distribution Group**  
213-322-8100  
408-727-2500

Or call IBM at 800-431-1833 (in New York call 800-942-1872) for more information.



## NEWS IN PERSPECTIVE

that the used 303X machines could greatly impact Amdahl's earnings, which for the bulk of this year will come only from its old 470.

Said an Amdahl spokesman: "We would tend to agree with this if large numbers of 303X machines reach the used market quickly. But we don't think this will happen."

He continued: "Many of the 303X users got their systems at high book value and are writing them off over four years. Lots of them are only half written down by now and still have two years to go. We think it more likely that the user will keep his 303X for two more years, sell it for \$300,000, and be a hero," he concluded.

Top Morgan Stanley analyst Ulric Weil thinks the next two years will be "nasty" for Amdahl.

"In the current climate, most Amdahl users would only consider renting 470s, not buying," Weil explained. "So in order to maintain its cash position Amdahl will try to offer trade-up deals. If a customer agrees to buy a 470 now, when the 580 that he really wants is delivered Amdahl will offer him a trade-up to the new machine," he said.

Weil said that if Amdahl makes it look financially attractive, some users might bite. "In any event, Amdahl will be hurting its cash position next year by mortgaging some of its 1983 earnings on these trade-ins," he said.

Weil's assessment is that Amdahl will get through its current troubles, but it will lose its attractiveness to the investment community. "They'll probably settle into the lower and more sedate growth patterns seen among IBM mainframe competition, or 'The Bunch,' as they are called."

One other analyst, Yankee Group research director Dale Kutnick, thinks it more likely that Amdahl's current problems will push it further into the arms of Fujitsu, which already owns 32% of its stock.

Further bad news for Amdahl will come from IBM in the form of its new French-developed communications controllers—internally called Chambord and Mirage—which will compete with Amdahl's 4705 controller. Announcement of these machines is imminent, sources stress.

Though both Amdahl and the investment community don't seem unduly troubled as yet (Amdahl's stock was holding at time of writing), many experts feel that the strain of copying, reacting to, and sometimes anticipating IBM is beginning to tell.

"It used to be much easier copying just hardware," says Fertig. "That was just one moving target to aim at. Now there are three, with software and more recently microcode being added.

"How can any vendor copy this?" Fertig asks.

—Ralph Emmett

## RESEARCH

# A LOOK INSIDE CRAY

**The sequence of events surrounding the firm's Colorado research lab sheds light on the firm's operation and future plans.**

What's going on at Cray Research? It's a question many are asking since the firm said it would shut down what was once slated to be its primary research facility. The Boulder, Colo., lab's history sheds light, if nothing else, on the peculiarities of working with company founder Seymour Cray and may, according to those involved, signal problems for future plans.

Cray Research Inc. has a long-standing reputation for entrepreneurial spirit, fostered by Seymour Cray. He left the big Control Data Corp. to found his own firm, but even then has always kept his distance, hiding out at a remote research lab, well out of reach of the corporate offices.

**Boulder was eventually to become the company's main research facility, according to statements made in 1979.**

Recently, to give himself even more time to design computers, he left his namesake and deals with the firm under contract as an independent consultant.

John Rollwagen, Cray president and chairman, was quoted more than once as saying that the company hoped to recreate at Boulder the same "intimate and productive atmosphere in which the Cray-1 was built." That particular quote was published in the Nov. 6, 1979, edition of the *Minneapolis Star*.

Since it was opened in July 1979, Boulder's purpose has been shrouded in a haze. It was never clear for very long just what was going on there and how it was to fit into the grand scheme of Cray the company. Like a boat broken loose from its anchor, Boulder's reason for being seemed to shift slightly from year to year. Its charter, according to sources there, was advanced research. Early statements made by corporate officers corroborate that story: "Ultimately Boulder will be where all our advanced research will take place," said Rollwagen in 1979. The announcement of the closing implied that Boulder's fate was directly linked to the planned Cray-2 system. Since Seymour's group in Chippewa

## NEWS IN PERSPECTIVE

Falls had that project, Boulder didn't need to exist anymore.

It was apparent from interviews with several sources at the Boulder facility that not everyone working at Boulder had the same understanding about its purpose. Further evidence of that came in November 1981, when the Cray-2 technology was unveiled (January, p. 52). Also disclosed was news that Boulder had been demoted from subsidiary to divisional status. That change caught some people, even some well-placed Boulder people, by surprise, claims one source.

If corporate's earlier statements are to be believed, then why is Boulder closing? The answer to this question begins back in 1979, when the lab started life as the

### The Colorado group designed two future machines, according to well-informed sources.

Band-Aid to cover a critical gash in the Cray-2 development program. According to some well-informed Boulder sources and a few knowledgeable analysts, the story of

Boulder goes like this:

In early 1979, Seymour Cray and his 30-plus member research team reached a deadlock on the Cray-2 project. How to cool the machine and how to package so many VLSI chips into a three-dimensional board stumped everyone. So Cray disbanded his team and headed off to Chippewa Falls to find a solution, taking only four or five junior engineers along for assistance.

Corporate management was worried. What if Seymour Cray couldn't solve the problem? The company would be stuck with one aging product, the Cray-1, while the Japanese and domestic competitors made faster and more competitive machines. It was also a time Wall Street was putting pressure on the company to somehow ensure itself against the loss of Cray himself. One product, one developer—Cray Research did not have a lot of depth to its bank of talent and technology.

The solution seemed to be the Boulder facility. It was billed as the site where "ultimately" all advanced research would take place. The immediate and most public project there was VLSI circuitry for the Cray-2. The Boulder researchers believed the corporate line—they really did think they would be the main advanced research site, that they had a charter of their own beyond any specific product. They hired on 45 people, telling them the same story.

Boulder worked. Wall Street was placated, company's stock stayed strong, and the Boulder team did in fact make excellent headway on a superfast machine—more powerful, even, than Seymour's Cray-2, revealed a knowledgeable ex-Boulder engineer.

Meanwhile, Seymour Cray had solved the Cray-2's cooling and board design problem and was back on track with the product by summer of 1981. By November, he was able to demonstrate his creation ahead of Boulder's baby. "He got there first," said the former Boulderer.

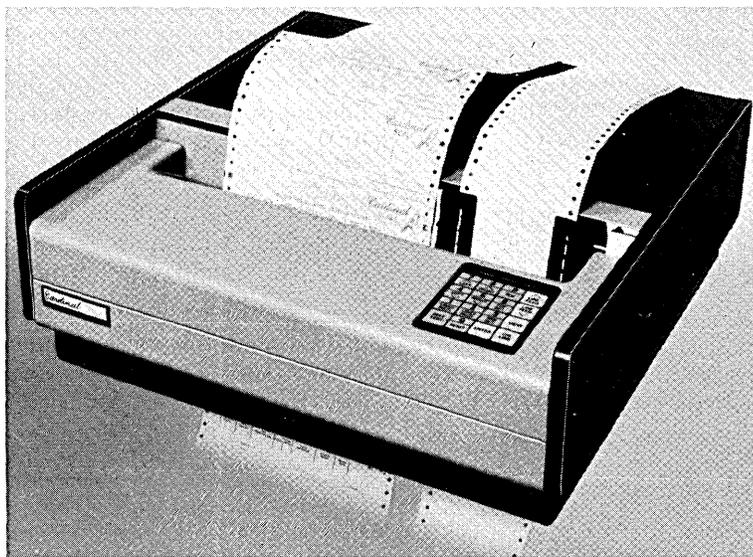
But what to do with Boulder?

Well, how about a machine with higher performance than the Cray-1, but a lower cost? It wouldn't compete in the Cray-2 class, but would, it was hoped, generate higher sales volume and more cash flow for the company. Boulder had a new lease on life. But that ledge over the abyss fell out from under Boulder last August when it was decided in Minneapolis to continue support for the Cray-1 indefinitely. Instead of a new marketing effort to sell the Boulder product, Cray decided to build on the present Cray-1 marketing force and software development team. What now to do with Boulder?

With the Cray-1 strategy in place, the need to develop a new low-cost product dissolved and, apparently, so did Boulder's future, according to John McManus, a computer analyst with Shearson American Express. Faced with three expensive develop-

# Cardinal® 2170

## High Speed Dot Matrix Data Printer



○ Five paper drive combinations including top or bottom tractor drive and individual forms handler.  
○ 200 cps.

○ 9-pin ballistic print head, 650 million character life.

○ Near letter-quality print at 100 cps.  
○ Heavy-duty industrial design.  
○ Five-input interfaces available.

Cardinal's new 2170 is a rugged performer, tough enough to take anything a factory environment can dish out... yet sophisticated to the point of engineering genius.

Unlike many of today's data printers, the 2170 is available with bottom tractor

feed. This enables an operator to remove a form immediately after the last line is printed.

Self diagnostic and signature analysis are built right into the 2170 too. This makes troubleshooting as simple as flipping a switch.

Write for more information today.

**Cardinal** COMPUTER DIVISION

Another of the Cardinal Industries  
P. O. Box 151 Webb City, Missouri 64870 U.S.A.  
Phone: (417) 673-4631

CIRCLE 39 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

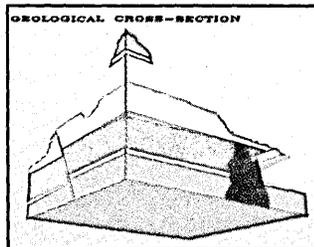
Precision Visuals' software tools are standardized, user-callable subroutine packages. They will save you hundreds of programming hours by forming the foundation of your graphics application programs. Their unique distributed-network design provides extraordinary economy of computer resources.

### 2. Versatility

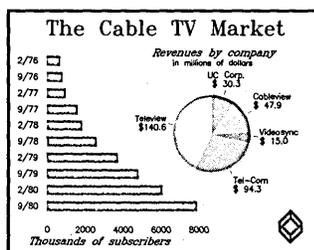
Precision Visuals' software tools provide the capabilities for performing virtually any graphics application: full-color, 3-D, dynamic image manipulation, full access to graphics input, graphics data structuring, a device-independent picture library, a business graphics vocabulary, and much more.

### 3. Adaptability

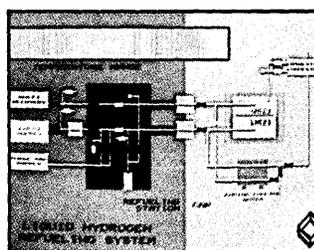
Precision Visuals' software tools currently run on 15 different computer systems, driving 26 different graphics display devices. They take full advantage of today's—and tomorrow's—most sophisticated graphics hardware, and are upward compatible with emerging hardware technologies.



*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 Dave Glander 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

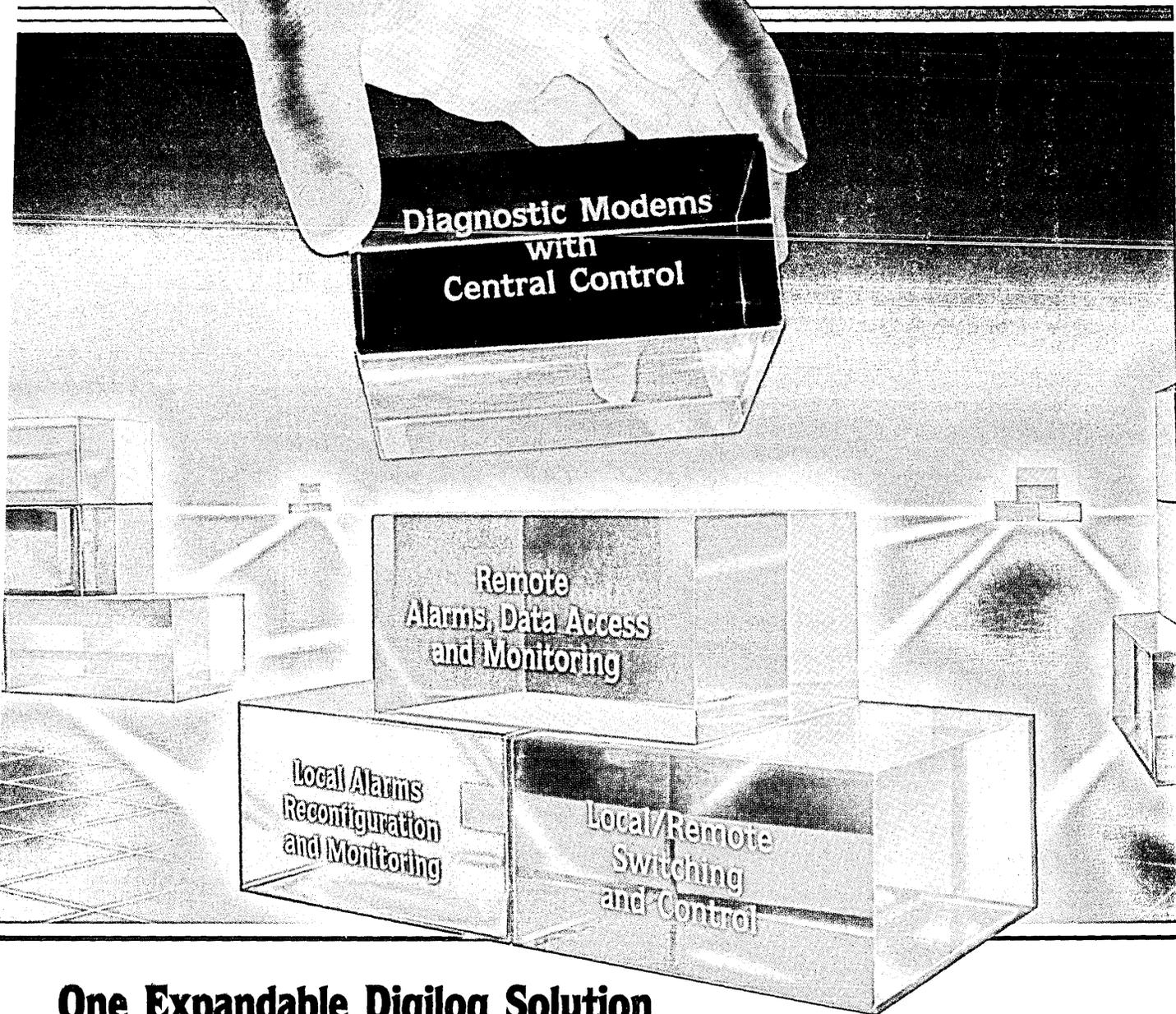


**Precision Visuals**  
Incorporated

250 Arapahoe Avenue  
Boulder, Colorado 80302 USA  
(303) 449-0806  
TELEX 45-0364/TWX 910-940-2500

CIRCLE 40 ON READER CARD

# The Power to Meet Your Growing and Changing Network Needs



## One Expandable Digilog Solution for Tech Control, Network Control and Network Management

Your data network is unique and growing. What's more, the demands users place on your network are continually changing. Month after month. Year after year.

The Digilog Network Supervisory System™ is engineered to accommodate your uniqueness. It can help you manage growth and change in the 80s.

NS System is a new totally modular system concept with a broad range

of diagnostic, alarm and control capabilities. The idea is to fit your local and remote requirements. Not ours.

You define the functional capabilities and performance objectives that meet your present network control needs. We configure the unique NS System solution that meets your requirements cost effectively. When your needs grow, NS System capabilities can

be added to keep pace with you. Here is one expandable system that spans the range from tech control to network control to network management. No data network is too small for an NS System. And you can't outgrow it.

Call Digilog today for consultation on your requirements (215) 628-4530.

**DIGILOG**  
NETWORK CONTROL DIVISION

See us in NCC Booth #5525-27

DIGILOG INC. 1370 Welsh Road, Montgomeryville, Pennsylvania 18936

CIRCLE 41 ON READER CARD

## NEWS IN PERSPECTIVE

ment projects to support—Seymour Cray's team working on the model 2 and the other Chippewa Falls team working on "significant" enhancements to the Cray-1, plus the costly VLSI development work at Boulder—R&D expenses were creeping up and over the firm's usual R&D spending ratio of 15% of revenues. By the end of first quarter (1982), R&D costs are forecast to touch 20%. Slack sales rather than an increase in actual R&D dollars is at fault, predicts one Minneapolis-based analyst. Something had to give and it was Boulder.

Among the company's excuses for the abrupt closing is that Boulder ran into some component problems. The lab could not continue research without certain specialized chips and the chips were going to be delayed a year or more. The implication was that the research team would be sitting idle during that time. Not so, was the emphatic response of a well-placed Boulder engineer. There were two design approaches under research at Boulder, "but only one approach involved the delayed

### The Cray-2's cooling problems were ostensibly the reason for starting the Boulder research lab.

chip," said the Boulder source. The other approach incorporated a "moderate-size gate array," but management was not "taken" with that approach.

People at Boulder had a different perspective. According to one source, the delay on the Fairchild VLSI chip was neither monumental nor unexpected. "When we went into the agreement with Fairchild to develop the chip, everyone, including corporate, knew what the risks were. Everyone knew it would take three to four years to develop, plus or minus a year, and Fairchild was doing well on the chip. But we also had other alternatives to that chip. You have to keep in mind that we always had three sorts of schedules: optimistic, realistic, and pessimistic. Fairchild was meeting the schedule it originally gave us. It was the optimistic schedule we were not meeting, and there was a large spread between the accelerated and the realistic schedules. We were only six months behind, not a year. The chip did not have a serious affect on the March decision." Perhaps, some suggest, Boulder all along had been more a corporate pawn than a critical player in the company's long-term business strategy.

With the Boulder lab's closing, a good number of well-qualified computer engineers will be looking for work. Among the firms doing business in the area is one Denelcor, which is hot on the heels of Cray with a supercomputer of its own. Speculates one former Cray engineer: "It's quite possible that their departure could haunt Cray like Cray has haunted Control Data."

—Jan Johnson

## SERVICES

# CITICORP FREE FOR DP ENTRY

**After three years of battle, ADAPSO has lost its case to keep Citicorp out of the computing services business.**

In this corner, Citicorp, holding company for the nation's second largest bank and at your service with the latest in data processing. In the other corner, the Association of Data Processing Service Organizations (ADAPSO), striving to ensure all's fair in the computer wars. Meet at the Federal Reserve Board and come out fighting, boys.

The winner, by a unanimous decision: Citicorp. But hold the hardware and software. There is sure to be a rematch.

Neither the contestants nor outside observers were surprised when administrative law judge Walter Alprin on March 29 granted Citicorp's application to amend Sec. 225.4(a) of the Federal Reserve

Board's Regulation Y. The Fed's counsel had recommended in January that he do so, and Alprin literally took him at his every word. The scope and breadth of the ruling, which is subject to review by the Fed's Board of Governors before becoming final, is sure to encourage those bank holding companies (BHCS) that have entertained notions of dabbling in the dp business.

At issue in the dispute, which began in February 1979 and was ordered to a hearing by the Fed in July 1980, was whether Citicorp's proposed activities, to be conducted through its Citishare subsidiary, were "so closely related to banking or managing or controlling banks as to be a proper incident thereto." Regulation Y currently authorizes nonbank subsidiaries of holding companies to engage in dp activities only for providing bookkeeping or dp services for the internal operations of the holding company and its subsidiaries and storing and processing other banking, financial, or related economic data.

Alprin's proposed order would amend Regulation Y to include the following permissible activities: 1) providing dp and data transmission services, information or facilities for the internal operations of the holding company or its subsidiaries; 2) providing to others dp and transmission services, information or facilities, or access to such operations, where data is financial.

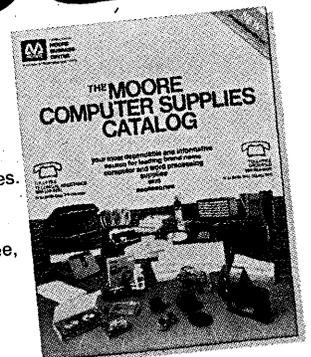
# FREE CATALOG

Send for your free Moore  
Computer Supplies  
Catalog today!

- Large selection of leading brand name supplies at low prices.
- Fast delivery from regional warehouses.
- Only toll-free technical assistance line in the industry.

For your free Moore Computer Supplies Catalog, call toll-free,  
**800-323-6230\*** Ext. 135 or complete and mail the coupon below.

\*In Illinois, call 312-459-0210, Ext. 135  
In Alaska and Hawaii, 800-323-4185, Ext. 135



Catalog Group  
**MOORE  
BUSINESS  
CENTER**

A Division of Moore Business Forms  
Moore Computer Supplies Catalog  
Department 135  
P.O. Box 20  
Wheeling, Illinois 60090

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Mail this coupon today!

CIRCLE 42 ON READER CARD

## NEWS IN PERSPECTIVE

banking, or economic related, the facilities are so designed and marketed, and the software and hardware are so designed and marketed, and the hardware is not the predominant part of any packaged offering; 3) providing by-products of permissible dp and transmission activities where not designed or appreciably enhanced for marketability; 4) providing unlimited excess capacity on dp or transmission equipment or facilities used in connection with 1) and 2) above; and 5) where the activities are provided by a holding company's subsidiary or related entity, the entity providing the ac-

### "It's pretty unfavorable to our position," commented Comshare president Richard Crandall.

tivities will have separate books and financial statements.

Citicorp played the humble victor, refusing to crow. ADAPSO licked its wounds and tried to make the best of what it concedes is not a particularly thrilling situation. It promised to file an appeal with the board, which it had to do by April 15.

"We're obviously pleased with the decision," Citicorp counsel Richard Whiting says. "We think the judge's reasoning was sound and appropriate. There are two or three areas where we think he made mistakes, but I don't know if we'll bother to appeal. If we do, it won't be voluminous."

"It's pretty unfavorable for our position," Comshare president Rick Crandall admits. "He approved things we would have said were not related to banking. I have no clue why either financial planning or general ledger accounting have anything to do with banking. How anybody could conclude they have is beyond me or anyone who knows what those functions are."

"We never said banks couldn't be in the dp business. We just want to ensure there are competitive safeguards," ADAPSO president Jerome Dreyer says. "Now we've got the same problem as when we started. We wanted more specificity on what Citicorp could and couldn't do and were hoping for a laundry list of prohibited functions."

Items on that hoped for list included computerized catalog shopping, ticket purchasing services, and home banking beyond account verification, bill paying, providing money market and similar information, and budgeting/tax accounting. Alprin emptied that basket quickly, saying past attempts at providing "negative laundry lists" have been unsuccessful and it was not appropriate under the circumstances. He refused to "arbitrarily restrict the banking industry's use of new technology."

"This decision allows BHC subsidiaries to expand into dp more than Regulation Y allowed without providing safeguards for the independent dp companies,"

Dreyer contends.

The judge believes those folks can take of their own. One of ADAPSO's main thrusts for relief has been that allowing Citicorp to expand its dp services would have an adverse effect on the public that would outweigh any potential increased benefit to the consumer. Alprin found favorably for Citicorp on all six grounds of the "public benefits" test required under Sec. 4(c)(8) of the Bank Holding Company Act.

Citicorp's proposed activities would: 1) increase competition among providers of dp and transmission services; 2) enhance convenience by creating wider accessibility of various financial services to customers; 3) not result in tying (conditioning the sale of one product on the sale of another) or cross-subsidization because "the structure of the data processing services industry is such that there is no possibility that any single company could become dominant"; 4) not result in an undue concentration of resources; and 5) not cause a conflict of interest or unsound banking practices.

ADAPSO's only consolation is that general timesharing, a lucrative business for many of its members, remains free from Citicorp's clutches.

"I think the judge was quite specific in saying Citicorp was restrained to banking services," Comshare's Crandall says. "But I'm not sure anybody is clearer on the definition of what a bank can and can't do. There are no guidelines to know what's banking and what isn't. In that regard we're very disappointed the judge didn't take a more cogent approach. It was a real surface treatment. I thought we would get somewhere even if we'd ended up worse off than we were."

Getting somewhere now will not be an easy journey. ADAPSO's appeal to the

### There is more likely to be moderate traffic than a bumper-to-bumper rush hour.

board will be little more than a formality. Administrative decisions such as Alprin's are rarely overturned. With support from its counsel, the board is extremely unlikely to disturb the findings. ADAPSO actually has a better chance of losing than gaining ground in the board's deliberations, which it must reveal by July 15.

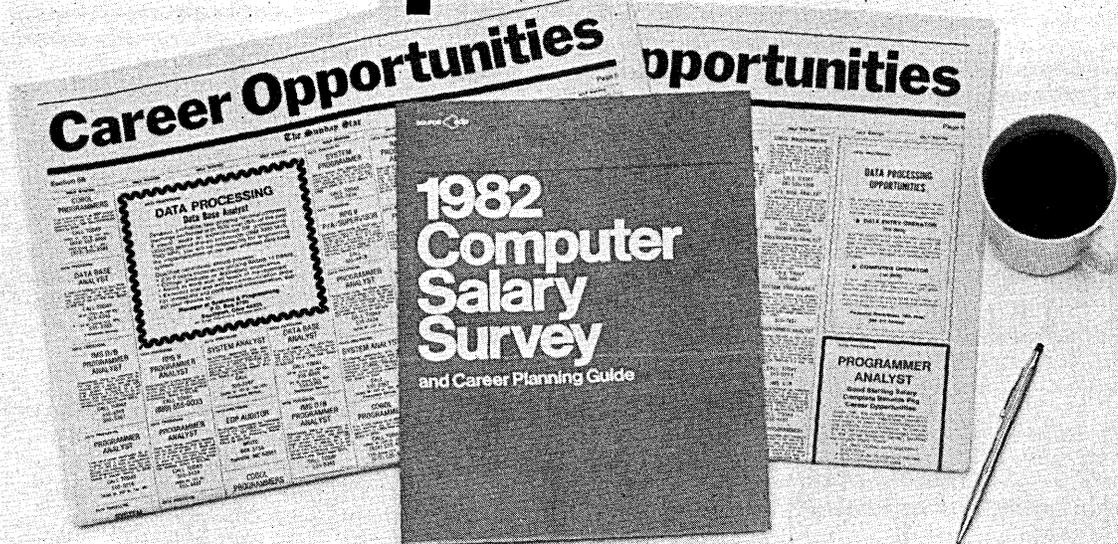
The organization's best hope lies in court. The board's decision is appealable to any United States Circuit Court of Appeals. ADAPSO already has a pending suit, which has been stayed awaiting the outcome of its tussle with Citicorp, against the board in U.S. District Court in New York. There the group also alleges that Citicorp's dp activities violate the Bank Holding Company Act. The stay is expected to continue until the Fed's final order is issued. But the legal precedents weigh heavily against ADAPSO

## Call today.

### United States:

<b>Arizona</b>	
Phoenix	602/258-9333
<b>California</b>	
San Francisco	415/434-2410
Mountain View	415/969-4910
Los Angeles	213/386-5500
Van Nuys	213/781-4800
Torrance	213/540-7500
Century City	213/203-8111
Irvine	714/833-1730
San Diego	714/231-1900
<b>Colorado</b>	
Denver	303/571-4450
Englewood	303/773-3700
<b>Connecticut</b>	
East Hartford	203/522-6590
Stratford	203/375-7240
<b>District of Columbia</b>	
Washington	202/466-5890
<b>Florida</b>	
Miami	305/624-3536
Ft. Lauderdale	305/491-0145
<b>Georgia</b>	
Atlanta	
Northeast	404/325-8370
Downtown	404/588-9350
North	404/953-0200
<b>Illinois</b>	
Chicago	312/782-0857
Northfield	312/441-5200
Oak Brook	312/986-0422
Rolling Meadows	312/392-0244
<b>Indiana</b>	
Indianapolis	317/631-2900
<b>Kansas</b>	
Overland Park	913/888-8885
<b>Kentucky</b>	
Louisville	502/581-9900
<b>Louisiana</b>	
New Orleans	504/561-6000
<b>Maryland</b>	
Baltimore	301/727-4050
Rockville	301/258-8800
Towson	301/321-7044
<b>Massachusetts</b>	
Boston	617/482-7613
Burlington	617/273-5160
Wellesley	617/237-3120
<b>Michigan</b>	
Detroit	313/259-7607
Southfield	313/352-6520
<b>Minnesota</b>	
Minneapolis	
West	612/544-3600
Downtown	612/332-6460
St. Paul	612/227-6100
<b>Missouri</b>	
St. Louis	314/231-4880
Clayton	314/862-3800
Kansas City	816/474-3393
<b>New Hampshire</b>	
Nashua	603/880-4047
<b>New Jersey</b>	
Cherry Hill	609/482-2600
Edison	201/494-2800
Morristown	201/267-3222
Paramus	201/845-3900
<b>New York</b>	
New York City	
Penn Station	212/736-7445
Wall Street	212/962-8000
Grand Central	212/557-8611
Syosset, L.I.	516/364-0900
White Plains	914/683-9300
Rochester	716/263-2670
<b>Ohio</b>	
Akron	216/535-1150
Cincinnati	513/769-5080
Cleveland	216/771-2070
Columbus	614/224-0860
Dayton	513/461-4660
<b>Oklahoma</b>	
Tulsa	918/599-7700
<b>Oregon</b>	
Portland	503/223-6160
<b>Pennsylvania</b>	
Philadelphia	215/665-1717
King of Prussia	215/265-7250
Pittsburgh	412/261-6540
Wilkins Twnshp.	412/247-4400
<b>Texas</b>	
Dallas	
North	214/387-1600
Central	214/749-1900
Fort Worth	817/338-9300
Houston	
S.W. Freeway	713/626-8705
Downtown	713/751-0100
N. Loop West	713/957-8555
San Antonio	512/344-0217
<b>Virginia</b>	
McLean	703/790-5610
<b>Washington</b>	
Bellevue	206/454-6400
<b>Wisconsin</b>	
Milwaukee	414/277-0345
<b>Canada:</b>	
Toronto	416/865-1125
Don Mills	416/425-5730
Montreal	514/849-7043

# Are you keeping up with computer salaries?



## Get the latest data in our new report. It's FREE!

**With compensation rising rapidly and sweeping technological changes occurring practically overnight in the computer profession, you can quickly become out-of-touch with salary and career trends. Are you—and is your salary—keeping up?**

If you haven't kept in touch with computer salaries in the past six months or so, you might be surprised at the changes.

In our recent survey, which polled more than 50,000 computer professionals, new statistics about compensation differences emerged. Here is a sampling:

- While some computer professionals have increased their salaries dramatically during the past twelve months, others,

performing the same type of work and having the same general level of experience, have barely managed to keep pace.

- While length of experience in computing bears a direct relationship to compensation, type of experience is often a more critical factor.
- Some emerging technologies—microcomputer systems, for example—are having an unusual impact on compensation in the field.

### **Salaries for 48 positions are compared.**

1982 salary data for 48 different position categories—at various levels of experience and computer installation sizes—are reviewed in the report. Included are positions in programming, software,

systems design, data communications, mini/micro systems, data base, EDP auditing, computer marketing and more.

### **It's free to computer professionals.**

The report is available without charge. Call today,

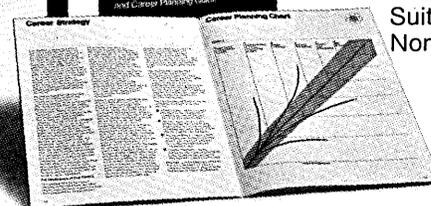
and a copy will be mailed to you in strict confidence, with absolutely no obligation.

**source edp**

North America's largest, non-franchised recruiting firm devoted exclusively to the computer profession.

### **Call for your FREE report today.**

**1982 Computer Salary Survey**  
and Career Planning Guide



The new report is available to you without charge. Call the office nearest you that's listed to the left for your copy. Our 28-page Survey will be sent to you in strict confidence, without obligation. If you're unable to call, please write:  
Source Edp, Department D-4  
Two Northfield Plaza,  
Suite 227  
Northfield, Illinois 60093

## NEWS IN PERSPECTIVE

and make remote any chance for success. Pursuit past the board could not be taken lightly.

Yet there may be no need for further action. Members may not, as they desperately fear, be swallowed by Citicorp or other BHCS that decide to enter the dp market. Some BHCS have been holding back, waiting for the Fed's signal. Now that it will be green, they will leap in. But there is more likely to be moderate traffic than a bumper-to-bumper rush hour.

First, all BHCS other than Citicorp may have to file a similar application with

the Fed. Second, the process is not accomplished overnight. Time, energy, and money are required to get dp services on line. Not even Citicorp can throw a switch and make it happen instantly.

"I don't think it's going to make an enormous difference in marketing," Citicorp vice president Ken Robin says. "Besides, what we're doing is not so unique. We've been doing it internally, but never through a subsidiary because we've never had the necessary approval. If the Fed approves, we'll do it through Citishare. But we won't be going into any new lines of

business. All we did was meet the statutory test of Sec. 4(c)(8). We'll still be doing banking, financial, and economic related activities and dealing with that data. It shouldn't be much of a change."

"There won't be a big push into the market that hasn't already happened," Comshare's Crandall agrees. "We have no problem with anybody being in competitive services if they compete fairly. I'm not sure the risk of unfair competition has been reduced, even though Citicorp promises—which they are required to do anyway—to keep separate books, records, and financial statements. If they really keep it separate, we'll be okay. Will our worries become reality? No one knows. If they don't, there will be no competitive impact."

To ease ADAPSO's fears of cross-subsidization, Citicorp committed itself not to transfer to Citishare any dp activities acquired by Citibank (New York) without submitting a separate application for board approval as required by Sec. 4(c)(8). If Citibank acts to the contrary, Alprin recommends the board consider reopening the proceeding.

"They have a built-in customer base and they control credit," ADAPSO's Dreyer says. "They could easily condition a loan on 'also taking dp services.' I don't think the judge did much to ease our concern about cross-subsidization and cross-marketing. It's fine for him to say the structure of the dp operation must stand alone. AT&T promised that, too, and look what's happening to them. I'd feel much better with a definition of maximum separation rather than just an accounting separation."

"This is not over by any stretch of the imagination," the ADAPSO chief warns.

Citicorp would be the first to agree.

—Willie Schatz

# IBM SYSTEM/34

You can buy a System/34 for as little as \$30,000. And, until now, software would cost more than \$10,000. Para Research offers a different marketing approach for software. Simply stated, we provide the best software packages at lower prices. We do this to obtain volume sales, a larger user base and to encourage user feedback. This approach has made us what we are today: the world's largest distributor of System/34 software. All packages are completely documented, supported by our hotline staff and our money-back guarantee.

## WORD PROCESSING \$750

Paratext is the most successful and complete word processing system available for the System/34. There are more than 1,700 Paratext users. Paratext offers full-screen text editor, automatic justification, individual forms design, viewable corrections, heads-down typing, word wraparound, variable data insertion, label printing and math capabilities. Paratext is also available for the System/38 at \$1,500.

## FINANCIAL MODELING \$500

Paracalc is a diversified modeling system that easily calculates budgets, cash flow, sales projections, commissions, return on investment, production forecasts, anything you can set up in rows and columns. Change one entry and all amounts are re-calculated accordingly in up to 24 columns and 400 rows.

## ACCOUNTING SYSTEMS \$500

General Ledger, Accounts Payable, Payroll, Fixed Assets Accounting, Billing, Accounts Receivable and Inventory. Whatever your needs in financial applications, Para Research has the answer. All modules support multiple companies, all are interactive and all can be interfaced with existing software.

## MAPICS PURCHASING \$1,500

MAPICS Purchasing provides complete tracking status for manufacturers using IBM's MAPICS System. It allows input of multiple vendors per item and interacts with MAPICS Accounts Payable, Inventory Management and Materials Requirements Planning modules. Users can produce reports ranging from Purchase Price Variance to Suggested Order Placement to Cash Requirements. MAPICS Purchasing eliminates key entry and typing of purchase orders. This is a must for every MAPICS user.

## PARAPLOT GRAPHING \$350

Paraplot turns statistical data into easy-to-read bars or points. It creates graphs and charts for almost any business activity. In fact, you can produce graphs over 25 inches high. The system plots on your system/34 character printer and CRTs. No special plotting equipment is required.

## DATA SYSTEMS \$250 to \$600

Documentor provides complete automated documentation, with up to fifteen individual reports that describe systems and subsystems in each program. Reports can be easily updated anytime with no programmer involvement. Clock, an advance job scheduler, allows your System/34 to be productive 24 hours a day. Rescue is a procedure re-start program that can also be used to create duplicate programs and procedures. Easy List, a report program generator, compiles an RPGII report or CRT program from a series of simple English prompts. You no longer need a programmer to create your own meaningful management reports.

At your request, we will send a complete set of documentation, free of charge. Call or write, Charles Morse, Software Sales, Dept. DM1, Para Research Inc., Whistlestop Mall, Rockport, MA 01966 (617) 546-3413

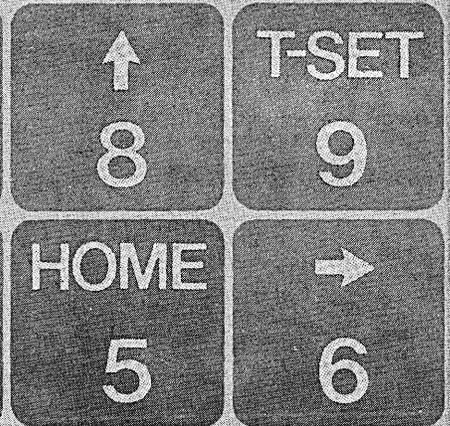
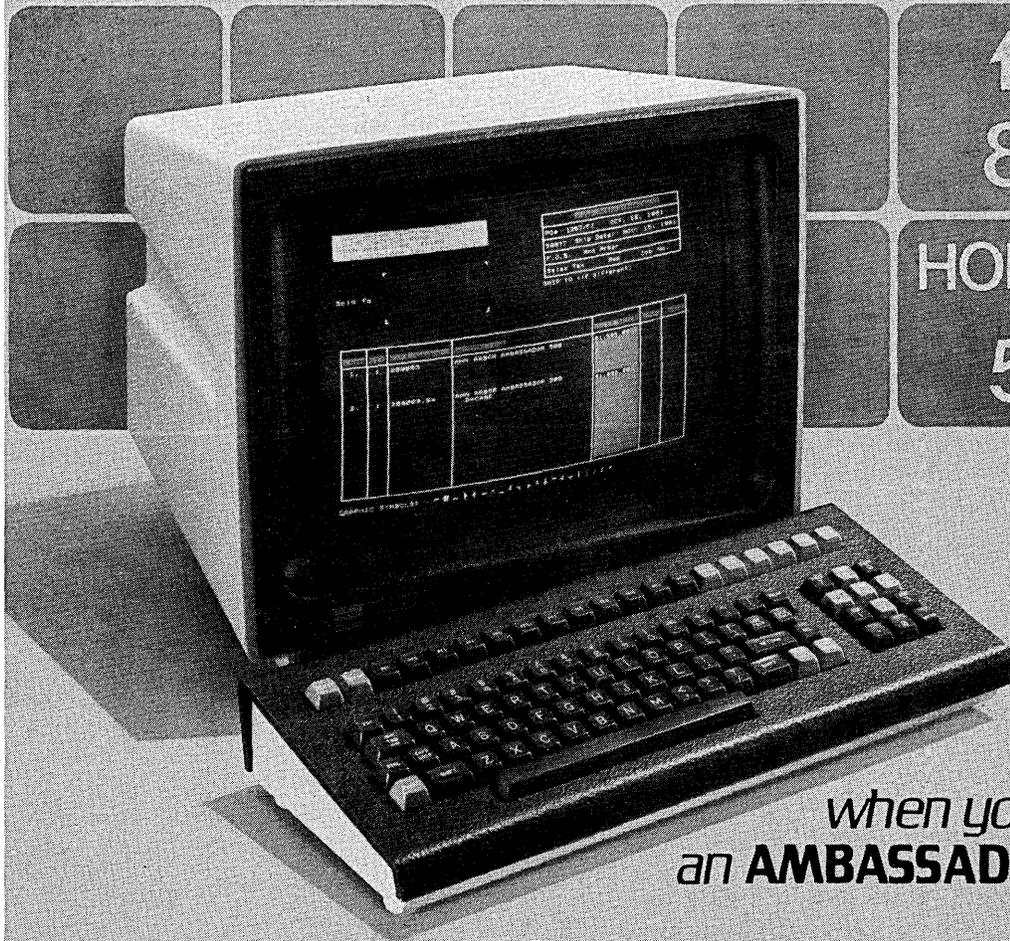
## SUPERCOMPUTERS

# SEEKING SPEEDY SOFTWARE

**Bomb builders at Los Alamos Labs want better software for future machines.**

It must be the largest scientific computing facility in the world. There are more than 90 computers in the network, including four Cray-1s, four Control Data 7600s, three CDC 6000 series mainframes, plus more than 40 DEC VAXs. Users at the Los Alamos National Laboratory in New Mexico, pri-

# THE ANN ARBOR AMBASSADOR™ 300



*Why settle  
for an  
emulation  
when you can have  
an **AMBASSADOR 300**?*

	AAA 300	DEC*VT100*		AAA 300	DEC*VT100*
Display Lines	60	24	Send/Print Controls	12	0
Screen Size	15"	12"	Send/Print Modes	30	0
Cursor Controls	22	15	Operator Convenience Mode	24	10
Graphic Renditions	6	5	Programmable Keys	48	0
Tab Controls	12	4	Line Drawing	Yes	Yes
Erase/Edit Controls	25	4	Non-Volatile Setup	Yes	Yes
Form-Filing Controls	10	0	Non-Volatile Control String	Yes	No

The Ann Arbor Ambassador 300 supports most of your VT100\* software *without* asking you to give up other features you'll like. Its selectable 60-line display lets you see more of your program or report. And you still get all the capability of the standard Ambassador. Things like editing, formatting, printer output and programmable function keys.

**For more information, call Ann Arbor Terminals at (313) 663-8000.**

\*DEC and VT100 are trademarks of Digital Equipment Corporation.



6175 JACKSON ROAD • ANN ARBOR, MICHIGAN 48103 • TEL: 313-663-8000 • TWX 810-223-6033

**Now  
a DEC/IBM  
inter-  
connect  
that's easy  
to use**

Your Dec users and operators have more important things to do than coping with data communications. The COMBOARD™ system from Software Results provides a reliable IBM or CDC link that's easy to use.

Users accomplish their job and data transfers quickly and with less effort. Job status inquiries may be made from any terminal. Operators appreciate the stand-alone function.

COMBOARDS are 16 bit CPU based single board computers which plug straight

**COMBOARD™**

into your DEC UNIBUS. Your COMBOARD, not the DEC host, handles all the real time interrupts and protocol processing associated with data communications.

COMBOARD models 631, 731 and 1231 support transfer rates from 4,800 to 56K baud. They are the leaders in DEC/IBM and DEC/CDC interconnects.

For more details contact your sales representative at Software Results at 614 421-2094 or mail the coupon today.

**SOFTWARE  
RESULTS  
CORPORATION**

1229 West Third Avenue  
Columbus, OH 43212-3090

Send me more information on

COMBOARD™.  
Name

Company

Address

COMBOARD™ Software Results Corporation  
DEC, UNIBUS™ Digital Equipment Corporation

## NEWS IN PERSPECTIVE

marily in the business of designing thermonuclear weapons, generate each month between 2 million and 4 million printed pages of output, from 2 million to 4 million frames of microfiche, and 10,000 to 20,000 feet of 16-mm and 35-mm film.

And yet those weapons designers say they need machines 100 times more powerful than anything available today, such as the Cray-1 and the CDC Cyber 205. They say they could use that power today. They don't expect all the speed improvement to come from faster hardware, so people from Los Alamos and its sister lab in Livermore, Calif., met in mid-March in Glendon Beach, Ore., with experts from the world of software—those at the forefront of new programming languages and language implementations.

One view of the bomb-makers' problem is that the number of debugged lines of code produced by a typical programmer has remained constant over the years, no matter what language is used. "So, what we're really talking about in the software game is leverage," says Robert H. Ewald of Los Alamos. "That's what this conference is about."

He noted that in the 1950s assembly language was used at the lab. Programmers would write one line of assembly language code and it would generate one machine instruction. In the '60s they moved to a higher level language and they saw one FORTRAN statement generate on the order of 10 machine instructions; that was a considerable gain in leverage. In the 1970s they produced large libraries of frequently used routines and other procedures, such that any one procedure call might now generate the equivalent of something like 500 machine instructions. And in the '80s they're applying structured programming techniques and software engineering tools, so that proce-

**The nation's leading nuclear weapons lab is looking for an increase in performance of some 100 times over currently available machines.**

dures calls will generate many machine instructions on a variety of machines, not just a single one. If one procedure call, then, can generate 500 VAX instructions, 500 CDC 6000 instructions, 500 CDC 7600 instructions, and 500 Cray-1 instructions, that might be considered a 2,000-to-1 improvement in programmer productivity.

But there is still a need to improve the leverage of software. Ewald continued. "We need to do that in a way that recognizes our current investment in existing software." He explained that there are several million lines of code at Los Alamos and 99% of it is in FORTRAN. It can't be just tossed out and written over again. The weapons men need to run it on today's machines and they need to run those same ap-

plications on future machines.

"What we're seeing, then, is that our software is becoming our hardware, if you will," he continued, noting, "What used to be software has become very hard. It can't be changed." There's a constant need to use the existing software, he said.

Later, following another presentation, Ewald said that in order to move from one FORTRAN version to another there would have to be a factor of four speedup in performance. To move from FORTRAN to another language, the users would demand an even greater improvement in processing speed. Demonstrating the lack of program

**Anthropomorphic programming, suggested by researchers at the University of Waterloo, may be the answer to some future supercomputing problems.**

transportability at the lab, he said that if it were considering bringing in a new machine, users would think it necessary to have a three- to five-time performance improvement in order to make the move worthwhile.

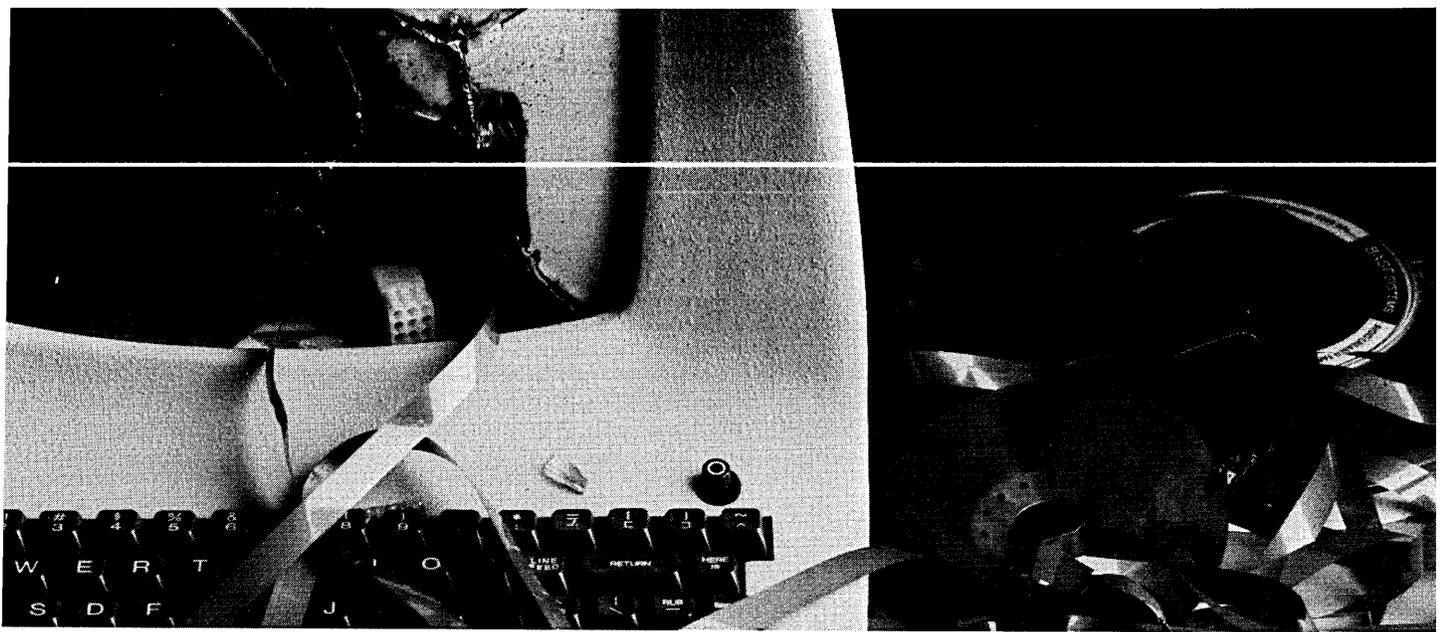
"I cite that number to show you the tremendous investment in software we have and our inability to change a piece of it," Ewald explained. "We need better tools, but we need to be able to use those tools from where we are today."

The point was made more bluntly by Alex L. Marusak of Los Alamos, who said, "If you wish to help FORTRAN programmers, the obvious place to start is to stick with FORTRAN. Don't design another language. If you do stick with FORTRAN, don't make any changes to it that cause old programs to stop working."

As it turned out, no one in the audience seemed willing to stick with FORTRAN, the sentiment seeming to be that in order to get the speed improvements being asked for, the lab would probably have to abandon vector processing and go to parallel processors, and FORTRAN may not be adequate for parallel processing. The lab's response to that, however, was that it needs a parallel processor on which to test the validity of FORTRAN.

This led to more questions that someone summarized as follows: in the long term, which option will be most useful—FORTRAN as it is today, FORTRAN 8X, FORTRAN plus macros, a new language, or the integration of the capabilities of several language systems including FORTRAN? From the floor came the question: why not all of them, since that's what likely will happen? Opinion was voiced in favor of FORTRAN plus macros, if macros are used as a means of modifying the language.

Thus the conference served two purposes. It provided a means by which the laboratory people, the scientists who devel-



# “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.\*

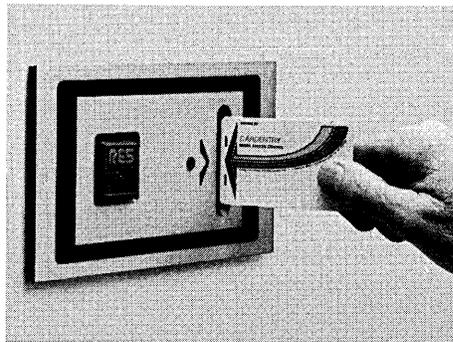
It’s that easy to account for (and control) unauthorized access and activities. And it’s that easy to save money.

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 52 ON READER CARD

CARDENTRY is a registered trademark and RUSCARD is a trademark of Rusco Electronic Systems.

\*Also available in French, German or Italian.

## NEWS IN PERSPECTIVE

op large programs, and the people who provide computing services to them, could explain why they've been using FORTRAN, what features are particularly attractive to them, and show the magnitude of their investment and commitment to that language. It also gave them an exposure to new languages, their design and features, and plenty of free time to discuss with academicians and research folks such things as programming environments, workstations, and dataflow computers.

Presentations with time for questions and answers were made on the Ada language, on dataflow languages—including a new one called Valid, developed by the Musashino laboratory of Nippon Telegraph and Telephone Corp.—and on applicative and functional languages. It was also

### **FORTRAN is the standard language for supercomputing, but a number of alternatives are being readied for trial runs.**

pointed out that the language VAL was becoming available at the Livermore Lab in an experimental program. Users were encouraged to try it and to provide feedback on it.

"We're in the middle of a research phase, and we want information," said James R. McGraw of Livermore. He said he thought applicative languages have a high potential for scientific computation. Arvind, a professor from MIT, explained the advantages that functional languages have over imperative languages like FORTRAN.

Two men from the University of Waterloo in Ontario, Canada, Kellogg S. Booth and W. Morven Gentleman, spoke on what they call anthropomorphic programming. It is designed to simplify the analysis and facilitate the understanding of large, complex systems, "often to the point where solutions that mirror structures evolved within the society can be applied immediately to problems in software engineering." The presentation prompted Kenneth Wilson of Cornell University to say later, "The only way you can really get a handle on the problems of parallel processing is with these anthropomorphic analogies."

During a panel discussion, which was more of an open discussion between paper presenters and the audience, a question from the floor came: "If I agree to abandon FORTRAN, should I use Ada or an applicative language?"

The response from Charles Wetherell of Bell Labs: "If you're going to do it today, you would use Ada for the lumpy concurrency [in contrast with fine concurrency] and applicative languages for the physics routines."

But Los Alamos' Bill Buzbee explained that the lab is not about to rewrite a 100,000-line program; rather, it has been

rewriting modules that are then inserted into existing code. He added that he thinks this has important consequences when it comes to the possibility of switching to a new programming language or using a new style of programming.

The discussion of future languages for future machines prompted Livermore's Christopher Hendrickson to suggest that someone produce a small engineering model of a dataflow computer and put it out where language people would be able to try out their programs.

Responding to that was someone from Texas Instruments, who said the company did exactly that in 1978, building a dataflow machine, then spending three years trying to interest the defense and energy departments and all the labs, but to no avail. No one was willing to put up the money to install the experimental machine, the TI representative said.

"The cost was going to be about \$3 million to put out a small machine, not a high-performance one," he said. "It could've been a test bed. We couldn't put the package together. We just dropped out of the business."

This, in turn, got a response from Buzbee, who acknowledged that the risks for machine makers to develop supercomputers has risen. For this reason he has begun to believe "It's time to nurture the construction of experimental equipment in any way we can, particularly with respect to these new architectures." He admitted it's difficult to find the money for such an undertaking but added, "We're eager to help in any such endeavor."

Buzbee's counterpart at Livermore,

### **New architectures will have to be tested with existing code before manufacturers will commit their scarce resources to building new machines.**

George Michael, observed that a machine with 100 times the power of a Cray-1 is not likely to emerge from any one organization in an appropriate time frame. It's going to take cooperation among the laboratories, academics, and the manufacturing communities, he said.

"And I don't think it's going to come through vector processing," he added. "I just can't imagine putting enough vector processors together in a system that would give us a factor of 100 over a Cray." If performance is measured by the number of floating point operations, he continued, that's 3,000 floating point operations per second. So perhaps what the labs must do is to send their physicists back to the drawing board to figure out a better way to solve their problems. Maybe, Michael noted, the need is to make smarter programs, not bigger ones.

—Edward K. Yasaki

# CALL YOUR LOCAL DYSAN OFFICE

- CA: Los Angeles  
(213) 907-1803  
Orange County  
(714) 851-9462  
Sacramento  
(916) 966-8037  
San Francisco/Sunnyvale  
(408) 730-2145
- DC: Washington  
(703) 356-6441
- GA:\* Atlanta  
(404) 952-0919
- IL: Chicago  
(312) 882-8176  
(800) 323-5609
- MA: Boston  
(617) 273-5955  
\* (617) 229-2800
- MI: Detroit  
(313) 525-8240
- MO: St. Louis  
(314) 434-4011
- NY: New York  
(212) 687-7122
- OH: Cleveland  
(216) 333-3725
- PA: Pittsburgh  
(412) 261-0406  
Philadelphia  
(609) 939-4762
- TX:\* Dallas/Ft. Worth  
(817) 261-5312
- WA: Seattle  
(206) 455-4725

\*Includes OEM Sales

Dysan Diskettes are also available from all ComputerLand Stores, Sears Business Systems Center, and many independent computer outlets nationwide.

For the location of the Dysan sales outlet nearest you, contact Dysan at:

(408) 988-3472  
Toll Free: (800) 538-8133  
Telex: 171551 DYSAN SNTA  
TWX: 910-338-2144

 **Dysan**  
CORPORATION

CIRCLE 53 ON READER CARD

# WHAT IS THE TRUE COST OF A DISKETTE?

If you said at least \$186.50\*, you're probably close.

Confused? It's simple. The minimum cost of a one-sided, single density 8" diskette equals the purchase price plus the cost of the time to fully load the data onto the disc\*. The adjacent diagram tells the story. As you can see, the purchase price of a diskette is a small fraction of the total cost of ownership. So why not pay a few cents more for the best diskette available?

That's where Dysan's quality comes in. Dysan diskettes and mini-diskettes are manufactured to the toughest quality standards in the industry. Every diskette is tested between the tracks as well as on the tracks to insure you 100% error-free recording over the entire disc surface. Dysan quality protects your investment of \$186.50.

You know how costly time and data losses can be should your "bargain" diskette be faulty. Every penny you think you save on the purchase of magnetic media could cost you dearly. Why take the risk when you can have Dysan?

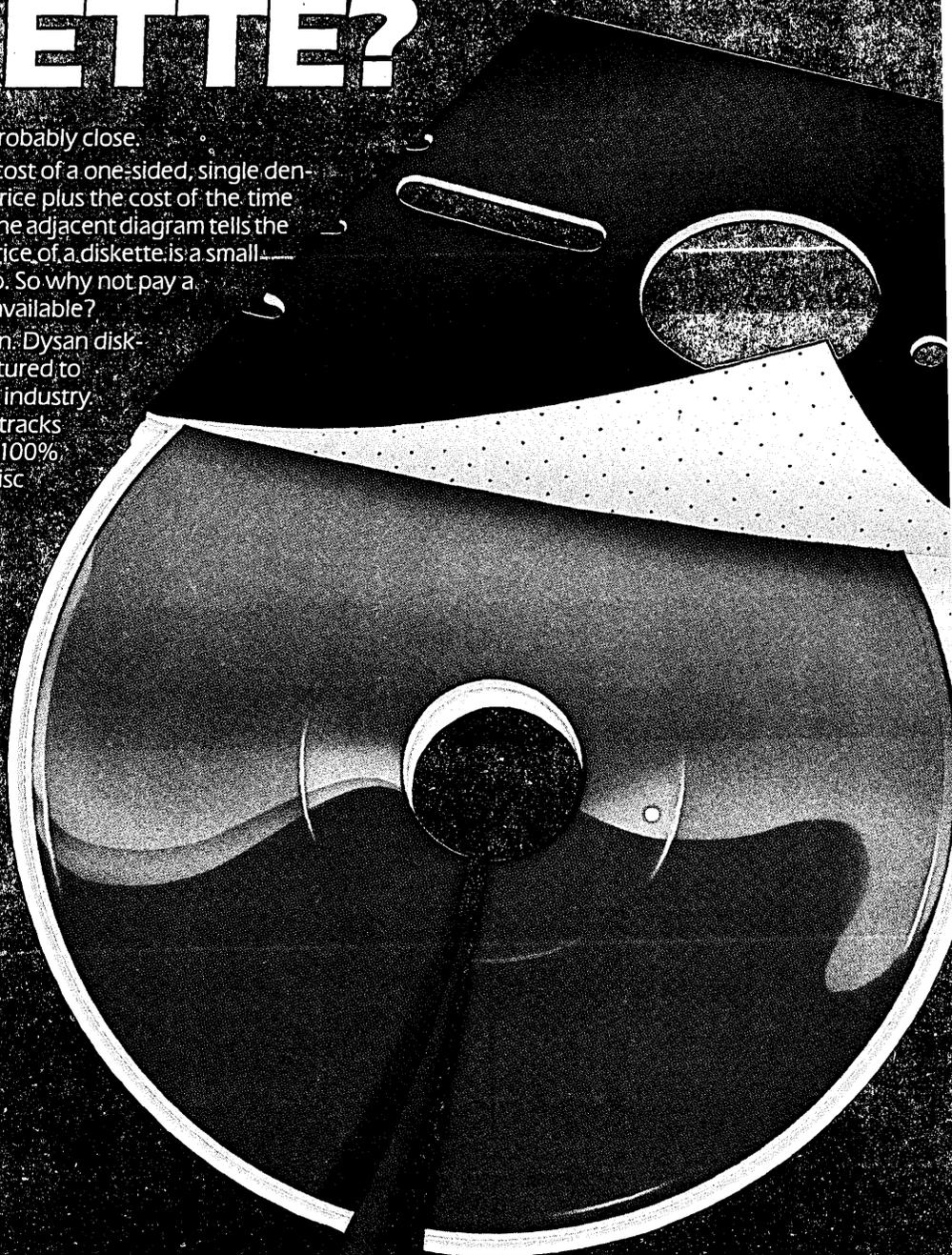


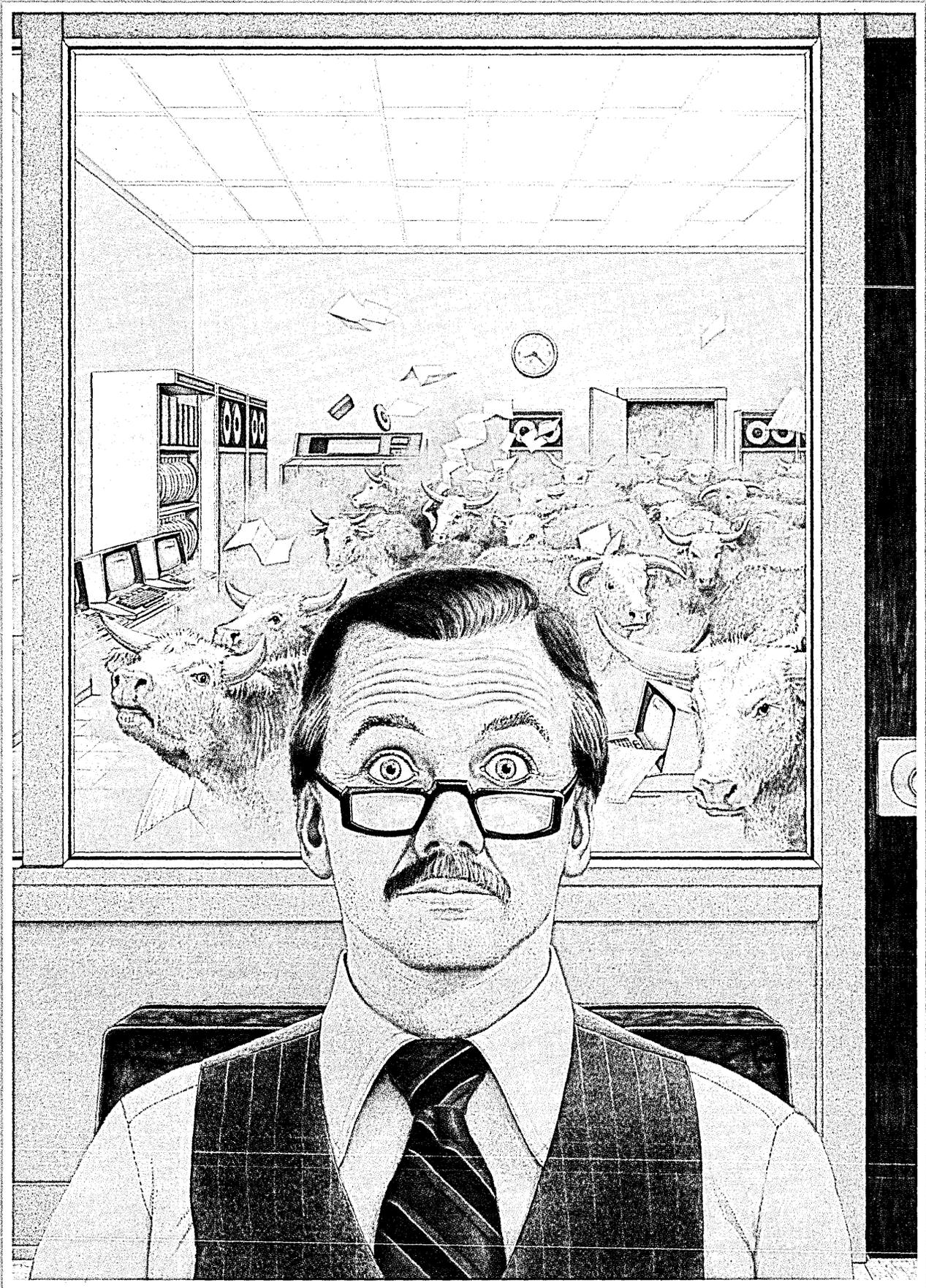
**dy**  
**Jan**  
**Dysan**  
CORPORATION

Our Media Is Our Message  
5201 Patrick Henry Drive  
Santa Clara, CA 95050

\*\$4 represents  
Dysan's suggested  
retail price for a one-sided, single  
density 8" diskette, packaged ten  
to a box. Minimum total cost of  
ownership = \$186.50

\*\$182.50 represents the cost of data  
loading (approximately 22 hours at  
11,106 keystrokes/hour at a labor cost  
of \$8.23/hour); based on 1981 Data  
Entry Management Association  
(DEMA) National Averages.





---

---

# "WHAT THE HECK IS A DATA CENTER MANAGEMENT SYSTEM? AND WHERE CAN I GET ONE...FAST?"

---

---

From UCC ... and *only* from UCC!

There is only one Data Center Management System: UCC-8. It is a revolutionary new software package that can help you deal with virtually every management problem presented by large data centers. It will help you:

- Monitor the immediate status of every project in your shop.
- Keep track of every one of your hardware and software problems.
- Keep tabs on every one of your vendors, and every piece of their equipment.
- Determine priorities and assign responsibility for every project.
- Control equipment and procedural changeovers.
- Identify the expense associated with every particular problem.

*What's more, it is a management support system for your entire company ... as well as for your data center.*

Call us about UCC-8 at 1/800-527-5012 (in Texas, 214/353-7312). Call us now ... and avoid the stampede.

Also, ask us about:

A Tape Management System that protects data from loss or destruction (UCC-1). Circle 54

A DOS Under OS System that lets you run DOS programs without conversion and generate OS JCL (UCC-2 + 20). Circle 55

A Disk Management System that saves the cost of new disk drives (UCC-3). Circle 56

A PDS Space Management System that eliminates PDS compression (UCC-6). Circle 57

A Production Control System that makes scheduling systems obsolete (UCC-7). Circle 58

A Data Dictionary/Manager that really gets IMS under control (UCC-10). Circle 59

An Automated Recovery and Tracking System that eliminates rerun problems (UCC-11). Circle 60

A Hardware Vendor Accountability package that gives you the facts on reliability (UCC Reliability Plus). Circle 61

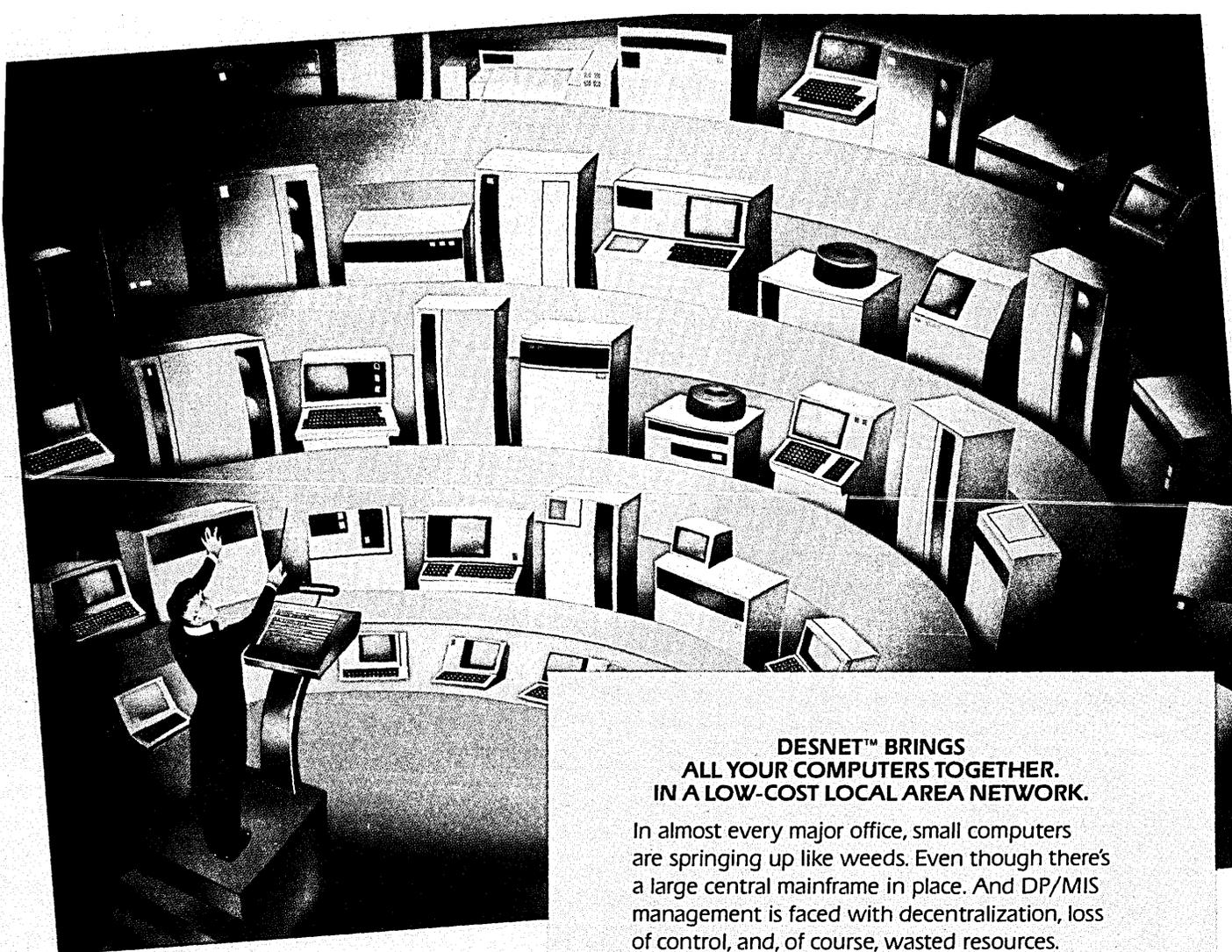
A complete line of Financial Application Software packages. Circle 62

The leading line of Banking Software packages. Circle 63



**We're #1 in Data Center Management.**

University Computing Company • Dallas • Toronto • London • Paris • Dusseldorf.



## SYMPHONY IN COMPUTER NETWORKING.

### DESNET™ BRINGS ALL YOUR COMPUTERS TOGETHER. IN A LOW-COST LOCAL AREA NETWORK.

In almost every major office, small computers are springing up like weeds. Even though there's a large central mainframe in place. And DP/MIS management is faced with decentralization, loss of control, and, of course, wasted resources.

Now all your computers can play the same tune. Share the same data. And use the same resources. From mainframe to mini to micro. With DESNET.

DESNET puts them all together in one efficient, low-cost local area network. To share your expensive high-speed peripherals and data transmission facilities, on-line file storage, or even implement your own electronic mail application. Even with dissimilar equipment that was never designed to work together.

DESNET connects dissimilar equipment at an affordable cost. So you preserve your in-place investment.

Only DESNET offers a choice of connecting media-baseband, broadband, fiber optics, or modem.

And only DESNET can cost less than \$250 per CPU connection.

Assume the conductor's role in all your computing operations. Call DESTEK at (415) 968-4593 for full information, and the name of the DESNET dealer nearest you. It could be the most productive thing you do today.

The DESTEK Group, 1923 Landings Drive, Mountain View, California 94043

# DESTEK

WE BUILD ACCESS TO PRODUCTIVITY.

CIRCLE 64 ON READER CARD

## NEWS IN PERSPECTIVE

TELECOM

# RCA GLOBCOM EXPANDS

**The international record carrier is hoping its new systems and a domestic marketing effort will help it do battle with Western Union.**

Low speed 50-bits-per-second Telex service has never been a particularly attractive offering to computer network users. But now the world of low speed message service is being phased into the higher speed domains of computer communications.

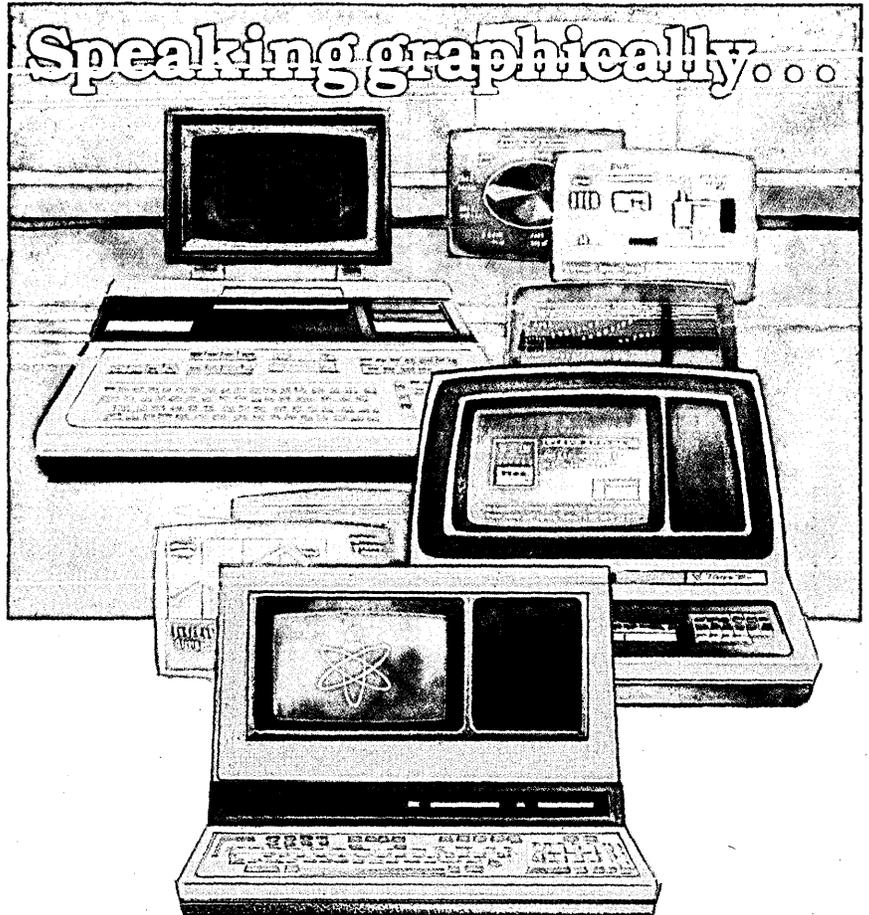
The catalyst in bringing these two worlds together has been the recent authorizations of the Federal Communications Commission to introduce competition to international record communications. One company in the forefront of this transition is RCA Global Communications Inc.

RCA Globcom, as it is known in the industry, will soon begin expanding its domestic services as part of the FCC effort to increase competition among international record carriers (IRCs). The most publicized part of these changes entails an abandonment of the restrictions that kept Western Union from handling international communications. But as WU is allowed to expand overseas, the IRCS, including RCA Globcom, will provide new services in the U.S.

Beginning later this year, customers with IRC Telex terminals in the U.S. will be able to interconnect this equipment to exchange messages. While this may sound like a logical capability, previous rules restricted these terminals to international messages only.

To provide increased flexibility to domestic users, RCA has signed interconnection agreements with other IRCS that will allow exchange of messages at a uniform rate of 35 cents per minute, according to Valerian Podmolik, Globcom's president and ceo. Essentially, this will create a second network, since it appears that WU will not interface with the IRC network. While users can send messages between the IRC and WU nets, Podmolik said there are advantages with the newer RCA store and forward computerized facilities.

"The heart of my network is less than four years old and it doesn't have any old electromechanical equipment in it," he observed, explaining that the Globcom computerized switching center in Piscataway, N.J., includes processors from Digital Equipment, Data General, and Gen-



## it really pays to rent terminals and desktop computers from Genstar REI!

You can rent — right now, off-the-shelf, for as short as 30 days — Hewlett-Packard desktop computers, intelligent graphics terminals, graphics terminals, digitizers and thermal graphics printers. Plus, you can rent dot matrix printers, graphic printers, impact printers and teleprinters from Centronics, HP, Tally, Texas Instruments, Qume, and more. Also, data terminals from ADDS, Beehive, Computer Devices, HP, Lear Siegler, Tektronix, Televideo Systems, TI, and others. We've also got modems and acoustic couplers immediately available for rent throughout North America. Think of your bottom line in graphic terms. Rent from Genstar REI. Today!

**GENSTAR**

**Rental Electronics, Inc.**  
**(800) 227-8409**

In California (213) 993-7368, (415) 968-8845, (714) 879-0561

GSA Contract #GS-04S-23560

**Show me the savings picture, REI. Send me a Free Catalog now!**

- It sounds great. Tell me more! Call me at \_\_\_\_\_
- I'm particularly interested in the following equipment: \_\_\_\_\_
- Send me your new Rental Catalog. \_\_\_\_\_
- I'd like a copy of your "like new" equipment for sale catalog, too. \_\_\_\_\_

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

ORGANIZATION \_\_\_\_\_

ADDRESS \_\_\_\_\_ MAIL STOP \_\_\_\_\_

CITY/STATE/ZIP \_\_\_\_\_

TELEPHONE \_\_\_\_\_ D582

Please complete coupon and mail to: Genstar Rental Electronics, Inc., 19525 Business Center Drive, Northridge, CA 91324

© Genstar Rental Electronics, Inc. 1982

CIRCLE 65 ON READER CARD

MAY 1982 73

# Look before you reap.

**T**here are many good ways to make your money work for you. And some not so good. So don't leap into anything without taking a long, hard look. Especially if you have no savings in reserve.

And if you don't have enough savings, look into U.S. Savings Bonds. Because Bonds do make sense.

They guarantee the interest. They're guaranteed against loss, fire, and theft. And the Payroll Savings Plan is a sure, easy way to guarantee savings. Federal income tax may be deferred and there's no state or local income tax.

A little is set aside each payday for U.S. Savings Bonds. Your savings will grow until you're ready to reap the rewards of regular saving.

Saving is one of the most important financial decisions you'll ever make.

**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.*

 A public service of this publication and The Advertising Council.

## NEWS IN PERSPECTIVE

eral Automation.

An example of the newer capabilities is the interconnection that Globcom has provided between a private X.25 packet net operated by Irving Trust and the international Telex network. The bank can send high speed messages from the packet net directly into the RCA facilities. Speed and protocol conversions are handled by RCA and a database is maintained enabling the user to inquire about the exact status of any message. Automatic verification of delivery is part of the service.

RCA is also able to provide customers with detailed billing information that Podmolik said was much advanced over the typical WU bill, which gives only the "total number of pulses sent."

But these are still interim benefits, as Podmolik sees it. The new IRC capabilities are laying the foundation for the eventual introduction of Teletex service. Not to be confused with Teletext, which is a video transmission service, the emerging Teletex is a 2,400 bps upgrade of basic Telex, using communicating word processors. This service has already started in Germany and within five years it will come to the U.S., Podmolik said.

The challenge will be to integrate Teletex into the framework of existing Telex facilities. Pointing out that there will always be less advanced countries where the slower speed 50 bps Telex will prevail,

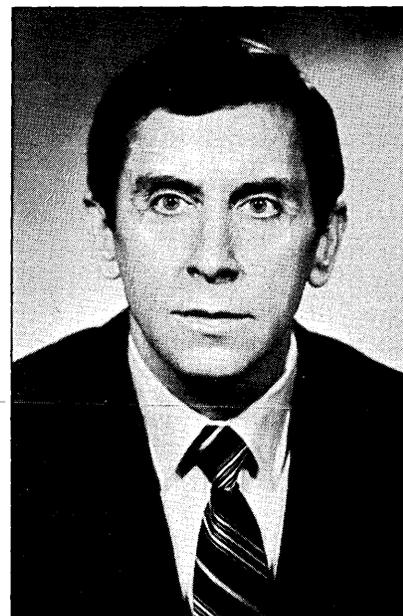
### International Telex machines will soon be able to communicate within the U.S.

the IRCs will have to provide compatibility to the "lowest common denominator."

In the U.S., RCA will have to interface Teletex to public packet switched nets such as Telenet and Tymnet. At present there are RCA interconnections that allow users to access Globcom from these public nets, but Teletex will make such access more complex. In Germany, where there is a single circuit switched public net, it is easier to provide Teletex than in the U.S., where there are several packet switched nets. But RCA is experimenting with the best methods to provide the necessary interconnections, he revealed.

While RCA has always been in a competitive arena with other IRCs, WU has always had a domestic monopoly, Podmolik said. The more aggressive nature of Globcom has allowed it to introduce more advanced features to keep its base of 10,000 U.S. teleprinters, which he said was about one third of the total IRC domestic terminal population. This is still small compared to the estimated 140,000 WU teleprinters, but Podmolik sees the new competition as an opportunity for RCA to increase its U.S. business.

A key element in the new RCA domestic service is a multiport terminal being



VALERIAN F. PODMOLIK: "You have to interface and cooperate. Each [offering] brings you closer to universal service."

built to Globcom specifications by Sidereal Corp., Portland, Ore. With a rental cost of about \$140 to \$160 a month, the terminal will provide ports to IRC, WU Telex, and TWX, and a 300 bps dial-up capability on the switched phone network. The terminal includes customized software, which can be modified to keep pace with the advanced services.

Answering criticism that the IRCs have never offered a U.S. directory of users, Podmolik said the new interconnection agreements will allow a common directory, which is already in preparation.

According to Ken Gross, Globcom vice president of marketing, the ability of the IRCs to operate in the U.S. will force WU to modernize its facilities. In the past as

### Globcom has had a new multiport terminal built for it by Sidereal Corp. of Portland, Ore.

much as 50% of Western Union Telex revenue came from handling IRC bound messages. Now, instead of users having to use an access code to go to an IRC via WU, the customer will be able to tie into RCA (or other IRCs) directly. The ability to send messages to other IRC terminals in this country will mean that many users will be able to eliminate expensive duplicate terminals that often had to sit side by side because of regulatory restrictions.

"This is the era of marketing," Podmolik explained, "You have to interface and cooperate. Each new [offering] brings you closer to universal service."

—Ronald A. Frank

# Every Racal-Milgo multiplexer delivers something extra.

You expect multiplexers to improve the efficiency of your network. That's what they're supposed to do. But Racal-Milgo's Omnimux advanced statistical multiplexers give you much more than just efficiency.

## Something extra in management information.

Most Omnimux models offer you the information you need to manage your network. Real-time network statistics are conveniently displayed on the Omnimux front panel. So, you get an up-to-the-second picture of aggregate link utilization and channel usage. And you can accumulate statistical data for analysis and planning.

Omnimux can be expanded or reconfigured remotely—to maximize your data flow. And you can tailor it to your network's requirements with a variety of practical options. Built-in modems, synchronous channels, and auto-baud are just a few of them.

## Something extra in after-sales support.

Like all Racal-Milgo products, Omnimux is supported by our nationwide team of factory-trained service specialists. They'll provide you with reliable on-site service, whenever and wherever you need it.

## Something extra behind the product.

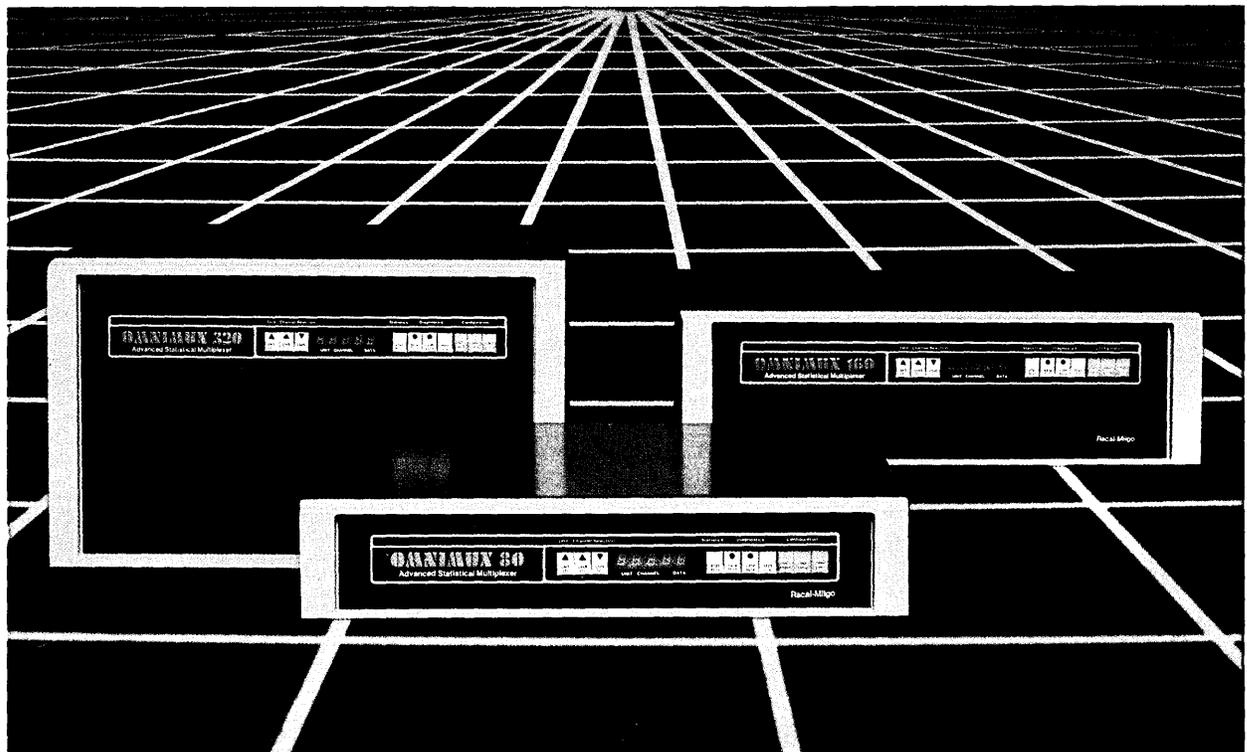
Racal-Milgo has been serving the needs of data communications users around the globe for over 26 years. Our comprehensive product line includes high-speed modems, network management systems, data encryption devices, data display terminals, word processor protocol and code converters, and voice digitizers. So you can depend on Omnimux to deliver the same superior performance and exceptional reliability that the worldwide business community expects from every Racal-Milgo product. And you can't get that with any other multiplexer. Only Omnimux.

The Omnimux series of modular 4, 8, 16, and 32 channel units can statistically multiplex both asynchronous and synchronous data, with full protocol transparency. For more information, call (305) 584-4242, or write Racal-Milgo, 6950 Cypress Road, P.O. Box 15662, Plantation, Florida 33318.

OMNIMUX®  
by Racal-Milgo

RACAL

CIRCLE 67 ON READER CARD



# CANADA COMES TO THE 1982 NATIONAL COMPUTER CONFERENCE.

ASTROHALL

• HOUSTON, TEXAS

• STAND 2527



Canada  
has its arm in space...  
and its hand in the future  
of computer technology.

Canadian advanced technology created "Canadarm," (space shuttle Columbia's Remote Manipulator System.) Now see what we can do with computer hardware, software, systems and service.

JUNE 7-10



Government  
of Canada

Gouvernement  
du Canada

Canada

## NEWS IN PERSPECTIVE

### STRATEGIES

# CAUTIOUS TEXANS REGROUP

**A slip in earnings tarnished Datapoint's previous luster, but the firm is reorganizing to get stronger for the future.**

Datapoint, the San Antonio, Texas, supplier of office automation equipment, has bitten off more than it can chew. The company that once seemed destined to dominate the distributed processing market it helped create, has slipped badly in recent months. The bottom line is sagging, Wall Street is disenchanted, and the product line appears spread too thin to some analysts. But the firm says it is moving swiftly and decisively to correct the mistakes it made in negotiating the obstacles of IBM, a host of other ddp vendors, and, now that Datapoint is vying for telephone interconnect business, AT&T.

After watching its stock price plummet early this year, the firm began an overhaul that has reached from the executive office on down to the lowest reaches of the sales force. A reshuffling of top management, a reordering of marketing priorities,

**Some analysts saw the firm moving into the "integrated office" too swiftly, before the market was ready.**

and new emphasis on so-called bread and butter business is hoped to bring the \$500 million firm back to its former standing as an office automation leader.

The first step has been the movement of Edward P. Gistaro, a longtime Datapoint corporate officer, to the presidential and chief operating slot. This leaves Harold O'Kelly as chairman and chief executive, and, according to the company, still in charge of overall strategy. Gistaro, most recently executive vice president of finance and corporate development, will be responsible for day-to-day activities. He will also act as general manager of the marketing division, displacing Millard Allen, who was moved into the sales vp slot.

As part of the reorganization, the former sales vice president, Stephen James, was made vice president of marketing strategy, assisting Gistaro in what promises to be a critical reevaluation of the firm's strengths, weaknesses, and strategies as its primary markets heat up under competition from a wide variety of contenders.

The company has decided to reduce

its field sales force by about 20% as well as lay off about 230 persons in the marketing support and management areas.

"I hope things will turn around within the next six months," says Gistaro, obviously feeling the pressure of market forces as well as a disillusioned investment community that was quite surprised to see the firm's yearly earnings show a rare dip compared to the year before. The stock traded heavily as its price took a nose dive and ended up worth 25% less than before the earnings report. The company said then it would be cautious from then on in esti-

mating future earnings.

That promise was recently fulfilled concisely by Vic Poor, the firm's chief R&D man, who told a collection of institutional investment researchers that business was "not good at the moment." He declined further discussion of the firm's operations.

But why did Datapoint's earnings show up as 54 cents a share, when projections had been for 66 cents a share? What made the firm miss its mark by as much as 12%?

"Our shipments tend to skew toward the last of the quarter. We are still

## Join the decision makers at



**June 14-16, St. Francis Hotel  
San Francisco, California**

You're invited to participate in this important conference. It will provide a forum for the interchange of theories, ideas, and practical experiences among people who deal with Decision Support Systems. And you will see the latest DSS products and services from these important companies.

**ADDISON-WESLEY  
PUBLISHING COMPANY, INC.  
APPLIED DATA RESEARCH  
ARTHUR ANDERSEN & CO.  
BOEING COMPUTER SERVICES  
COMSHARE, INC.  
CUFFS PLANNING AND MODELS, LTD.  
DATA RESOURCES, INC.  
EVALUATION AND  
PLANNING SYSTEMS, INC.  
EXECUCOM SYSTEMS CORPORATION  
FEROX MICROSYSTEMS  
HALBRECHT AND COMPANY, INC.**

**INFORMATION BUILDERS, INC.  
INTERACTIVE DATA/CHASE  
ECONOMETRICS  
LLOYD BUSH & ASSOCIATES  
MANAGEMENT DECISION  
SYSTEMS, INC.  
MARAKON ASSOCIATES  
PLANMETRICS  
SCIENTIFIC TIMESHARE  
CORPORATION (STSC)  
SIMPLAN SYSTEMS, INC.  
TYMSHARE**

**For more information, contact:  
DSS-82, Room 405, 146 Westminster Street,  
Providence, RI 02903, (401) 274-0801.  
CIRCLE 68 ON READER CARD**

## NEWS IN PERSPECTIVE

taking and shipping orders in the last weeks of the quarter," explained O'Kelly. "What happened was we just didn't get the orders and also we had a number of orders moved out on us, delayed." (Datapoint's treasurer, David A. Willis, has since resigned, but O'Kelly claims there was "no correlation" between the two events. Willis was replaced by Gerald Birr, who joins from Mohawk Data Sciences, Corp.)

The recession has taken its toll on Datapoint; no one disputes that. Research indicates, in fact, that many companies selling small business systems are more vulnerable to the ebb and flow of the economy than those that sell bigger, more expensive systems. According to a recent user study conducted by Quantum Science, New York, "Orders for smaller business systems were easier and more likely to be canceled or delayed than orders for large mainframes."

But the recession was only part of Datapoint's downturn picture. More to the heart of the matter was a weakening in new orders. On that count, Datapoint admits its own marketing strategy was at fault. Over the past two years, the marketing focus had been drifting away from Datapoint's bread and butter line—its dispersed data processing products—and its networking products, moving more toward selling an "integrated office" concept. As Gistaro puts it, the

company hired in a lot of new salespeople, many of whom came from Wang, and directed them at the integrated office, selling word processing and several other functions such as the fax interface, a database manager for non-dp types, electronic mail, laser printers, graphics, and several types of communication features.

The strategy didn't pan out. "[Datapoint] didn't have the understanding to attack this marketplace, nor did it have the sales force. In addition, the market was not

### Datapoint has reorganized its corporate offices and is streamlining its marketing operations.

ready for the integrated office," summarizes George Colony, office automation analyst with The Yankee Group.

The general consensus among analysts is that Datapoint was pushing too hard and got in front of its customers' needs. "As we look at our clients," said Norm Zimbel, head of the distributed processing and office automation systems group at Arthur D. Little, "we see the more advanced companies, on the whole, just getting into planning activities. We don't see much action as far as true integration."

Faced with a soured economy, a downturn in orders, and an "aging back-

log," the company is "backing off" its aggressive integrated office approach, said Gistaro. Back to the basics. The company plans to shore up its traditional line, focusing once again on ddp, local and remote networking, and its ISX data and voice switch lines. That translates into some big changes on the marketing and sales side. "We have to fix marketing before we fix anything else," said Gistaro. That's why he has taken an active role in running the marketing division. The problem: too many people and not enough sales. It all began when the company took off with the integrated office strategy. With high hopes and aggressive sales figures in mind, the company staffed up its field sales force and staffed up its management levels to handle the increased numbers in the field.

"What happened was that we anticipated a certain level of growth in sales and built up the management structure to support that level." By the end of second quarter, it was apparent that sales were not reaching the anticipated level. Now Datapoint is paring back that structure to a more moderate size, "instead of waiting to see if the market will pick up," says Gistaro.

"We are not pulling out of areas, we are only reducing the number of people in those areas," he adds. While people in sales, marketing, and management levels will be affected by the reduction, field service will not. "We have an installed base to support and that hasn't changed," explains Gistaro.

The new business plan also calls for some changes in product strategy. The company is "de-emphasizing" its support of the graphics product line and the laser printer, while beefing up support of the ISX line. A.D. Little's Zimbel found the news that the company was pulling back on graphics "interesting." "Graphics is an important area. Maybe they just don't have the resources to pursue all of their product lines," he speculated.

Meanwhile, ISX, according to one analyst, is in need of more attention. "Datapoint made a number of promises to ship ISX in 1982," said the Yankee Group's Colony. "They planned to have 50 systems installed by the end of the year and have not delivered yet. Part of the problem is their key switching exchange. An oem agreement with the Japanese fell through. Now with the delays, the ISX is casting a shadow over Datapoint's reputation with its existing customers. When a company plans to implement a PBX of the size of ISX it is extremely important that the supplier deliver because of the leases with Bell that have to be canceled."

Colony also points out that the jump from data processing to telecommunications is not an easy one. "The telephone environment is a no-fail environment. You put in the product, flip a switch, and it had better run. One reason ISX has been delayed

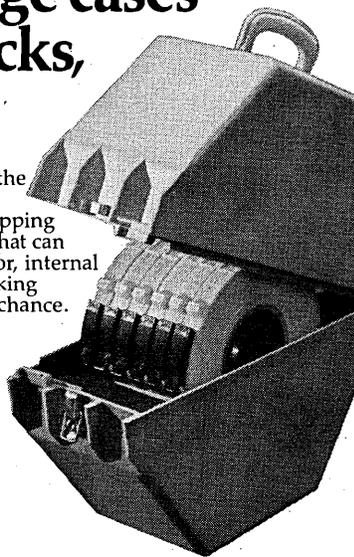
## Data Vault™ Software shipping, carrying and storage cases that take hard knocks, save hard cash!

Tapes, disc cartridges, floppies. In Data Vault they can be shipped and stored safely, despite the roughest handling.

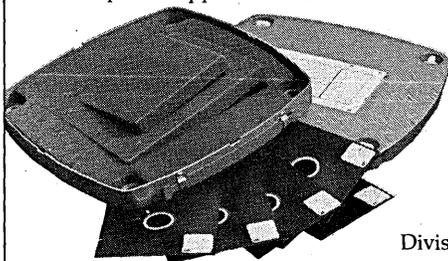
The Data Vault line of single and multiple shipping and carrying cases are software security cases that can take it. They've got rugged polyethylene exterior, internal shock-absorbing foam and a positive-action locking system. Dirt, dust, moisture just don't stand a chance.

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.



Reusable Round-Trip Shipping Cases.



Dealer inquiries invited.

**PRC** of America®

Division of Plastic Reel Corporation of America  
475 Boulevard, Elmwood Park, New Jersey 07407  
(201) 796-6600

© 1981 Plastic Reel Corporation of America

28

CIRCLE 69 ON READER CARD

# WHEN IT COMES TO YOUR CAREER, WE THINK STATE OF MIND IS AS IMPORTANT AS STATE OF THE ART

These days, you can't get ahead by staying behind.

That's why we have multiple data centers with 3081s. And why we're involved in automation strategies, as well as with projects in teleconferencing, electronic mail, voice and data communications.

So if you're interested in working in an environment that's state of the art, you know we're committed.

But what you don't know is, we're just as committed to your state of mind.

That means we provide training, job rotations and exceptional

opportunities to move up. You help shape your career by applying for development programs and work experiences that make you more promotable.

And now is the best time to start with us. Because we're growing at top speed, and we need the kind of people who can move just as fast.

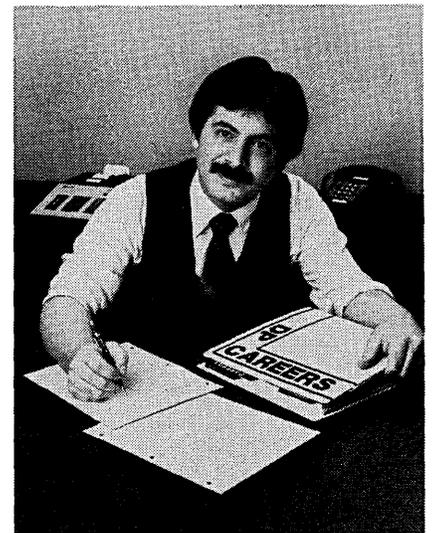
But at Connecticut General, your state of mind isn't all

business. Our headquarters are on over 500 acres of country. You can jog, run a fitness course, play tennis, volleyball or bowl. And if you like, you can have three meals a day in our cafeteria.

So you can see our human services are as advanced as our information services.

Find out more about working at Connecticut General, our benefits and relocation program. Write for our brochure on information services careers: Corporate Information Services, Dept. 303CW-10, Connecticut General Life Insurance Company, Hartford, CT 06152.

Equal Opportunity Employer M/F/H/C



## CONNECTICUT GENERAL



Connecticut General Life Insurance Company  
a company of  
CIGNA Corporation

CIRCLE 70 ON READER CARD

## NEWS IN PERSPECTIVE

is that Datapoint realized a little late that this no-fail environment is the kind of environment they are getting into. It was not confident their product was at that point."

Although Datapoint is backing off its integrated office strategy, it has no intention of abandoning the concept, it claims. Now, instead of trying to sell word processing and the like, the company will focus on its dispersed processing products and "talk about Datapoint's migration path into the integrated office," says Gistaro.

"The market is moving toward the integrated electronic office," he says. He figures in a couple of years no one is going to buy just word processing; suppliers will be expected to provide a lot more.

Most analysts are optimistic that Datapoint will find its niche. George Weiss of Quantum Science's Weiss expects Datapoint to be one of the top three suppliers of equipment to businesses and departments in medium to large companies. "I have a great deal of respect for the management and technical capabilities of Datapoint," he comments. "They are one of a few companies with strong capabilities in data processing, telecommunications, and several other elements of the integrated office. They may experience more growth pains and setbacks from the recession, but I think they will rebound."

—Jan Johnson

## EMPLOYMENT

# BRAIN DRAIN AGAIN

**Dpers recruited in England are settling in California's arid San Joaquin Valley.**

The average annual rainfall in Bakersfield, Calif., is 5.89 inches.

This might not be an appealing statistic to everyone but it was to seven young English data processors who currently are working in this city of 92,000 at the southern end of California's vast San Joaquin Valley.

The rainfall statistic was just one of hundreds of facts about Bakersfield that were shared with the group before they made any decisions to come to the U.S.

"I bent over backwards to warn them of all the negatives," said Tom Culwell, manager of computer services for Tosco Corp., a petroleum refining company where the young people are working. He told them, for instance, that it can get up

to 120°F in the summer and he still worries that they might not fully realize what that means. "It was 85° when they got here [last October] and some of them were complaining that it was too hot."

The young people are not employed by Tosco. They were hired by and are paid by Commercial Programming Systems, Inc. of Los Angeles, a four-year-old contract-to-hire firm. This company contracts with dp centers to provide specified personnel for a given period. When that period is up, if the center's management and the CPS people like each other, the center can hire them for no placement fee.

CPS currently has 60 people working at client sites throughout the country. The firm began recruiting in England in September 1980. "We were approached by a headhunter there to go in on a joint venture," said Al Strong, CPS president. "This didn't work out because there was little or no follow-through in England."

He explained that it takes six to eight weeks to get visas, and, with the first joint venture, people would be hired and then hear nothing more from anyone in that six- to eight-week period, get cold feet, and back out.

So CPS sought and found another partner in James Baker & Associates, a London recruiting firm. When CPS has a specific request from a client, the Baker organization advertises the positions in British computer trade journals and does the preliminary screening. Then CPS people go over for additional interviews, followed by the client. Constant contact is maintained with the new employees between the date of hire and the date of departure for the U.S.

Numerous U.S. companies are recruiting data processing personnel in the U.K. these days, says Strong. He thinks he has the best mechanism. Firms recruiting for permanent U.S. positions have to wait an interminable time for their hires to attain

# Every project manager knows that it's a lot tougher than it looks.

Juggling cost, time and resource factors manually is something that too many project managers face daily. Only they know precisely how inefficient, wasteful, and downright difficult it is.

**We can help.**

Our PAC II™ Project Management System makes the whole process of managing a project a lot easier and a lot more skillful. It's an automated project scheduler, resource scheduler, cost processor and manager that helps you budget, plan, monitor, analyze and report any type project—regardless of its size or complexity.

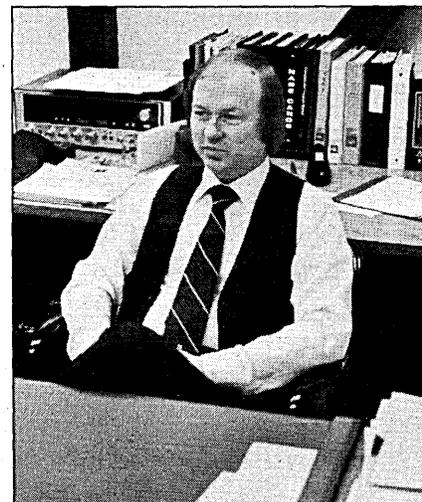
PAC II's planning facilities support a simulator capability with critical path indications, resource loading, inter-project dependencies and full resource leveling. And with PAC II you can monitor every stage of projects in progress to insure that you're on target and within budget.

You'll always know when your project will be completed, how, and at what cost. PAC II never drops the ball.

Write or call the PAC II Product Manager for full details.

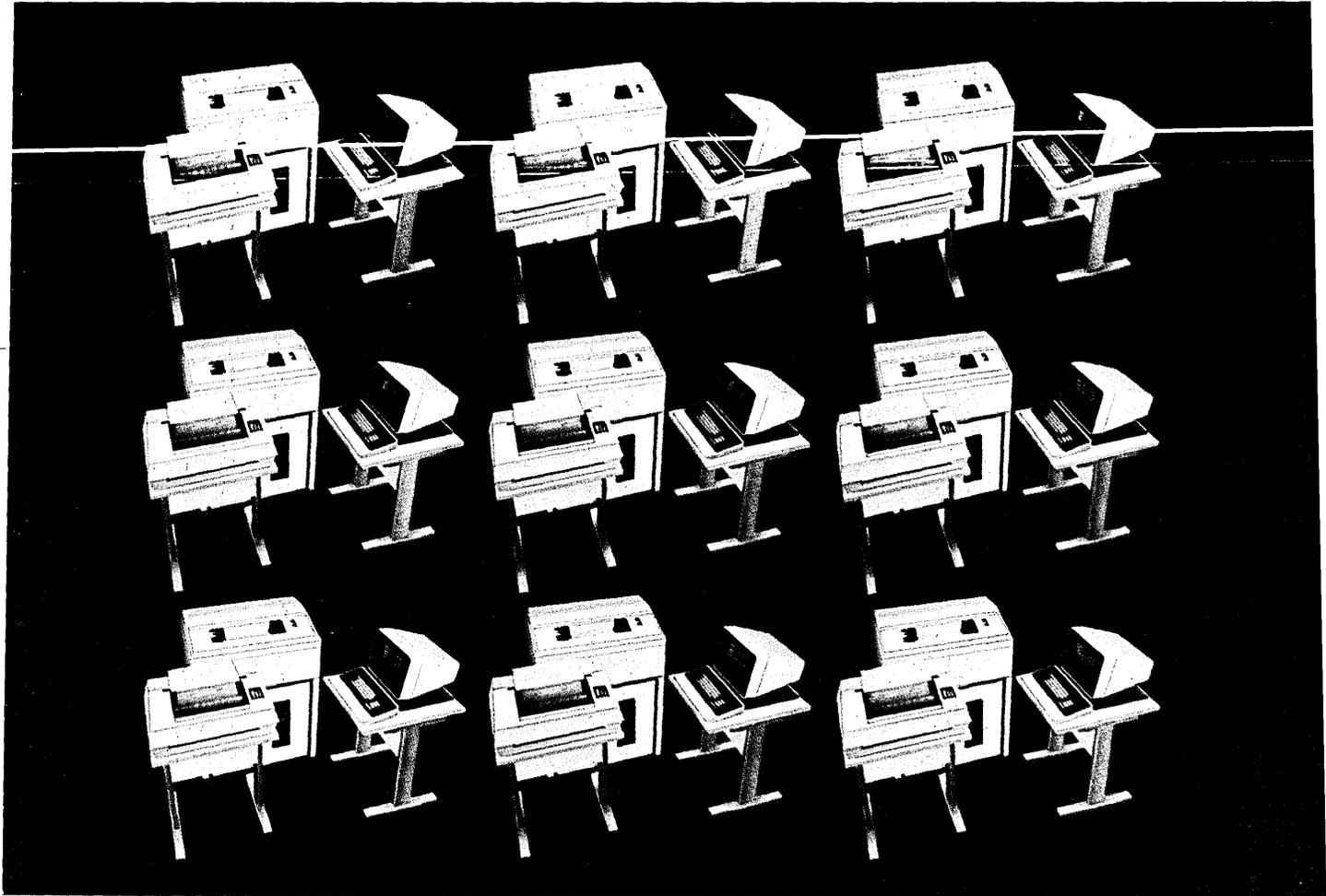
**International Systems Inc.**

The world's leader in project management systems  
850 Valley Forge Plaza • King of Prussia, PA 19406 • (215) 265-1550



TOM CULWELL, manager of computer services at Tosco Corp., "warned them of all the negatives."

CIRCLE 71 ON READER CARD



# 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 2505, 100 Witmer Road, Horsham, PA 19044

Please tell me more about  Work Stations  
 Printers  Other Peripherals \_\_\_\_\_

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

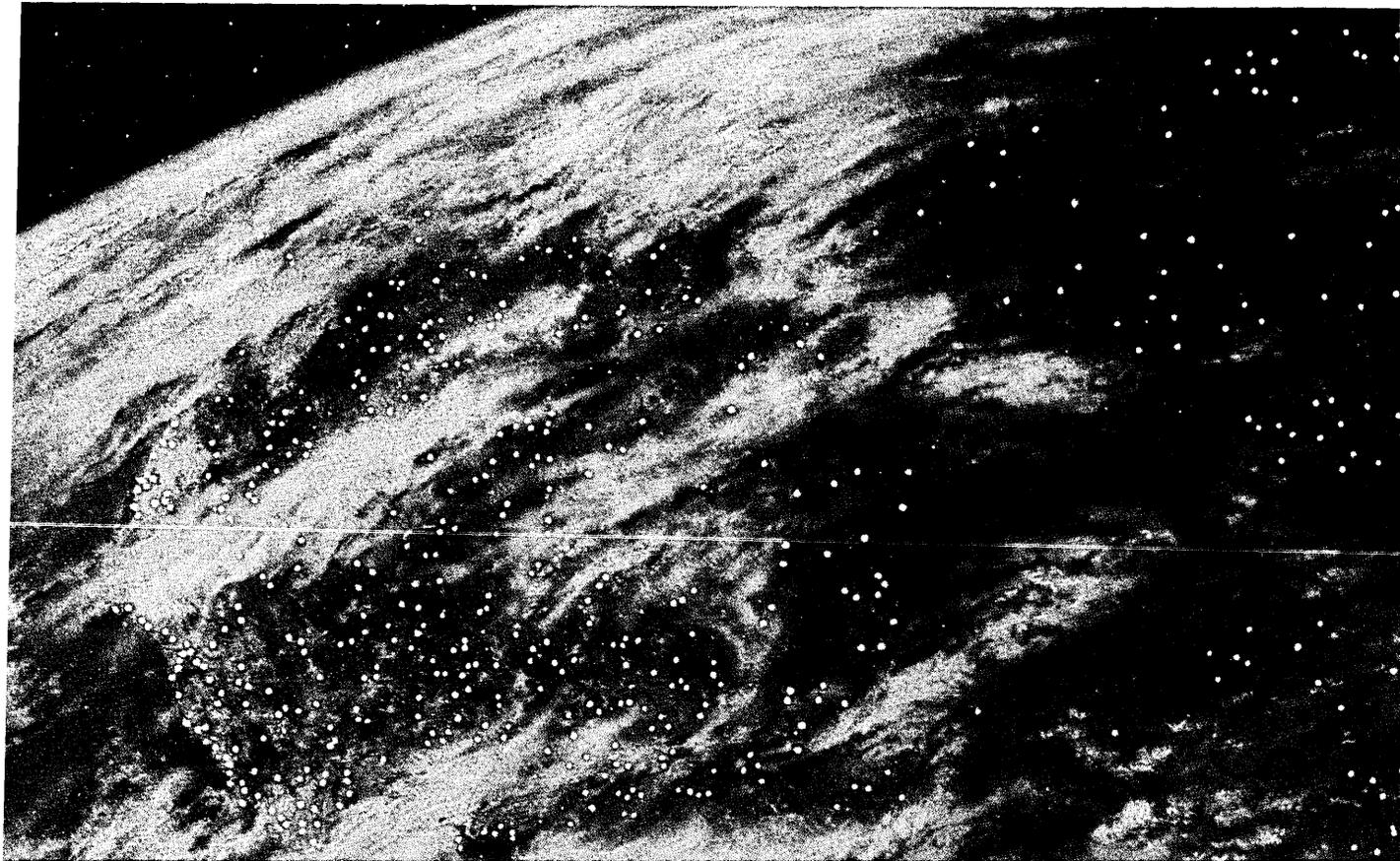
State \_\_\_\_\_

Zip \_\_\_\_\_

Telephone \_\_\_\_\_

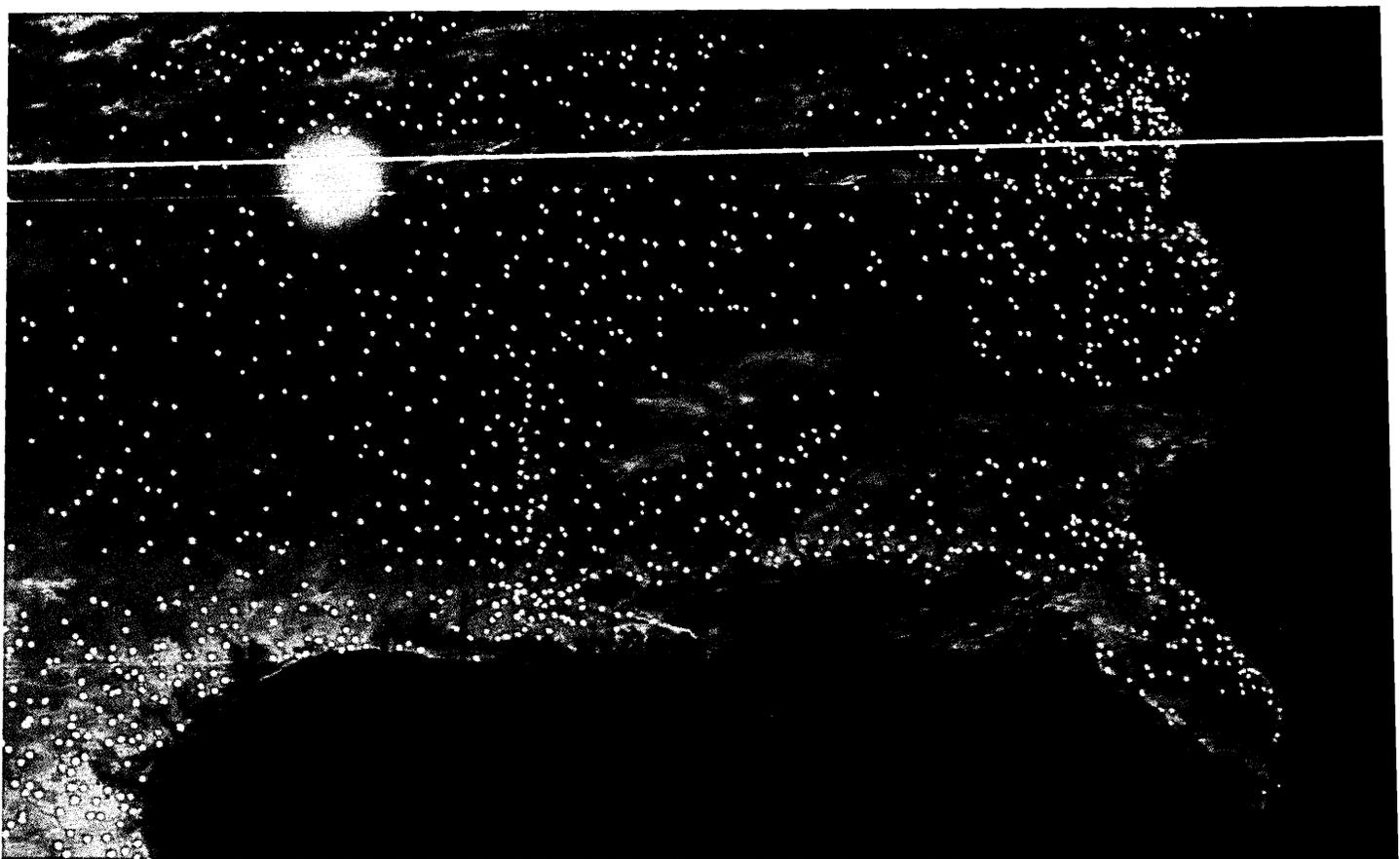
# IT'S YOUR DECISION.

CIRCLE 72 ON READER CARD



# We're looking for trouble.

Technology should solve your business problems without creating more of them. And Bell has the systems to prove it.



For example, the First Wisconsin National Bank has 1800 data terminals scattered over three states, updating accounts and exchanging information with the bank's computers in Milwaukee. If a terminal suddenly runs wild, part of the network is jammed.

Our trouble-shooting Dataphone® II communications system solves the problem. It not only transmits data over telephone lines, but monitors the flow of data as well, locating and isolating trouble instantly—even zeroing in on the very component involved. For First Wisconsin, that's money in the bank.

If your business has an information management problem, chances are communications products from Bell—like the Dataphone II system—can solve it in trouble-free fashion. One call to your Bell System Account Executive will start putting our knowledge to work for you.

**The knowledge business**



# Changing Computers?

**Retain your SOFTWARE INVESTMENT**

**Dataware can provide the software and "turnkey" services to meet your plans for the 80's**

**COBOL to COBOL**  
Circle 75 on Reader Card

**RPG/RPG II to COBOL**  
Circle 76 on Reader Card

**AUTOCODER/SPS to COBOL**  
Circle 77 on Reader Card

**PL/1 to COBOL**  
Circle 78 on Reader Card

**RPG/RPG II to PL/1**  
Circle 79 on Reader Card

**EASYCODER/TRAN to COBOL**  
Circle 80 on Reader Card

**BAL/ALC to COBOL**  
Circle 81 on Reader Card

**FORTRAN to FORTRAN**  
Circle 82 on Reader Card

Call or write today.

the  
**Conversion  
Software  
Experts!**

**Dataware, Inc.**

2565 Elmwood Avenue  
Buffalo, New York 14217  
Phone (716) 876-8722  
TELEX: 91519

## NEWS IN PERSPECTIVE



**NO MAD DOGS THESE ENGLISHMEN:** In out of Bakersfield's noonday sun came British programmers (left to right) Steve Baker, Jim O'Connor, Marion Jewiss, John Indrisia, Paul Brizell, Clive Lucas, and David Billings. All are employed by Commercial Programming Systems, Inc., a programming employment agency in Los Angeles, but work at Tosco Corp., a petroleum refining company.

immigrant status and get green cards. CPS hires for temporary assignments, which do not require immigrant status.

There are two types of visas for non-immigrants, explained Jerald Serviss, an immigration lawyer who works with CPS. There are B visas, which break down into two types: B1 for business visitors who can conduct business here for a foreign employer, and B2 for visitors for pleasure. Then there are the H visas that CPS uses. These are of three varieties, all allowing for temporary employment of up to three years. There's H1 for professional people, H2 for people who are not true professionals but who have a skill needed in the U.S., and H3 for trainees. CPS uses both H1 (when a prospect has a degree) and H2. With the latter, Serviss said, it is necessary to demonstrate to the Department of Labor that there are insufficient U.S. personnel for the jobs.

Under CPS' agreement with Tosco, if, at the end of one year, the English employees and the company both want it, Tosco can hire them and sponsor them for immigrant status.

Should any of the employees want to stay with CPS on other assignments, CPS could apply for an extension of the H visas or could itself sponsor the employee for a green card. This, though, would be more difficult for CPS as the original employer than for Tosco as a new employer, Serviss said. "They'd have to prove that circumstances had changed."

Tosco's Culwell can't say enough good things about his company's experience with the English employees. "It's been outstanding. There haven't been any problems. I can't even find words strong

enough to express my satisfaction."

He said the positions filled by the English had been open for five years. How long would it have taken to fill them if he hadn't gone the CPS/England route? "Forever," said Culwell.

"There is no data processing community in Bakersfield. Everyone we hire has to come from somewhere else. Californians see Bakersfield as a hamburger stand in the middle of the desert. People from the Midwest see too many horror stories [about California] on the 6 o'clock news."

Before going to CPS, Culwell said he spent \$7,000 on ads in newspapers all over the country in a two-week period. "I got eight resumes, and six were accompanied by letters saying, 'Hey, that sounds like a great job. Can you teach me to do that?'"

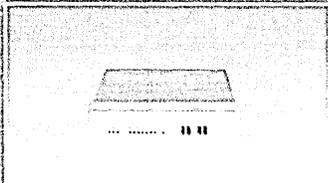
"I didn't spend \$7,000 going to England. I didn't have anything to lose. We couldn't be out anything. It was a no-lose situation."

CPS pays all relocation expenses including return to England if an employee chooses that course of action. The contract firm also pays salaries and insurance. "We give two weeks' vacation and whatever holidays the client firm observes," said Strong.

Culwell said Tosco, since the arrival of the English group, has taken to celebrating English holidays.

The two-week vacation bothers Marion Jewiss, who looks back wistfully to the four-week vacations customary in England. She'd like to include a trip back to England in her vacation plans but doesn't think two weeks are enough for that. Marion and her fiancé, Jim O'Connor, are the

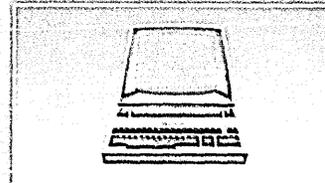
# BUILDING A TOTAL DATA-COMM NETWORK IS AS EASY AS GDC



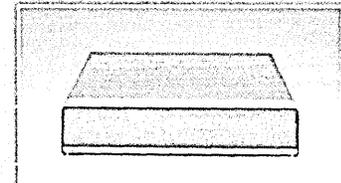
Modems = high, medium and low speed modems combine advanced technology with low cost for all network applications.



Multiplexers = high efficiency time division, frequency division, statistical and polling multiplexers move more data faster.



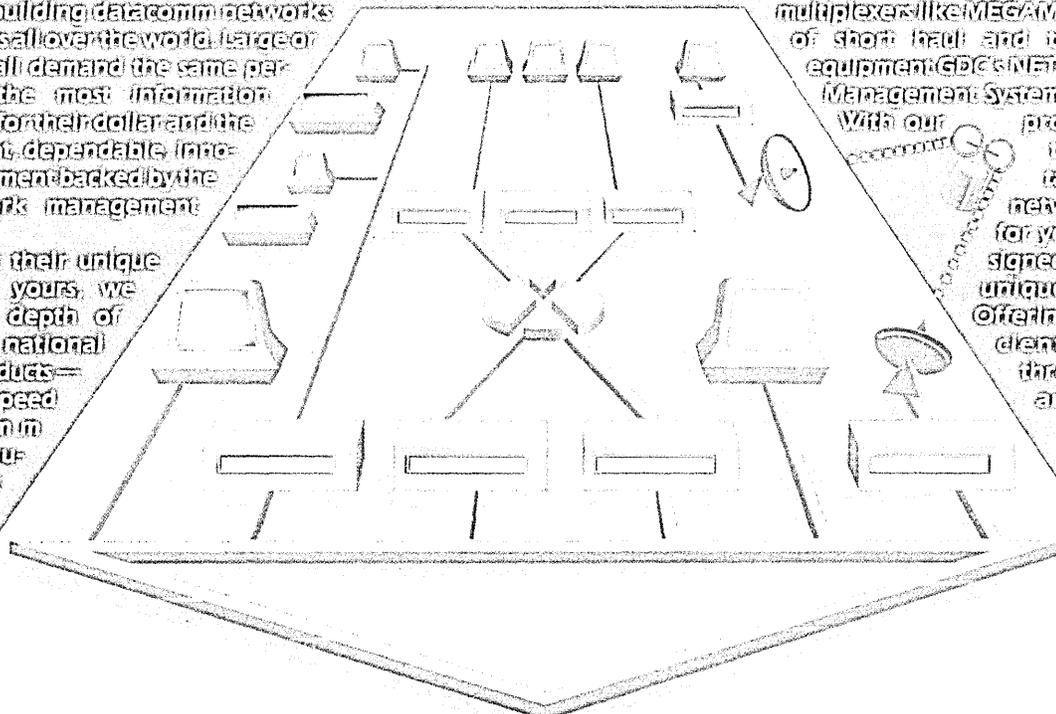
Network Management Systems = integrate with any existing network design for the ultimate in centralized management.



Network products = build high speed local networks or expand existing networks for increased capacity and data throughput.

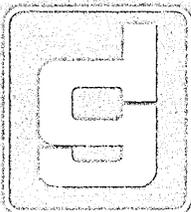
GDC is building datacomm networks for customers all over the world. Large or small, they all demand the same performance: the most information throughput for their dollar and the most efficient, dependable, innovative equipment backed by the best network management available.

To meet their unique needs, and yours, we combine a depth of local and national network products — high/low speed DataComm modems, super-efficient



multiplexers like MEGAMUX, and a variety of short haul and regional sharing equipment. GDC's NETWORKS Network Management System, oversees it all. With our product depth and technical assistance, a complete network can be built for you — custom designed for ordinary or unique applications. Offering the most efficient information throughput — now and for the future — from GDC, The Networking Company.

For more information, contact The Networking Company:



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 M2W 4Y3  
(416) 498-5100

General DataComm  
(UK) Ltd.  
Touley Road  
Wokingham, Berkshire  
RG1 5ON, England  
(0734) 791 444

U.S. Sales Offices: Atlanta, GA (404) 955-0682; Boston, MA (617) 229-2740; Chicago, IL (312) 298-4181; Dallas, TX (214) 950-0803; Detroit, MI (313) 540-4110; New York, NY (212) 423-5080; San Francisco, CA (415) 569-3115; Santa Ana, CA (714) 957-0244; Washington, D.C. (301) 596-0888; U.S. Telecom Sales: Atlanta, GA (404) 971-5914; Chicago, IL (312) 553-9262; Green Valley, IL (309) 352-3400; Santa Ana, CA (714) 957-0244; Dallas, TX (214) 241-5883; Indianapolis, IN (317) 849-7113; Seattle, WA (206) 355-4800.

MEGAMUX and NETCON are Trade Marks of General DataComm Industries, Inc.  
CIRCLE 86 ON READER CARD

## NEWS IN PERSPECTIVE

only two of the group who knew each other before being hired by CPS.

"We didn't even know until after we'd hired them that they were a thing," said Mike Kassel, CPS vice president.

Jewiss and O'Connor also are the only two who didn't make first contact via James Baker & Associates. They answered an ad placed by an agency called RTC, one Kassel said he doesn't want to use anymore. "They gave me what they said was an IBM JCL test, which turned out to be more a utility test," said Jewiss.

She holds a degree in sociology

from the University of Essex but didn't want to do social work. She did secretarial work in London until a friend interested her in taking a government sponsored course in data processing, after which she became a

**"I can't even find words strong enough to express my satisfaction."**

systems programmer for a British insurance company, Sedgewick Group.

Marion cited the "British economy," as the biggest single motivating fac-

tor in her decision to come to the U.S. Having taken the rainfall statistic quite literally she is finding "more rain than I expected." She finds Americans, "very, very friendly. They're more laid back in general. They're just not quite as serious." She likes Bakersfield, her job, and her standard of living here ("it's more hectic") but hasn't made up her mind yet if she wants to stay.

Neither has John Indrisia. Married and the father of two daughters, aged three and 18 months, Indrisia, a systems programmer, likes the weather in Bakersfield. He has an apartment within five minutes walking distance of Tosco.

He said he'd had a number of interviews for U.S. jobs in England. "I was considering California and Florida, but I read a few books and from them and what people told me, I decided California would be better, that Florida is mainly for tourists." He said he had one other offer of a job in California and picked CPS because of "how professional they were, how well they let us know exactly what we were letting ourselves in for."

He admitted to homesickness. "It was worst at Christmas time. At first we phoned home once a week. Now we're down to every two to three weeks."

He likes Tosco. "The working conditions here are better than at any job I had in England." He also likes the people. "Most Americans are more outward going and friendly. I settled in here right away. It might take a month or more in England to feel like you fit into a company."

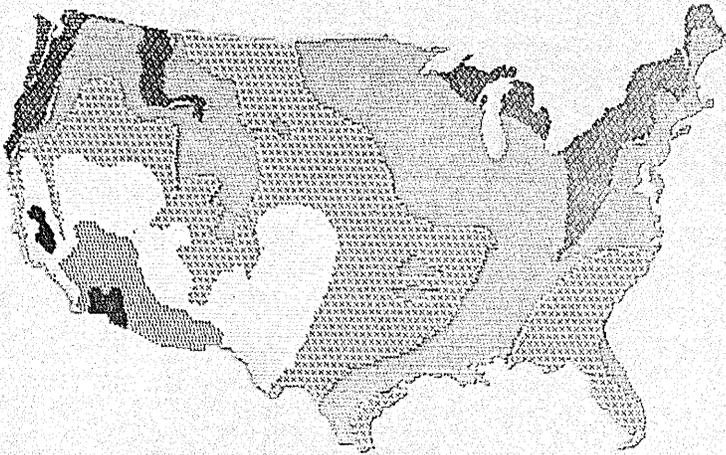
Tosco did what it could to help. In addition to offering assistance with house hunting and credit application problems, the company instituted a buddy system matching each newcomer with someone of similar family situation and personality.

"My buddy is married with one child," said Indrisia. "His services even included baby-sitting."

One transplant, at least, is sure he wants to stay in the States although he's not certain as to whether or not it will be with Tosco. "That'll depend on the nature of the job," said Steve Baker, son of James Baker of James Baker & Associates and, at 23, the youngest member of the group.

He's already had one change of jobs at Tosco. He's moved from programming into information planning and analysis and likes the change. "The work's very interesting. It's liaison with users, identifying user problems." It also means he gets to go down to Los Angeles once every two weeks to Tosco's corporate offices.

As with the others, money was a factor in Baker's wanting to come to the U.S., but while the others talked of having a better standard of living here, he said, "As for money, I'm no better off than I was in England but I'm having a better time." He eats out at restaurants all the time except for breakfast, he says.



**Critical picture definition.** Does your application require high resolution color graphics? PrintaColor's GP1024 ink jet printer lets you be critical — with dot addressable color control of each pixel in a 1024x1024 display.

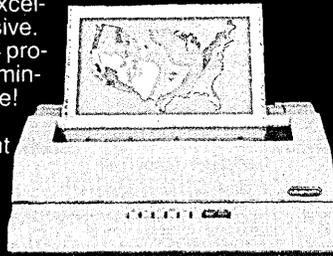
**Critical of high printer prices? Try \$5,495!**

This printout (unretouched photograph) is vivid proof from PrintaColor that excellence does not have to be expensive.

Virtually noiseless, the GP1024 produces a full page in just over two minutes. At only 10¢ per copy average! It's so simple to use, anyone who can operate your terminal can print informative color graphics with just a few key strokes.

Call today for your nearest representative. Ask about our full line of dot-addressable and character graphics printers. There is a PrintaColor just right, and priced right, for your application.

PrintaColor Corporation, P.O. Box 52, Norcross, GA 30091 (404) 448-2675

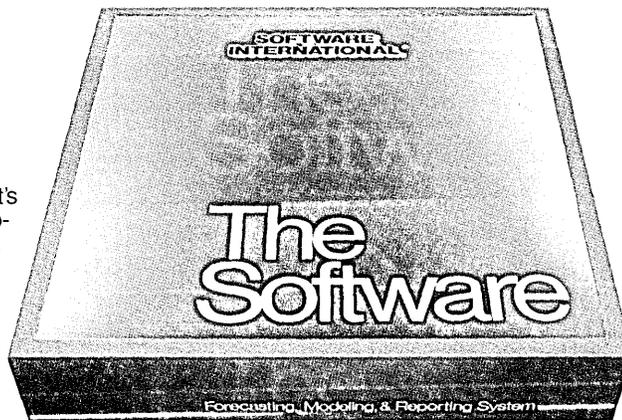


**PrintaColor**

CIRCLE 87 ON READER CARD

# AVOID FUTURE SHOCK

WITH THE NEW, EASY-TO-USE FORECASTING  
SYSTEM FROM SOFTWARE INTERNATIONAL.



Things happen so fast today it's hard to know what to do next. Tomorrow always arrives too soon. Future shock hits when the wrong decision catches up with you.

Until now, forecasting systems have been so difficult to use, many managers were forced to wait and see what happens! But now they have a system that's incredibly easy to use.

They'll wonder how they were ever able to manage without it.

For forecasting applications, this is The Software: the most complete package of features *plus* the best training, documentation and support in the industry. This system enables users to ask "what if" questions and generate comprehensive reports on the outcome — in minutes. Because the system is powerful enough to handle the complex forecasting needs of multiple users simultaneously, demands on the DP department are dramatically reduced.

Now available in IBM and IBM plug-compatible OS and DOS versions, this is the latest innovation from Software International. A subsidiary of General Electric Information Services Company, we are part of a world-wide family of more than 5,000 computer professionals putting information to work for the future of business.

Here's a quick glimpse at just a

few of the system's many capabilities: fearless financial projections; on-target budgeting; accurate cost analysis. Risk analysis, probability distributions and statistical analysis make sense of the most complex business environment and the numbers that relate to it. User security control facilitates protection of information.

Call or write today for your FREE 20-page, full-color brochure on the new Forecasting, Modeling and Reporting System. And make future shock a thing of the past.

## FOR BUSINESS SOLUTIONS: THE SOFTWARE

# SOFTWARE INTERNATIONAL®

GENERAL  ELECTRIC

Elm Square, Andover, MA 01810 (617)475-5040

Atlanta (404) 955-3705 Boston (617) 729-8962 Chicago (312) 298-3500 Columbus, OH (614) 773-2167 Dallas (214) 960-0220 Denver (303) 696-8591 Houston (713) 444-3348  
Los Angeles (213) 573-0402 New York (914) 253-8050 San Jose (408) 292-9700 Wilmington, DL (302) 478-8980 Montreal (514) 866-5728 Toronto (416) 924-1461 Vancouver (604) 669-6122  
Australia, Brazil, Colombia, Finland, France, Guam, Hong Kong, Israel, Italy, Malaysia, Mexico, Netherlands, Norway, Saudi Arabia, Singapore, South Africa, Sweden, United Kingdom

CIRCLE 88 ON READER CARD

## NEWS IN PERSPECTIVE

He's learned country dancing while in Bakersfield and was even teaching it in Tosco in March in preparation for a Western party the company was planning.

He says he's spending the same amount of money on gas as he did in England. "I have a big American car which uses twice as much gas, but gas costs half as much."

CPS' Strong said salary is generally the biggest incentive in recruiting people from England since wages in general are considerably lower there and the cost of living higher. He said too many firms make the mistake of offering salaries that simply are better than those for the same jobs in England. "Then people get here and find they're earning less than the going rate for their jobs." CPS, he said, always offers the going rate in this country.

Strong said CPS was planning a recruiting trip to England at the end of March for Continental Airlines. "They need six airlines reservations systems people. We've already identified 20 and probably will meet with 30." And they'll be going back again soon for Tosco.

Strong said CPS charges a client "one dollar per hour per thousand we pay in salary."

—Edith Myers

## WORKSTATIONS

# MARK IV FOR THE MASSES?

**Informatics' new processor, its first hardware product, brings the power of Mark IV to users' desks.**

This month, Informatics, Inc., the big Woodland Hills, Calif., software and services firm, began doing what it only hinted at a year ago (June '81, p. 78). It's selling hardware.

Active marketing has begun for its Informaticom workstation in the Los Angeles area. San Francisco area marketing will follow next month, with the rest of the country expected to be covered by the end of the year.

Five of the Ontel-based systems already are installed at customer beta test sites, with an eight-month-old installation at Chevron Research in place the longest.

The system has been under development since early 1979 under the direction of Robert R. White, Informatics' director of technical services. In March, ready for the market at last, it was moved from research

and development, which is a corporate activity, into the Software Products Group.

David Saykally, director of new business operations, said the system can be seen in two different lights. "To a dp professional it is a Mark IV [Informatics' popular file management system] programmer's workbench. To a non-data processing end user, it is a desirable local processor which can be used as a decision support system."

Authorized users select information from corporate databases for local problem solving at the workstation. Information is immediately available with no reformatting or data entry.

The system offers three levels of user options in operation. An A version is for totally formatted operation, a B version is for free style, and a C option makes it a programmer's workbench.

Informatics' Mark IV file management system has been around since 1969. It has been widely heralded because of its high degree of data independence. It features optional interfaces to IBM's IMS and Cincom's TOTAL and it builds highly structured files without any need for a user to consider the logical structures of the files. Any field can be referenced at any time in combination with any other field without the user even knowing the location of the field in the database.

The file maintenance method is primarily directed toward production files. Once the master file has been defined and created, the transaction processing for each type of transaction is defined. When updating the master file, all that is required is to input a run control card naming the file and transaction definitions; the transaction file is then passed against the master file.

All this had previously required a big IBM or IBM-compatible host computer. Now it can be done via Informaticom with minimum connection to a host. So much can be done at the workstation that connect time is low. In the C mode of operation a local user can do as much with Mark IV as someone with direct access to a host, the firm claims.

Saykally says initial marketing efforts will be aimed at dp managers who he feels will want to move systems out to user areas.

A multilevel language prompts new users through simple tasks and can extend functionality to experienced users, he said. A dictionary keeps track of user-authorized local files and central databases and automatically defines data being downloaded to the workstation from the cpu. A file manager performs all access automatically for local data entry functions, data extraction from central databases, and file combination. Local files are secured by password authorization to the workstation. Access is controlled for central data at file, field, and field content level.

Price of Informaticom ranges from \$20,000 to \$40,000 depending on quantity and configuration. Basic includes a 64K microprocessor, 2.4 megabyte disk storage, and a 160 cps Tally printer.

Robert J. Connors, Informaticom marketing specialist, new business operations, doesn't think his sales force will find selling Informaticom any different from selling software. "It is the software that's the key. We're selling a way of doing things and Mark IV is a component of that."

—Edith Myers

## GRAPHICS

# TEK EYES MARKET OPENINGS

**The firm's Information Display Division is hoping to tap CAD/CAM, office, and other emerging markets.**

In the latter half of the 1970s, people interested in applying CAD/CAM technology to their businesses went to the turnkey vendors, companies like Computervision, Applicon, Auto-Trol, and Calma. The success of these suppliers attracted to the market such computer makers as IBM, CDC, DEC, and HP, systems vendors who have shown an interest in tying together CAM, CAD, and office automation with local networking. But in order for these disparate activities within a corporation to communicate, there's a need for some commonality.

"I think the database is going to be a real key issue down the road," says Jon

**Tek concedes it stayed exclusively with the storage tube for too long, but its new organization has let it build new display products.**

Reed, general manager of the Information Display Division of Tektronix Inc., Wilsonville, Ore. The largest market served by the division is CAD/CAM oems, those same turnkey vendors who hit it so big in the '70s. Reed says that because the database is the vehicle by which the various automated sets in a company can talk to each other, there's a need for a common language with which to communicate and a common format in which to store data. "It's almost like the days of the host machine are coming back because of this database," he adds. "I think we'll see the database reside on the host and a lot of very intelligent worksta-

# INTEGRATED, CLOSED-LOOP MANUFACTURING AND FINANCIAL SOFTWARE.

Now everyone in your company can have the information they need—from one system: THE SOFTWARE.

Because every manufacturing operation affects financial data, anything that happens on the shop floor, in purchasing, sales or inventory control is reflected throughout our system. Decision-makers in production, marketing or finance finally work from the same set of numbers to assure maximum productivity and profitability.

This is the essence of effective MRP: bringing all the elements of a manufacturing business under better control to eliminate guesswork and unwanted surprises. Best of all, our system enables you to accomplish all this without putting an extra load on your data processing operations.

Our modular approach allows you to implement the manufacturing components of our software separately, in manageable stages. Then you can integrate them with financial software specifically designed for MRP applications.

You end up with a comprehensive, integrated system which includes all the key functions: Order Processing, Bills of Material, Inventory Planning, Material Requirements Planning, Order Release, Purchase

Order Tracking, Shop Floor Control, Labor Performance Measurement, Work in Process Costing, Accounts Receivable, Payroll/Personnel, Accounts Payable, and General Ledger.

Successful implementation of our MRP systems has already helped satisfied users reduce inventory levels by as much as 40%. Improved customer service (on-time deliveries) to 90% or better. Eliminated the "end-of-the-month crunch", and dramatically improved the quality of life throughout the manufacturing operation.

Our proven, field-tested, interactive, on-line, database-designed MRP systems are now available for Prime and Hewlett-Packard equipment. Even smaller manufacturing companies can reap the productivity

benefits of integrated manufacturing and financial software that is quickly installed and easy to use.

As part of General Electric Information Services Company, Software International is a member of a worldwide family of computer, education, and consulting professionals putting information to work for the business of manufacturing.

Call or write today. We'll show you how THE SOFTWARE will go to work for your company.



## FOR BUSINESS SOLUTIONS: THE SOFTWARE

### SOFTWARE INTERNATIONAL®

331 Montvale Ave., Woburn, MA 01801 (617) 938-0901

CIRCLE 89 ON READER CARD

GENERAL ELECTRIC

Chicago (312) 298-3500

Houston (713) 444-3348

Los Angeles (213) 573-0402

San Jose (408) 292-9700

## NEWS IN PERSPECTIVE

tions all over the place."

Reed acknowledges that the market is looking for total solutions and that Tek does not supply them, but he sees a strong demand for computer graphics terminals and systems, which his group does provide. There's a need for computers, which Tek does not supply. And there's a demand for applications software, which again does not supply, although it is slowly building this capability and inventory.

Late last year, for example, the company came out with its two-dimensional drafting applications program, which runs on the Tek 4054 desktop computer. It's viewed as merely the first of several applications programs being developed. "We'll do more," says Reed. But Tektronix's interest is primarily in the electrical engineering side of the business, "because it's a business we know," he explains. The company earlier developed a mechanical engineering drafting package. But Reed admits the company lacked adequate knowledge of ME business, the Boeing and Caterpillar tractor type of applications. So Tek withdrew the software package.

"I believe our best response to market need right now is to build the best hardware and get our base utility software in shape, and then get ready to build on top of that with the application software where we see a market need that no one is fulfilling."

The division has its current 4100 family of display terminals, which maintains compatibility with the 4010 series. Reed sees the direction of the 4100 line as being toward the intelligent workstation, configurable for CAD or CAM work, or both, as well as office applications. "So we think we're getting ourselves up for the right kind of market," he observes. "In fact, I'm almost pleased that we're not yet a turnkey vendor."

It was in January 1981 that Reed took over the Information Display Division (IDD) when Tektronix underwent a decentralization move. He succeeded Howard Mikesell, who took over the company's production and materials management organization. Reed says the divisionalization

### **"We need to let people know we're in computer graphics."**

effort now under way "fits in real well with our business strategy because we're in a critical turning point in our business. I don't want to give the impression we're turning away from the direct view storage tube [DVST], the thing that made us great, because it's still going fairly well. But we know we've got to add the other technologies to our product line, particularly raster scan and color."

As he sees it, Tek allowed itself to fall behind in the marketplace, sticking with the storage tube. "We hung onto the DVST a little too long as the only technology," he

says. "We need now to make a real spurt and let people know that we're in the computer graphics business, not just the DVST business."

Under the new divisional setup, IDD has its own marketing and sales force, allowing it to be more responsive to market needs. Reed points to his new 19-inch color terminal, the 4113, as an example of the things that result from the division's new-found freedom. The division decided on the product in June 1981, put on an all-out effort, was able to announce it in November, and begin volume shipments last March. That short interval from product conception to market availability was, says Reed, "for us an all-time record."

Today IDD is about the same size as the entire Tektronix company was five years ago. So Reed sees the need in the next five years or so to again split the division, hoping to retain the responsiveness of the smaller organization.

—Edward K. Yasaki

## PERIPHERALS

# PRINTERS FOR THE OFFICE

**Longtime printer manufacturer Dataproducts is striving to jump on the office automation bandwagon with a new line of daisywheel machines.**

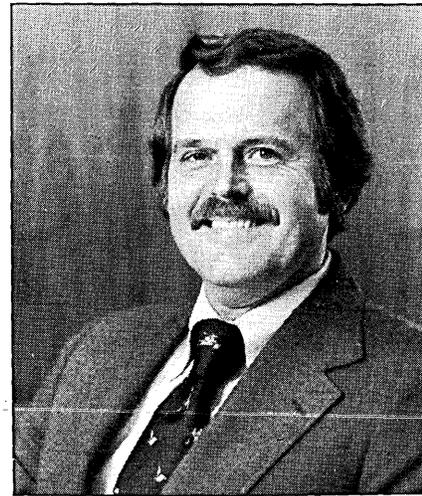
Dataproducts wants into the office.

The printer company thought it had a foot in the office door back in April 1979, when it acquired the Printer Division of Plessey Peripheral Systems in Irvine, Calif. What it got was an 18-month-old design for a daisywheel printer of which 100 had been shipped, a 30,000 sq. ft. facility, 50 employees, and a lot of problems.

The problems, said Richard H. Ericson, vice president of the Irvine operation that is now the Word Processing Division of Dataproducts, were mostly design problems. "There were design deficiencies in the D-50 [the Plessey product], primarily with the paper feed system. It took us nine months to fix these."

Dataproducts has long called itself "The Printer Company" and claims to have revenues "far in excess of" those of any other independent printer manufacturer in the world. But it sees itself as the new kid on the block in daisywheel printers and office automation.

"Dataproducts sees word processing, office information systems as the fast-



RICHARD H. ERICSON: "We're looking at alternatives that will enable us to get into that market very quickly."

est growing information field, and we're in the printer business as it relates to information," said Robert J. Pieper, vice president, marketing.

With the Plessey acquisition, Ericson said, "we were at somewhat of a disadvantage. We had to catch up with the competition and we had to spend a lot of time fixing the acquired line. We turned that to an advantage. We used the time to look at all devices available, to select features and characteristics we found were important to users, and to include the best of these features in our products."

In March, Dataproducts introduced the DP-55, a letter quality daisywheel printer, which is the first in its marketplace to have been designed from ground zero using Dataproducts technology.

The DP-55 is rated at 55cps and offers quiet operation, top print quality, digital status display, and printing with metal or plastic printwheels. The only other printer manufacturer to offer the latter option, said Ericson, is Diablo. The DP-55 is priced at \$1,790.

Dataproducts will follow up the DP-55 this month with introduction at the NCC of the DP-35 (same characteristics at 35cps).

As for the old D-50, Ericson said there now are 5,000 units installed, 80% sold by Dataproducts, and "it is considered by many to be the top in its class today. The DP-55 is comparable and better."

Dataproducts is already evaluating a product with higher performance than the DP-55 which it may introduce within 18 months. "There are technical thresholds we haven't crossed yet."

After that will come a lower performance product, and, said Ericson, "We're looking at alternatives that will enable us to get into that market very quickly." Acquisition? He wouldn't say, but he acknowledged, "We know how to evaluate now."

—Edith Myers

# THE CONVERGENT COMPUTER EVOLUTION HAS STARTED AN OEM REVOLUTION.

The Convergent evolution has made true distributed intelligence a low-cost reality. OEM's everywhere, large and small, have seen the advantages of our systems in their applications. Consider just four examples:

## SMALL BUSINESS COMPUTER

An entry-level Convergent system doesn't cost significantly more than a fully-outfitted personal computer. But it does a *lot* more.

You start with a 16-bit processor and as much as 1/2 megabyte of RAM—plenty of power for advanced applications. Optional 5-1/4" floppy and Winchester disks fit right inside the desktop lectern.

And if a small business suddenly becomes a big business, it won't outgrow the computer—there are many ways to add power and resources.

## DISTRIBUTED DP

Every Convergent system comes with clustering capability built in—just plug the workstations together, with no software modifications.

Want to emulate X.25, 3270's, or 2780's? We've already written the software.

You can do your own program development in COBOL, FORTRAN, BASIC, or Pascal, using powerful data management facilities including ISAM and a forms package.

## WORD PROCESSING

If you were defining the ideal word processor, you'd start with superb human engineering. So did we—with detached 98-key keyboard, high resolution tilt/swivel CRT, and built-in document holder.

Then we created a word processing program with the ability to manipulate seven separate documents on the screen simultaneously, to select 80 or 132 column screen lines, and do lots of other unique things.

## GENERAL PURPOSE MINI

No, it doesn't look like the standard black box mini. But it has what you need, in a package that's more compact and a *lot* more attractive.

CPU? A powerful 16 bitter. RAM? Up to a megabyte. Disk? Up to 1.2 gigabytes. Interfaces? Industry-standard parallel and serial, plus Multi-bus® for special needs.

Software? Everything you'd want, including a real-time multitasking operating system that's designed to be built upon. Plus a comprehensive set of development tools.

## SIX MODELS TO CHOOSE FROM

The six Convergent workstations look similar, but each has a unique combination of features and price. And perhaps most importantly of all, we're delivering all *six in quantity* right now.

Is it any wonder we've started a major OEM revolution?

## Convergent Technologies

Where great ideas come together.

For information call (800) 538-7560 (in California, (408) 727-8830) or return the coupon. I'm an OEM. Here's my application: \_\_\_\_\_

Name/Title \_\_\_\_\_

Company \_\_\_\_\_

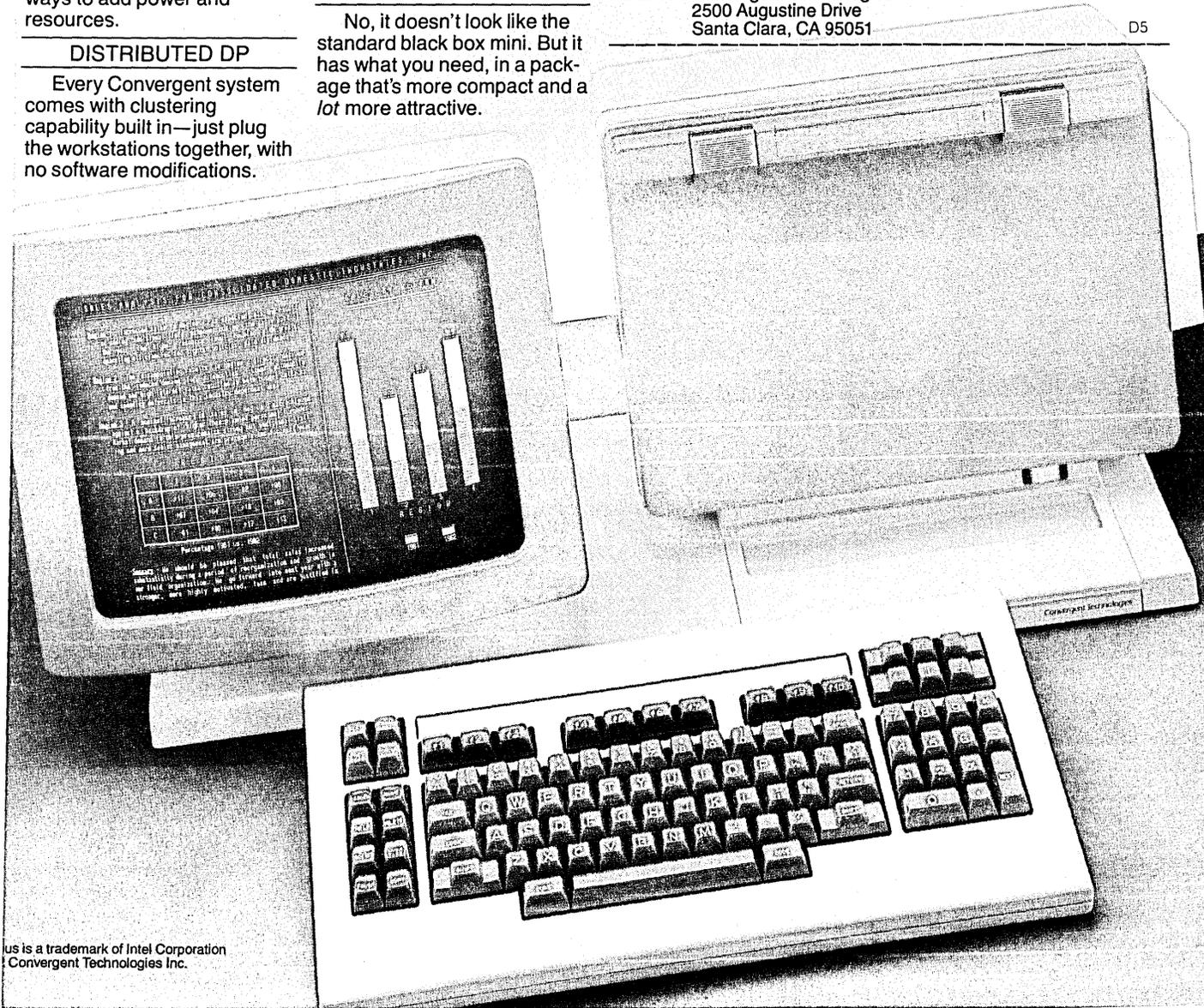
Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_

Phone \_\_\_\_\_ EXT \_\_\_\_\_

Return to: Convergent Technologies Inc.  
2500 Augustine Drive  
Santa Clara, CA 95051

D5



THIS IS A TELEVIDEO TERMINAL;  
 THE SIMILARLY-PRICED  
 TERMINAL ON THE RIGHT IS NOT.  
 WHICH WOULD YOU RATHER READ ALL DAY?



Unretouched photos—identical conditions

## Which would you

Our competitor on the right claims high resolution. But what about that glare? The washed-out background? And the black and white screen? It's enough to give you a headache.

The TeleVideo terminal on the other hand, with its finer character dot matrix, sharper background contrast, and a black-on-green non-glare Panasonic screen is much easier on the eyes.

Obviously.

**Every TeleVideo terminal has just four basic modules. Each module is the best that can be made.**

Every screen, keyboard switch, power supply and video module on every TeleVideo terminal is identical. For the same high reliability. And same ease of service.

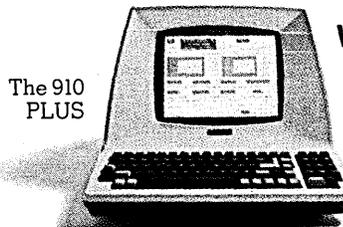
None of our competitors can say that.

**If you order 200 terminals today, we can ship them tomorrow. If you order 500, we can still ship them tomorrow.**

And if you order a 1,000, well, maybe you'll have to wait a day or two.



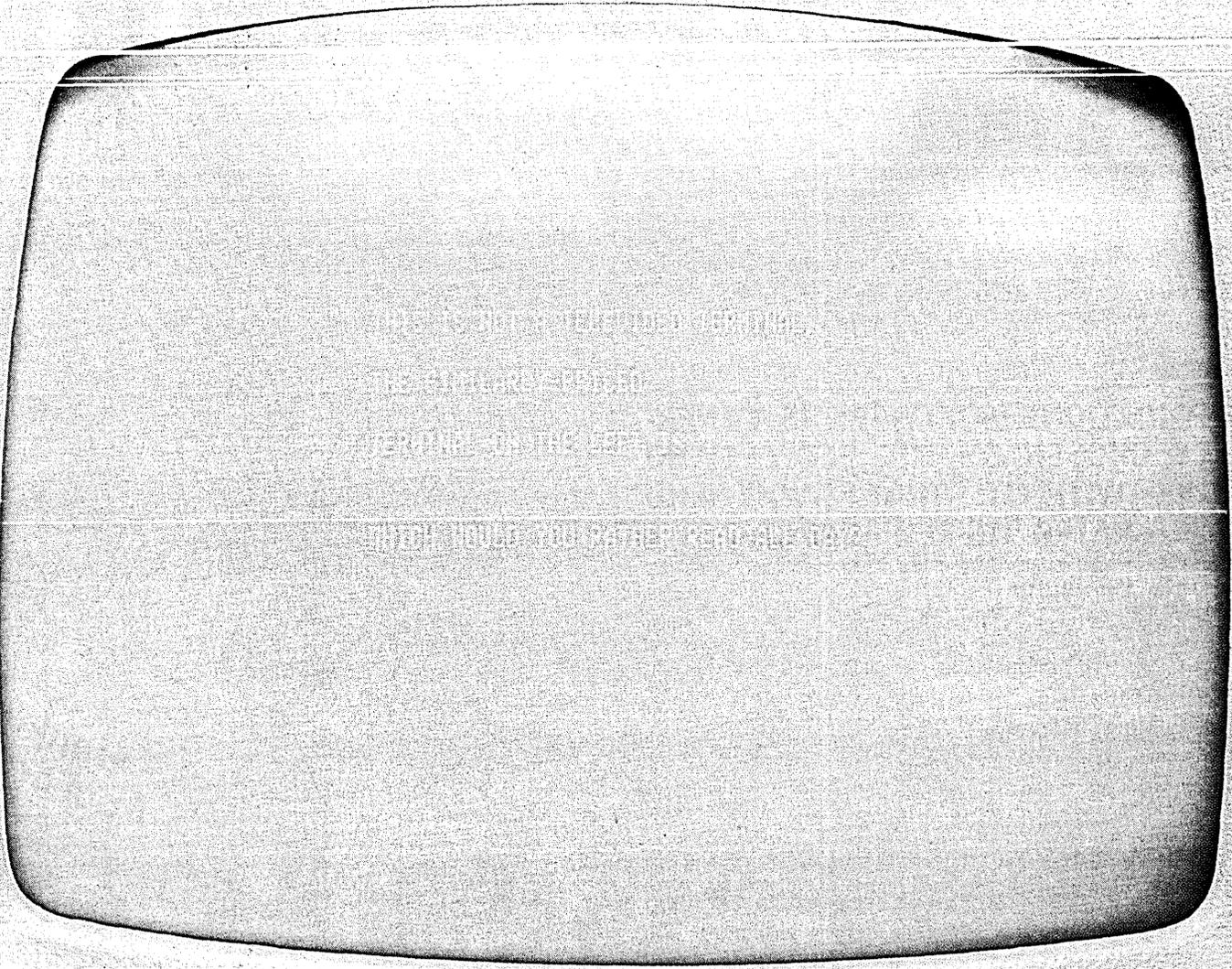
The 920C



The 910 PLUS

**We put our terminals through five bad days so you'll never have even one bad day.**

Our terminals are designed to withstand heat up to



## rather read all day?

155°F and shocks that simulate being tossed in the back of a truck. And before any terminal reaches you, every major component goes through a five day series of thermal and power-on cycling tests.

The result?

The highest reliability rate in our industry.

**TeleVideo sells 50% more terminals a month than our nearest competitor.**

Three years ago, TeleVideo shipped its first terminal. Today, we're the number one

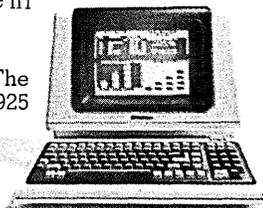
The 910



independent terminal supplier. One reason is because our advantages are clearly visible. 8 hours a day.

For more information call, toll-free, 800-538-8725. (In California, call 408-745-7760.) Or call your nearest TeleVideo sales office.

The 925



The 950



**TeleVideo®**

All TeleVideo terminals can be serviced by your nearest GE Instrumentation and Communication Equipment Service Center.

**CIRCLE 90 ON READER CARD**

# APPLICATIONS

**APPLICATIONS SOFTWARE IS GENERALLY CHOSEN BY THE PEOPLE WHO WORK WITH IT. THAT'S WHY END USERS RATED THESE PACKAGES.**

## by Data Decisions

This software evaluation report presents in detail the results of a nationwide survey, conducted in November and December, of users known to have specific, applications-oriented software packages installed. The report complements a similar survey of systems software packages that was published in *DATAMATION* in December 1981.

Historically, software surveys have been conducted by asking cognizant data processing managers to rate software packages. While that approach was valid in the early days of batch-oriented operations for both systems and applications packages, it remains valid today only for systems software.

Most general purpose mainframe data processing environments today support at least a large percentage of on-line activity that normally includes the user application packages run in the company. End users in functional work centers throughout various departments, such as finance, personnel, engineering, etc., are the primary parties who 1) evaluate and select applications packages, 2) appreciate and understand the current value of those packages, 3) determine the need to upgrade or replace the packages. It is these end users who are the correct parties to answer user ratings questionnaires.

We've taken this approach, and it has required that the vendors themselves cooperate with a publication/research organization in the conduct of a user rating survey. Vendors were invited to provide us with a list of their 100 most recent customers, each of whom had the package in question installed a minimum of six months. The vendors certified that they had not deleted known unhappy customers or attempted to contact customers to influence their replies to our survey.

Both the systems and the applications surveys were conducted by Data Decisions of Cherry Hill, N.J., in conjunction with ratings reports published in Data Decisions' *Computer Systems and Software* edp reference services. The survey employed a precise sampling of software packages known to be installed at 10 or more user sites. Data for these user site samplings were obtained from the applications software vendors directly, using International Computer Programs' (Indianapolis, Ind.) Million Dollar list as a source. Only vendors with packages identified by ICP as having grossed \$5 million or more in sales were contacted for user source data.

Over 4,000 known users of 59 different applications software packages at 4,373 sites comprised the statistical sampling. Extensive letter questionnaire mailings were made to obtain completed user interviews. By such exhaustive efforts, a total of 2,294

user responses were obtained. Of this total, 2,104 were validated as representing active users currently employing the packages surveyed. This constitutes the statistical base.

All users were asked to rate a specific applications package with respect to stated features, functions, and performance criteria. The questions posed to the users were specific in nature. Some only required a yes or no response. Others related to the selection of a phrase or phrases that defined the how, why, or other aspects of software performance. The most specific required the user to assign performance ratings based on a scale ranging from 10 to 9 for Superior, down to 2 or 1 for Inadequate in relation to statements defining

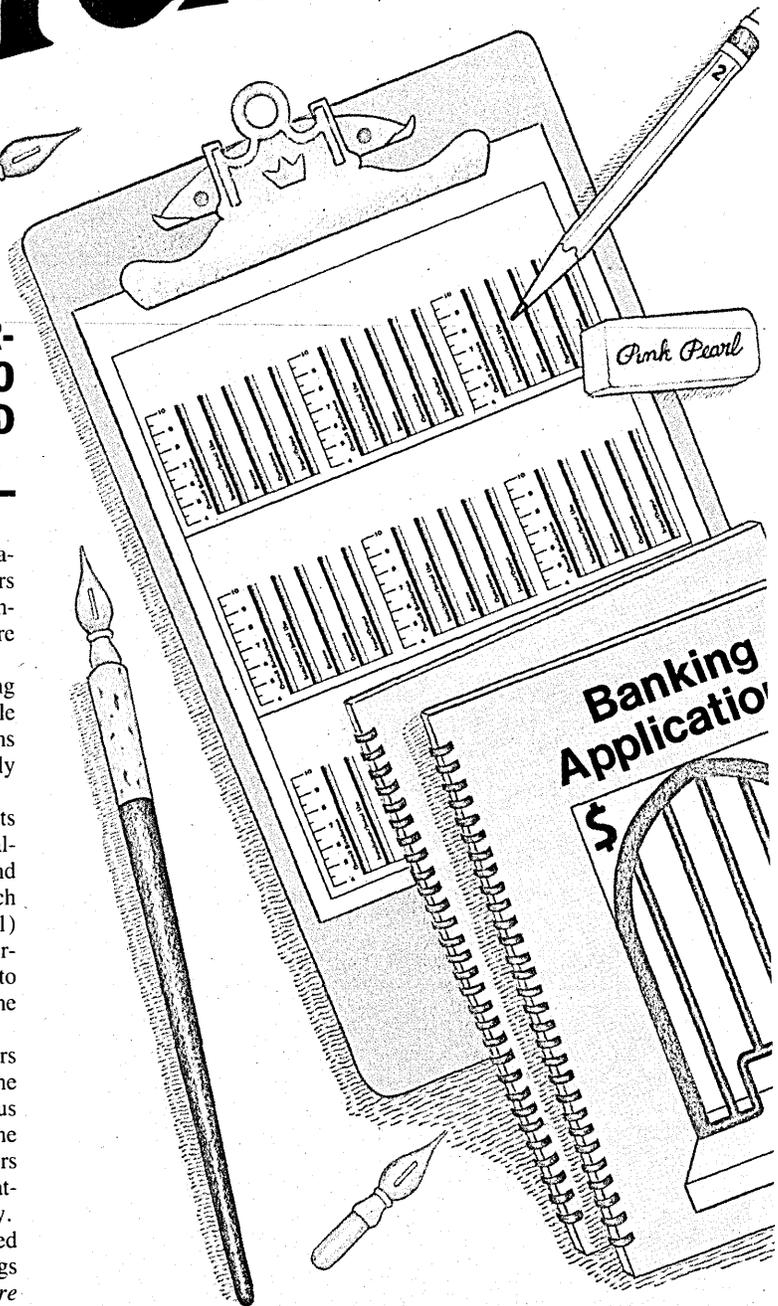
package use, vendor service, software operation, input/output performance, and overall satisfaction.

Survey results showed the following:

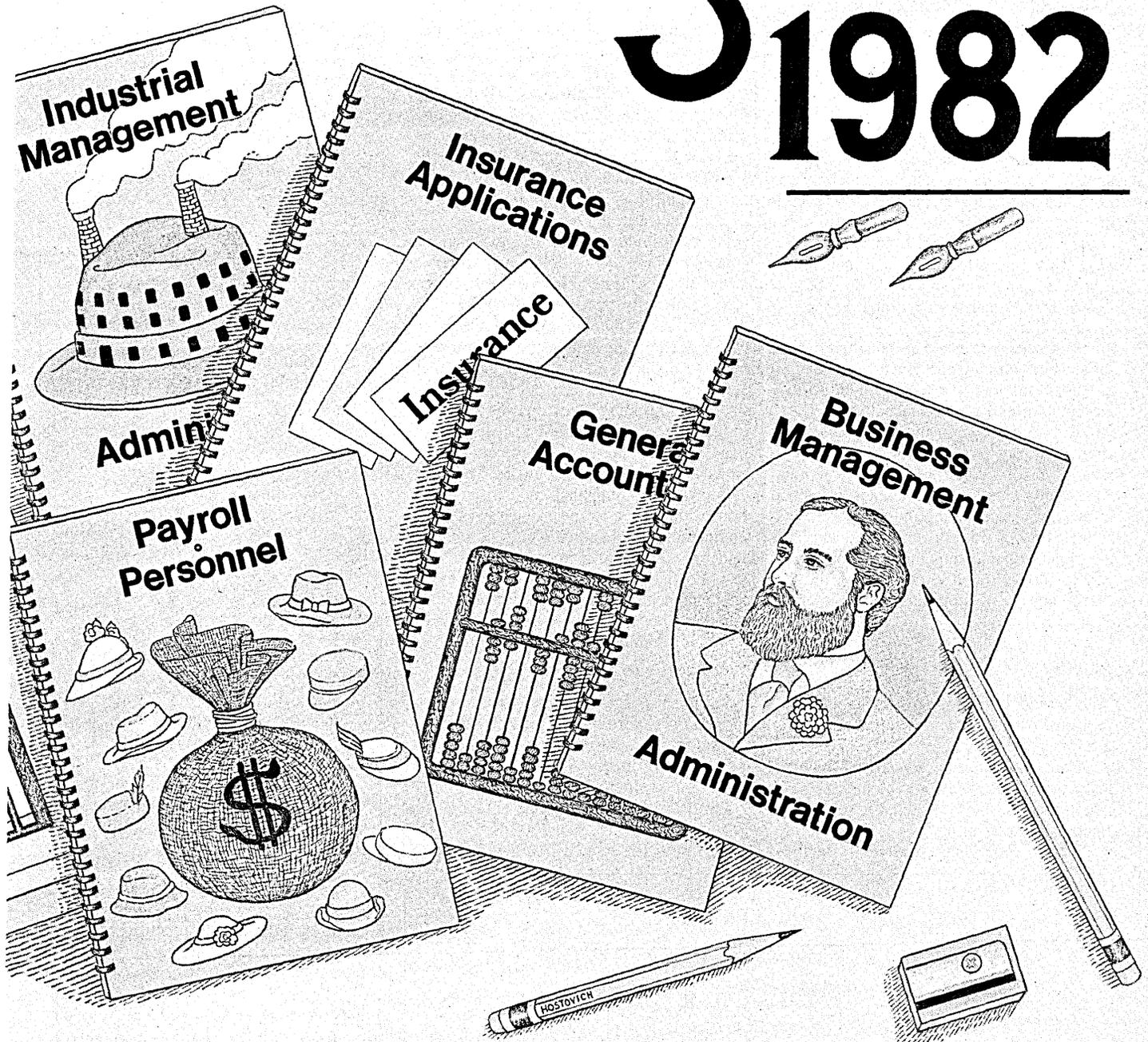
### Buying Influences

An overwhelming 91% of the users indicated that software features and functions were major influences in their decision to acquire the applications package. Other major influences cited were overall vendor "presence" or reputation in the industry (55%); related costs and time to implement the applications package with internal staff (43%); and the package's compatibility with existing software (40%).

Of the buying influence responses,



# SOFTWARE SURVEY 1982



86% indicated that the results of benchmark runs had little or no influence on the buying decision. In addition, 83% indicated that experience with other vendor packages had little or no influence on their decision to acquire the specific applications package, and 76% said the same of consultants and third parties.

#### Alternative Packages

Overall, 81% of the users stated that they had evaluated alternative packages before making an acquisition decision. By type of package, a high of 92% of the users of payroll/personnel applications packages evaluated alternatives, and a low of 72% of the users of business management/administration packages evaluated alternatives.

#### Computer Systems

The applications packages were installed on the following host systems: IBM, 61%; DEC, 9%; Hewlett-Packard and Burroughs, 4% each; Amdahl, NAS/Intel, Univac, and Honeywell, 2% each; Control Data, 1%; other hosts or no answers, 13%.

#### Time Installed

Overall, the average time period the applications packages were installed was 31 months, or about 2.6 years. The responses ranged from 16% employing the package less than one year to 3% having the package installed more than eight years.

#### Maintenance

Over 80% of the applications soft-

ware users reported that the package(s) they were using had maintenance performed by the same vendor that provided the package(s). About 15% employed an in-house staff to maintain their package(s), while only 1% employed a third party software support organization.

#### Replacements

Only 9% of all users responding indicated they were actively seeking or considering replacement of their installed applications package(s). Of this number, only 16% (or 1.5% overall) cited that the reason for replacement was that the package was generally unsatisfactory and only 18% (1.6% overall) stated that slow execution speed was a

# SOFTWARE SURVEY

reason for replacement. The main reason for considering replacement of the package, cited by 29% of respondents (2.7% overall), was the need for features not currently incorporated into the package.

## Performance vs. Promises

Over 68% of the users stated that the installed applications package either met or exceeded all vendor promises with respect to installation time, features and capabilities, and performance, speed, or efficiency factors. Only 3% of the users said that vendor promises made on such software performance factors had not been met.

## Overall Satisfaction

Users were asked to state their overall satisfaction with the package on a scale of 10 to 9 for Superior, 8 to 6 Very Good, 5 to 3 Acceptable, and 2 to 1 Inadequate.

Almost 17% of the users responding cited their satisfaction level as Superior in meeting or exceeding all requirements, and 59% rated overall satisfaction as Very Good in meeting or exceeding most requirements. A total of 21% rated overall satisfaction as Acceptable in meeting many requirements, and about 2% rated overall satisfaction as Inadequate in meeting many requirements.

## SIX PACKAGE GROUPS

The packages have been grouped into six broad categories by type for group averaging and comparisons. The applications software package groups are:

- *General Accounting Packages*—includes applications software for general ledger, accounts receivable, accounts payable, and fixed-asset accounting.
- *Payroll / Personnel Packages* — includes

payroll and human resources management software.

- *Business Management / Administration Packages*—includes business and financial forecasting applications, plus modeling, planning, and other business software.

- *Industrial Management / Administration Packages*—includes industrial and manufacturing control, planning, and inventory management software.

- *Banking Applications Packages*—includes general banking, deposit system, shareholder accounting, customer information, and check processing software.

- *Insurance Applications Packages*—includes general insurance, claim management, accounting, and policy management software.

The findings presented in this report reflect user perceptions of package performance in response to the particular dimensions probed by the questionnaire. These perceptions are not intended to be all-inclusive, nor do they necessarily provide evaluations comparable to those that would be obtained under conditions of a controlled engineering test or experiment. The numbers reported are estimates within a range of what would have been obtained had all user sites in the survey universe been similarly enumerated. \*

This article is based upon information contained in Data Decisions' *Computer Systems*, a monthly updated looseleaf edp information reference service. *Computer Systems* is available on a no-purchase-obligation basis from Data Decisions at 20 Brace Road, Cherry Hill, NJ 08034. Telephone (609) 429-7100.

## HOW THEY RATE

The following bar charts provide graphical representation of user ratings with respect to questions on Overall Satisfaction, Installation and Initial Use, Vendor Service and Support, Operations, and Input/Output criteria. Graphs are presented for the 59 applications software packages that were sampled. The graphs are grouped by categories: General Accounting, Payroll/Personnel Accounting, Business Management/Administration, Industrial Management/Administration, Banking Applications, and Insurance Applications.

In addition, bar ratings are included for both the total survey and for the various group averages. Data are also presented with each bar graph, citing the total number of user responses, the number of users rating the package as providing "outstanding" features and capabilities, and the number of users actively considering replacement of the installed package for any reason as well as those seeking replacement because of generally unsatisfactory performance.

Bar chart ratings at three scale levels are illustrated—10 to 9 Superior, 8 to 6 Very Good, and 5 to 4 Acceptable. Ratings under 4 are not graphed, although a rating of 3 is also acceptable.

*Overall Satisfaction:* represents overall user satisfaction with package features, capabilities, and/or utility as they relate to requirements; with the frequency of failures requiring extra efforts for recovery; and with vendor installation, documentation, modification, and training support.

*Installation and Initial Use:* includes user ratings on program freedom from bugs/errors, the time required for initial installation, and the ease of initial installation, including the quality of documentation and training.

*Vendor Service:* includes user ratings on the vendor's speed and thoroughness in fixing bugs/errors, the quality of vendor program modifications, and the frequency of package updating.

*Operations:* includes user ratings on program backup/checkpoint procedures, recovery from erroneous input, audit trail procedures, and the processing of nonstandard transactions.

*Input/Output:* includes user ratings on data entry provisions, data output/report procedures and formats, and the ease of changing input/output formats.

(Special Note: For split bar presentations in the following bar graphs, the solid bar designates the individual package result and the open bar denotes the applicable group average.)



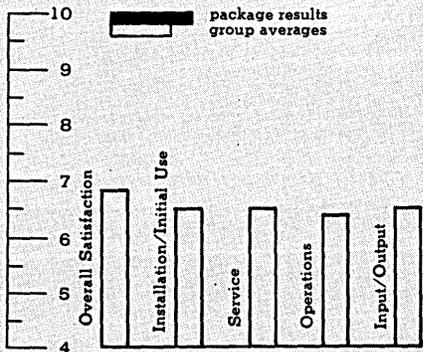
© DATAMATION

CARTOON BY CHUCK VADUN

**OVERALL SUMMARY**

Average - All Packages • 59 packages

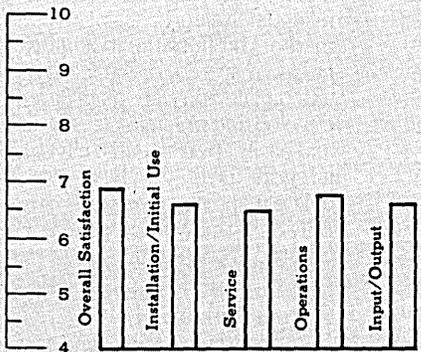
2,104 responses • 961 users judged features/capabilities outstanding • 194 users actively seeking to replace package, with 31 citing unsatisfactory performance as reason.



**GENERAL ACCOUNTING PACKAGES**

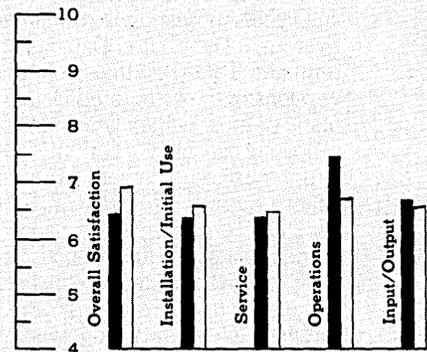
Group Average • 14 packages

568 responses • 242 users judged features/capabilities outstanding • 37 users actively seeking to replace package, with 5 citing unsatisfactory performance as reason.



**AMS LGFS • American Management Systems, 1777 North Kent Street, Arlington, VA 22209 • 703-841-6000**

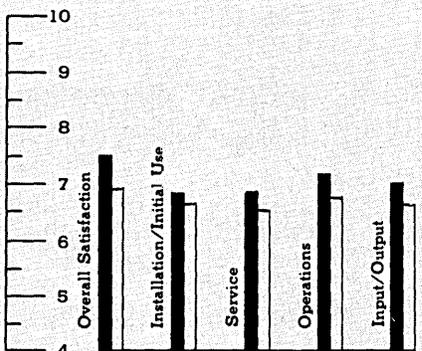
10 responses • 2 users judged features/capabilities outstanding • 0 users actively seeking to replace package.



CIRCLE 374 ON READER CARD

**COMPUTERISTICS CustomAR • Computeristics, Inc., 2 Skiff Street, Hamden, CT 06416 • 203-288-2834**

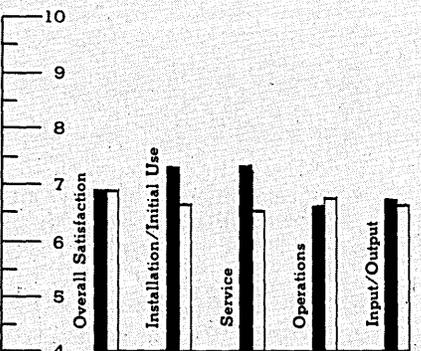
36 responses • 21 users judged features/capabilities outstanding • 4 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 375 ON READER CARD

**DATA DESIGN Accounts Payable System • Data Design Associates, Inc., 1250 Oakmead Parkway, Suite 310, Sunnyvale, CA 94086 • 408-730-0100**

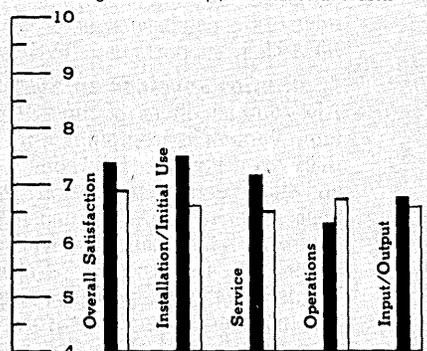
24 responses • 10 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 376 ON READER CARD

**DATA DESIGN Fixed Asset Accounting System • Data Design Associates, Inc., 1250 Oakmead Parkway, Suite 310, Sunnyvale, CA 94086 • 408-730-0100**

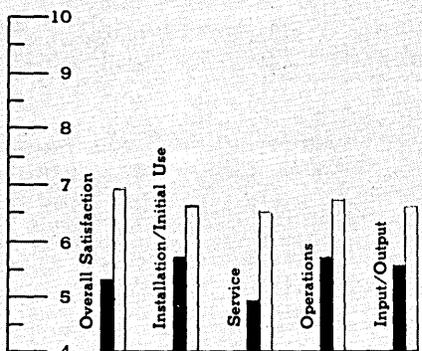
49 responses • 24 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 377 ON READER CARD

**INFORMATICS Accounting IV • Informatics, Inc., 21031 Ventura Boulevard, Woodland Hills, CA 91364 • 213-887-9040**

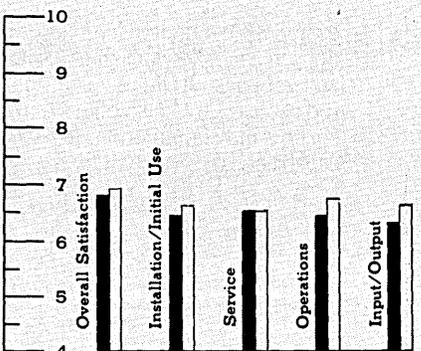
38 responses • 2 users judged features/capabilities outstanding • 4 users actively seeking to replace package, with 2 citing unsatisfactory performance as reason.



CIRCLE 378 ON READER CARD

**MSA General Ledger • Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 • 404-262-2376**

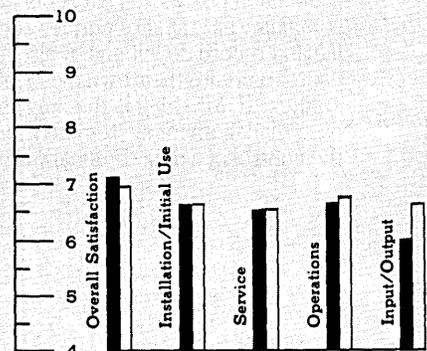
50 responses • 23 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 379 ON READER CARD

**MSA Accounts Payable • Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 • 404-262-2376**

32 responses • 12 users judged features/capabilities outstanding • 0 users actively seeking to replace package.



CIRCLE 380 ON READER CARD

# IDMS-1982-the most integrated DBMS

**IDMS-1982** Its new products include an Online Application Development System, a Distributed Database System, and ESCAPE. It also offers new versions of the Integrated Data Dictionary—now with online update and reporting capability—OnLine Query, OnLine English, Universal Communications Facility, INTERACT, EDP-AUDITOR, and the first relational view of the most powerful production database. Application software includes a General Ledger system, the Cullinane Integrated Manufacturing System, and a Customer Information System for the banking industry. All will be fully integrated with IDMS and its related components.

**IDMS Release 5.7** A production DBMS with relational access. Its logical record facility lets application programmers view data as a flat file. It can be easily used even by someone without knowledge of the database structure. And IDMS fully supports native VSAM files.

**Application Development System** ADS/OnLine offers the most dramatic improvement in programmer productivity ever. It reduces the complexity and effort required to develop online applications to access and update the database. It automatically develops transactions from the user's English-like definition of the process to be accomplished, all under control of a data dictionary. ADS/Batch does the same for batch oriented applications.

**Integrated Data Dictionary Release 3.0** With online inquiry and update capabilities. IDD, the single point of integration for all Cullinane products, provides the control necessary for production processing. In addition to containing all standard entities such as file and record definitions, it also allows users to create their own dictionary entities. IDMS-1982 is the only database management system fully under the control of a data dictionary.

**IDMS-DC Release 2.0** The most powerful on-line teleprocessing system on the market. It offers the most advanced on-line map generation facility ever. It lets on-line applications programmers develop and modify screens quickly and easily. Because it's fully integrated with the IDD, online mapping automatically edits and validates data entered at the terminal.

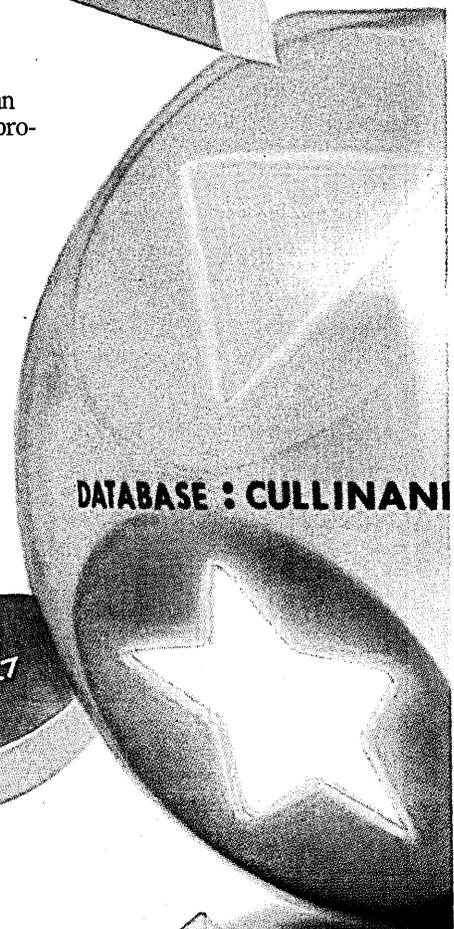
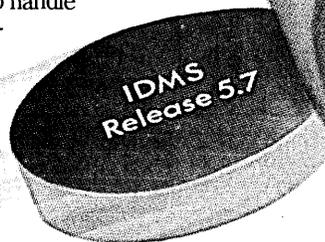
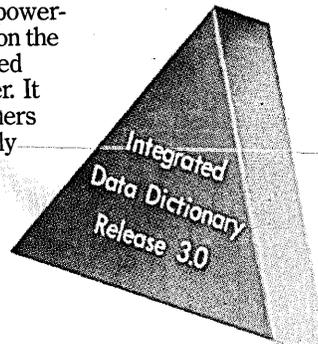
### **Distributed Database System Release 2.0**

Lets programs access data stored on any CPU in your network. Now you can distribute data to remote locations for pro-

cessing and access or update the data from any program running in any network CPU. DDS also allows establishment of a back-end database machine to handle all database services thereby reducing the host processor's work.

### **OnLine Query Release 3.0**

Lets computer users get fast answers to technical and business questions. Users ask questions in a simple English-like language and get back on the terminal a formatted report. OLQ also offers extensive sorting and computation capabilities.



# comprehensive and ever developed.

Online Query  
Release 3.0

**ESCAPE** Permits users of other DBMS products such as IMS/DL1 to migrate easily to IDMS.

**CULPRIT/EDP-AUDITOR** CULPRIT, an online report generator, allows

Online English  
Release 2.0

non-programmers to create files or reports. EDP-AUDITOR, a special version, includes a library of generalized audit routines for tasks such as confirmations, file footing and exception analysis.

**Universal Communications Facility Release 2.0** Applications developed with UCF will run under any teleprocessing monitor without modification.

Universal  
Communications Facility  
Release 2.0

**OnLine English Release 2.0** Gives users direct access to data using the English language. It requires no training. The system can be tailored to fit your business language.

Distributed  
Database System  
Release 2.0

**INTERACT** A text editor which minimizes development time by providing for online entry of source statements. It also offers word processing facilities for the creation and maintenance of all types of text.

**Applications Cullinane Integrated Manufacturing System**—the first on-line, interactive manufacturing software system incorporating advanced DBMS technology. Applications include bill of materials, inventory control, material requirements, shop floor control, master production scheduling, order entry, cost control and purchasing.

**Cullinane Financial Systems/General Ledger**—All your financial transactions will be managed by the most integrated DBMS ever. Users will have unlimited ability to generate financial reports in any format.

**Customer Information System**—an online information management system for use with existing banking applications. Using DBMS technology, it gives senior bank executives the information they need to manage their bank and to build a more profitable business.

**Attend an IDMS Management Seminar in your area.** Return the coupon below. Or call your local Cullinane representative.



Cullinane  
Database Systems, Inc.  
400 Blue Hill Dr.  
Westwood, Mass. 02090  
(617) 329-7700  
Telex: 200102

Database  
Systems

Please send me:

- Seminar and IDMS-1982 information.  
 Cullinane Corporate Profile and 1981 Annual Report.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City, State, ZIP \_\_\_\_\_

Telephone \_\_\_\_\_

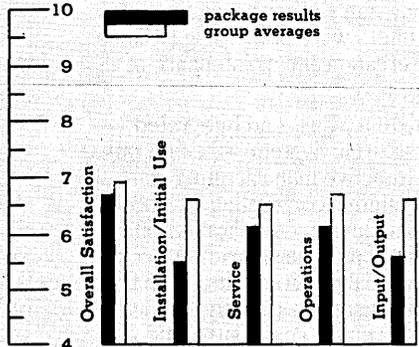
My computer is \_\_\_\_\_

**CIRCLE 91 ON READER CARD**

# SOFTWARE SURVEY

**MSA Accounts Receivable • Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 • 404-262-2376**

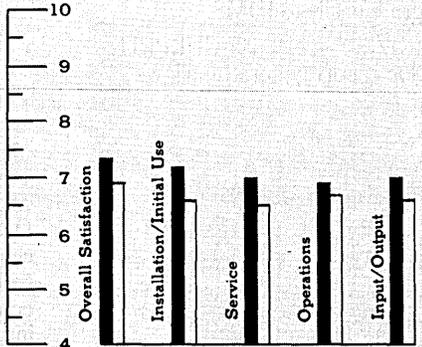
39 responses • 12 users judged features/capabilities outstanding • 4 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 381 ON READER CARD

**MSA Fixed Asset Accounting System • Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 • 404-262-2376**

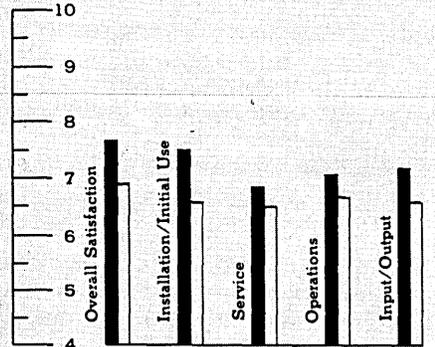
47 responses • 20 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 382 ON READER CARD

**McCORMACK & DODGE G/L Plus • McCormack & Dodge Corp., 560 Hillside Avenue, Needham Heights, MA 02194 • 617-449-4012**

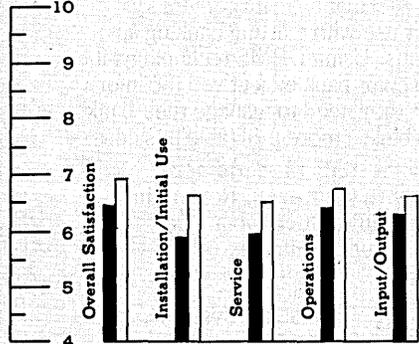
55 responses • 34 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 383 ON READER CARD

**McCORMACK & DODGE A/P Plus • McCormack & Dodge Corp., 560 Hillside Avenue, Needham Heights, MA 02194 • 617-449-4012**

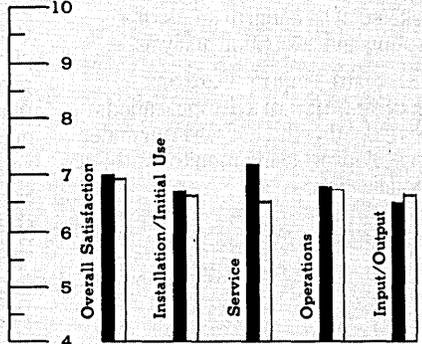
38 responses • 14 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 384 ON READER CARD

**McCORMACK & DODGE F/A Plus • McCormack & Dodge Corp., 560 Hillside Avenue, Needham Heights, MA 02194 • 617-449-4012**

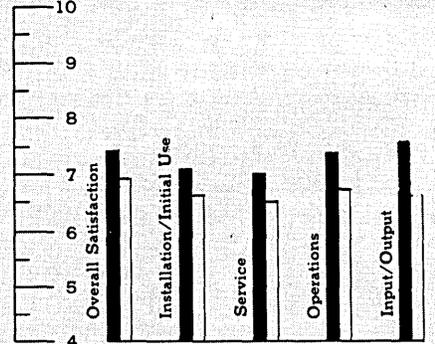
43 responses • 18 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 386 ON READER CARD

**TIMBERLINE Client Accounting System • Timberline Systems Inc., 10550 SW Allen Boulevard, Suite 220, Beaverton, OR 97005 • 503-643-9461**

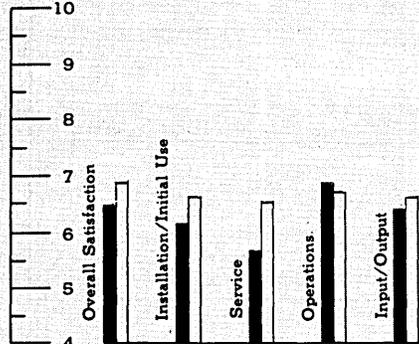
70 responses • 53 users judged features/capabilities outstanding • 9 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 387 ON READER CARD

**WESTINGHOUSE DATASCORE IAI Financial Accounting System • Westinghouse Datacore Systems, 97 Humboldt Street, Rochester, NY 14609 • 716-288-6900**

37 responses • 18 users judged features/capabilities outstanding • 6 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.

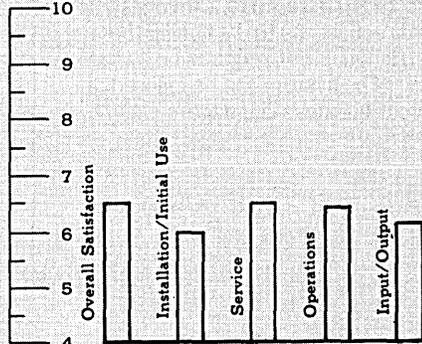


CIRCLE 388 ON READER CARD

**PAYROLL/PERSONNEL ACCOUNTING PACKAGES**

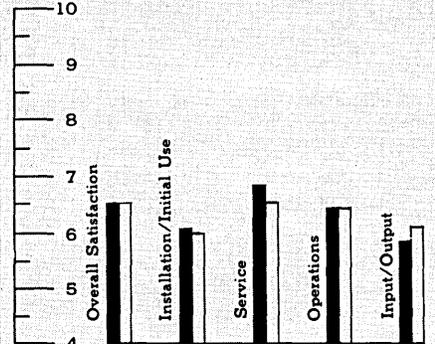
Group Average • 6 packages

270 responses • 100 users judged features/capabilities outstanding • 19 users actively seeking to replace package, with 3 citing unsatisfactory performance as reason.



**CYBORG Payroll/Personnel System • Cyborg Systems Inc., 2 North Riverside Plaza, Chicago, IL 60606 • 312-454-1865**

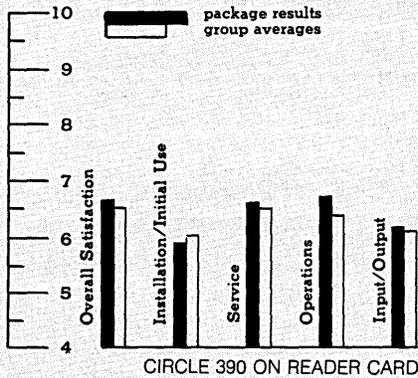
75 responses • 23 users judged features/capabilities outstanding • 3 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 389 ON READER CARD

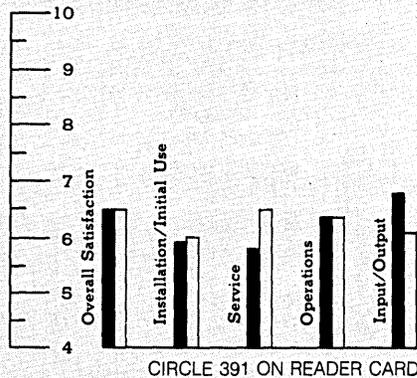
**DYATRON Human Resource Information**  
 ● Dyatron Corp., General Systems Division, 515 Sparkman Drive, Huntsville, AL 35805 ● 205-837-9211

27 responses ● 10 users judged features/capabilities outstanding ● 1 user actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



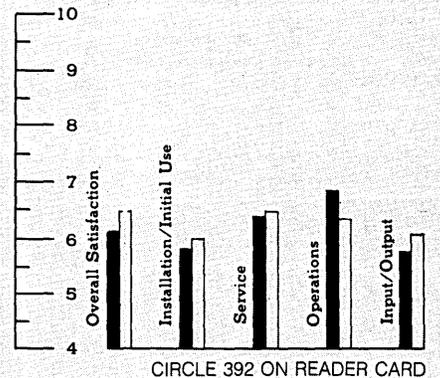
**INFORMATION SCIENCE InSci Human Resource** ● Information Science Inc., 95 Chestnut Ridge Road, Montvale, NJ 07645 ● 201-391-1600

45 responses ● 17 users judged features/capabilities outstanding ● 4 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



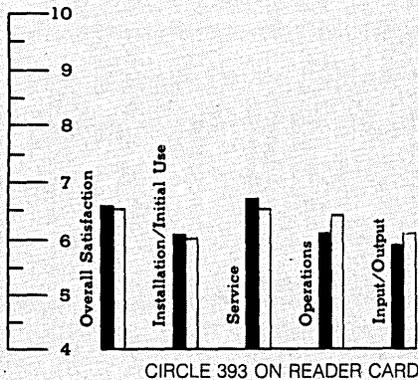
**INTEGRAL SYSTEMS Payroll/Personnel** ● Integral Systems Inc., 39 Quail Court, Walnut Creek, CA 94596 ● 415-938-7600

20 responses ● 7 users judged features/capabilities outstanding ● 0 users actively seeking to replace package.



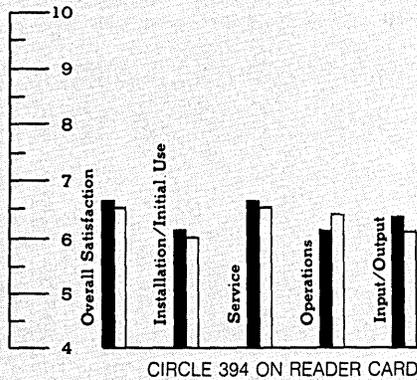
**MSA Personnel Management & Reporting**  
 ● Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 ● 404-262-2376

51 responses ● 16 users judged features/capabilities outstanding ● 7 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



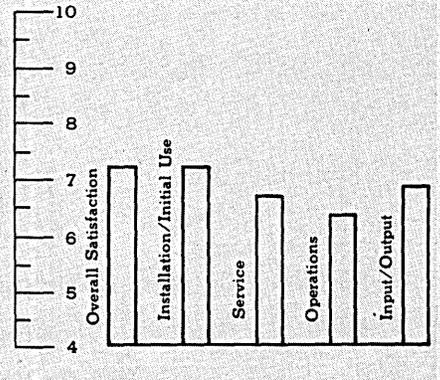
**MSA Payroll Accounting System** ● Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 ● 404-262-2376

52 responses ● 26 users judged features/capabilities outstanding ● 6 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



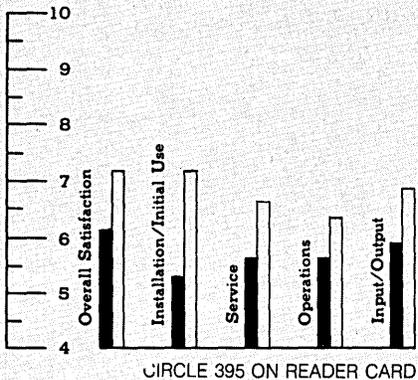
**BUSINESS MANAGEMENT/ADMINISTRATION PACKAGES**  
 Group Average ● 10 packages

406 responses ● 210 users judged features/capabilities outstanding ● 42 users actively seeking to replace package, with 4 citing unsatisfactory performance as reason.



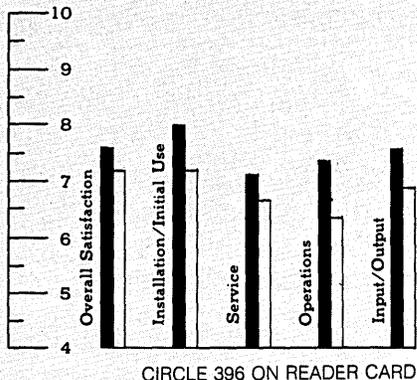
**AMERICAN SOFTWARE Sales Forecasting**  
 ● American Software Inc., 443 East Paces Ferry Road, Atlanta, GA 30305 ● 404-261-4381

35 responses ● 20 users judged features/capabilities outstanding ● 0 users actively seeking to replace package.



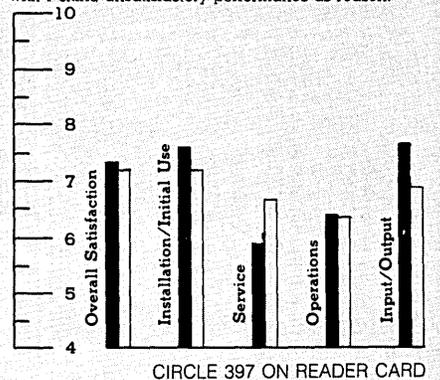
**COMSHARE Tactics** ● Comshare, Inc., 3001 South State Road, Ann Arbor, MI 48106 ● 313-994-4800

17 responses ● 4 users judged features/capabilities outstanding ● 9 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



**EVALUATION & PLANNING FCS-EPS** ● Evaluation & Planning Systems Inc., 8700 Commerce Park Drive, Houston, TX 77036 ● 713-771-0618

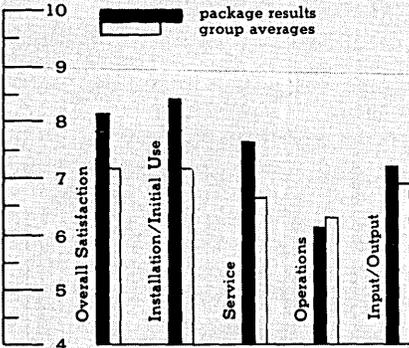
25 responses ● 15 users judged features/capabilities outstanding ● 2 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



# SOFTWARE SURVEY

## EXECUCOM Interactive Financial Planning System • Execucom Systems Corp., P.O. Box 9758, Austin, TX 78766 • 512-345-6560

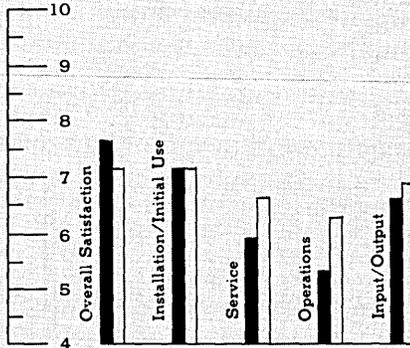
53 responses • 29 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 398 ON READER CARD

## INTEGRATED SOFTWARE DISSPLA • Integrated Software Systems Corp., 4186 Sorrento Valley Boulevard, San Diego, CA 92121 • 714-452-0170

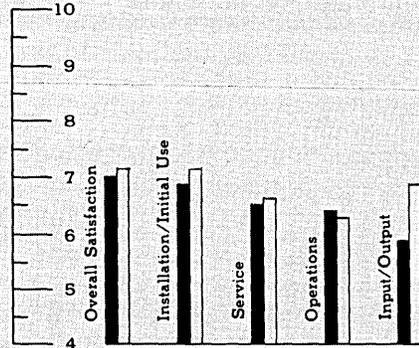
48 responses • 31 users judged features/capabilities outstanding • 3 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 399 ON READER CARD

## INTERNATIONAL SYSTEMS PAC System • International Systems Inc., 890 Valley Forge Plaza, King of Prussia, PA 19406 • 215-265-1550

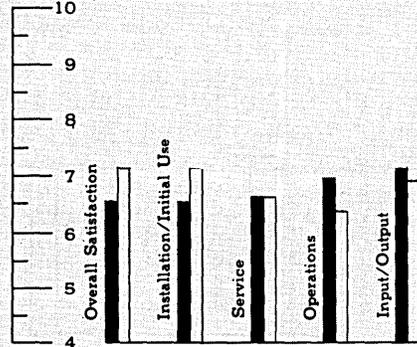
61 responses • 25 users judged features/capabilities outstanding • 3 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 400 ON READER CARD

## MSA Financial Forecasting & Modelling • Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 • 404-262-2376

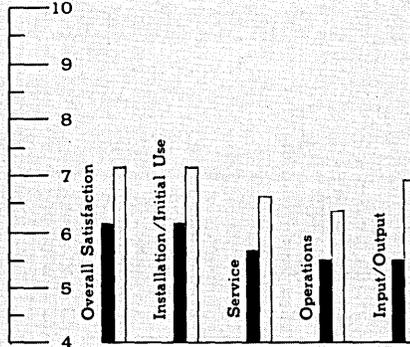
14 responses • 6 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 401 ON READER CARD

## NICHOLS N5500 • Nichols & Company Inc., 5839 Green Valley Circle, Suite 104, Culver City, CA 90230 • 213-670-6400

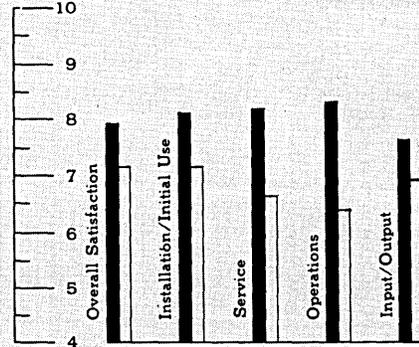
52 responses • 16 users judged features/capabilities outstanding • 5 users actively seeking to replace package, with 2 citing unsatisfactory performance as reason.



CIRCLE 402 ON READER CARD

## SADDLEBROOK Financial Planning & Control System • The Saddlebrook Corp., 80 Rodgers Street, Cambridge, MA 02142 • 617-661-8100

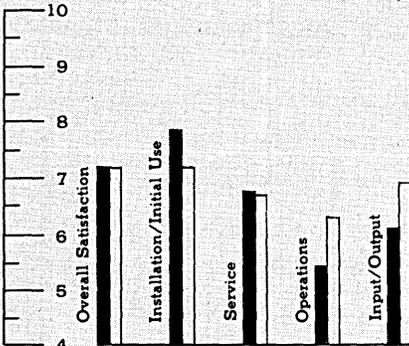
41 responses • 37 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 403 ON READER CARD

## SPSS Batch System • SPSS Inc., 444 N. Michigan Avenue, Suite 3300, Chicago, IL 60302 • 312-329-2400

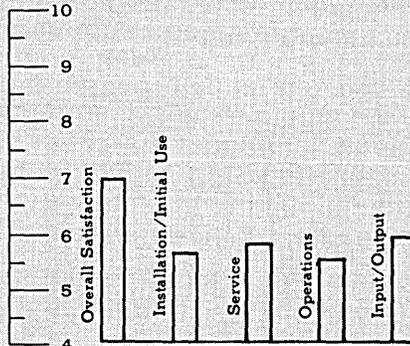
60 responses • 22 users judged features/capabilities outstanding • 4 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 404 ON READER CARD

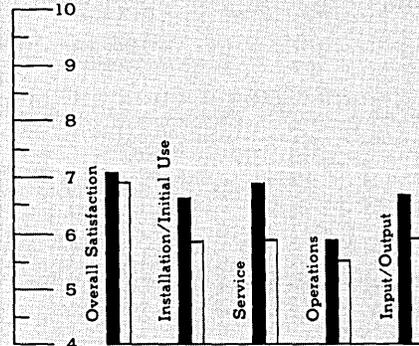
## INDUSTRIAL MANAGEMENT/ADMINISTRATION PACKAGES Group Average • 11 packages

373 responses • 158 users judged features/capabilities outstanding • 39 users actively seeking to replace package, with 7 citing unsatisfactory performance as reason.



## ASK MANMAN • Ask Computer Systems Inc., 730 Distel Drive, Los Altos, CA 94022 • 415-969-4442

55 responses • 27 users judged features/capabilities outstanding • 7 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 405 ON READER CARD

# How do you create a microcomputer to match the power of the UNIX™ operating system?

Imagine. You are perfecting a revolutionary operating system. In about two years, it will be the system of choice for 16-bit microcomputers.

But the breakthrough features of this operating system are going to make stringent demands on the computer.

Your operating system will be named UNIX.

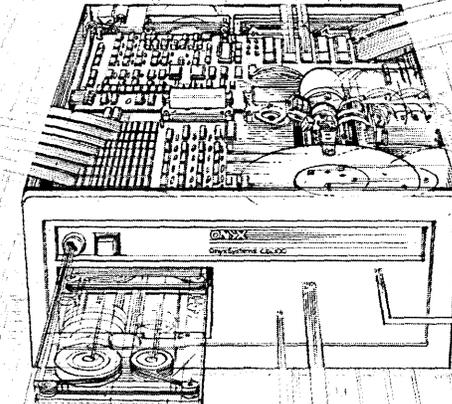
The microcomputer, developed specifically for your operating system more than two years before commercial UNIX distribution, is named ONYX™.

ONYX will live up to every demand and expectation.

To achieve the ultimate flexibility, simplicity, efficiency and productivity, the UNIX operating system will incorporate a file system of highly uniform sets and subsets of directories, arranged in a tree-like hierarchical structure.

And flexible directory and file protection modes, allowing all combinations of "read," "write," and "execute" access, independently for each file or directory, or for a group of users.

But these advantages will require intensive disk access, and superior memory management. In simple language, disk access must be as fast as possible, and the disk must have an



unusual capacity to maintain complex file systems on-line at all times.

Floppy disks with their low capacities and high access times won't do.

Winchester disk drives that utilize slow-moving stepper motor head positioning devices won't do.

ONYX's IMI Winchester disk storage system, with its servo-driven voice coil head positioning, is more than twice as fast!

So, obviously the ONYX C8002 will do.

And, as developed, the ONYX C8002 features expandable memory up to 1 Mbyte, and disk storage up to 160 Mbytes on-line. Its cartridge tape backup offers cyclical redundancy checking

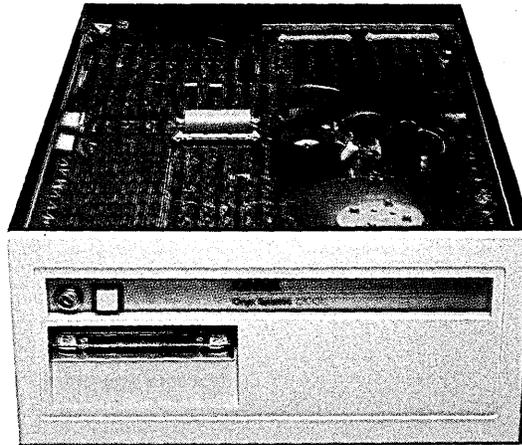
on every backup. Both the Winchester disk storage system and the cartridge tape backup are *internal*.

Now it's 1982. The UNIX system's pre-eminence among 16-bit operating systems is established. And ONYX is the only company that has significant production experience with UNIX systems. ONYX has installed over 1500 UNIX systems.

In the UNIX operating environment, the disk becomes an extension of main memory. "Swapping" programs between the disk and main memory increases the number of operations that can run concurrently. ONYX's memory management system utilizes "scatter" instead of "contiguous" allocation, and the more efficient swapping minimizes demand on the disk channel. That's why ONYX assures a highly efficient environment for the UNIX operating system.

Today there are a lot of systems being developed to operate with the UNIX (and "UNIX look-alike") operating systems. But there are many reasons why you should consider the names UNIX and ONYX as inseparable.

For more information, write Onyx Systems, Inc. Or call (408) 946-6330:



Make the Connection

# ONYX UNIX

OPERATING SYSTEM

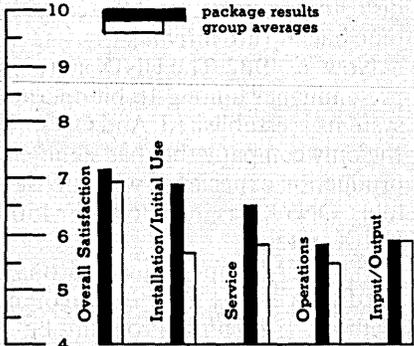
Onyx Systems Inc., 25 East Trimble Road, San Jose, CA 95131

CIRCLE 92 ON READER CARD

# SOFTWARE SURVEY

**CINCOM Manufacturing Control** • Cincom Systems Inc., 2300 Montana Avenue, Cincinnati, OH 45211 • 513-662-2300

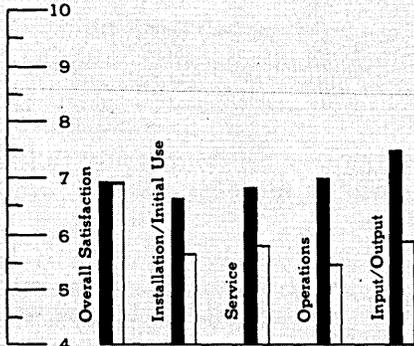
16 responses • 7 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 406 ON READER CARD

**COMPUTER METHODS PROFIT** • Computer Methods Inc., 9401 West Beloit Road, Milwaukee, WI 53227 • 414-327-4471

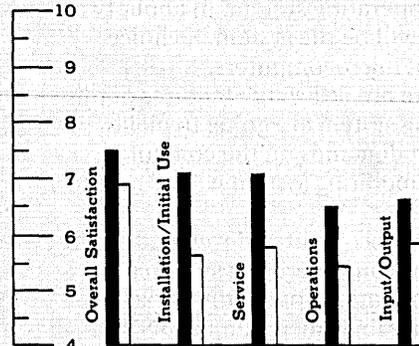
59 responses • 26 users judged features/capabilities outstanding • 5 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 407 ON READER CARD

**COMSERV AMAPS** • Comserv Corp., 1385 Mendota Heights Road, Mendota Heights, MN 55120 • 612-452-7770

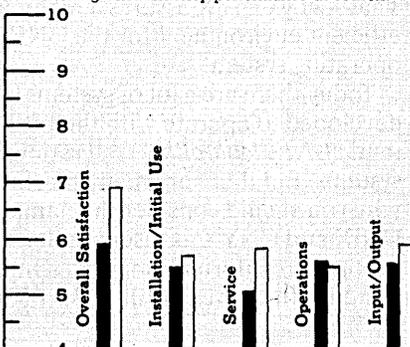
50 responses • 33 users judged features/capabilities outstanding • 5 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 408 ON READER CARD

**DISTRIBUTION MANAGEMENT DMS-1500** • Distribution Management Systems, Inc., 11 DeAngelo Drive, Bedford, MA 02130 • 617-275-2000

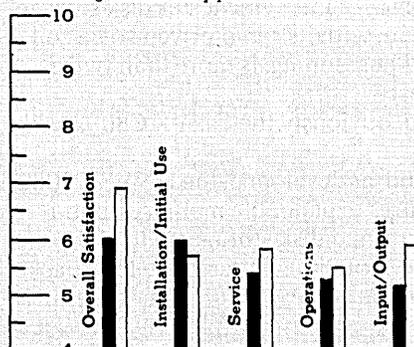
17 responses • 6 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 409 ON READER CARD

**MSA Supplies Inventory Control & Purchase** • Management Science America, 3445 Peachtree Road, Atlanta, GA 30326 • 404-262-2376

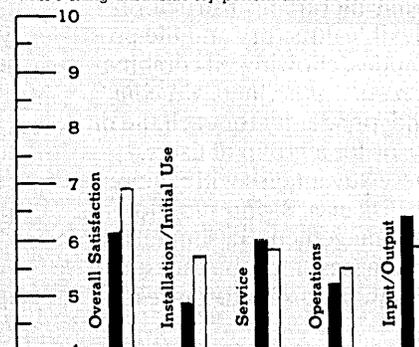
35 responses • 7 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 410 ON READER CARD

**MARTIN MARIETTA MAS Modular Application System** • Martin Marietta Data Systems, 6301 Ivy Lane, Greenbelt, MD 20770 • 301-345-0100

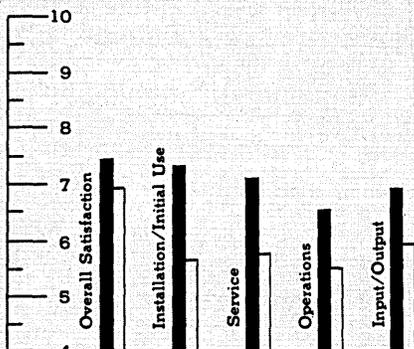
16 responses • 11 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 411 ON READER CARD

**NCA MS-11 Manufacturing System** • NCA Corp., 388 Oakmead Parkway, Sunnyvale, CA 94086 • 408-245-7990

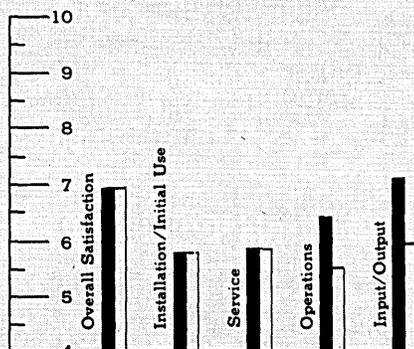
37 responses • 20 users judged features/capabilities outstanding • 8 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 412 ON READER CARD

**RAND CIDS** • Rand Information Systems Inc., 98 Battery Street, San Francisco, CA 94111 • 415-392-2500

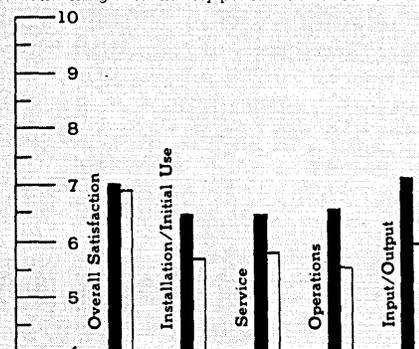
7 responses • 3 users judged features/capabilities outstanding • 0 users actively seeking to replace package.



CIRCLE 413 ON READER CARD

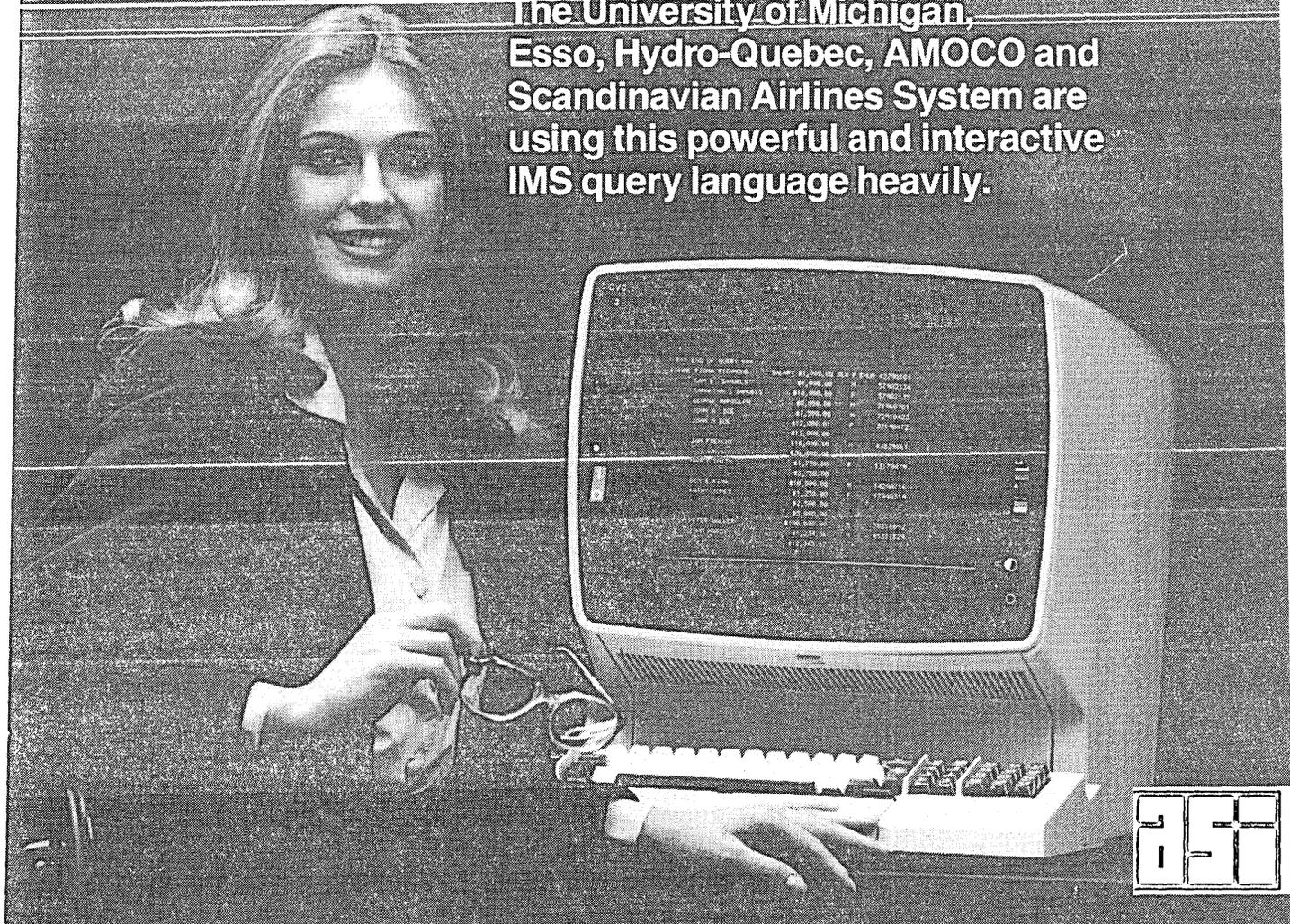
**TIMBERLINE Management Accounting for Contractors** • Timberline Systems Inc., 10550 SW Allen Boulevard, Suite 220, Beaverton, OR 97005 • 503-643-9461

58 responses • 34 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 414 ON READER CARD

# ASI/INQUIRY: Customers like Hughes Aircraft, The University of Michigan, Esso, Hydro-Quebec, AMOCO and Scandinavian Airlines System are using this powerful and interactive IMS query language heavily.



## And here are three productivity-boosting reasons why.

### 1. ASI/INQUIRY Is Remarkably Easy to Use.

Because inquiries are stated in simple English, nonprogrammers can learn to use ASI/INQUIRY quickly. DL/1 structures are completely transparent to the user. You need not understand the complexities of multipathing or multiple data base access. Comprehensive diagnostic messages simplify error correction. ASI/INQUIRY automatically displays data in the appropriate format—horizontal, vertical, or overflow. Or you can specify any desired screen format. Repetitively executed queries can be saved in an on-line catalog. New Release 5.5 features include the ability to defer query execution from MP to BMP and support of IMS *Fastpath* facility.

### 2. ASI/INQUIRY Assures Faster Access and Response Time.

ASI/INQUIRY lets you access your DL/1 data bases through IMS or TSO faster and more efficiently. That's because it eliminates need to write and debug those highly procedural programs usually required to access data bases. ASI/INQUIRY operates as an IMS message processing program executed from any IMS DB/DC-supported terminal. Execution priority is dynamically controlled through automatic program message switching. High initial priority assignment assures fast response. Priority is then automatically adjusted to the rate that to-be-displayed data is encountered, which optimizes *load leveling* of IMS DB/DC resources.

### 3. ASI/INQUIRY Provides Complete Security.

Built-in safeguards protect data at the system, terminal, data base, field and value levels. Further, an installation's customized security system, as well as RACF or ACF2, may be integrated with ASI/INQUIRY security.

Learn why ASI/INQUIRY is the *most heavily used* IMS query language. Call or write — today!

**Applications Software, Inc.**  
21515 Hawthorne Boulevard  
Torrance, CA 90503  
(213) 540-0111

Member SIA  Software Industry Association

CIRCLE 93 ON READER CARD

# Networking standards. Nobody keeps your options open like Digital.

By now, everyone understands the need for standard communications protocols. Without them, an electronic Tower of Babel would surely ensue. But there have to be different standards for different networks. A local-area network is different from a wide-area network. A public network is different from a private one.

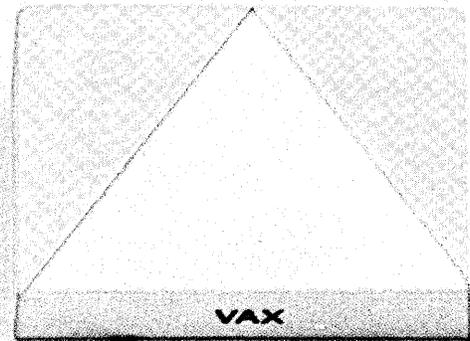
No single universal standard has emerged. Nor is one likely to. There are simply too many diverse networking environments, each fulfilling specific, mutually exclusive needs.

That's why Digital is committed to supporting and, in fact, actively promoting the more important standards now surfacing in the various environments.

Our goal is to offer our customers a range of standards to achieve any combination of networking objectives. And we've been pursuing that goal for many years.

#### **A forward-thinking strategy.**

When we first developed our networking architecture, we understood the need for flexibility. We consciously adopted an architectural strategy that would allow our networking software to work freely with a wide range of protocols, including



some that didn't even exist at the time.

The success of that strategy is now becoming apparent. As more

---

vendors enter the networking field, Digital is uniquely positioned to offer compatibility with the emerging protocols. We've gone farther than anyone to assure that your options are open.

#### **X.25 and other public networks.**

Digital offers the X.25 protocol for use with public packet-switched networks such as Datapac (Canada), Transpac (France), and PSS (U.K.).

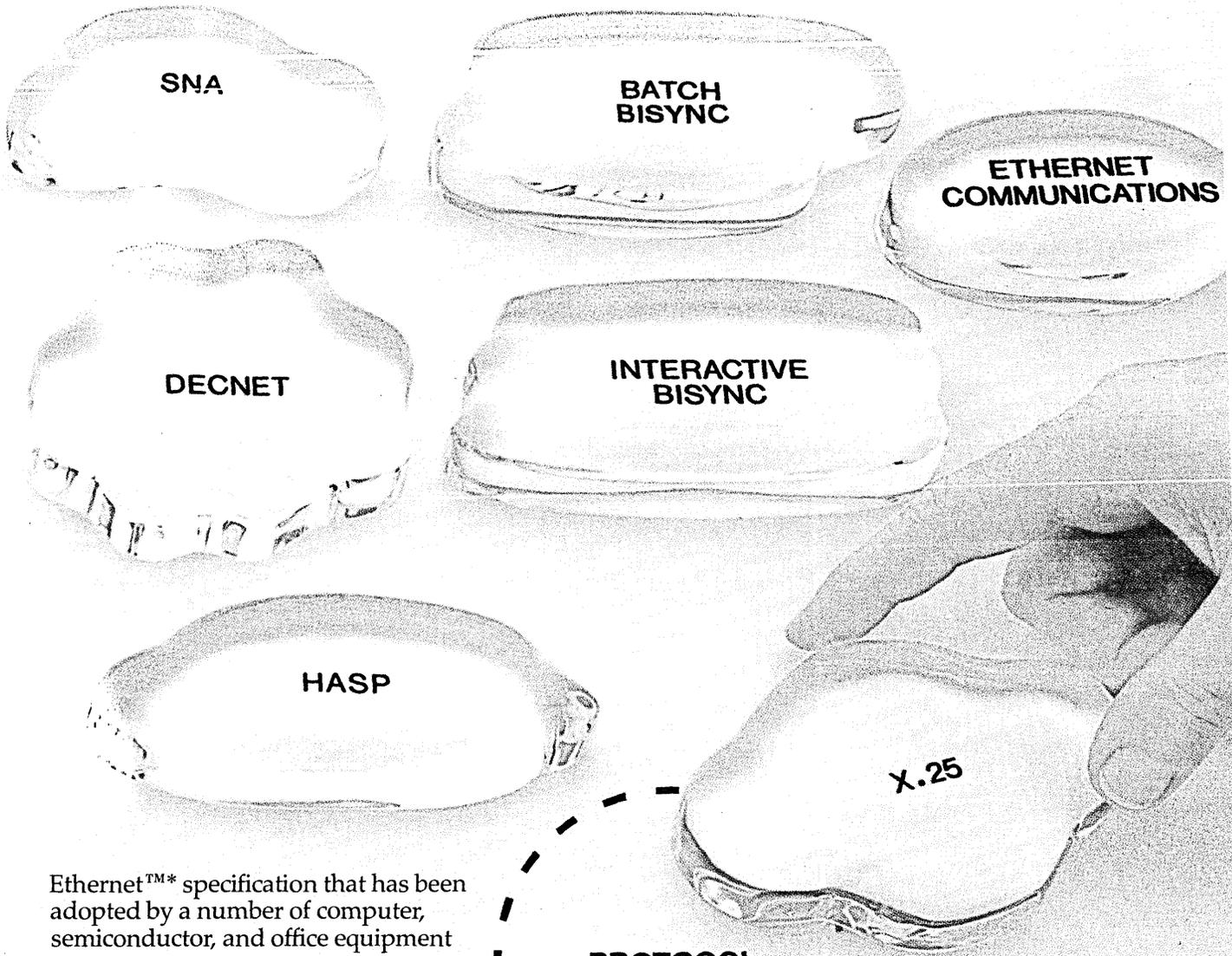
But when used with our computers, X.25 is much more than a simple link. We can provide you with the higher-level protocols that will take your systems beyond mere communications and into the sophisticated functionality that has made us a leader in networking software.

#### **Hierarchical networks.**

Even though we prefer to implement more flexible distributed networks, we are amply equipped to support SNA and related mainframe-oriented protocols such as Batch BISYNC, Interactive BISYNC, and HASP.

#### **Local-area networks.**

Digital is one of the original sponsors of the



Ethernet™\* specification that has been adopted by a number of computer, semiconductor, and office equipment

manufacturers. We recognized early on the need for highly reliable local-area networks. We were in on the ground floor of the definition, development and, now, the implementation of the Ethernet specification.

**Distributed data processing networks.**

DECnet,™ Digital's proprietary networking software, is based on a layered architecture. This is the same architectural approach followed in the model proposed by ISO. Our DECnet offers a wide range of quality networking products, products that allow such sophisticated options as adaptive path routing, down-line loading, and enhanced network management capabilities.

**And so on.**

We have listed a few of the many standards we are currently supporting. There are more.

But even more important than the number of protocols is the attitude we have toward them. We are determined to help you

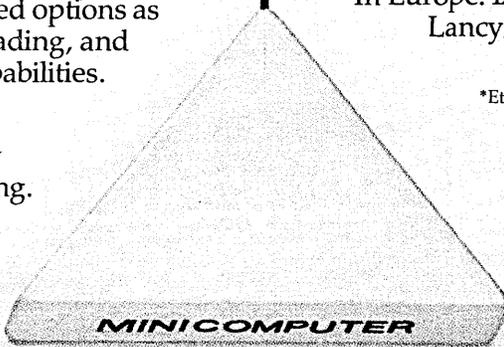
**PROTOCOL**

meet any kind of networking objective. And our capabilities in that regard are as far-reaching as they are farsighted.

So if you're planning a network, don't make the mistake of planning just for the present. Talk to the people who can meet your current needs and still keep your options open for the future. Talk to us.

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.

\*Ethernet is a trademark of Xerox Corporation. ©1982, Digital Equipment Corporation



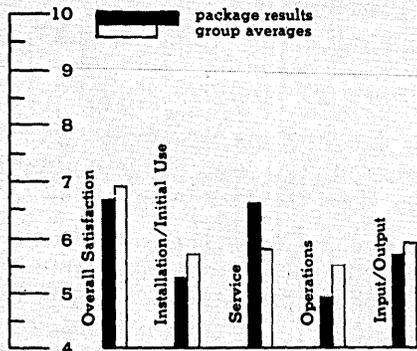
**digital**

We change the way the world thinks.

# SOFTWARE SURVEY

**TRES Customer Information System** • Tres Systems Inc., 4255 LBJ Freeway, Suite 220, Dallas, TX 75234 • 214-233-4341

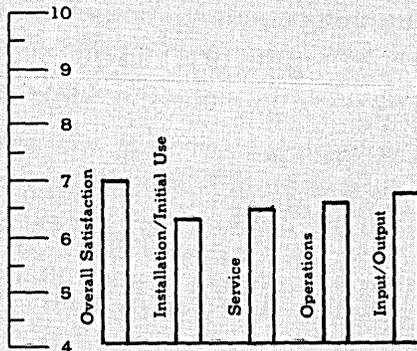
23 responses • 6 users judged features/capabilities outstanding • 5 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 415 ON READER CARD

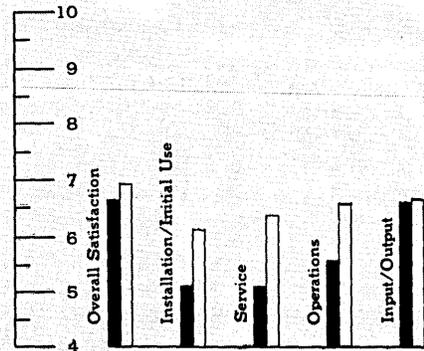
**BANKING APPLICATIONS PACKAGES**  
Group Average • 9 packages

295 responses • 136 users judged features/capabilities outstanding • 33 users actively seeking to replace package, with 2 citing unsatisfactory performance as reason.



**ARBAT Banking System** • Arbat Systems, Ltd., Arbat Plaza, 4th Floor, Hoboken, NJ 07030 • 201-963-4400

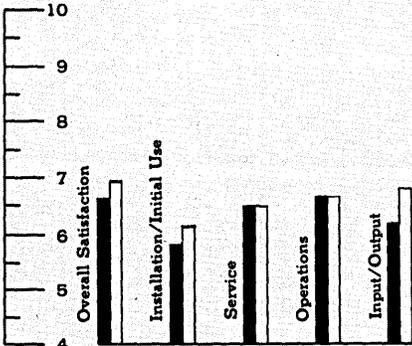
7 responses • 3 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 416 ON READER CARD

**CITIZENS AUTOMATED Canton System** • Citizens Automated Systems, 100 Central Plaza South, Canton, OH 44702 • 216-452-9966

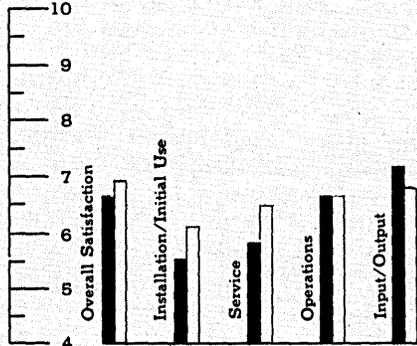
15 responses • 6 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 417 ON READER CARD

**HOGAN HA Transaction System Deposits** • Hogan Associates, 1120 Empire Central Place, Dallas, TX 75247 • 214-688-1675

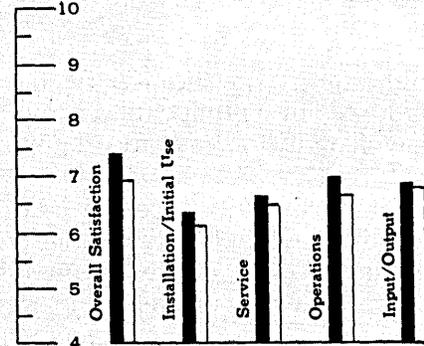
11 responses • 9 users judged features/capabilities outstanding • 0 users actively seeking to replace package.



CIRCLE 418 ON READER CARD

**INFORMATICS Corporate Shareholder** • Informatics Inc., 21031 Ventura Boulevard, Woodland Hills, CA 91364 • 213-887-9040

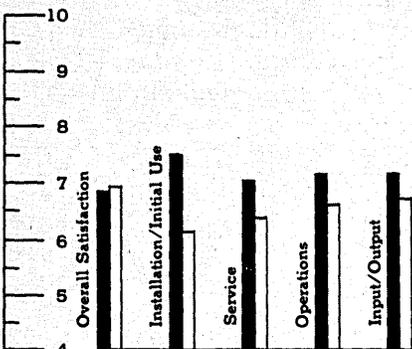
38 responses • 16 users judged features/capabilities outstanding • 5 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 419 ON READER CARD

**REMOTE COMPUTING SLP** • Remote Computing Corp., 1076 East Meadow Circle, Palo Alto, CA 94303 • 415-494-6111

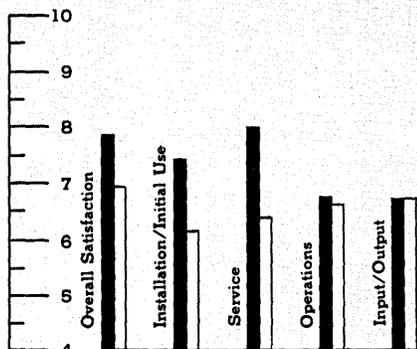
17 responses • 3 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 420 ON READER CARD

**STOCKHOLDER SYSTEMS PEP** • Stockholder Systems Inc., 1965 North Park Place, Atlanta, GA 30339 • 404-952-3387

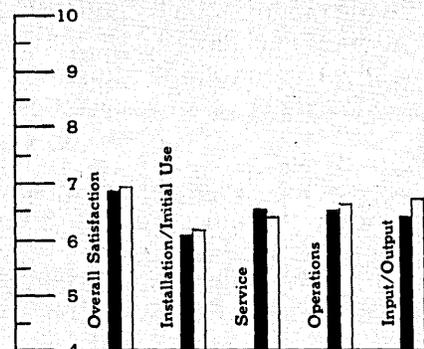
48 responses • 24 users judged features/capabilities outstanding • 3 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 421 ON READER CARD

**UCC Customer Information File** • University Computing Co., UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

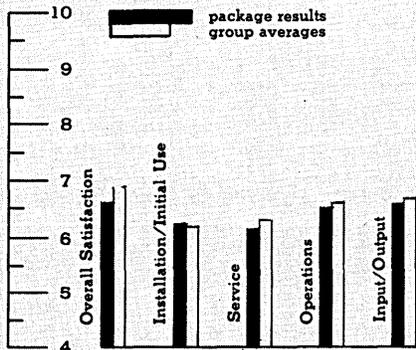
47 responses • 28 users judged features/capabilities outstanding • 9 users actively seeking to replace package, with 2 citing unsatisfactory performance as reason.



CIRCLE 422 ON READER CARD

**UCC Financial Control** • University Computing Co., UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

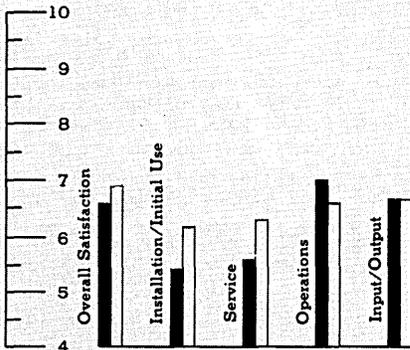
59 responses • 23 users judged features/capabilities outstanding • 8 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 423 ON READER CARD

**UCC MICR** • University Computing Co., UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

53 responses • 22 users judged features/capabilities outstanding • 5 users actively seeking to replace package, with 2 citing unsatisfactory performance as reason.

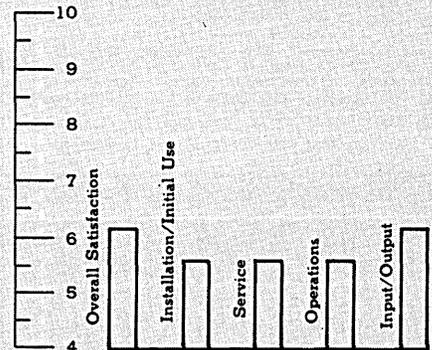


CIRCLE 424 ON READER CARD

**INSURANCE APPLICATIONS PACKAGES**

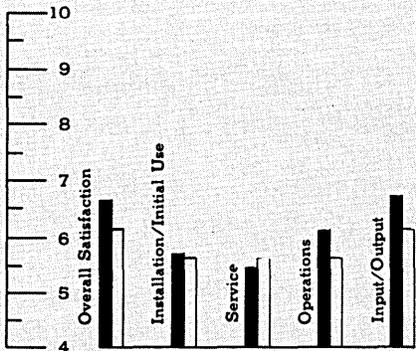
Group Average • 9 packages

192 responses • 81 users judged features/capabilities outstanding • 30 users actively seeking to replace package, with 8 citing unsatisfactory performance as reason.



**CYBERTEK Auto/Issue** • Cybertek Computer Products Inc., 6133 Bristol Parkway, Suite 300, Culver City, CA 90230 • 213-649-2450

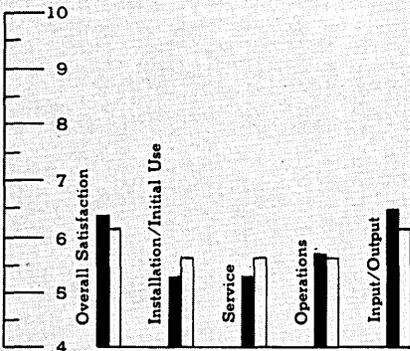
25 responses • 13 users judged features/capabilities outstanding • 10 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 426 ON READER CARD

**INFORMATICS Life-Comm** • Informatics Inc., 21031 Ventura Boulevard, Woodland Hills, CA 91364 • 213-887-9040

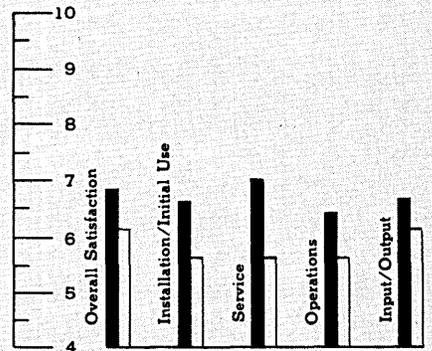
13 responses • 7 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 427 ON READER CARD

**INSURANCE SYSTEMS Accounting, Budget & Cost** • Insurance Systems of America, Inc., 6855 Jimmy Carter Boulevard, Norcross, GA 30071 • 404-441-8800

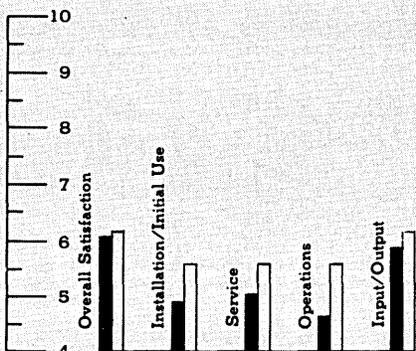
39 responses • 17 users judged features/capabilities outstanding • 1 user actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 428 ON READER CARD

**INSURANCE SYSTEMS Health Claim Management** • Insurance Systems of America, Inc., 6855 Jimmy Carter Boulevard, Norcross, GA 30071 • 404-441-8800

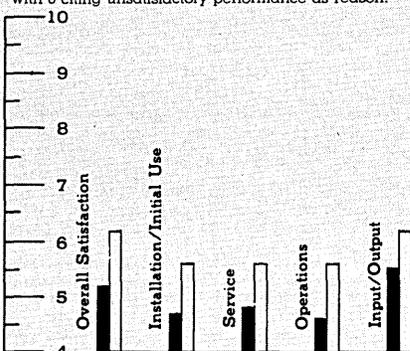
7 responses • 1 user judged features/capabilities outstanding • 0 users actively seeking to replace package.



CIRCLE 429 ON READER CARD

**INSURANCE SYSTEMS Casualty Information** • Insurance Systems of America, Inc., 6855 Jimmy Carter Boulevard, Norcross, GA 30071 • 404-441-8800

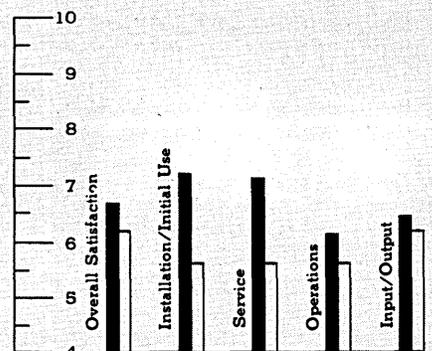
26 responses • 3 users judged features/capabilities outstanding • 6 users actively seeking to replace package, with 3 citing unsatisfactory performance as reason.



CIRCLE 430 ON READER CARD

**LOGIC Credit Life Administration System** • Logic Inc., 2720 Stemmons, Dallas, TX 75207 • 214-630-6131

11 responses • 5 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.

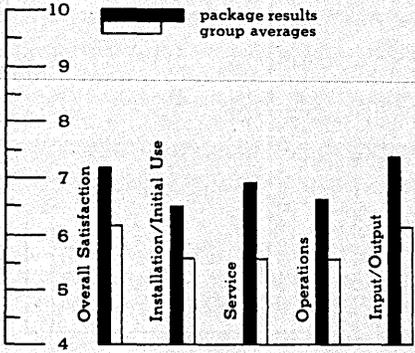


CIRCLE 431 ON READER CARD

# SOFTWARE SURVEY

**LYCOR PALM** • Lycor Inc., 2606 Fortune Circle East Drive, Indianapolis, IN 46241 • 317-243-7591

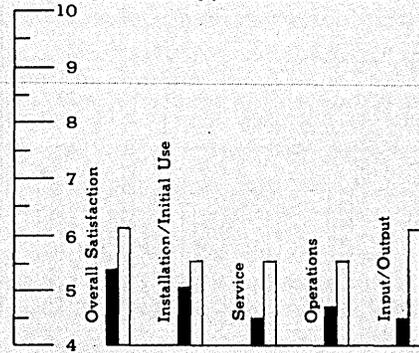
17 responses • 9 users judged features/capabilities outstanding • 2 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 432 ON READER CARD

**NETWORK DATA Insurance Logistics Automated System** • Network Data Processing Corp., 321 3rd Street, Cedar Rapids, IA 52407 • 319-365-8691

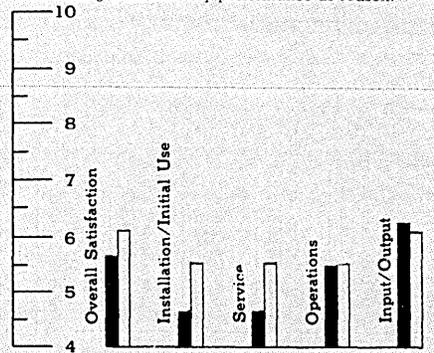
18 responses • 3 users judged features/capabilities outstanding • 5 users actively seeking to replace package, with 1 citing unsatisfactory performance as reason.



CIRCLE 433 ON READER CARD

**POLICY MANAGEMENT Policy Management System** • Policy Management Systems, Inc., P.O. Box 1, Columbia, SC 29202 • 803-748-2000

36 responses • 14 users judged features/capabilities outstanding • 3 users actively seeking to replace package, with 0 citing unsatisfactory performance as reason.



CIRCLE 434 ON READER CARD

## THE WORLD MEETS IN PARIS AT THE SICOB

SICOB:

EVERYTHING IN TELEMATICS

EVERYTHING IN OFFICE AUTOMATION

EVERYTHING IN DATA PROCESSING

EVERYTHING IN OFFICE ORGANIZATION

SICOB:

363,504 VISITORS FROM 117 COUNTRIES

780 EXHIBITORS FROM 29 COUNTRIES

SEPTEMBER 22nd TO OCTOBER 1st 1982  
**SICOB THE GREAT INTERNATIONAL TRADE SHOW**  
 AND CONVENTION INFORMATIQUE

THE INTERNATIONAL SOFTWARE CONGRESS  
 SEPTEMBER 20th TO 24th 1982

Further information from  
 INTERNATIONAL TRADE EXHIBITIONS IN FRANCE, INC.  
 8 West 40th Street, NEW YORK N.Y. 10018  
 Tel. 869.17.20  
 Telex 427 563 Frshws

PUBLICIS

1/7994

**NCR** *Paper\**

BRAND OF CARBONLESS PAPER

# LESS MEANS MORE

**100% LESS CARBON  
MEANS MORE CLARITY  
AND ACCURACY.**

**100% LESS CARBON  
TO HANDLE MEANS  
MORE CLEANLINESS.**

**100% LESS CARBON  
MEANS LESS CLEAN-UP  
DOWNTIME . . . MORE  
PRODUCTIVITY.**

Look at the minuses of carbon paper. Then, consider the plusses that you get when you use carbonless paper.

It all adds up to the over-riding reason why you should be using NCR Paper brand of carbonless paper — more profit.

**100% LESS CARBON  
WITH NO SPINDLE  
SET-UPS MEANS  
MORE EFFICIENCY.**

**100% LESS CARBON  
MEANS MORE  
RUNNABLE FORMS.**



**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 96 ON READER CARD**

The Editors and Publishers of

**DATAMATION®**

request the pleasure of your participation

in

# An Intensive One-Day Executive Briefing

on

## Strategic Planning for Information Systems: Integrating Corporate and Systems Planning

---

---

May 13, 1982  
Hyatt Regency  
Chicago

May 25, 1982  
Grand Hyatt  
New York City

June 25, 1982  
Hilton Hotel & Tower  
San Francisco

Please send me more information

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Return to:  
Ms. Karen Caruthers, Datamation Institute,  
Conference Coordination Office, Suite 415,  
850 Boylston Street, Chestnut Hill, MA 02167,  
or call (617) 738-5020.

SP382

CIRCLE 97 ON READER CARD

Today's dp executives must keep up with technological advances but must also sharpen their management skills.

# I'M LEARNING AS FAST AS I CAN

A Raleigh, N.C., dp executive threw up his hands in dismay. "It's harder and harder to stay on top on things today," he lamented. "I'm supposed to be the resident technical guru. That means keeping up with state-of-the-art technology. At the same time I've been told if I want to advance in this company, I must broaden my management skills. Meanwhile, I've been busier than hell just keeping the dp department running effectively."

The Raleigh manager's complaint is one that's being echoed by many information processing professionals today. With new technologies emerging almost daily and the needs and demands of a more knowledgeable corporate environment growing, computer people are finding themselves in what often seems like the impossible profession. Not only are they expected to keep on top of the latest technologies and the options that go along with them, but they are increasingly joining the ranks and sharing the concerns of corporate management—a job that requires a different set of skills. These skills often have less to do with technology per se and a lot more to do with integrating their expertise into the business as a whole.

Keeping up in these areas is a formidable task for the dp executive dealing with issues as disparate as office automation and personnel. "There's an explosion of knowledge and a menu of alternatives we never had before," says Don Peoples, president of GTE Data Services in Tampa, Fla.

That menu has seemingly endless choices in the area of technology alone, and the MIS manager could easily spend most of his or her time tracking alternatives. Technologies that were virtually nonexistent less than 10 years ago—micros, teleconferencing, networking, CAD/CAM—are now becoming the status quo in many major, and not so major organizations. Says Carl Reynolds, staff vice president, communications and data processing at Hughes Aircraft Co., Culver City, Calif.: "Five years ago MIS executives knew they'd implement an IBM system. Today that's an alternative. There are minis that outstrip an IBM solution and micros with their own distinct advantages. There's unbelievable diversity."



ILLUSTRATION BY DAVID FEBLAND

## There's a feeling in the industry that dp execs themselves are still resistant to sharpening their managerial skills.

And increasingly, because of distributed data processing, lower computer costs, and more knowledgeable end users, computer power is very often no longer dispersed organizationally under the watchful eyes of MIS executives. This situation makes it even more difficult for dp managers to keep track of the technology and the responsibilities that go along with it.

What happens to the dp manager who can't or won't keep peace? "There are fast obsolescence rates," says Reynolds. Adds Peoples: "MIS executives have to maintain a technical awareness if they themselves don't want to be obsolete in four years."

More options, however, also mean new solutions. "As the new technology emerges, the MIS manager wants to be able to use it as soon as it is proven," says John Riggs, senior vp and assistant director of the dp group at First Interstate Services Co. in Torrance, Calif.

But the MIS manager can't expect to survive on technical skills alone. Today, MIS managers are increasingly a part of executive committees and corporate boardrooms. With that new status has come new responsibilities. Senior management expects the dp executive to view his or her department with an eye to corporate goals and to manage both the information and people resources with the skill of a businessperson.

"The dp manager has to build a broad understanding of how the technology can be used in the organization not only to support the administrative processes, but to improve productivity and create a competitive edge," says Dr. Richard Nolan of Nolan, Norton, Inc. in Lexington, Mass.

Indeed, business issues such as budgeting have taken on a new significance in today's recession. And business acumen is important, for example, to determine the best way to finance equipment—should the department rent, lease, or purchase? Moreover, a knowledge of tax laws is useful in making that decision. "The economics of computing are much different now," says Reynolds.

The personnel situation is also different, according to Reynolds. The much-talked-about scarcity of dp professionals requires the skills of an experienced manager to deal with issues of recruitment and retention—no easy task these days when job hopping is a popular pastime. "You have to spend time planning for your manpower needs, recruiting good people, and then training those people," says Charles Oldenburg, general manager of computer services at Standard Oil, California.

"The problem is sorting out what's important," says Reynolds about the situation that now confronts the MIS manager. With positions that demand both technological and managerial expertise, dp executives

have to establish a focus.

### CONCERNS OF THE MIS EXEC

What concerns the MIS executive chooses to focus on may depend on several factors. "In an organization that's concerned with staying close to state-of-the-art technology, the MIS executive is going to have to focus more on the technology aspects of his or her job," according to Thomas Beddow, vp of data management services at Farm Credits Banks of Springfield in Massachusetts. "But if there are no massive expenditures on new equipment because of budget constraints, technical knowledge is less critical."

Then, too, the function of MIS within the organization comes into play. Says Dick Nolan: "In many organizations, senior management still expects the MIS executive to be a technical expert and that's unfortunate." Herb Halbrecht of Halbrecht associates, Inc. in Stamford, Conn., agrees. "It's a self-fulfilling problem. Viewed as a technocrat, the MIS manager is preoccupied with keeping abreast of technology when in fact management skills will have more to do with his or her survival."

There's a feeling in the industry, too, that dp executives themselves are still resistant to sharpening their managerial skills and place too much importance on technical expertise. "The technical side is still so dynamic that there's a fear of becoming obsolete," says Daniel Cougar, coauthor of the book *Motivating and Managing Computer Personnel*, "so most of what the manager reads is on the technical side. And management skills are neglected."

"It's easy to focus on the technical aspects of your job," says Dennis Thurman, department manager of edp systems at Seattle First Bank in Washington. "But our roles are more policy oriented now." Charles Couchman, manager of computer and information systems at ESL, Inc. in Sunnyvale, Calif., also feels that "there's a tendency to focus too much on the technical at a time when MIS managers have to move into the political and organizational world."

But Thomas Cimino, vp of systems and dp at Blue Cross of California in San Francisco, maintains that MIS executives are very much concerned with management issues indeed. "They're placing more importance on the management end today than they ever did before. The key," he says, "is to be aware of technology and how it's evolving and to be able to see its utility in your particular business."

In short, Cimino and many of his colleagues believe that there has to be a balance between management and technology issues. One area does not necessarily deserve more attention than the other. "What good is the

technology if the business has problems that the technology can't solve?" asks Dr. Ernest Foernzler, group manager of divisional computer services at Hoffman-LaRoche in Nutley, N.J. "There has to be a focus on both the corporate business problems and on the technology."

One of the best ways to keep on the technical track is to tap the vendor as a source of information. "I rely most heavily on the manufacturers to stay current on the technology, rather than outside associations," says Joel Dietrich, vp of MIS of GTE Telenet, Inc. in Vienna, Va. Many executives, for example, attend vendor-sponsored presentations and seminars. "It's good to have an idea of the direction the vendor is taking," says Oldenburg, who visits the research labs and attends presentations of various hardware and software vendors. In addition, Oldenburg likes the opportunity these meetings present to talk to colleagues and "evaluate technology changes." "I have agreements with several vendors," adds Thomas Beddow, "to visit their corporate headquarters and learn what they're putting their money into for the future. It helps in the planning process."

Trade journals and vendor literature may also provide the technical slant the MIS executive is looking for. "Reading a few of the specialty magazines every month is important," says Carl Reynolds of Hughes. Moreover, he adds, "there are a host of technology watchers—the Yankee Group, for example—to tell you what's going on."

Then, of course, there are the technical seminars and courses such as those offered by Advanced Systems Inc. and Deltak, local universities, and technical institutes and associations. "I set aside about 10 days a year to get away and attend some technology seminar," says Don Peoples of GTE, who supplements the information from those courses with extensive reading.

For Dennis Thurman of Seattle First, a good way to keep pace is to "make myself available to conduct some of these seminars myself. It helps at a time when budget restrictions on travel make it difficult to attend as many seminars as I might like."

In addition to being chairman of the COBOL committee at Southern Railway, Jack Jones, the railway's vp of MIS, also participates in several professional groups and societies. One group, for example, sponsors research meetings to discuss issues such as networking, personal computers, and technological trends, and is attended by the chief computer executives of some of the major corporations. Jones is also part of a trade organization committee of top computer executives in the railroad business.

Similarly, dp executives are finding ways to keep up with the business and management demands of their jobs. Says Jones:

# Almost too beautiful for words.



With most workstations, the less you see the better. But the new Media-Flex™ workstations from Acme Visible are as beautiful as they are flexible.

And are they ever flexible! Media-Flex workstations fit as beautifully into tight places as they do in open spaces. They accommodate large word processors or small terminals. And you can choose from a number of units or combine several to create the ideal system for your own office needs. All this in workstations so good-looking, so well designed, if they didn't already go with your decor, you'd probably design your office around them.

**Media-Flex Workstations by**

**AEME VISIBLE**

First in putting information in its place.



- Have your filing systems specialist contact me.
- Please send information on your workstations and entire Media-Flex line.

Call toll free (800) 368-2077 or send coupon to:  
 Acme Visible Records, Inc.  
 1000 Allview Drive / Crozet, Virginia 22932 DA52CT1

Name \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_ Phone \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**CIRCLE 98 ON READER CARD**

Canadian Sales: Acme Seely Limited, Hwy. 17, Renfrew, Ontario. Offices in principal cities.

## Technologies that were virtually nonexistent less than 10 years ago are now becoming the status quo in many organizations.

"I consider myself part of the management team and I never forget that my company is in the railroad business, not in the business of computers." Jones prefers a "hands on" open teamwork management style. He attended an advanced management program at the Harvard Business School for three months and is currently participating in another series aimed at innovation in problem solving for ceos and vice presidents.

In an attempt to meet the challenges of cost control, project control and recruitment—"a job in itself"—Thomas Beddow attended a two-week executive education seminar at Harvard to help in the development of a five-year plan. Beddow plans to register every three years for the seminar in addition to attending others—one offered by the Wharton School, for example, on "what the edp executive should know in the financial arena." Thomas Cimino enrolled at the University of Southern California in a six-month general management program; he also does "a lot of reading in the behavioral and soft sciences," and just completed *The Art of Japanese Management*.

Generally, "there seems to be more offered technically," claims Beddows, echoing a sentiment shared by many of his colleagues. But according to Dick Nolan, whose consulting firm offers clients a management seminar through ASI for the MIS executive, although there's been a "paucity" of courses with an MIS management perspective, "there's a trend to resolve that discrepancy."

Increasingly, companies such as ASI and Deltak, leaders in the dp education area, business schools and universities, outside consultants, and management associations are offering courses and seminars that appeal directly to the many information needs of the typical dp executive. Here are some of the available sessions.

### In-house video seminars

*Advanced Systems, Inc.:* ASI, of Elk Grove Village, Ill., is one of the leading publishers of multimedia video training courses that the customer rents on a monthly basis (ranging in cost from \$60 to \$120 a month depending on usage). Each course—ASI has a library of over 2,000 tapes on a range of dp topics—includes a videotape on a given topic, an audiotape, text (student workbooks and guides), and optional CAI (computer assisted instruction) for self-paced, interactive instruction.

ASI takes a "three-pronged approach to helping the dp executive keep up to snuff," says Rohit Patel, vp of business planning and acquisitions. That approach covers technology strategies, implementation strategies, and general management philosophies and falls under the general heading of "The Management Perspective Series." Heading

the series is "Dp Management—The Emerging Profession"—a three-tape perspective developed by the consulting firm of Nolan, Norton, Inc. and presented by Dr. Richard Nolan—which focuses on computer technology as a tool in productivity. The next tape in the series, presented by David Norton is "Dp: A Business in a Business," which deals with the transition from "the computer room to the board-room." And finally, in "Corporate Strategies for Information Systems of the '80s," Ted Withington, vp at Arthur D. Little in Cambridge, Mass., discusses the impact of technology on the corporate structure.

In addition, the series branches off into topical areas—controlling information; hardware/software impact; security, controls, and auditing; and motivation and training—with video courses presented by industry experts. (Donn Parker on computer crime, for instance.)

ASI also sponsors the annual two-day Drucker/Nolan Seminar in Palm Springs at which Peter Drucker and Dick Nolan conduct seminars and workshops on topics such as "Increasing the Productivity of Your Knowledge Workers" and "Applying the 'Stages of EDP Growth' Model to Office Automation," CAD/CAM, networks, and other emerging technologies.

Says ASI customer Dennis Thurman of the advantages of ASI's video presentations: "In a short period of time I can get a management briefing, and it's easier and less expensive to go up to the training center than it is to go out of town to attend a seminar."

*Deltak, Inc.:* Deltak, located in Oak Brook, Ill., also takes the multimedia approach to training with its in-house video courses offered on a rental basis. Like ASI, Deltak's videotape library covers a range of dp-related topics. Many of those—specifically, three management briefing libraries—are oriented to the MIS executive, and presented in a ½-hour "videojournal" format (rather than the more lengthy multimedia training approach). "Deltak is good for periodic shots of information at my own time," says customer Don Peoples, who has used the company's advanced Technology Library Series.

The series, developed in conjunction with industry guru James Martin, follows a three-tier structure, according to Serge Beauregard, group vp of development and operations for Deltak. For each topic, such as "Office Automation and Office of the Future," "Telecommunications and Data Transmission" and "Database and Database Management," there are two videojournals and a standard skills training presentation. The videojournals are geared to senior management and MIS executives: one is a short, nontechnical presentation focusing on planning and strategies; the other gives a more

technical treatment of the subject and covers the technologies involved, implementation alternatives, and project management. The skills training presentation is geared to dp staff.

Of the executive videojournals, John Riggs, senior vp at First Interstate Services Co. in Torrance, Calif. says: "They keep me up to date on concepts and it's cheaper than flying to New York."

Deltak also offers an information Resource Management Library, developed with The Diebold Group, Inc. in New York, which presents more of a management perspective and features John Diebold discussing concepts in information management, planning, organization and policy issues, the implications of technology, and human resource issues. Booz, Allen, Hamilton, Inc. in New York worked with Deltak on its third management briefing library, called Global Technology, which, Beauregard says, "brings home the potential of technology."

*Edutronics:* Edutronics (a division of McGraw-Hill International Training Systems, Inc. in New York) is another leading videotape publisher in the dp field. The company's audiovisual materials are packaged as "modules" and include a number of general management development courses. According to representative Lynne Mills, Edutronics is currently working on a curriculum specifically designed for the MIS manager, to supplement a limited number currently available. The company now offers an eight-lesson course called "Management Information Systems," which is produced by the UCLA School of Management and covers management systems goals, organization theories, and human factors in motivation. Another course directed at the MIS exec, developed with Donn Parker, is "Computer Security and Auditing."

### Outside Seminars

*AMA:* The American Management Assn. offers two programs geared to the dp executive. "Managing the Corporate Function" is a three-day seminar that covers such topics as "The Effective Manager," time management, analysis of management style, user/customer satisfaction, and employee and management development. It will be offered five times this year in major cities throughout the country. The other seminar—"Long Range Information Systems Planning"—is a recent addition to the dp curriculum. A three-day planning workshop, this course ran once last year and will be offered eight times in 1982 "because of tremendous response to it," says Holly DeVan, program director. According to DeVan, "It has really started to take off because dp executives are now part of corporate management and the dp manager has to do planning in the use of dp

# The Nashua difference?

## Absolute statistical control of quality.

Are you getting sick of hearing how manufacturers inspect and inspect their products and then inspect them again until they're perfect?

So are we.

Do you get the feeling that some inspector was yawning at the exact instant the product you're about to buy went through the final inspection?

So do we.

There is another way to do it, and we at Nashua are doing it the better

way just by following this one simple idea: "make it right in the first place, then inspection, no matter how rigorous, will be just a formality."

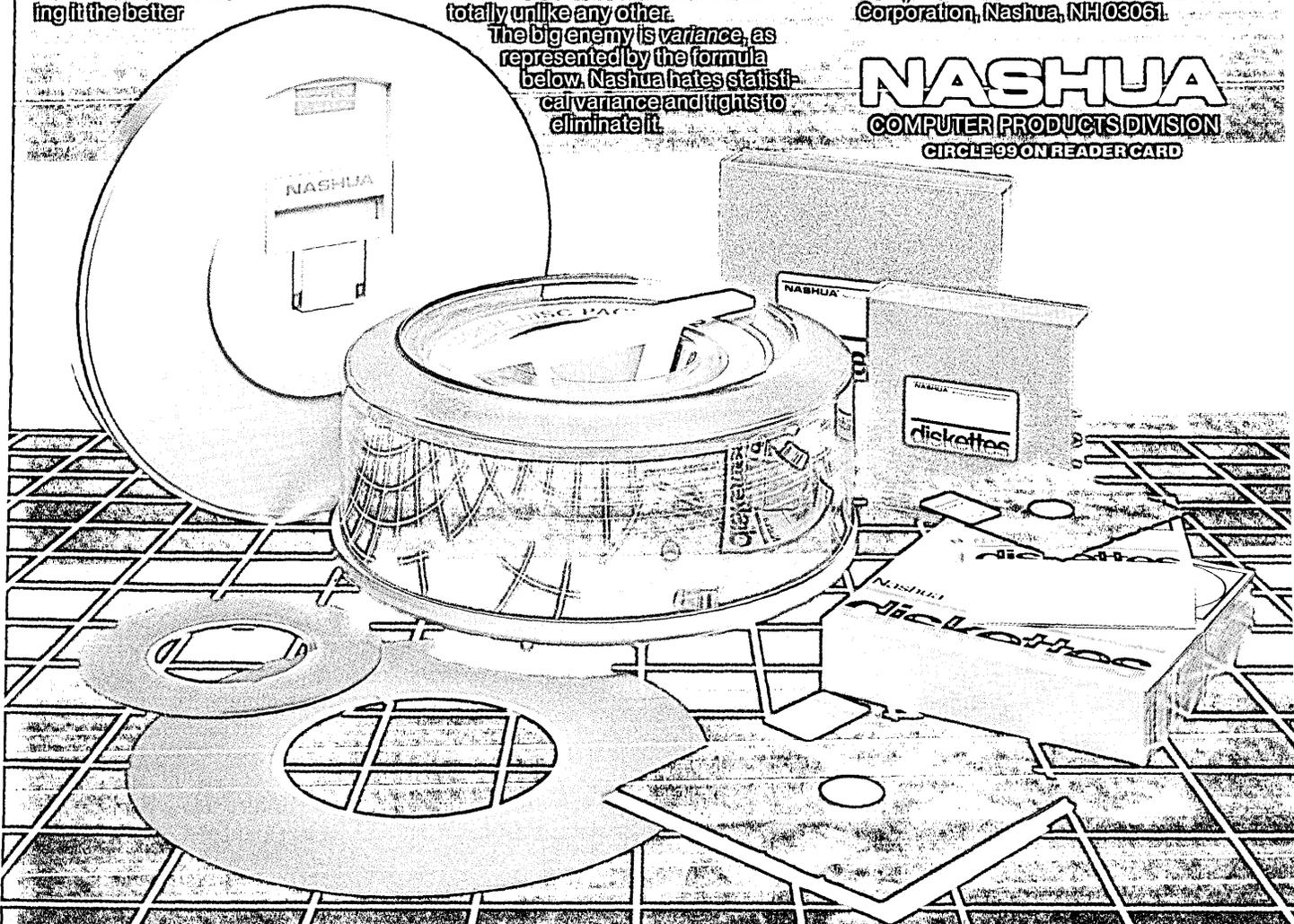
This means a fanatic devotion to statistical control as an integral part of the manufacturing process. We use literally hundreds of charts and records, constantly updating them as part of each step of the manufacturing process. Our people are trained to work in a statistical environment totally unlike any other.

The big enemy is variance, as represented by the formula below. Nashua hates statistical variance and fights to eliminate it.

One disk or diskette looks very much like another. But there is one big difference: with Nashua, your data is safe and secure. With other makers, it may be.

We make the world's most complete range of magnetic media and have published a handy little book to tell you how to select it. For your free copy of our "What Fits What" book, see your Nashua dealer or write to the Computer Products Division, Nashua Corporation, Nashua, NH 03061.

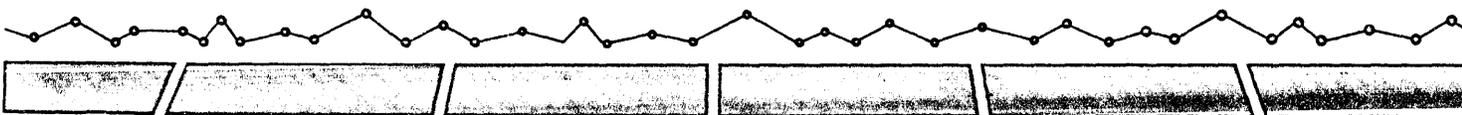
**NASHUA**  
COMPUTER PRODUCTS DIVISION  
CIRCLE 99 ON READER CARD



Variance:

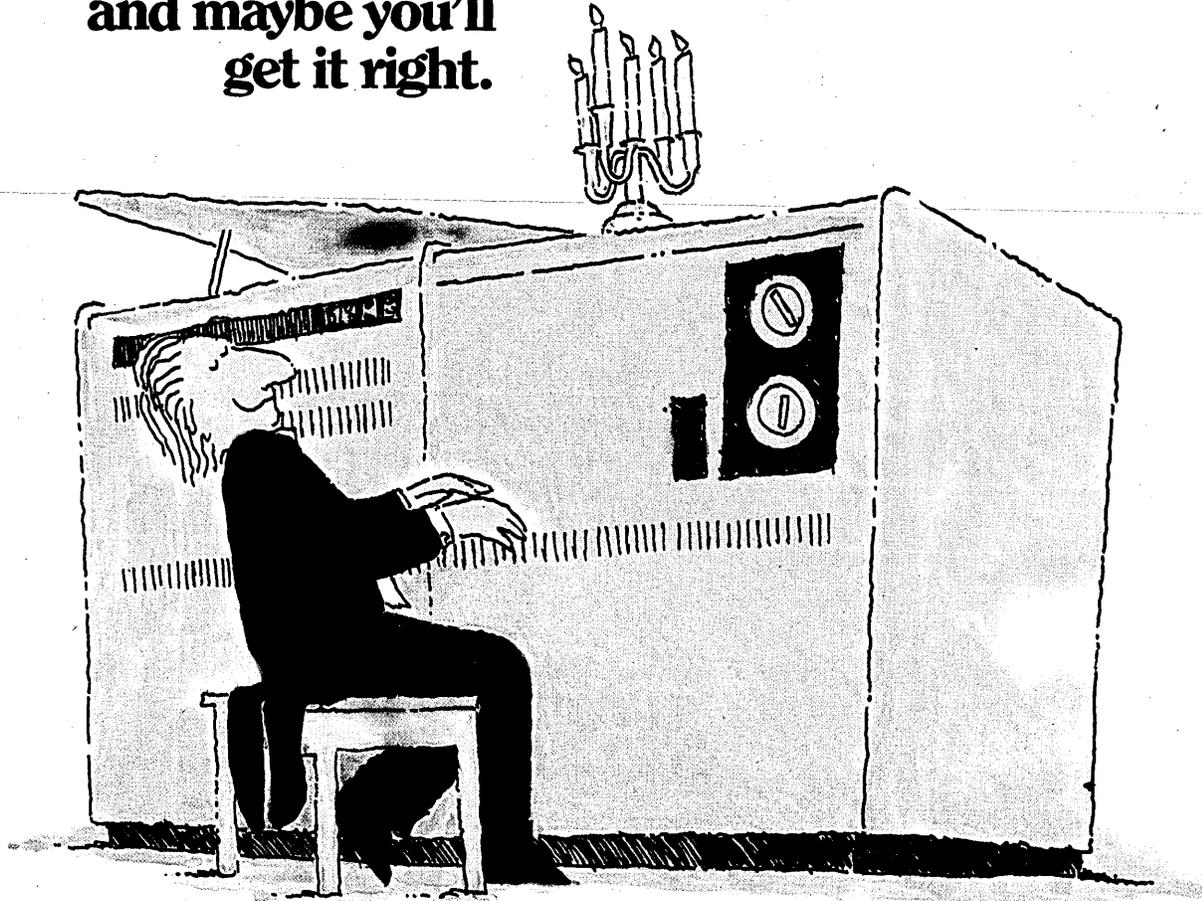
$$V(\hat{\beta}) = V\left(\sum_{j=1}^k \beta_j X_j + e\right) = V\left(\sum_{j=1}^k \beta_j X_j\right) + \sigma^2$$

$$= \sum_{j=1}^k X_j^2 V''(\beta_j) + \sum_{j=1}^k \sum_{l=1}^k X_j X_l \text{cov}''(\beta_j, \beta_l) + \sigma^2$$



# Using most teleprocessing monitors is like playing the piano.

Years of practice, continuous tuning  
and maybe you'll  
get it right.



Before ordering just any teleprocessing monitor for your 4300, make sure you understand the score. Getting most teleprocessing monitors to play will take weeks of installation effort. Composing a fully orchestrated application can easily stretch over a year. Keeping most teleprocessing monitors in tune with your changing requirements will demand the full-time support of an experienced systems programmer. And to prevent the wrong notes in untested programs from ruining your performance, you'll need separate test and production systems.

If this isn't music to your ears, consider a COM-LETE alternative. COM-LETE from Software AG integrates all teleprocessing functions into one incredibly easy to use package. Installation takes no more than a day. Applications that would take 1-2 years to develop with most teleprocessing monitors can be completed in 1-2 months with COM-LETE.

All COM-LETE facilities are independent of your operating system and terminal devices so they adapt automatically to changes in system hardware and software. A built-in storage protection feature eliminates the need for separate test and production systems. And COM-LETE can be combined with our ADABAS data base management system to give you a completely integrated data base/data communications system.

COM-LETE has everything you need to assure virtuoso teleprocessing performance from your 4300 running under OS or DOS/VSE.

Use this coupon to arrange for a free lesson.

-----  
Software AG of North America, Inc.  
11800 Sunrise Valley Drive, Reston, Virginia 22091  
(703) 860-5050

- I would like a free COM-LETE lesson.  
 Please send me information on your free seminars.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Zip Code \_\_\_\_\_ Telephone (\_\_\_\_) \_\_\_\_\_

CPU \_\_\_\_\_ Operating System \_\_\_\_\_ Release \_\_\_\_\_

**SOFTWARE AG**  
OF NORTH AMERICA, INC.

CIRCLE 100 ON READER CARD

DM 0582

# One company takes a multimedia approach to training with its in-house video courses offered on a rental basis.

resources; that planning must be coordinated within the corporate structure.”

## TOTAL SYSTEMS TRAINING

The AMA's Information Systems and Technology division also offers a number of other dp seminars in the areas of Office Systems and Administrative Support, Business Applications, Technical Skills, and Management Skills.

*BSI:* BSI (Brandon Systems Inc.) specializes in dp training and offers a series of courses and workshops that vary in length from two to five days. The company also issues an annual dp training survey. In addition to a total systems training (TST) curriculum (this includes workshops in systems analysis, design techniques, structured design, and project leadership) directed at different levels of the dp staff, BSI offers two courses specifically geared to the MIS manager. “How to Develop a Long Range Dp Plan” is a three-day course that focuses on long-term commitments and strategic goals as “the secret to improved dp resource utilization” and includes lecture, discussion, and class exercises, as well as a review of the results of the planning efforts of several public and private organizations.

Dr. Ernest Foernzler participated in “Long Range Planning” a few years ago along with the top management of the MIS staff at Hoffman-LaRoche. “We learned a formalized approach to MIS planning,” says Foernzler, who liked the participative orientation, and as a result established a three-year, long-range business plan.

“Project Management” is a four-day course that covers project planning, project control, people management, and personal work management. Topics include estimating and scheduling, leadership styles, supervisory techniques, and group dynamics.

*DATAMATION:* DATAMATION offers a number of seminars through its seminar center in Cambridge, Mass. Typically, these one- and two-day seminars are held once a month in all major cities and include: “Strategic Planning for Information Systems,” “Data Communications Concepts: A Management Overview,” “Distributed Systems: A Management Overview,” “Administration and Control in DBMS Management,” “Dp Center Operations: Lowering Costs Through Improved Productivity,” “Strategic Planning for Office Automation,” and “Computer Graphics.” In addition, for the first time this August DATAMATION will offer a five-day seminar in Connecticut on “Strategic Management of Information Systems Technologies.”

*DataPro Research Corp.:* A division of McGraw-Hill, Datapro is best known for the publications of monthly technical reports and updates, product evaluations, directories,

and teaching materials for virtually every area of data processing and office automation.

DataPro has five seminar seasons, held in most major cities throughout the year. Of the 500 offered each season, there are four three-day seminars geared specifically to the dp executive: “EDP Operations Today: Effective Computer Techniques,” “Computer Operations Management: Effective Scheduling and Console Operation,” “Computer Performance Measurement and Capacity Planning,” “EDP Project Management: A Practical Approach,” and “Advanced EDP Management: Methods and Techniques in the '80s.” DataPro also offers a wp/office automation series that includes a seminar on the integration of wp and edp systems; two series sponsored by *Data Communications* magazine, one of which includes the seminar “Ddp: A Management Update”; a systems and software series; and general seminars on computer graphics, and the selection and implementation of minicomputer systems.

*Harvard Business School:* Harvard offers a two-week dp executive seminar every August called “Managing Information Services Resources.” This seminar was developed in 1971 by F. Warren McFarlan, professor of business administration, and Dick Nolan, then a member of the faculty. According to McFarlan, participants use case studies to cover management issues (organizing and structuring information systems, rethinking new technology, addressing leadership problems, and policy assimilation, etc.); is planning (how to link information systems to the corporate strategy); management control (budgeting and accounting, for example); problems of product management; and is operations management. Each 14-hour session consists of individual assignment preparation, formal classroom participation, and group meetings.

“The discussion groups help participants gain the perspective of other individuals in similar situations,” says Thomas Beddow. “And the case-study approach puts you in a position in which you have to make decisions. It's very beneficial.”

*IBM:* IBM's Advanced Business Institute, in White Plains, N.Y., also uses the case-study method in its one-week “President's Seminar” for the dp executive, offered 12 to 14 times a year. Designed to “give the dp director a better understanding of how the corporation operates,” says instructor Leland Ferguson, the course is offered both in White Plains and at regional IBM locations throughout the country. ABI's staff includes professors from some of the leading business schools such as Colgate, Harvard, and MIT, according to Ferguson.

For a more technical education, IBM's Systems Science Institute in Dallas, Texas, has four centers, each with a different focus

and specialty: planning, management control of dp and assets, managing data communications systems, and application development. The staff at SSI is made up of IBM employees who have a particular expertise in a given topic area. According to Frank Parson, director of the institute, each course offered—disaster recovery, data security, auditing, for instance—is three and a half to four days in duration. Both Ferguson and Parson stress that you do not have to be an IBM user to attend either institute.

*Integrated Computer Systems, Inc.:* ICS, in Santa Monica, Calif., typically offers four-day courses and workshops in state-of-the-art technology through on-site presentations, video and self-study courses, and seminars conducted in major cities. For the first time this spring, however, ICS is offering seven two-day seminars—six of which are aimed at an MIS management audience. According to Ruth Dordick, supervisor of educational services, from May through July, dp executives can choose from the following seminars: “Ada—Resolving the Software Crisis,” “Managing the Software Development Function,” “Computers, Communications, and Ddp,” “A Management Overview of Networks,” “Computer Graphics in Business and Industry Today,” “Practical Management Skills for the Technical Manager,” and “Personal Computers for Managers: A Hands-On Workshop.”

## Consultants

*J. Daniel Cougar:* Professor of computer and management science at the University of Colorado, Cougar has done extensive research on the topic of motivation of dp professionals. He offers a two-day seminar called “Motivating and Managing Computer Personnel” in conjunction with Frost and Sullivan, Ltd. (a firm that specializes in executive education) every March. Says Cougar: “As you go up the ladder, behavioral and management skills are important. Technical skills are secondary.” The seminar, offered in London, covers theories and techniques for enhancing dp motivation and productivity with topics such as “Concepts of Motivation and Productivity: Relationship to Dp Activities,” and “Selecting a Management Style to Fit Needs of Dp Employees.”

*The Diebold Group, Inc.:* This New York-based consulting firm—well known in the management arena—offers various services (conferences, projects, research, etc.) that are oriented to the management of information systems and office automation. The Diebold Research Program, for example, is a “research and support program”—sponsored by over 200 major computer users worldwide—that focuses on “Managing the Information Resource.” As part of Diebold's total consulting effort in this area, for exam-

# A 212A-COMPATIBLE ACOUSTIC-COUPLER? THAT'S IMPOSSIBLE!

Introducing the AJ 1233.  
The "impossible" communications machine.

For the first time in history you can have the portability of acoustic coupling for Bell 212A applications. And—with the flick of a switch—for VA 3400 and Bell 103 as well.

Flick another switch, plug in a simple RJ-11C jack, and you can use the AJ 1233 as an FCC-approved direct-connect modem.

It's the world's first "triple" acoustic coupler/modem.

They said it couldn't be done. Acoustic coupling and Bell's 212A mode were clearly incompatible because of data errors caused by harmonic distortion.

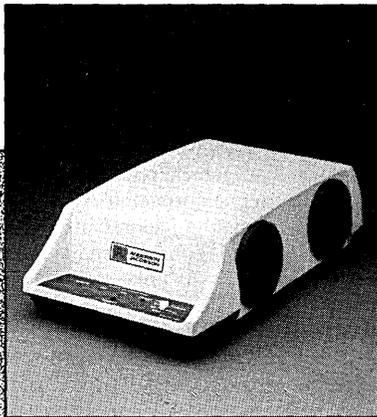
But Anderson Jacobson, the company that pioneered acoustic data coupling, has done it. And in the process we've achieved unprecedented reliability and accuracy.

Get all the details on the "impossible" AJ 1233 from your nearest AJ regional office: 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.

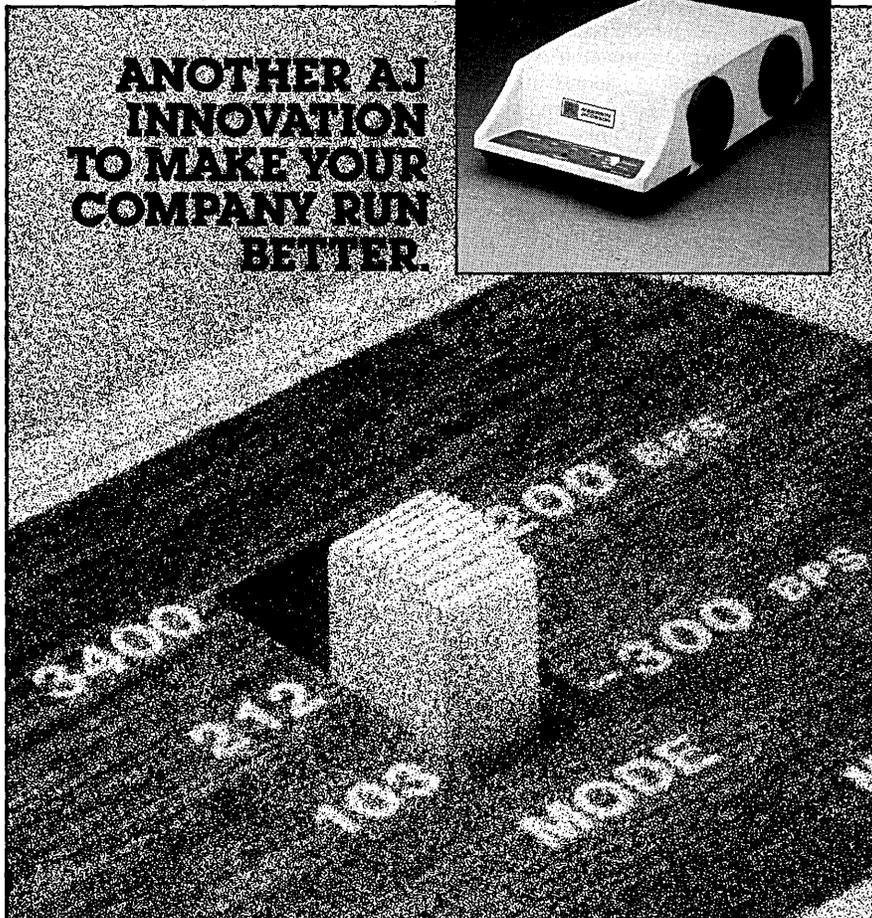
Also available through AJ subsidiaries in Markham, Ontario, Canada.

**See us at NCC,  
Booth No. 4322.**

**ANDERSON  
JACOBSON**



**ANOTHER AJ  
INNOVATION  
TO MAKE YOUR  
COMPANY RUN  
BETTER.**



**CIRCLE 101 ON READER CARD**

ple, the firm would work closely with both corporate and MIS management to develop information standards and policies. "The Diebold Automated Office Program" provides guidelines for the planning, acquisition and implementation of equipment and tools for cost control and effectiveness. The firm might work with the client, for instance, to develop an electronic mail system.

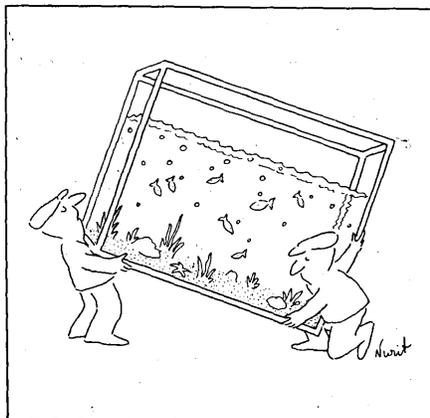
Jacob Waller, vp of management services at Coca-Cola USA in Atlanta (the domestic soft drink division of The Coca-Cola Co.) and formerly the corporate director for information services, was an "active" member of The Diebold Group for 12 years. "It's a good source for staying current," says Waller, "as well as for contacts and sharing information. You have the chance to see the situations of other managers in your field."

*Halbrecht Associates, Inc.:* Says Herb Halbrecht: "MIS managers have to manage people, not technology. They have to be able to assess the skills of those beneath them." This philosophy is the basis for Halbrecht's first two-day seminar that will be held in New York this April entitled "People: The Information Resource Crisis." The seminar addresses topics such as "The Ideal Work Environment," "Finding the Right People for the Right Job at the Right Price," and "Tools, Techniques, and Methodologies for Improvement."

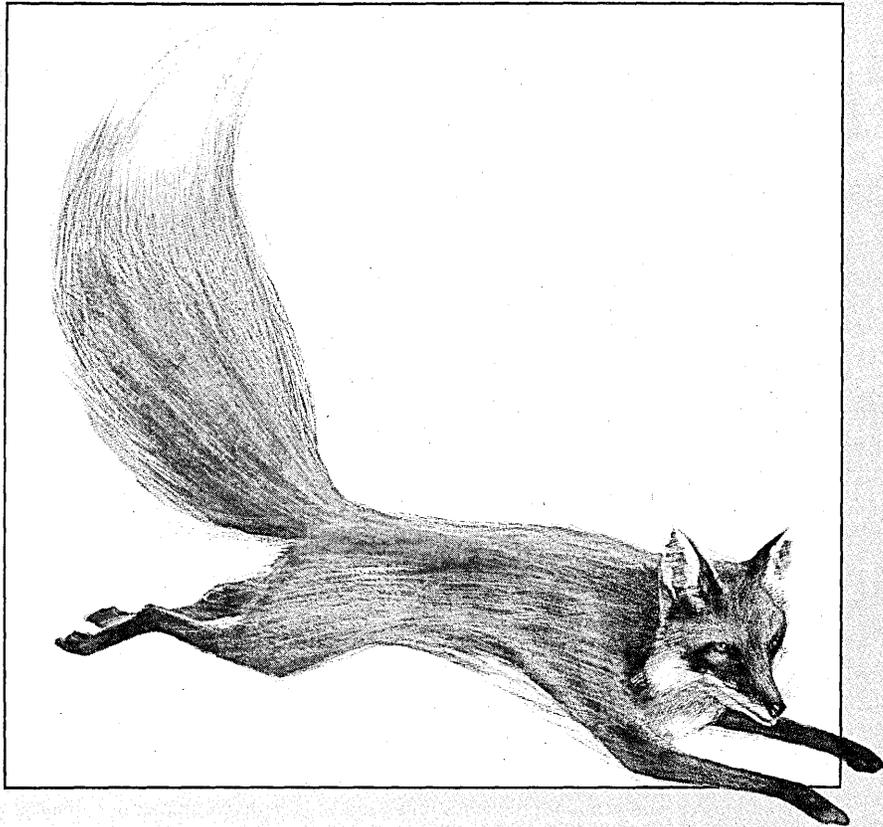
*Nolan, Norton, Inc.:* This consulting firm offers a two-day "Executive Seminar" at the Harvard Club in which members of an executive committee (president, vp, and dp manager, for example) of the client company each write a case on the top five issues they are confronted with as well as those issues that they think concern their colleagues, says Dick Nolan. Each participant has the opportunity to discuss his or her concerns with the other members of the committee. "We try to deal with the discrepancies," says Nolan.

With continued change and new developments on the dp horizon, chances are there will be more and more seminars, courses, and channels of information to help MIS managers keep up. Daniel Cougar thinks it's a trend. "There will be more courses tailored specifically to the needs of the top level MIS manager," he predicts.

Adds Don Peoples of GTE: "Change is the nature of this business. You can't afford to rest on your laurels—you have to try to keep up." \*



# The cunning new computer from Digital Microsystems.



**Catch one now or  
see it at NCC/COMDEX.**

See us at NCC Booth #A 749

**Digital Microsystems**

*Because man was not meant to work alone.*



1840 Embarcadero, Oakland, CA 94606 (415) 532-3686 TWX 910-366-7310/Extel House, East Harding St., London EC4P-4HB 01-353-1080 Telex 23721

**CIRCLE 102 ON READER CARD**

**What you see on your terminal screen is an imperfect reflection of human intelligence. As we move computers from a linear, left brain orientation into the right brain realm of inference and intuition, the missing parts of the image will appear.**

# CONVERSATIONS WITH AN INTELLIGENT CHAOS

by Vincent Rauzino

Surface dealings are all sweetness and light. In a typical modern human-machine scenario, you sit down in front of a chic office desk in a comfortable but no-nonsense chair and face a reassuringly familiar typewriter-style keyboard with a tv screen. You tentatively type in something innocuous like, HELLO. MY NAME IS CARLOS. The computer responds, HELLO YOURSELF. MY NAME IS JUAN. HOW MAY I HELP YOU?

Reassured by the computer's slightly slangy illusion of personality, you continue: SHOW ME THE SALARIES AND PERKS OF THE TOP FIVE EXECUTIVES IN THIS COMPANY. Slight pause. The computer answers, SORRY, CARLOS. YOU ARE NOT AUTHORIZED TO SEE THAT INFORMATION. HOW ABOUT THE LATEST FUND ACCOUNTING FOR THE SUNSHINE CLUB? Oh well. NO THANKS (sigh). LIST THE AVAILABLE SALES REPORTS FOR MARCH. . . .

The dialog settles into a routine of menu selections, prompting, selected-data extractions, cross-footing, subtotalling, etc., in what is rapidly becoming a very productive interplay between man and machine.

The intellectual complexity of the interaction can go in two directions from this simple confrontation, depending on your personal inclinations. One direction is more of the same: you learn how to exploit the computer more skillfully until you encounter its limits, and then you start dropping memos to your boss asking for a larger system, more computer time, etc. A clinical analysis uncovers the first signs of insatiable computer lust. The other direction is far more dangerous. Recognizing that an English language human-machine dialog is roughly equivalent to a conversation between an idiot and a very young child, you start leafing through BASIC and COBOL manuals and maybe even a FORTRAN book. The next thing you know you've signed up for that extension course on The Fundamentals of Computers, with COBOL, and then the fun starts. Or, worse yet, one of your jobs might be to sit on the planning

committee to help decide what new computer to buy, what new software to acquire, what communications facilities to add, and so on.

The innocent simplicity of the naive Carlos and friendly Juan dialog is lost forever to anyone who scratches behind the glossy face of a computer because COBOL, FORTRAN, and other computer languages are not particularly friendly, nor can naiveté long endure in an atmosphere of bits and bytes, logic arrays, microprocessors, and modems. This is where the chaos starts; not a real chaos in the biblical sense, but a virtual chaos of conflicting, competing, and reinforcing technologies that can be as difficult to grasp as a handful of water.

The chaos has two parts, indelibly labeled hardware and software. Hardware is simply all the tangible parts of a computer. Conversely, one would expect software to represent the intangible parts of a computer. This expectation is correct to the extent that one cannot point to a thing and say, "Aha! There's a software," but that's too neat a way to dismiss the most important part of a computer. A different perspective is needed to give fresh meaning to both hardware and software.

A plunge into the technologies that make computers possible touches practically every major scientific discipline, with the expected emphasis on mathematics, physics, and chemistry, in roughly that order. (Electronics, here, is a subset of physics.) Were this a different sort of article, I would now lavish thousands of words on semiconductors, logical circuitry, lasers, optical fibers, and the rest of the technological arcana that transmute base metal into computer hardware; but these are all causes, not effects. The effects are three: more computing power is being made available to more people for less money and in smaller packages; ditto for memory; and the traffic lanes among computers are moving up from the equivalent of rutted cow paths to superhighway connections. All of the underlying causative turmoil, or seeming technological chaos, ultimately sup-

ports one of these three effects.

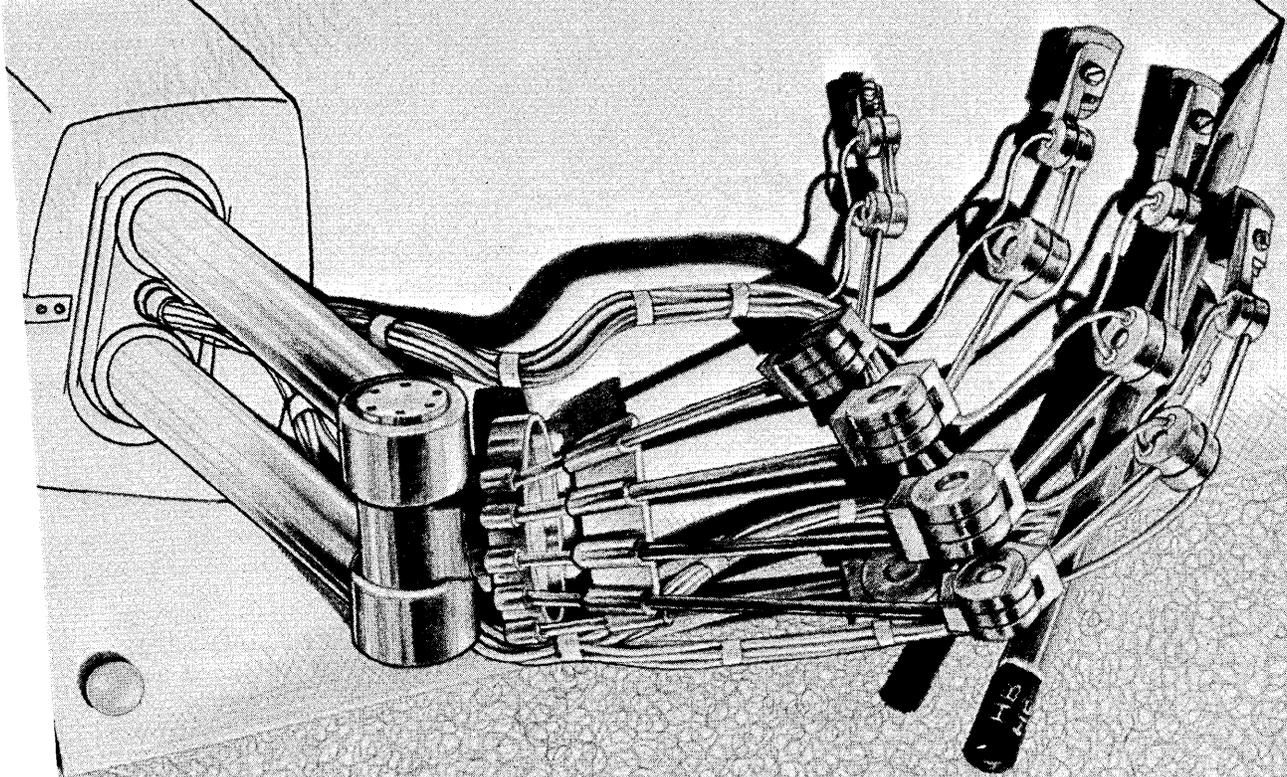
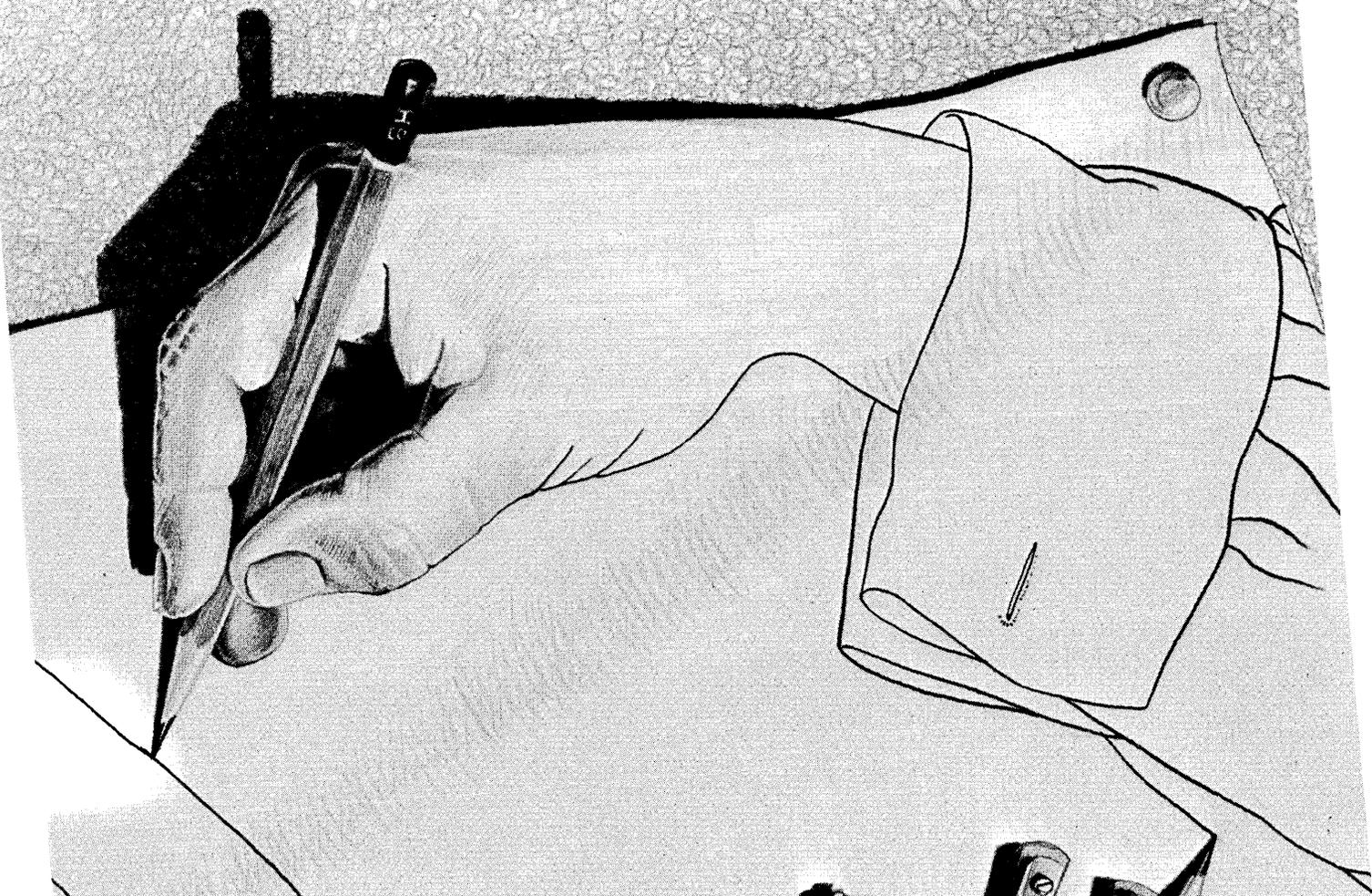
The most obvious effects of these effects, translated into businesslike, bottom-line language, are improved productivity, more efficient internal operations, and accelerated management awareness, all of which are redundant facets of the same sparkling jewel: profitability. The maintenance and improvement of profitability provide the crass motivational energy to sustain the enormous information processing market and to justify the research budgets of IBM, AT&T, Exxon, etc. Already measured in the hundreds of billions of dollars, the information processing market could even surpass the energy market within a decade or two.

## MARGIN OF PROFIT IMPORTANT

The margin of profitability is also important. An investment in a computer must promise a return of more than a couple of percentage points (no matter how measured) over current profits to justify the decision to automate. Notwithstanding a 25-year history profusely stained with computer users' blood, computers have helped to create many executive heroes whose advice by example is a blunt "automate or perish."

The now unquestioned acceptance of computers has produced several interesting side effects—some that are consonant with historical experience, others that promise to create genuinely new human experiences. The success of computers has generated enormous amounts of cash for vendors to reinvest in new techniques and equipment. The climate of profitability has also attracted large quantities of outside investment money. This liberal flow of cash helped to create a DEC here and an Intel there, converted IBM into a megabusiness, and sustained several other businesses that would have failed on any industry growth curve less than exponential. The users and investors who paid for it all can be viewed, in a sense, as patrons of the computer arts because they unknowingly supported many experiments and outright research

ILLUSTRATION BY PONDER GOEMBEL



Ponder  
Goeml

# Computers have helped to create many executive heroes whose advice by example is a blunt "automate or perish."

indulgences by sustaining a highly encouraging environment.

Another effect, often completely ignored, is the way computers have promulgated computers. A computer in the hands of a talented scientist or technician can enormously simplify and accelerate the process of developing a better computer. The better computer can then be used to develop an even better one, and so on. Each step is logically shorter than the preceding one, so the whole process possesses a kind of  $n$ -derivative cumulative synergism whose curve I wouldn't attempt to plot but which must be mind boggling.

The new experiences I alluded to two paragraphs ago need some preparation. Since I have already arbitrarily inverted computer hardware technologies to yield three basic effects, I can recklessly continue by claiming that all computer hardware is nothing more than a tangible vehicle for the intangible "substance" of software. This claim is not meant to dismiss hardware, because the incredible speed of electronic circuits is what makes computers practical to begin with; it is intended to place the hardware in its proper perspective relative to a total system. I could almost say that the only justification for continuing hardware research and development is to make the software run better, but that pushes the issue to an absurd extreme. New hardware developments frequently suggest better ways to do the software and vice versa. The essential point is that hardware is the intellectually passive component of a computing system; software is the intellectually active component.

It may be difficult for some readers to accept "intellectual" and "computer" in the same sentence, but bear with me for a while as I add a few more words to the millions of words already written about software.

In classical terms, software equals programs; a program is a sequence of instructions that tells a computer how to solve a problem. A program generally requires and produces data, but the data can be and usually are handled independently of the program. This is as far as I care to go with the classical definitions because the next step is a chaos of technologies (though not as diverse as hardware) that distinguishes among software for systems, applications, databases, batch processing, transaction processing, and so on. The important definition is that a program is a data-independent solution to a problem in the same way that  $C=2\pi r$ , with precisely the same notational and procedural obstacles to the uninitiated. Each program also has the same more or less universally applicable qualities as  $C=2\pi r$ . A program is the product of a strictly human reasoning process. When it is expressed in computer language and committed to a computer, it becomes a

formal encapsulation of human intelligence that can then be accessed and used by other humans who are thereby spared the labor of reconstructing the solution sequence, which is exactly the purpose of  $C=2\pi r$ .

## MOSAIC OF COMPUTER PROGRAMS

The preceding ideas provide a platform for a broad extrapolation: all software encountered by a computer user can be thought of as crystallized chunks of other persons' intelligences working collectively to yield a "best solution" no matter how one approaches the computer. Thus, the so-called human-machine interface is really a human-human interface because all of a computer's intellectual substance is wholly derived from people. Any perception of independent intelligence is an illusion created by a computer's only real asset—speed. But given enough speed, combined with an evolving ability to pack a lot of very fast circuits into tinier spaces, the sheer quantities of things that can be done in very short periods with computers introduces some important second-order effects. These effects create the physical environment for the new experiences I have yet to discuss.

The view gained from the preceding analysis is that when Carlos begins to communicate with Juan, the "mind" that Carlos contacts is actually a mosaic of hundreds of separate, little problem solutions developed by perhaps as many people and all linked together to form a collective intelligence complete with subordinate personality traits. The extended perception of Juan's mind is distorted because Juan can do superhuman calculations in a few seconds and can pore over mountains of the dullest data without exhibiting a trace of boredom.

These machine-related qualities give Juan's intelligence a disturbingly alien texture, like that of a part genius, part idiot who can solve partial differential equations in his head but insists on holding his spoon backwards. These traits, however, are simply the direct manifestations of the computer's superfast circuitry and have nothing to do with intelligence. So, if I now give Carlos a more important title, like Collective Man, then Juan is merely Carlos's reflection, or alter ego. The reflection is grossly imperfect, but it is, nonetheless, a human viewing other humans through a tv screen.

Practically every computer built in the last 30 years has been wired and programmed in the classic von Neumann mode, which, very briefly, is rigidly sequential and linear. This means that a von Neumann computer is designed to solve problems in A, B, C, D order and cannot arbitrarily solve a problem in B, C, A, D order or derive an instant solution by solving A, B, C, D all at the same time. This is not a bad thing and is

even postpredictable through the reflection hypothesis developed in the last paragraph.

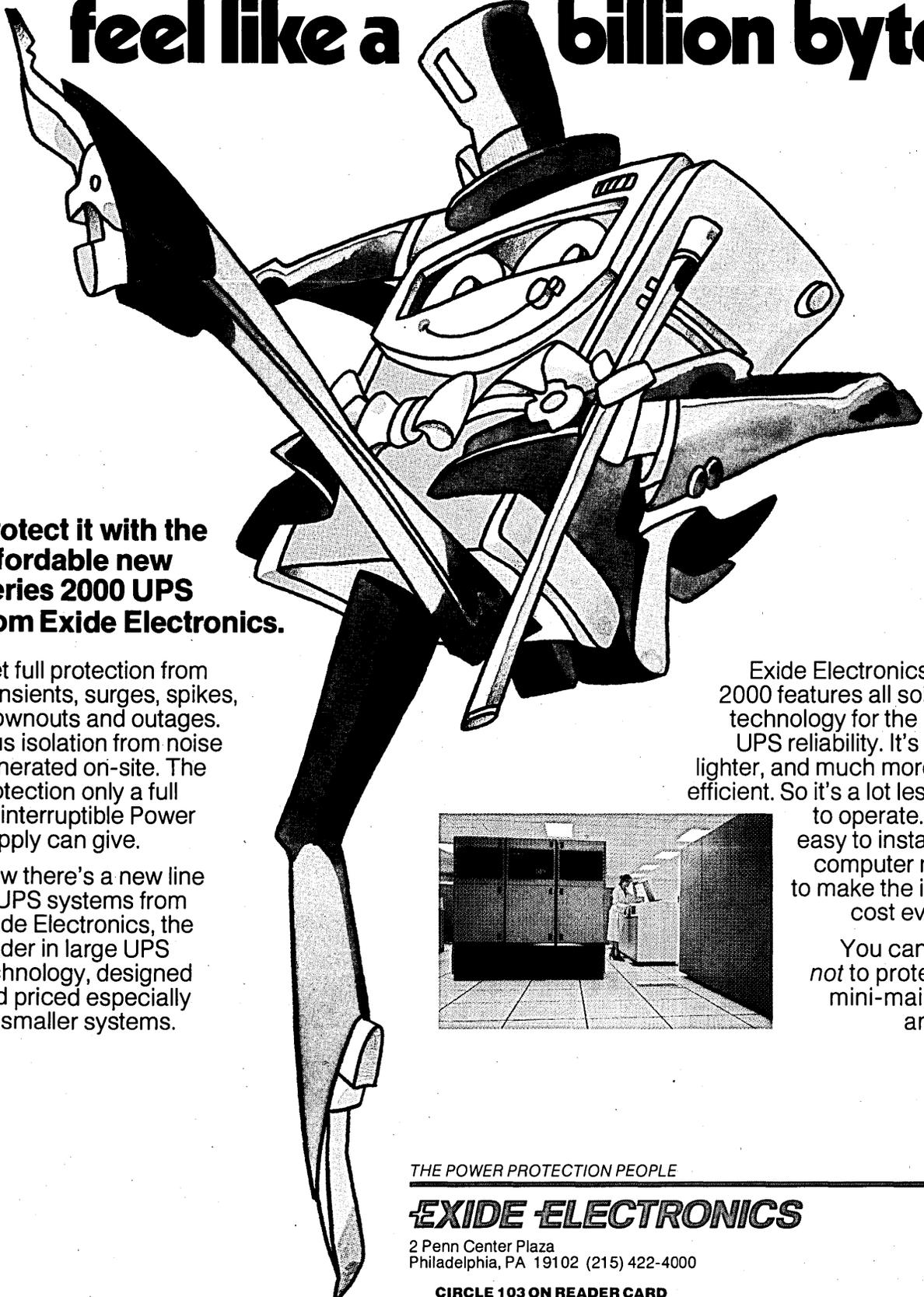
The first glimmering of reflected intelligence—around 1946, with Eniac and then Binac—had to be decomposable into its smallest possible parts so that those early users could handle problems in the then new environment of several thousand mathematical operations per second, with every solution sequence laboriously expressed in a totally alien coding scheme. The first new experiences in the computer environment were the unpleasant realizations that a program must be expressed in absolutely nonambiguous terms and that the program's coding must be 100% error-free. If these two conditions are not met, the glimmer of intelligence winks out, and only the true chaos of mindless circuitry is left. Given the requirements for absolute correctness, the ability to decompose a program into A, B, C, and D chunks is practically mandatory because errors can be more easily isolated, identified, and corrected. Obvious and lucid sequentiality is so important in program design that it has been persistently encouraged through various planning and procedural techniques, the latest of which is called structured programming.

Viewing computer intelligence as a reflected mosaic of crystals of human intelligence is useful because it allows us to invert the underlying hardware technologies. Questions such as "What is an optical fiber?" converge toward the simple query, "How do (optical fibers, semiconductors, lasers . . .) improve the quality of the reflected intelligence?" Or, in other words, How do all these technologies help make computers seem more like people?

Each crystal in the reflected mosaic has two qualities: it is a best-case problem solution, like  $C=2\pi r$ , and it is an amplifier of certain selected human capabilities. The first quality I have already dealt with; the second needs an exemplification.  $C=2\pi r$  is not very difficult for anyone to solve if the value of  $\pi$  is held to three or four decimal places and that of  $r$  is also kept to a few digits. But what happens if  $\pi$  is allowed to swell to 30 digits and  $2r$  represents, say, the mean diameter of Venus' orbit to 15 decimal places? The human execution time required to solve  $C=2\pi r$  rises toward another large number, which, for many people, would approach infinity because of the boredom factor. Not so for a computer. Depending, of course, on the computer, the complex  $C=2\pi r$  calculation can be done in about the same time as the simple one. The execution time inside the computer is measured in microseconds, though the total time may stretch out to a minute or two if program call, data entry, and printout times are included.

And this is for a trivial example. Oth-

# How to make your mini-mainframe feel like a billion bytes.



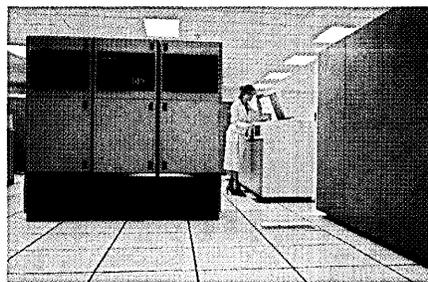
## Protect it with the affordable new Series 2000 UPS from Exide Electronics.

Get full protection from transients, surges, spikes, brownouts and outages. Plus isolation from noise generated on-site. The protection only a full Uninterruptible Power Supply can give.

Now there's a new line of UPS systems from Exide Electronics, the leader in large UPS technology, designed and priced especially for smaller systems.

Exide Electronics' Series 2000 features all solid-state technology for the ultimate UPS reliability. It's smaller, lighter, and much more power efficient. So it's a lot less costly to operate. And it's easy to install in any computer room . . . to make the installed cost even less.

You can't afford *not* to protect your mini-mainframe, anymore.



THE POWER PROTECTION PEOPLE

## EXIDE ELECTRONICS

2 Penn Center Plaza  
Philadelphia, PA 19102 (215) 422-4000

CIRCLE 103 ON READER CARD

# The so-called human-machine interface is really a human-human interface because a computer's intellectual substance is wholly derived from people.

er calculations and data-handling feats that are literally impossible to do in the human time frame can become minor exercises, taking only a few hours, for a computer. Far more time is typically spent on developing the programs than on executing them.

## HUMAN BRAIN AS COMPUTER

The phenomenon of human intelligence, or any other kind of intelligence for that matter, sits at the top of any list of complex topics. In fact, some scholars perceive the mind of man as ultimately incomprehensible to the mind of man because any understanding of the mind, no matter how encompassing, must always be a subset of the set of the mind (a variation on a Zeno paradox). But we can identify certain components of intelligence without necessarily knowing or explaining how they work. These components, or abilities, are, in bottom-up order: computation, correlation, association, inference, and extrapolation. If these labels are applied to the mosaic of computer software, computation is by far the dominant reflection, with correlation catching up fast. The reflections of association and inference are barely perceptible, and extrapolation is not there at all. The total reflection is thus skewed sharply toward the lower end of man's intellectual capabilities. The resulting distortion helps give computers their alien feel (even though man is peering at man).

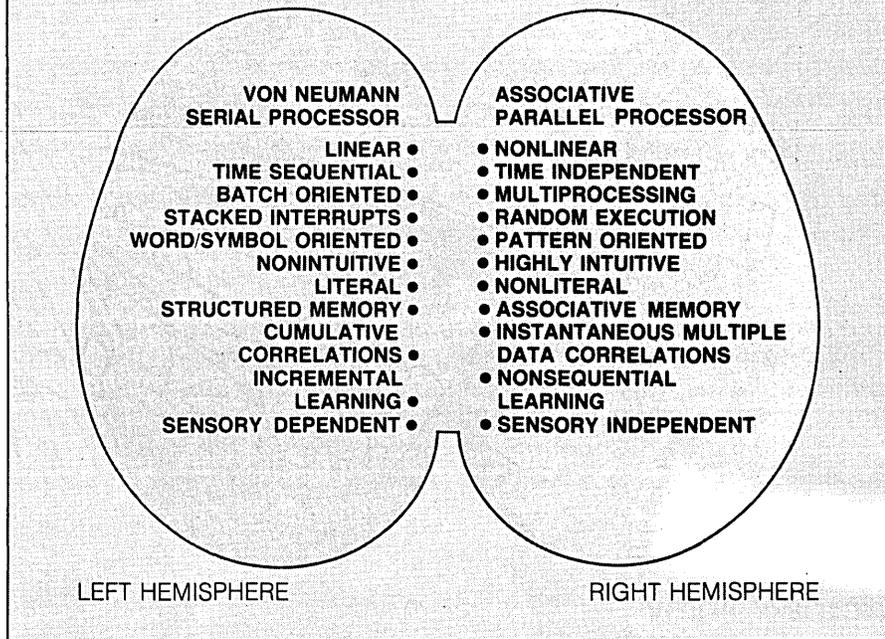
The term for a 1980s-style computer could be changed from computer to something like intelligence amplifier or, perhaps more acceptably, to information processor, with a corresponding improvement in the general understanding of what a computer is and can become. A modern IBM 3081, for example, is an intellectual googolplex away from Eniac and Binac, and the xxx machine of a decade hence will be again that much ahead of the 3081. But how will it be that much better? The answer is that the missing parts of the reflection will be filled in and intensified.

Much of the latest research into the organization and functions of the brain supports the theory that the brain is functionally split into two hemispheres interconnected through a large bundle of nerve fibers called the corpus callosum. The corpus callosum has been severed experimentally in animals and through surgical necessity in humans, and each brain hemisphere has been studied independently. The results seem to indicate that the left brain is the biological analog of a von Neumann computer, which means fairly rigid A, B, C, D sequentiality, a linear time sense, and other characteristics. The right brain is far more mystical and appears to develop and deal with gestalts, or patterns, rather than with separate objects.

Unfortunately, most conscious

FIG 1

## SOME OPPOSING CHARACTERISTICS OF THE CORESIDENT BRAIN COMPUTERS



thought is word based, and the language centers are in the left brain. So it turns out to be very difficult to describe right brain functions in left brain terms because the verbal concepts are inextricably connected to the left brain's serial von Neumann computer.

The products of the right brain are generally nonverbal—a painting, a symphony, an intuitive flash—except for poetry, which may be one means of expression where the two hemispheres meet on common ground. The qualities of abstract association, seemingly nonlogical inference, and creative extrapolation seem to come from the right brain; whereas the logical or tightly reasoned versions of these same qualities appear to reside in the left brain. It is not obvious why the evolutionary pressure toward higher life forms causes the brain to split into, in effect, two different types of coresident computers, but all of the currently available evidence seems to support the observation that that is precisely what happens.

The von Neumann-oriented left brain is the unbalanced reflection of man that man sees in the computer. Some critics of computers argue that the initial choice of von Neumann architecture for computers was unfortunate because it helped to overaccentuate humanity's already accentuated logical side at the expense of the creative side. The argument presupposes that the original designers of Eniac, Binac, and, later, Univac had a choice. My reply is that they did not.

If the entire extraordinarily rapid development of computers is viewed as an attempt to create an intensified reflection of the human intellect by tapping the speed of electronic circuitry, then the left brain orientation had to dominate first because any other selection would have been alien to left brain logic (which is far more accessible than right brain logic) and thus uncontrollable.

In fact, the evolution of computers has been so dramatic and so tightly condensed into the merest twitch of time that I will convert the inevitability of choice into a homegrown biological imperative, which states that all computer structures are ultimately predicted by man's biological structure and will build from the simple (accessible) to the complex (less accessible). Stated another way: humans in the process of reconstructing humans cannot create an alien but will move through increasingly less understood neural paths toward a complete reflection of the brain. The implication is that all of the baseline technologies that contribute to the making of a computer, no matter how abstruse they are, produce systems whose organizations are preordained by the biological structures of those who assemble the systems. The structure of future systems should therefore be logically predictable according to what is known about the systems builders. The technologies can be taken as givens that will affect only the timetable of the predictions, not their substance.

# 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 Winchester technology discs, IBM compatible back-up tape, a ¼ 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.

CIRCLE 104 ON READER CARD



\*UNIX is a trademark of Bell Laboratories.

# Results of research indicate that the left brain hemisphere is the biological analog of a von Neumann computer.

## LEFT BRAIN VS. RIGHT

This biological imperative mandates that the earliest computers had to be von Neumann machines because left brain structure would not permit otherwise. Practically all computer developments during the past 30 or so years have reinforced this mandate by augmenting the overtly measurable left brain abilities to compute and correlate. Left brain functions are reasonably well understood, or at least quantifiable through hundreds of different tests, and have been well described in left brain symbols. So the directions that computers had to take to improve the abilities to compute and correlate were clearly marked, and techniques such as floating point hardware and database management systems were developed to satisfy obvious needs. Unfortunately, the infallible hindsight offered by the biological imperative cannot be applied with equally infallible foresight because right brain functions cannot yet be accurately quantified and predicted. Worse yet, many right brain functions cannot even be expressed in left brain terms except perhaps through the disturbingly ambiguous languages of Zen-type philosophies.

Apparently, the right brain computer can execute some A, B, C, D functions in any order and still get the right answer. It can also execute an A, B, —, D sequence and infer the value of C by what appears to be a simultaneous solution to all known elements of the set. Similarly, simultaneous solutions of multiple sets can somehow be assembled into congregations of sets that can then be expressed as symphonies, paintings, or theories of relativity. The right brain's time sense is also different in a way that seems to let the future precede the present and let the present extend the future. All of the now-you-see-them, now-you-don't qualities of precognition, telepathy, and other ESP phenomena, if they exist, are probably manifestations of the right brain computer.

How does one quantify the complex pattern-synthesizing, gestalt-processing right-brain machinery that produces a symphony? And how can one quantify the intuitive leap from Maxwell's Equations to the Theory of Relativity? Though there is no quick and easy answer to these questions, the lack of an answer is certainly not slowing the flow of technological developments because the expected profitability stimulus from the users and prospective users is even stronger now than it was a decade ago. This stimulus generally motivates researchers toward development of cheaper and better computers independently of the direction of the development.

If the direction of computer development is inevitable and therefore predictable by a biological imperative, then how can it be used to predict the automation of right brain

functions when an understanding of the functions is either an obscure occult wisdom at one extreme or a groping in neuronal darkness at the other extreme? Logical, or mechanistic, analyses of brain organization collapse at about the seventh or eighth synaptic level because the sheer number of possible interconnection permutations slide off the scale of comprehension, even with the help of a computer. The accepted occult wisdoms, which some feel should include psychology and psychiatry, lose their meanings in the process of left brain translation.

The chasm between these extremes can be poked into with musical and mathematical symbols, colors, and shapes, and will sometimes give back something comprehensible. More often not, though, the left brain is not particularly happy with seemingly irrational unpredictability. The only other route toward right brain comprehension comes to a dead end on a Tibetan mountaintop. The conveniences of the man-building-a-reflection-of-man hypothesis and the retrospective accuracy of the biological imperative theory suggest that perhaps the preceding impasse will be broken by itself because computer developments will subconsciously be driven toward the only solutions permitted by the imperative. In other words, right brain organization will be revealed by the way computers evolve because there are no alternative evolutionary paths. Of course, the answers won't unfold so neatly; the process will most likely be a painful bootstrapping operation up to some breakthrough point.

## THREE ELUSIVE QUALITIES

The qualities of association, inference, and extrapolation—which I have identified as higher-order intellectual traits as yet unreflected by the computer—are elusive, yet identifiable, qualities that appear to flip back and forth between the coresident brain computers according to the demands of the problem at hand. (This characteristic of organic readjustment is extremely important, and I will return to it later.) A simple association, for example, might begin with a correlation between two sets of data, say, a five-year record of rainfall and a listing of corn yields over the same period for a selected Iowa county. Rainfall versus corn yields can be plotted, and neat graphs can be developed to determine what amounts of rainfall produce the maximum and minimum yields. Another correlation can be made to the distribution of rainfall, and the graph accordingly modified. Yet another correlation can be made to the recorded hours of sunshine in each yearly period, and so on. The data can be easily correlated with a computer, but the association of the data into a meaningful set of information is so far strictly a human task. No problem here—all clearly

sequential work of the left brain.

Now imagine a more complex situation. A friend responds to a request: "No, I won't." In black/white left brain terms, the response is an absolute negative. The complex set-associative machinery of the right brain, however, now goes to work and instantaneously processes whole sets of experiences and attitudes to evaluate the response according to the nature of the request, the sex of the respondent, the relationship to the respondent, persuasive capabilities in the current situation, voice inflection, body posture, etc. The right brain's interpretation of the response might be an unequivocal "Yes, I will."

An example of simple inference is the sequence 3, 5, —, 11, 13, 17 . . . The given numbers are primes; a 7 is inferred for the gap. Again, all left brain work. But now suppose that coffee stains had obliterated part of the following:

In Xanadu did Kubla . . .  
A stately pleasure . . . decree  
Where Alph the sacred river . . .  
Through . . . measureless to . . .  
Down to a sunless . . .

If you know the poem, the example ends. But if you don't, the right brain turns on and quickly fills in "Khan" in the first line. The second line is pure imagery, and you might choose "house" or "place" instead of the author's "dome," depending on how much of your left brain is contributing. In the third line, rivers normally "flow," but you might choose "ran" if you like the alliteration and want to rush the rhyming. For completion's sake, the last three omissions are "caverns," "man," and "sea." Imagery, highly associative word selection, rhythm, rhyming—this is the inferential stuff of the right brain.

Extrapolation is the most difficult to illustrate. It is the foundation of the intuitive flash and the even more elusive quality of creativity. It is basically the ability to build new patterns from known patterns. In its left brain form, it is a Madame Curie who accumulates data until the sheer accretion of data coalesces into a theory (pattern). In its right brain form, it is an Einstein who formulates a theory (pattern) in one intuitive leap and then places the burden of discrete proof on the rest of the world.

The qualities of association, inference, and extrapolation are actually inseparable, though I have treated them here separately. They are combined in various mixtures and at different times through each of the coresident computers according to how the brain's "operating system" decides the brain's total resources can be best leveraged and economized.

The single trait that seems to characterize all identifiable right brain functions (I exclude ESP) is parallelism, or the apparent

SYMBOL OF EXCELLENCE

# RAMIS II®

WITH SO MUCH SOFTWARE AVAILABLE TODAY, IT IS NOT ALWAYS EASY TO ISOLATE THE BEST BUY. WHATEVER THE BASIS FOR COMPARISON, ONE PRODUCT STANDS OUT. RAMIS II.

## COMPARATIVE EVALUATION

The most recent DATAPRO\* comparison ranks RAMIS II number 1 of the leading database products in six of nine categories.

	PRODUCT					
	RAMIS II	ADABAS	FOCUS	IDMS	IMS	TOTAL
Overall Satisfaction	3.4	3.2	3.1	3.3	2.8	3.0
Reliability	3.5	3.6	3.3	3.6	3.4	3.4
Ease of Installation	3.4	3.2	3.3	3.3	2.5	3.0
Ease of Use	3.6	3.4	3.6	3.2	2.4	3.0
Efficiency	2.9	3.2	2.9	3.2	2.6	2.9
Troubleshooting	3.0	2.8	2.8	3.3	2.8	2.6
Documentation	3.1	2.8	2.8	3.1	2.8	2.7
Education	3.3	2.8	3.0	3.3	2.6	2.8
Maintenance	3.2	2.9	3.1	3.2	2.9	2.8

\*Survey conducted by DATAPRO Research Corporation.

## RETURN ON INVESTMENT

RAMIS II users report complete payback of their investment in less than 12 months... with increasing savings in years to come. And many of those users already had another database product installed when they acquired RAMIS II.

## TECHNOLOGY LEADERSHIP

RAMIS II is the leading 4th generation language and can handle more of your applications than any competitive product.

## GROWTH

MPG revenues have grown at a compound rate of 53% for the last 6 years and by the end of 1981 there were more than 775 MPG product installations.

## REPEAT BUSINESS

50% of our installations are with companies who were so satisfied with the first copy that they came back for more.

## AVAILABILITY

RAMIS II is available in all major IBM environments. Your applications are completely portable, without change, across those environments.

If you need more productivity or information processing at a cost you can afford, call or write:

Lillian Greenhut  
 Mathematica Products Group  
 P.O. Box 2392  
 Princeton, NJ 08540  
 (609) 799-2600  
 and find out about the best—

## RAMIS II SOFTPOWER™

*Software that unlocks  
 the power of your hardware*



CIRCLE 105 ON READER CARD

# Xerox interactive software for Digital hardware.

Xerox Computer Services is now marketing Praxa Software—proven applications software for manufacturers and distributors specifically designed to run on in-house Digital PDP-11 and VAX hardware.



Applications are written in ANSI Cobol and run on PDP-11 and in native mode on VAX.

But software is only as good as the people who stand behind it. And at Xerox, we have over eleven years experience installing and supporting inter-

Praxa has a wide range of integrated applications. Inventory Control, Purchase Order, Order Entry and Invoicing, Sales Analysis, Material Requirements Planning, Capacity Planning and Scheduling, Factory Order Control and Cost, Engineering Data Control, General Ledger, Accounts Receivable, Accounts Payable, and Payroll.

And the applications can be used independently or together to form a complete system.

Praxa is flexible, easily expandable, and simple to use.

The interactive systems immediately update all files affected by each transaction. And data input at terminals can be promptly edited for total accuracy. It's perfect for distributed data processing at multi-location companies. And the software is menu-driven so specialized training isn't required.

XEROX and PRAXA are registered trademarks of XEROX CORPORATION. PDP-11 and VAX are trademarks of DIGITAL EQUIPMENT CORPORATION.

active systems. Our branch offices are in major cities nationwide. And in Europe, too. So we're there when you need us.

For more information about Praxa Software, call toll-free (800) 323-2818. In Illinois call (800) 942-1166, or send in this coupon.

And see how much Digital hardware can do with Xerox software.

**Xerox Computer Services** D5/82  
c/o Ron Rich, 5310 Beethoven St., Los Angeles, CA 90066.  
I want to know more. Please send me your brochure about Praxa Software.

Name/Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Telephone \_\_\_\_\_

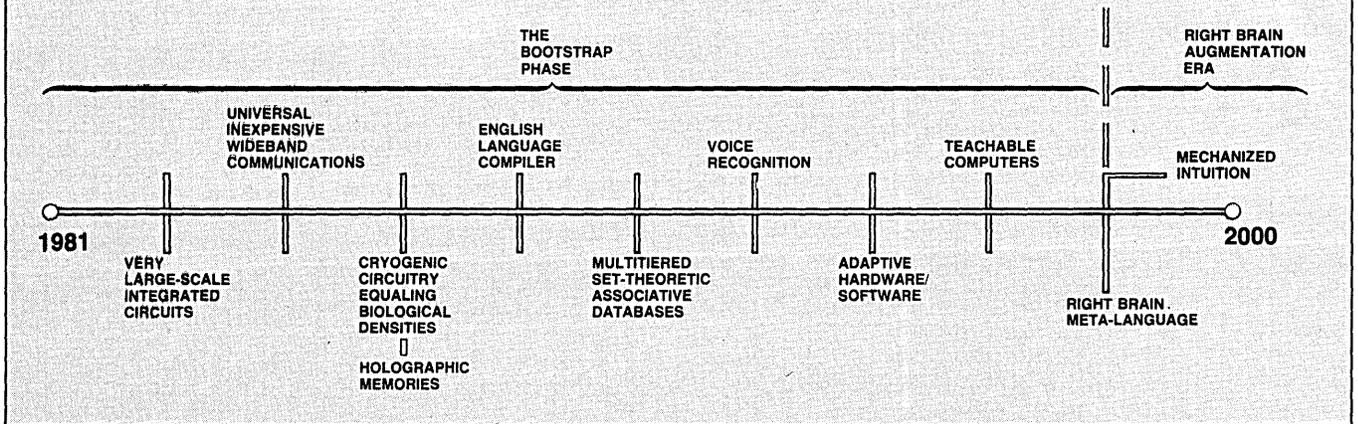
**XEROX**

CIRCLE 106 ON READER CARD

# Hardware is chaotically mindless and acquires an intellectual focus only through the human additive of software.

FIG. 2

## PROJECTED TECHNOLOGICAL EVOLUTION TOWARD RIGHT BRAIN AUGMENTATION ERA



ability to think about more than one thing at the same time. Parallelism can be further divided into two parts, which I will define, in computer vocabulary, as data retrieval and data processing. Data retrieval is the way in which memory is accessed. Although the efficiency of this technique is influenced by the way memory is organized, the technique itself is independent of memory organization. Data processing is the program(s) putting the data through their algorithmic paces. The left brain and its von Neumann machine reflection retrieve and process the tiniest possible piece of data at a time—a number or letter in the left brain and a byte in the computer.

Try to remember how you learned addition in the first grade. The just-learned magic symbols + and = (the program) were written as + = (the program), and the spaces were laboriously filled with a 2 (data unit) and a 2 (another data unit). The program was processed (maybe with the help of the finger computer), and there was an unreal 4, completely the product of an idea. Very quickly,  $2 + 2 = 4$  became a pattern that migrated to the right brain to yield the instantaneous answer 4 for the merest glance at the  $2 + 2 =$  pattern. Other patterns, both mathematical and linguistic, were developed and similarly transferred, but most of them were invariably processed and rationalized through the one-piece-at-a-time left brain machinery.

Later, the individual processes and collections of processes could be called on in such a way that whole armloads of data could be retrieved in one giant swipe at the memory and flung at the processes. Regardless of how it happens, the effect is that large amounts of data are available and are being processed at the same time in the right brain computer, which implies that memory is somehow be-

ing addressed in a way that dredges up not only a single item of interest but also a clinging web of associated information. Think through the extraordinarily complex retrieval process operation that occurs for a simple learned-pattern stimulus such as "dog." If you ever owned a dog, that dog's image probably pops into mind. But which image? Pup? Young dog? Old dog? Running? Sitting? Tail wagging? Panting? Why that particular combination? And how about the setting? Day? Night? Backyard? Field? What do you look like? And so on. The simple retrieval probably massaged hundreds of thousands, maybe millions, of data bits through some very complex programs in the space of a couple of milliseconds. By contrast, the standard von Neumann computer is back at step one, still in a figurative first grade.

That last statement is not entirely true. Computers have always exhibited a certain hardware/software schizophrenia in which the hardware has usually promised to deliver far more than could actually be implemented by mere humans through the software. At no time have computers been more schizophrenic than right now. Hardware developments are apparently obeying the biological imperative, at least for those right brain functions that are visible and describable in left brain terms. The developments are primarily architectural variations made more feasible by the availability of cheaper, faster, and smaller components. The right brain's mass data retrieval characteristic is being simulated in computers by associative, or content-addressable, memory techniques that address computer memory in much the same way that "dog" is translated by the right brain into a simultaneous address to vast bodies of related experiences, images, and information residing in human memory.

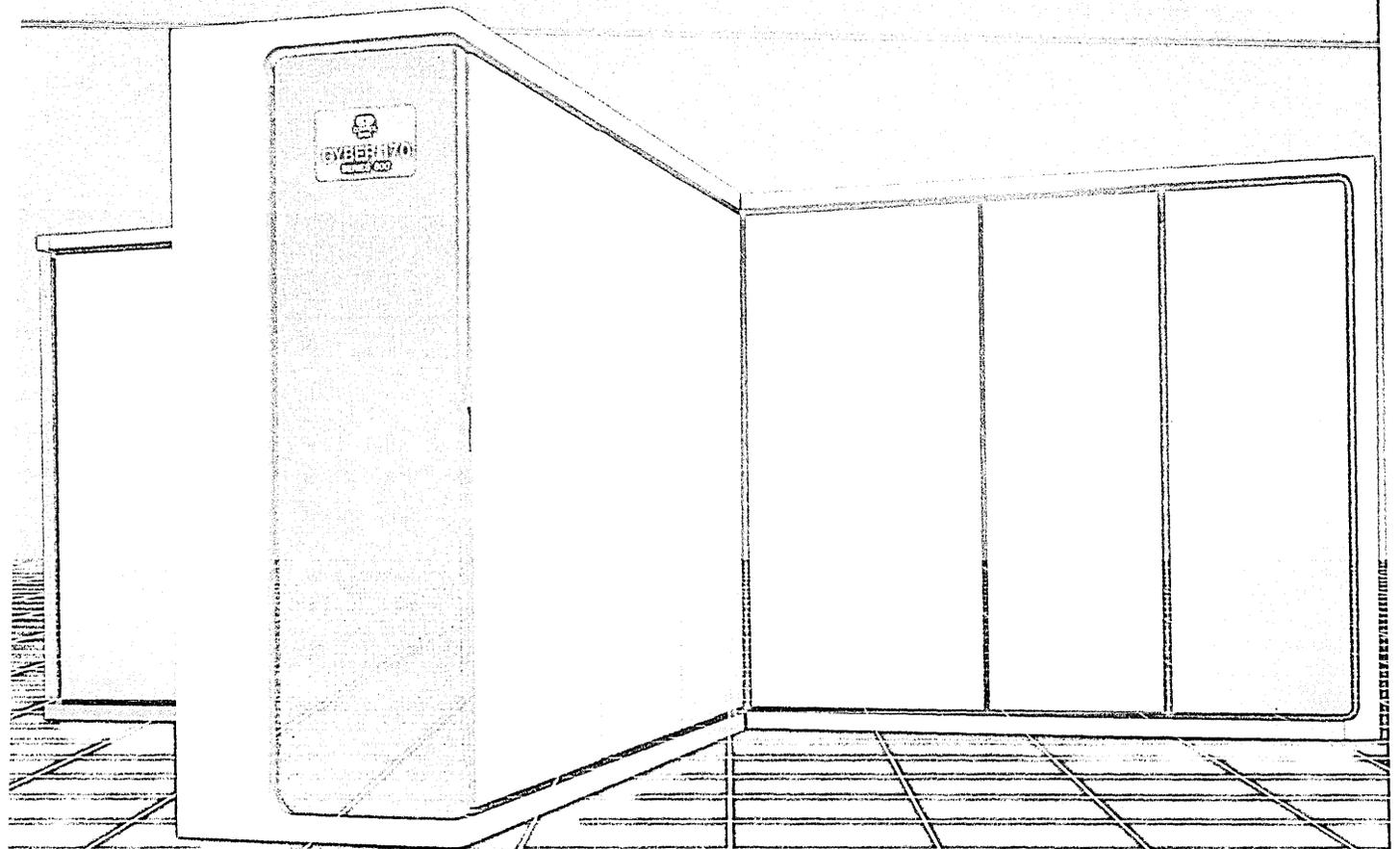
Content addressability, however,

obeys only part of the imperative. Once large amounts of data are drawn out of a computer's memory banks through an associative address, or key, nothing is gained if the data must still be handled serially through the sequential processing machinery of the von Neumann computer. The effect is like giving the set of numbers 1 to 1,000 to a first grade student with instructions to add 1 to 1,000, 2 to 999, 3 to 998, etc. The student must still slog away in good old serial fashion, adding each couplet in sequence. Since the process is identical except for different numbers and since both the process and the number distribution are known, why not distribute all the numbers to 499 (+ =) processors and do the whole job in one parallel operation? Or, better yet, recognize that the answer is always 1001 and solve the thing as a pattern.

This is precisely the way parallelism is being handled in new and experimental computers—through increasingly more powerful microprocessing nodes that are linked together in various ways to form processing arrays and networks. These networks, along with associative memories, are beginning to simulate the most rudimentary characteristics of right brain operation. They are providing the tools for the simulation. Remember, the hardware is chaotically mindless and acquires an intellectual focus only through the human additive of software.

Unfortunately, most current software languages and techniques are still tangling with the 30-year-old problems of lucid sequentially and error-free coding. They cannot yet manipulate patterns and combinations of patterns or handle error-filled patterns. Conversely, the human mind seems to have a very high tolerance for pattern errors and can handle substantial amounts of erroneous data within a pattern before the pattern solutions are skewed toward nonreality. An interesting

# Announcing the CYBER 170 Series 800.



Once again, Control Data customers  
get more computing power  
conversion free.

# Meet your major application challenges now. The CYBER 170 Series 800 has the features you need.

## More performance per dollar.

The new CYBER 170 Series 800 computer systems give you more computing power and bigger memories. The result: more throughput than with any CYBER 170 computer in history, or most of the other computer systems on the market. So you can have the computing muscle you need today.

And the Series 800 drives down the cost per calculation. So you can handle more computations per computing dollar than ever before.

The Series 800 also delivers on a Control Data commitment: to give our customers expanded capabilities, with all the benefits of *proven* hardware, software and support—all conversion-free.

## Software compatibility.

If you're a Control Data customer, you can upgrade to the Series 800 and protect your investment in application software.

If you're a new customer, you also benefit by moving to the CYBER 170 Series 800. Even if you have to convert, the Series 800 systems give you proven hardware, proven peripherals, and proven operating systems and application software. And Control Data's tradition of compatibility.

A major reason for this compatibility: Control Data's user-proven Network Operating System—NOS—now enhanced to make the computer system easier to use for everyone in your organization. Novice, casual user, applications user, programmer—NOS offers them all equal friendliness and speed.

## Massive memory.

Series 800 systems give you four to eight times more memory than

the maximum on the Series 700 systems. Even the compact, air-cooled 825, the smallest 800 system, offers you a central memory of from 262 thousand to 1 million 60-bit words, to handle applications from seismic processing to CAD/CAM.

Four other 800 systems let you build even larger central memories, and grow to meet future needs efficiently, economically.



## Reliable and maintainable.

Series 800 architecture, software and support services are all proven in use. Series 800 systems, installed and tested with Control Data customers around the world, have already confirmed improved reliability. As for maintainability, our Remote Technical Assistance feature can often solve problems in minutes, instead of hours or days.

## The bottom line: faster, more cost-effective computing for major industry applications.

With the new Series 800 systems, Control Data gives you the power—and the application programs—you need right now.

In manufacturing, we deliver integrated CAD/CAM capabilities that very few other systems can offer. In the petroleum industry,

we put fast, accurate seismic processing and much more at your service.

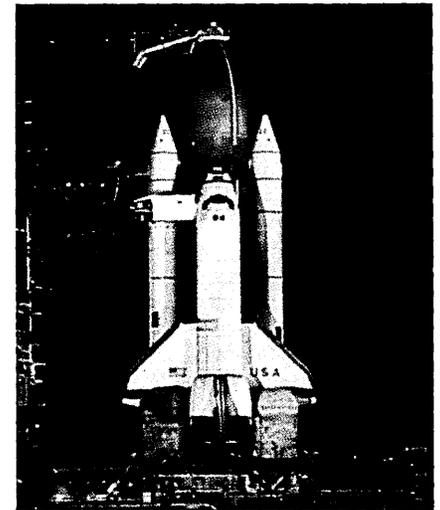
For electric utilities, Series 800-based applications handle complex power generation tasks simply and easily. For weather forecasting, you get the memory and speed you need to run advanced numerical prediction and image processing programs.

And for colleges and universities, we make it possible to process everything from complex research through student instruction.

And now our PLATO® computer-based training system runs side by side with your other applications, to deliver education and training for business and industry, as well as for the academic community.

All of these capabilities are available today—without conversion—to Control Data customers. All are available today to new customers, who need power and performance without the fear of future obsolescence.

Call your local Control Data sales office today for an immediate briefing on the outstanding capabilities—and benefits—of the new CYBER 170 Series 800.



# GD CONTROL DATA

Addressing society's major unmet needs  
as profitable business opportunities

CIRCLE 107 ON READER CARD

# A learning, adaptive computer is not only possible, it is probably inevitable . . . sometime during this decade.

comparison is that the human computer reportedly has an average accuracy of about one part in a hundred, which means that one error can typically be expected for every 100 units of data processed by the brain; whereas computers are well-nigh error-free, subject only to hardware failures, if they are given error-free programs and data.

## PROBLEMS OF LANGUAGES

The fundamental route to a chronology of right brain augmentation—during which everything we have done so far with computers will seem like a crude sand castle by comparison—is language, or, more precisely, the nature of language. Most of you who are reading this article probably use English as a primary tongue even if you learned it secondarily. All chauvinism aside, English is a particularly rich language that supported the lush resonances of the predominantly right brain-oriented Elizabethan poets and playwrights and then gave full expression to the matter-of-fact logicity of a Ben Franklin and to the intricate philosophical-mathematical reasoning of Russell and Whitehead. An attraction of English is its general purpose character, which many foreign speakers see as a license to be ambiguous; but anyone who has read Shakespeare, Eliot, or Joyce can also recognize the compelling strength of controlled ambiguity when shaped by gifted minds.

This very quality of ambiguity, combined with a relatively free-form syntax, makes everyday English incompatible with the lucid sequentiality requirement of computer dialogs. Early programmers thus had to communicate with computers wholly on the computers' terms. These terms are called machine language, which is, incidentally, the only language ultimately comprehensible to computer circuitry. Machine language is an alien patois that consists only of patterns of Is and Os. Actually, the Is and Os are abstractions of even more basic pulses of electrical current, but the pulse layer gets uncomfortably close to the "chaos" referred to in this article's title.

Machine language is tedious to work with and tends to stimulate rather than reduce errors because abstract I/O patterns are difficult to build into the meaningful context strings that can relieve the pressure of concentration. It did not take long for computer scientists to further synthesize the I/O patterns into recognizable mnemonics such as ADD, DIV, MUL, etc. and then let the computer translate the mnemonics into the inescapable machine code. This synthesization process has continued along more or less the same lines up to the present and has produced complete, logically self-contained languages such as FORTRAN, COBOL, PL/I, BASIC, and many others. Each language is, in effect, a

least ambiguous proper subset of English with a limited and well-defined vocabulary and syntax.

Newer languages, called query languages, support somewhat free-form, non-procedural dialogs based on a small standard English vocabulary and standard grammatical rules, but their range of expression is extremely restricted. Their range of responses is equally restricted, to a fixed catalog of canned answers. Even with all these restrictions, though, many modern computers are surprisingly easy to converse with once their limitations are understood and accepted. The inescapable realities, however, are that the ease is an illusion and that nothing really significant has been done with computer languages since the development of COBOL in the late 1950s.

The major obstacle to a genuinely open-ended language interface to the computer and, consequently, to the use of a computer to augment right brain functions is the translator that converts quasi-English language statements into machine code. This translator, variously called a compiler or an interpreter depending on whether it translates on the fly or in large batches, consists of human-devised programs completely conceived and coded in left brain terms and thus confined to the left brain's sense of order. This is another way of approaching the impasse described earlier, and the impasse is formidable. Consider some of the problems.

In a restricted language, a single word such as DISPLAY can be mandated for all requests to the computer to retrieve and display selected data on the tv screen. The translator is coded such that when it detects the character combination DISPLAY, it automatically activates all the necessary circuitry to alert the tv screen to the fetched data. Other information is either translated or referenced to determine exactly how the retrieved data is to be displayed. Nothing could be simpler. Only very small amounts of the computer's resources are needed to handle the job as long as one and only one word is used define the job and as long as the word is spelled correctly.

Now, if we open up the English language floodgates to all possible permutations of DISPLAY, we could have LET ME SEE. . . , SHOW ME. . . , I WANT TO LOOK AT. . . , GET ME. . . , WRITE OUT THE. . . , I WANT TO SEE. . . , RETRIEVE. . . , and many others. The complexity of the translator rises at a rate somewhere around the seventh or eighth power of the number of words permitted and at an even steeper rate if all possible combinations of words are permitted. And I have so far considered only a keyboard medium. Direct voice translation would add the complex dimensions of inflection and variations in dialect, pronunciation, and grammar. When

approached from this angle, one can appreciate the remarkable capabilities of the coresident computers that form the human brain, which can instantaneously process the trillions of bits implied by the preceding description of a very ordinary human environment.

The solution is inescapable: an implied corollary of the biological imperative seems to be that the evolution toward a complete reflection of human intellect in the computer must also recapitulate humanity's intellectual development. In simpler words, the easiest way to get at right brain functions is through the natural left brain/right brain linkage of unrestricted natural language, and the logical way to build this facility into a computer is to teach it the language the way we teach language to a child. The instruction is not quite the same, perhaps, because we can begin with the latent intellectual equivalent of a mature adult who is part genius and part idiot.

A very workable English vocabulary of 100,000 words or so can be easily stored in even a small computer. The complete structural rules, or grammar, can also be converted, albeit painfully, into programs and stored in the computer. If I now leap ahead and make the computer a content-addressable nodal network parallel processor, the corollary becomes marginally possible to implement because the hardware can simulate the basic associative qualities needed to handle complex word relationships.

## THE OPERATING SYSTEM

Now let's discuss the software. Earlier in this article I used the term "operating system," appropriately set off by quotation marks. Every computer has an operating system whose general function is roughly equivalent to the role of the cerebrum in the human brain. It does not contain direct problem solution software, in the sense of  $C = 2\pi r$ , but it does contain a large body of indirect solution software. The job of this "operating system" is to make sure the right program gets the right data at the right time, to keep track of what execution phase each program is in, to execute "pieces" of each program in a carefully planned way so that several programs appear to be running at the same time, to make certain all the peripheral devices are available when needed and are operating correctly, etc.

The operating system is frequently called the executive, which aptly describes its reason for being. The operating system is where we can expect to see the results of extensive research on linguistics, set theory, and communications theory applied directly to the problems of how to understand, program, and control highly parallel processes linked to virtually unlimited related data. Two very complex pieces of software are

# SCSS™ —Data Analysis Made Conversational

If your computer seems more like an obstacle than a valuable research or management tool, it's time you and your computer sat down and talked things out. All you need is the SCSS™ Data Analysis System—the powerful, sophisticated software package that communicates with you in plain English.

SCSS (from the developers of SPSS®—the world's most widely used data analysis system) is a comprehensive package of statistical procedures and data management facilities specifically designed for complete interaction between analyst and data. With little or no previous computer experience, you get output during your first session because SCSS "prompts" you in English, step-by-step. You can concentrate on applying statistical procedures and interpret results, rather than on the mechanics of obtaining output.

## SCSS POWER

SCSS offers a full range of statistical procedures, from simple tables to multiple regression and factor analysis. It has facilities for data selection and transformation. It handles data bases of any size, because there's no limit on the number of variables and observations.

## SCSS EFFICIENCY

SCSS is designed to allow you to see immediate results—at each step you can direct the analysis more effectively. Most important, SCSS allows you to pursue a train of thought or a discovery quickly, as it develops.

Find out for yourself the advantages of talking things out with your data. For full information on the SCSS Conversational

Data Analysis System, call or write SPSS Inc., 444 N. Michigan Ave., Chicago, IL 60611, 312/329-2400.

# ARE YOU AND YOUR DATA ON SPEAKING TERMS?



SCSS is available for IBM 360's and 370's under TSO, CMS, or MTS/DEC 10's, 20's VAX/Prime/Burroughs large systems. Contact SPSS, Inc. for other available conversions.



## Perhaps a poet-programmer will come along who will formulate a language of left brain triggers for reliable right brain responses.

needed to give the operating system a boost into right brain territory. One is a learn-by-experience program that will sit between the grammar and the vocabulary store and will build another store of phrase patterns based on what the computer learns during each dialog with each user. I will assume that synonym linkages are built into the vocabulary file so that the many versions of, say, DISPLAY, which are all identical, can be resolved immediately. The major software problem, then, is to resolve ambiguities and to learn from each resolution how to narrow the range of possible future ambiguities during each successive human-machine session.

The other piece of software is much harder. It will be designed to examine a problem, to decompose the problem into its sequential and associative parts, and then to alter the organization of the computer at each instant of the solution according to which organization can best handle each phase of the solution. This adaptive, or organic, restructuring is similar to the way the human cerebrum flips a problem back and forth between its coresident computers to gain the best problem-solving leverage from the brain. The capacity to learn, which I have defined here as the ability to resolve ambiguities and to apply the resolutions toward solving new ambiguities, and the capacity for adaptive restructuring, which implies the ability to rec-

ognize both the content of a problem and its solution sequence, are deceptively muted software challenges. If they are accepted, the resulting battle will be like wrestling ourselves to the ground. If the solutions work, the resulting insights into brain functions will make the Event at Alamogordo seem like a tiny pop.

A learning, adaptive computer is not only possible, it is probably inevitable (at least in someone's lab) sometime during this decade. It may not be terribly sophisticated at first, which means it may waste a lot of computer power and require terabyte-sized memories, but the blind pressures of technological developments will soon give us IBM 370/168 equivalents on a quarter-inch chip with virtually unlimited superfast memories—all for about the amount of money a kid can earn on a paper route. These components will also be cheap to operate because there is no energy problem. The expense of these devices will be measured by how much raw intellectual energy they absorb from the people who assemble them into improved reflections of themselves. The price will be high.

A learning, adaptive computer is not quite the breakthrough I mentioned earlier because it will provide only the crudest possible bridge into the fuzzy, mystical realm of the right brain. Now I tread on treacherous ground. The goal of a truly right brain aug-

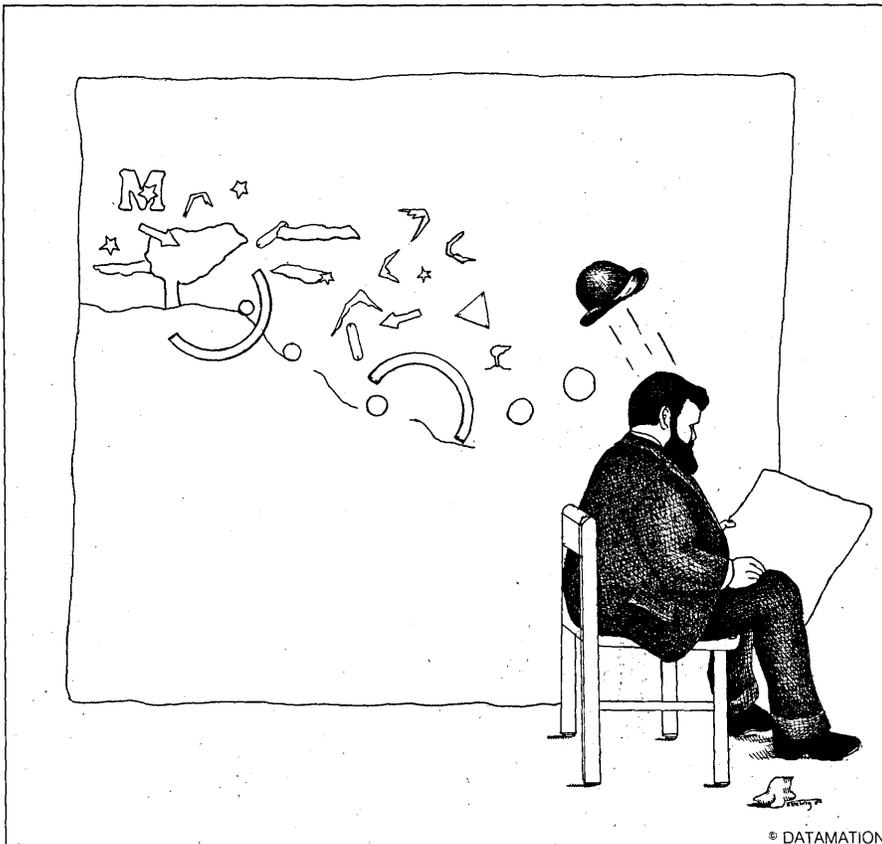
mentation computer would be to harness the complex set-associating, pattern-synthesizing, gestalt processing (all left-brain terms), right brain machinery into coherent and predictable equations that would, in effect, give us the capacity to mechanize intuition. Perhaps the concepts of "harness" and "intuition" are irreconcilable in the same sentence, but I think not. Again, the fundamental barrier appears to be language because of its unshakable roots in the comfortable soil of left brain logic. Telepathy, with its science fiction promise of pattern-to-pattern contact, appears to be out of the serious running, at least for a while, and the more overt right brain languages of art and music are too subjective to build a latter-day COBOL on.

What's left? Nothing—except possibly the shaky bridge of language itself, but greatly modified to deal with sets and combinations of sets rather than with elements of sets as it does now. Poetry, rather the poetic impulse, sometimes seems to be able to cross the bridge into right brain territory without losing touch with the left brain's verbal centers. Perhaps a poet-programmer will come along who will formulate a language of left brain triggers for reliable right brain responses. Maybe the Day of the Poet will be recycled around the turn of the century.

More likely, since the poetic muse is not noted for reliability, the answers will come from mathematics, possibly from a new form of set theory combined with abstract algebra, and from linguistics of highly associative, pattern-based, so-called primitive languages such as Hopi, Australian Aborigine, and Eskimo. I cannot divine how all the pieces will come together to form this right brain metalanguage, but I am convinced that models can be developed.

The models can be tested on our teachable adaptive computer to prove (or disprove) that simple patterns can be mechanically manipulated, and, if proved, to demonstrate that the effects of the manipulations cannot be distinguished from observable right brain phenomena. That will be the breakthrough. Man's intellectual reflection can then be completed in the machine, but with an intensity that may make it difficult for the computer user of 199? to remember the computer's humble, human origins. \*

Vincent Rauzino is software project manager for Data Decisions, Cherry Hill, N.J. Prior to joining Data Decisions he managed new product development for Datapro. He has worked as an independent consultant, and spent six years with Univac doing software design, proposal writing, and documentation. He has a BA from Temple University in music and languages.



## Power Problem #37



### HOW DO YOU PROVIDE CONSTANT POWER FOR A CHANGING COMPUTER-ROOM ENVIRONMENT?

**Answer:** With new Powercenter Plus™, the first power distribution system with microcomputer-controlled power conditioning.

New Topaz Powercenter Plus offers maximum computer-room flexibility and advanced power conditioning — together in one attractive cabinet.

Topaz Powercenter Plus uses flexible cables to safely distribute AC power throughout a computer room. These cables allow maximum ease and economy in arranging, rearranging and expanding computer systems.

Topaz Powercenter Plus also features PowerLogic™, the most advanced power conditioning technology ever developed. PowerLogic provides complete protection against voltage sags, voltage surges, noise transients and other

power disturbances which can impair system performance. In addition, PowerLogic ensures maximum operating reliability and provides for thorough system analysis and diagnosis.

Other important benefits include money-saving 95% power efficiency, computer-grade grounding, patented system status monitoring and system mobility.

To ensure computer-grade power for tomorrow as well as for today, give your computer system protection with a *plus* — Topaz Powercenter Plus.

For more information, return this ad with your name and address, mark the reader service card, or call us:

Topaz DPP Division  
3857 Ruffin Road  
San Diego, CA 92123  
(714) 292-1711

CIRCLE 109 ON READER CARD

**TOPAZ**  
SOLUTIONS TO POWER PROBLEMS™

The Editors and Publishers of  
**DATAMATION.**

request the pleasure of your participation  
in

A Major National  
Executive Briefing

on

Mini/Microcomputers:  
The Revolution in Hardware  
and Software Markets  
and Business Strategies

---

June 21-22, 1982  
The New York Hilton  
New York City

Please send me more information

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Return to:

Kimberly Barton  
Conference Coordination Office, Suite 406-DM  
850 Boylston Street, Chestnut Hill, MA 02167,  
or call (617) 788-5030.

presented in conjunction with

**Software News™**

MM

CIRCLE 110 ON READER CARD

**What to do when a program is large enough to need the benefits of a database management system but too small to justify the DBMS cost.**

# INTERNAL DATABASE MANAGEMENT

by **R. A. Baker**

A database management system (DBMS) is required when several independent application programs need to access the same data. Since each application program has a different view of the data, the function of the DBMS is to reformat the data to satisfy these different views. In its extended application, the DBMS must also protect parts of the data against access by unauthorized programs.

A requirement similar to DBMS arises when a single application program is very large or very complex. The large or complex program has parts within it that are, in many respects, independent of one another but still require the same data. Control of data in this environment can be accomplished through internal database management (IDBM).

IDBM may be implemented as a special DBMS application, but this entails burdening the program with the requirements of the DBMS. These requirements can be too costly to justify for a single program, especially in small programming shops.

IDBM can meet the data management needs of the programs that are too large to do without data management but too small to warrant a complete DBMS. IDBM is a technique, not a program product.

It is most effectively used when the program consists of many independently compiled modules that are linked and executed in one job step. It can be applied to a program that consists of a few large and independent modules, but the data barriers between sections of code are not as well defined as when there are many modules, and this makes the clear organization of data difficult.

Before discussing the IDBM technique itself, I shall review the ways in which data items are physically located in a computer system. In a gross sense, data are located either in core or on external media. (Transient locations such as cache memories, cpu registers, channels, etc., are not necessary for this discussion.)

Fig. 1 illustrates three categories of data location: 1) on files, 2) in the subroutine

area of core, and 3) in the global area of core. These are the areas that are most apparent to the programmer and over which he has some control.

Filed data may be on punched cards, disk, tape, etc. In all cases the data are accessed by the equivalent of a READ or WRITE statement. The programmer must know how the file is organized, and can assume that the program user will provide the external file identifier, such as tape number or dataset name.

Storage in core is implied by reference to a variable name in the program. The programmer is not concerned with core organization or external identifiers. For our purposes we can consider dynamically allocated storage as being reserved in the subroutine area. Access to storage within a subroutine is controlled by that subroutine. Other subroutines can modify the stored contents only if the original subroutine calls first.

Access to global storage is uncontrolled. Any subroutine in the system can gain access without explicit ties to other subroutines. In this way, global storage resembles file storage, but it is rarely as well documented as files. Because of this lack of control, global storage is not the preferred method for large programs.

The alternatives to global storage are to pass data through parameter lists, use files to communicate between subroutines, or don't divide the program into too many modules. This third solution is, in practice, a method of implementing global storage without calling it that, and the same problem arises: flow of data becomes confusing as the program grows.

The second alternative, use of files, has problems similar to those of global storage. The generating subroutine writes the data to a file, and the using subroutine reads the file, but there is no explicit control over what happens to the file between the execution of these two programs. A maintenance programmer might be unaware of the connection and use the file for something else, creating a bug in the system.

The first alternative, use of parameter lists, has three difficulties of its own: the list may have to hold parameters that are not used by the subroutine, the list may get too long, and the list can be difficult to change because all calling subroutines also have to be changed.

All three of these difficulties are answered by IDBM, but only the first will be discussed in detail here. Fig. 2 shows a calling hierarchy in which subroutine A calls B, B calls C and D, and D calls E.

If a data element in A is needed in C, then the element must also appear in the parameter list of B even if B does not use it. It gets worse when C generates data needed by E but not by the other subroutines. In this case, the data element will appear in B and D simply to get the data from C to E. The physical storage will be allocated to B.

A programmer working on a subroutine with unused data elements in the parameter list often has to look at other subroutines to understand the flow of data. If we could get data directly from one subroutine to another regardless of parameter lists and the calling hierarchy, we could solve all three list problems at once: unused parameters could be eliminated, lists could be as long as convenient, and changing the parameter list would be optional.

## TYPICAL PROGRAM HISTORY

We might summarize these methods of handling dataflow by tracing the history of a typical program that began small and grew almost to operating system size.

We start with a simple problem and write a small program to solve it. At first all the variables are local to a few lines of code. With added requirements, the main program lengthens, and a few relatively small subroutines are added.

With continued growth, the main program becomes all but incomprehensible. It is then recoded, perhaps rewritten from scratch, into many smaller subroutines that are functionally distinct. With the addition of func-

tional requirements, most of the growth is in the addition of new subroutines.

At this point, the dominant means of dataflow has shifted from local to the equivalent of global, and now to parameter lists. With further growth, the awkwardness of parameter lists becomes apparent, and a formal use of global storage begins to appear and grow because it is the most convenient method of separating the dataflow from the calling hierarchy.

Finally, so many variables have spilled over into the global area that a major reorganization effort is undertaken to better organize the global area and make use of work files. Records are described for the work files to hold data that can be logically grouped. External documentation of internal structure has become very important.

By now the program may well have been divided into separate job steps, and has grown to the point that it has significant relationships with other programs in the shop. That is, other programs either supply data to or use data generated by our program. With time these programs become ever more dependent on one another, causing overlap among the programs, common data, and extra files.

At this point the system is reorganized around a DBMS. The file becomes the dominant means of data transfer; the external documentation has become formalized and computerized, and is processed by the DBMS. The physical organization of the data is no longer a concern of our program. Our typical program has reached the current state of the art.

Internal database management enters the history of a program when the program is large enough to need the benefits of a DBMS but not large enough to justify the DBMS cost. IDBM is implemented as calls to subroutine entries, as illustrated in Fig. 3.

Fig. 3 shows the simplest form of IDBM: data are held in subroutines where they are generated, and other subroutines access the data by calls. In the figures, subroutine A generates the data and keeps them in local storage. Subroutine C also sets up a storage area for the data element and calls an entry in subroutine A. The entry copies the contents of storage in A to storage in C. A one-way tunnel for data has been built from subroutine A to subroutine C.

As long as the tunnel remains one-way, a simple implementation of IDBM can be maintained. When tunnels become two-way—that is, when data generated by one subroutine are modified by another—the IDBM becomes somewhat more complicated, as illustrated in Fig. 4. In the figure, the variable X is generated by subroutine A and modified by subroutine C. If the storing entry is included in subroutine A, as would be done in the simple case, the logical function of A

FIG. 1

### THREE CATEGORIES OF DATA LOCATION

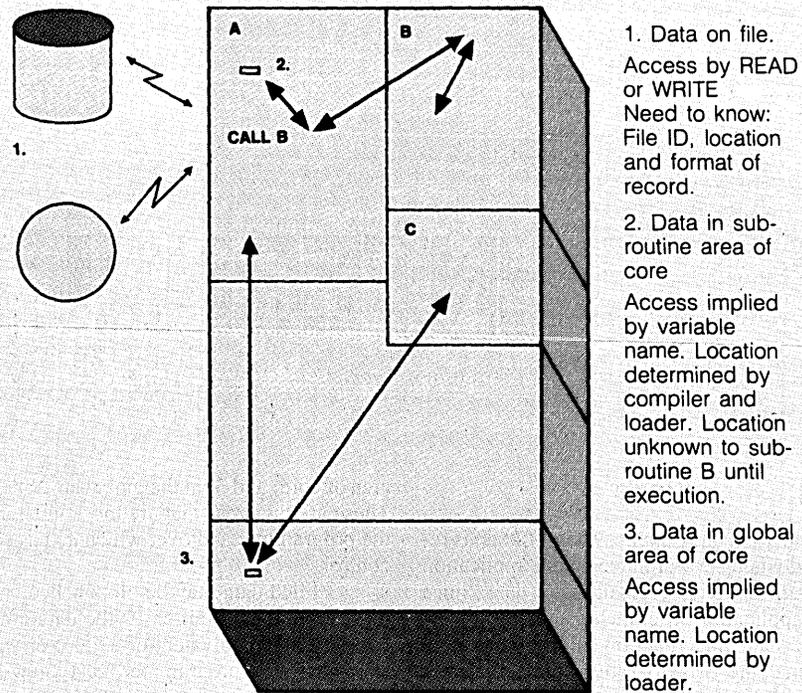
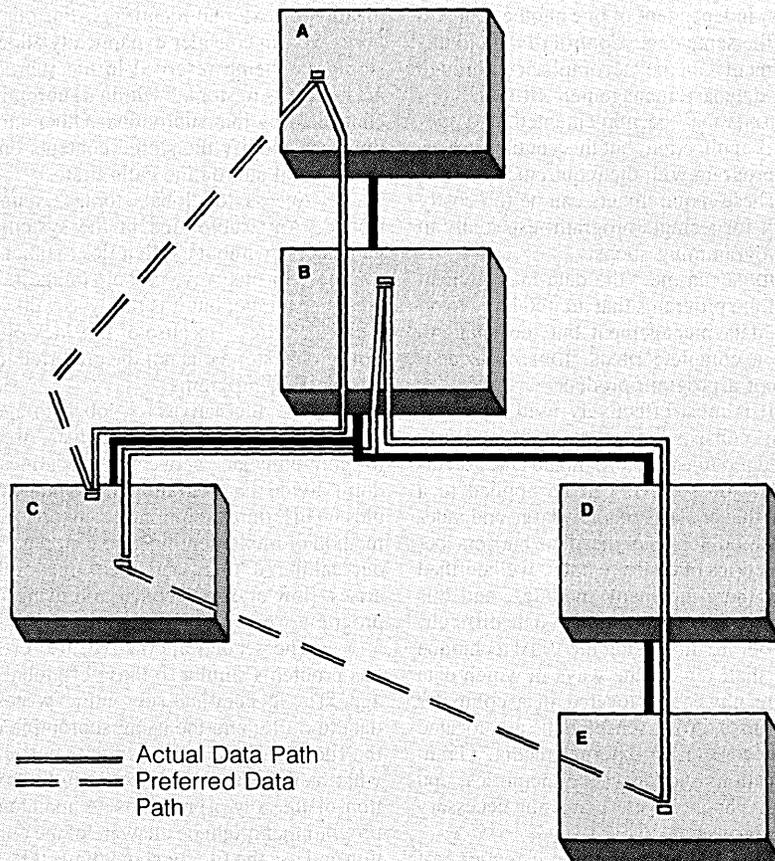


FIG. 2

### A CALLING HIERARCHY



# How to turn your HP-41 into a handheld computer.



## Introducing the Hewlett-Packard Interface Loop.

Starting today, your HP-41C or HP-41CV can be more than just a great little calculator. It's a great little computer, capable of controlling a quickly-expanding family of peripherals.

The new Hewlett-Packard Interface Loop (HP-IL) makes it all possible. HP-IL is an easy-to-use, low-cost interfacing system, specifically designed for battery-operable devices.

### The Interface Module and Peripherals.

At the heart of the system is the Interface Module, which plugs into any one of four HP-41 ports. You can control up to 30 peripherals, using only one port in your HP-41 calculator.

One of the key HP-IL peripherals is the new Digital Cassette Drive. This battery-operable device provides an



HP-IL Drive. This battery-operable device provides an

incredible 131,000 bytes of mass memory.

Another work-saving HP-IL peripheral is the new, battery-operable Thermal Printer/Plotter with enhanced formatting options and graphics. **This is just the beginning.**

There are many more HP-IL products on the way. And they're all designed to provide the versatility and adaptability you expect from HP. You see, Hewlett-Packard is committed to a very big idea: small devices talking to each other, giving you big system capabilities – at small system prices!

For details and the address of your nearest dealer, CALL TOLL FREE: 800 547-3400, Dept. 275K, except Hawaii/Alaska. In Oregon, call 758-1010, or write Hewlett-Packard, Corvallis, OR 97330, Dept. 275K. TTY users (503) 758-5566.

392/04

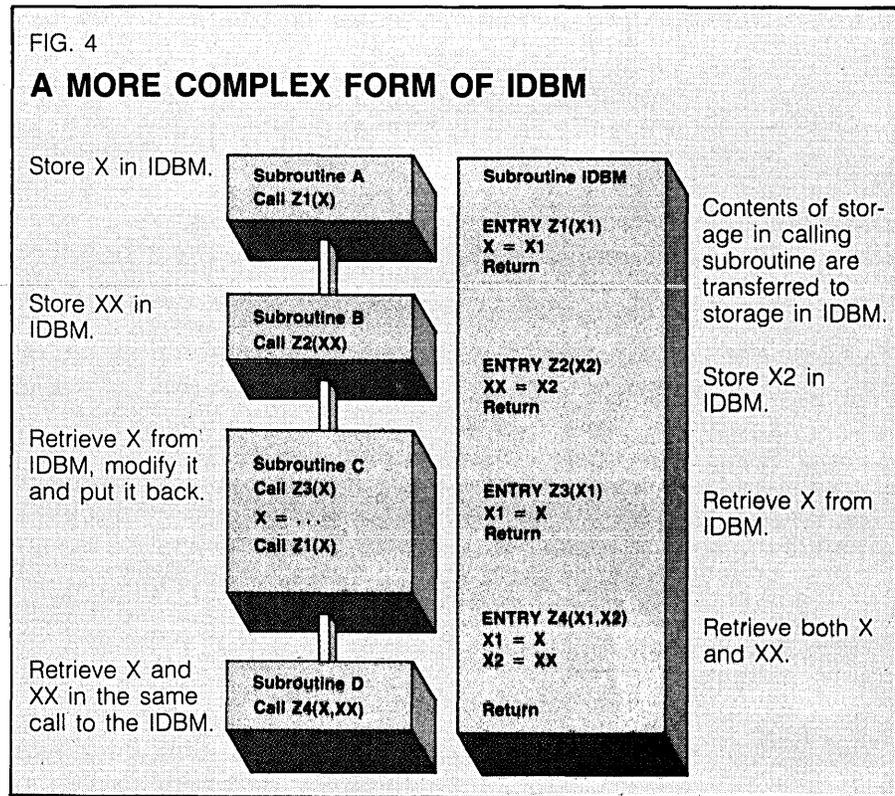
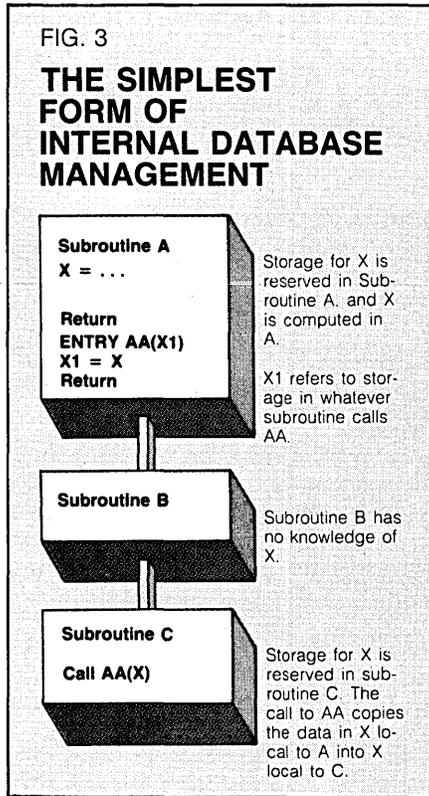
*When performance must be measured by results.*



**HEWLETT  
PACKARD**

CIRCLE 111 ON READER CARD

# IDBM is more than just an alternate way to allocate storage. It provides a combination of flexibility and control not otherwise available.



becomes confusing.

One solution is to put all the data storage areas into one block of code, labeled IDBM in Fig. 4. The IDBM block then becomes similar to global storage, but access is through calls rather than reference by variable name.

Data in the IDBM block can be modified only by a call to an entry that explicitly modifies the data. For example, it is not possible for a programmer working on subroutine D to modify the variable XX without an entry in the IDBM to make the modification. This requirement makes IDBM global variables significantly different from true global variables.

IDBM is more than just an alternate way to allocate storage. It provides a combination of flexibility and control not otherwise available. Storage access can be reorganized when necessary, as in the case of subroutine D in Fig. 4, where the variables X and XX are being retrieved simultaneously.

In relational database terminology, the IDBM has performed a logical join. The IDBM can as easily perform logical projections (the opposite of a join), or retrieve data requiring logical selection at any level of complexity. It can provide sorted tables of data or counts of data elements.

In practice, IDBM retrievals should not be overly complex because maintenance of the IDBM code becomes difficult. The IDBM, when configured as shown in Fig. 4, can take

on some of the objectionable attributes of any other single program that has outgrown its maintainable size.

Entries in the IDBM are called ports, indicating that they are used for access. The ports can be classified as either retrieval or storage ports, and the IDBM code can be organized by port type.

## EXTENDED USE OF IDBM

IDBM meets one of the major goals of database management: separation of data handling from application programming. As data storage requirements grow, data formerly held in core by the IDBM can be written to a file and then read from the file when a retrieval is requested. The subroutine that makes the call to access the data need not be concerned with how or where the data are stored. The IDBM keeps track of whether the data are in core, on a sequential file, a direct file, an indexed file, or wherever.

While performing some of the functions of a DBMS, IDBM is not and cannot be a replacement for a DBMS. By virtue of being internal, it cannot serve more than one application program. However, it can ease the transition of a program into the use of a DBMS because the conversion will affect only the IDBM, leaving the application programs unchanged.

Conversion of an existing program to use of IDBM is less difficult than conversion to

a DBMS and may solve most of the problems that the DBMS would solve.

In most cases conversion can be done along with routine maintenance. The greatest cost of conversion will probably be in second order, or domino, effects; straightening out one mess in the code will make another mess even more glaring in its faults, thereby leading to unplanned maintenance.

IDBM requires learning no new language, no purchase of new software. The only requirement is that we think of currently used languages in a slightly different way; we must think of the data storage facilities of subroutines as well as the data processing facilities. With minimal investment of time and thought, we are able to tunnel information from one part of the program to another without dataflow ambiguities or rigid rules.

As a final suggestion, you may consider adding the name of the calling subroutine as a parameter in the CALL statement. If the IDBM is large and calls to modify data are common, this will help in tracing bugs. Using the name of the subroutine as a parameter is a useful technique in any complex program, whether IDBM is implemented or not.

Dr. R.A. Baker has been active in scientific programming and program design and analysis for 15 years. Currently, he is research supervisor for Exxon Production Research, Houston, Texas.

**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:**

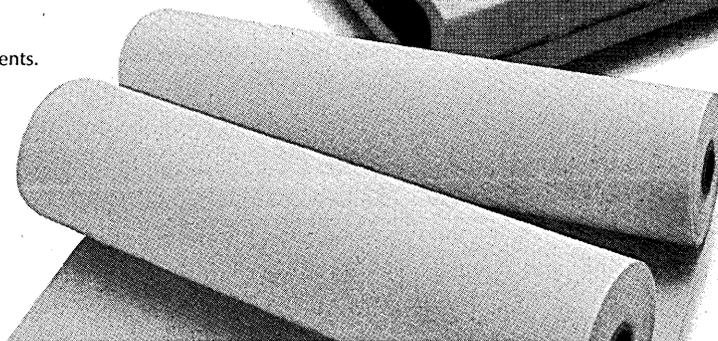
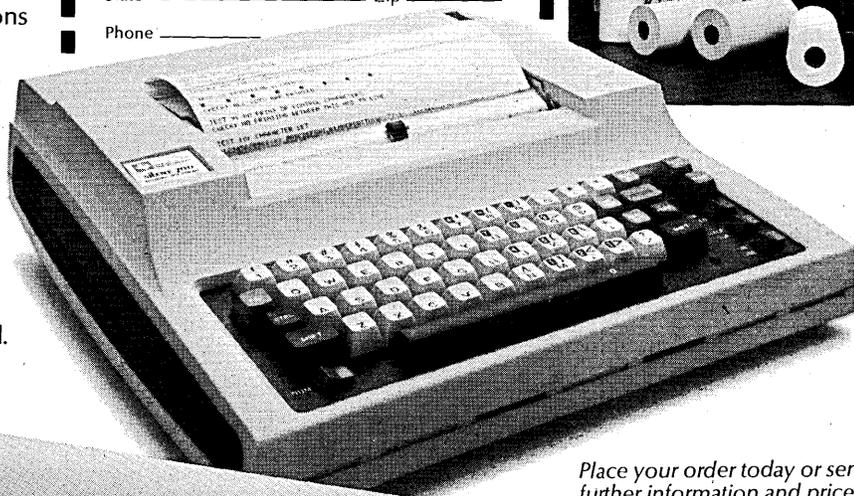
- Nashua® thermal paper is compatible with all TI Silent 700 data terminals and meets all machine manufacturer's specs.
- Paper is prime quality, has bond-like appearance. No waxy coating.
- Lower your cost. Buy direct from us, eliminate middleman and enjoy price advantage.
- Fast delivery. We ship promptly, 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 \_\_\_\_\_



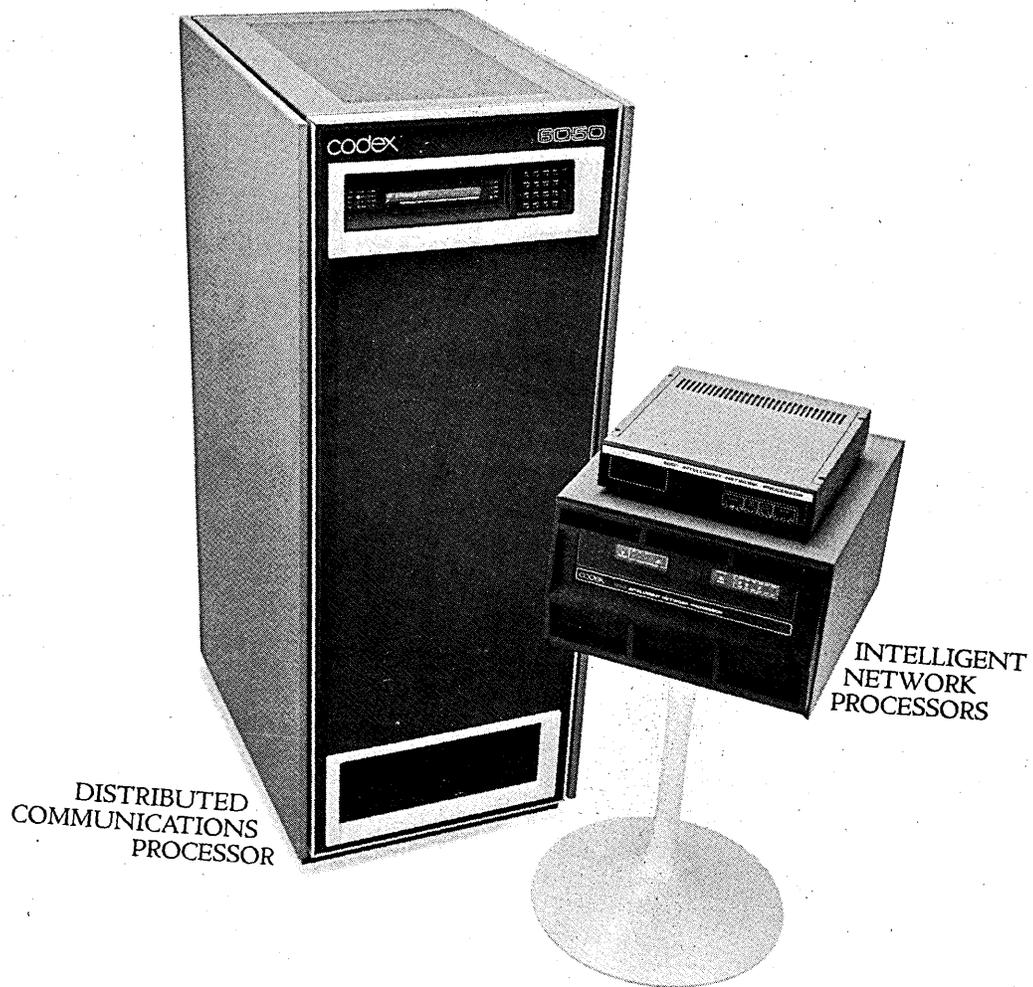
Place your order today or send for further information and price list.

**NASHUA  
CORPORATION**

Chart Division  
44 Franklin Street  
Nashua, New Hampshire 03061  
603-880-2664

**CIRCLE 112 ON READER CARD**

# 84 WAYS CONGESTION



# TO RELIEVE

Codex offers eighty-four variations of Intelligent Network Processors to choose from. All use innovative statistical multiplexing techniques to give you the fastest, most efficient ways to clear up congested circuits and save on data communications costs. And, if you still can't find the solution you need among these — we'll tailor one for you.

Our 6050 Distributed Communications Processor is the most advanced statistical multiplexer in the business. Featuring automatic adaptive routing, user-selectable destination routing, protocol intervention for satellite links, dynamic load leveling, support for up to 64K bps circuits,

and remote diagnostics. All of which improve network operation.

Our 6000 INP Series can handle over 40 different protocols, including SDLC, DDCMP, Bisync, Async, and X.25. Each INP can be adapted to your specific requirements. And each can be upgraded to meet the needs of a growing network, from 2 channels on up.

For any data communications problem, turn to Codex. The complete networking company. For more information, call 1-800-821-7700 ext. 887. In Missouri, 1-800-892-7655 ext. 887.

*See our networking demonstration at NCC, June 7-10th.*

## CODEX

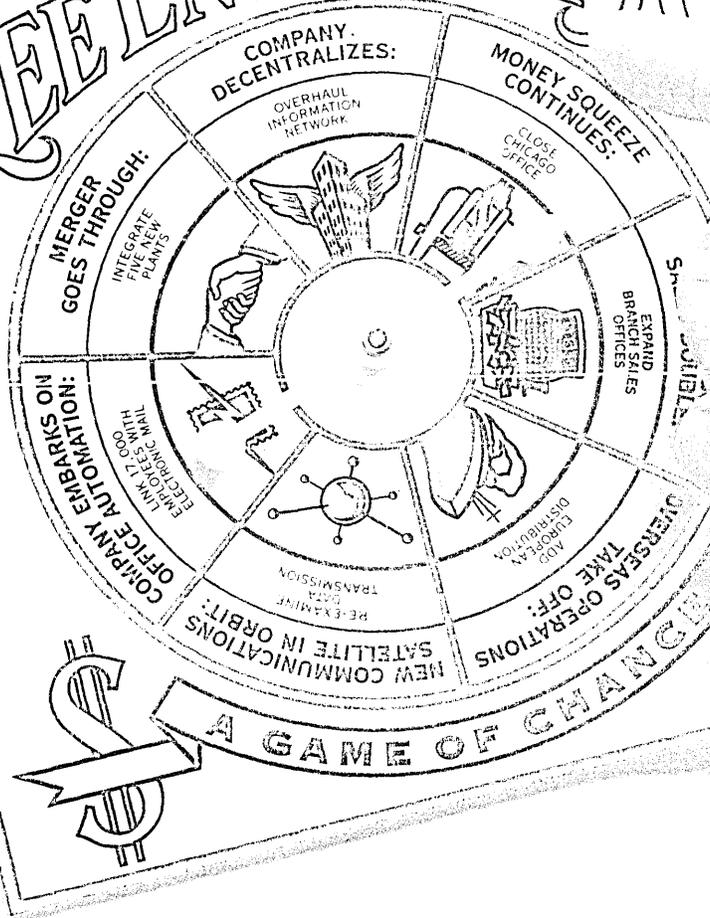
A Subsidiary of  
**MOTOROLA INC.**

*We'll get you through*

**CIRCLE 113 ON READER CARD**

**ANNOUNCING  
NETWORK  
SOFTWARE  
FOR THE ONLY  
CERTAINTY  
IN AMERICAN  
BUSINESS:  
UNCERTAINTY.**

# FREE ENTERPRISE



COMMUNICATIONS SOFTWARE SO FLEXIBLE, IT'LL HELP YOU EASILY KEEP PACE WITH CHANGE, INSTEAD OF BEING OVERWHELMED BY IT.

In the absence of any quick and infallible means of foretelling the future, Data General has designed the next best thing:

The only networking software that accepts the inevitability of change—and is designed to be flexible and comprehensive enough to absorb change as it happens.

## A TRANSPARENT SYSTEM THAT'S ACTUALLY TRANSPARENT.

Data General believes that when it's not necessary to change your applications software, it's necessary not to change it. And our networking software reflects this.

Those periodic network changes that all companies go through (from new computers to new communications links) will require no corresponding overhaul of your applications programs. Your accounting department, for example, can relocate to

another floor, or you can deal with an impending acquisition and the need to integrate the applications of the new company. Spawning new applications and users is a basic business programming.

## SNA AND X.25 NETWORKING THAT WORK IN CONCERT, NOT AT CROSS-PURPOSES.

While there are dozens of companies touting networking software, only a few promise SNA compatibility.

Of those, only one, Data General, is delivering SNA and X.25 networking running simultaneously on the same machine. And the advantages of this in terms of communications flexibility are self-evident.

## LOCAL AND REMOTE NETWORKING THAT ACTUALLY EXISTS.

Because our machines have a communications architecture that is independent of applications, you can do

What's more is that none of these things is done at the expense of integrated local and remote networking without

which true office automation is impossible.

Data General does.

Nor do we require you to make any hard choices to support your network.

Whether it's local, global, batch, interactive, public, private, biync, SDLC, peer, hierarchical, commercial, scientific, mini to mini, or mini to mainframe, Data General has it. And it all runs on our ECLIPSE™ family of 16- and 32-bit computers.

All of which is vital.

After all, if you're being asked to build a network, you're in effect being asked to do the impossible—namely, see into the future. And nobody else makes the impossible as accessible as Data General.

For more information write to Data General, Dept. P-1, 1400 Computer Drive, Waltham, MA 01580.

 **Data General**  
WE ENGINEERED THE ANXIETY OUT OF COMPUTERS.

CIRCLE 114 ON READER CARD

Know before you go:  
a brief rundown on  
more than four dozen  
products that will make  
their debuts June 7 to  
10 in Houston.

# NCC PRODUCT PREVIEW

More than 70,000 people will converge on Houston's Astrodome complex for the 1982 National Computer Conference. Sponsored by the American Federation of Information Processing Societies Inc. (AFIPS), the industry's show of shows will be held June 7-10. While this year's conference won't be the largest yet, that is not AFIPS' aim. The goal is increased quality rather than annual attendance, explains Larry Jennings, manager of exhibit sales and operations.

NCC will house some 650 exhibitors' booths covering 320 square feet of exhibit space in two adjacent buildings—Astrodome and arena systems. The conference program lists some 300 speakers, and there will be 36 scheduled sessions. This year's conference chairman is Russell Brown, formerly of Stone Paper Company. Winston Salem's computer science professor Howard Morgan is program chairman.

And there will be products galore! Because NCC is an important showcase for vendor wares, some companies will display their full line of offerings. Others, such as those listed below, will take this opportunity to unveil a brand new offering. The following is a sneak preview of new products that will debut at NCC.

## ALPHA MICRO Irvine, Calif. COMPUTER SYSTEMS Booth 5512

New from this vendor is a line of Winchester-based multi-user, multitasking timesharing computer systems that use the firm's newly announced processor, the AM-100/1. The processor incorporates the Motorola Mc68000 chip. Applications soft-



## NCC PRODUCT PREVIEW

ware and the operating system are compatible throughout the product range so that the same software will run on the smallest to the largest system. The desktop system for one or two users supports a 5¼-inch Winchester disk; larger systems use 8-inch and 14-inch disks with storage expandable to 2.4 billion bytes. These systems can have up to 8MB of internal RAM and can support up to 64 terminals and printers, depending on the application. Distributed through dealers and systems houses, the systems have a wide range of configurations and pricing as well. End-user prices range from a low of \$6,000 to a high of about \$70,000.

**FOR DATA CIRCLE 550 ON READER CARD**

### ALTOS COMPUTER SYSTEMS

San Jose, Calif.

#### MICROCOMPUTERS

Booth 1114

The new Series 5, a family of multi-user micros incorporating micro Winchester technology, will be displayed at this vendor's booth. Three users share a common database, providing an advantage over separate database maintenance on single-user systems. The two available configurations are the Series 5-15D, with dual 5¼-inch flexible disk drives (1 Mb each) and starting at \$3,990, and the Series 5-5D, featuring a 5Mb 5¼-inch micro Winchester drive backed up by a single floppy (1 Mb) drive and starting at \$6,990. Both systems are compatible with leading operating systems, including CPM, MP/M, and OASIS. Other features are a 4MHz Z80A cpu with 196K of RAM; a double-density, double-sided flexible disk drive; four serial (RS232C) I/O ports; and a parallel I/O port. Each can be field-upgraded with an additional micro Winchester disk drive. The systems permit one serial port to be configured as a high-speed (800Kb) multidrop network port and another to be configured for asynchronous or bi-synchronous communication. Baud rates can be selected independently for the serial ports. Other features include multitasking, direct memory access, and parity checking. Designed for business and scientific applications, the Series 5 has a 90-day end-user warranty and third-party nationwide service.

**FOR DATA CIRCLE 551 ON READER CARD**

### AMPERIF CORP.

Chatsworth, Calif.

#### CACHE DISK MEMORY SUBSYSTEM

Booth 8328

The new Model 5070C from Amperif is a fixed-record length cache disk designed to store the most frequently accessed data from the disk subsystem and high-speed solid-state memory. It can be attached to any IBM 3830 or 3880 control unit or equivalent, and will support IBM software operating systems that support those control units (if the disk sub-

system is initialized for fixed length records.) Standard cache size is 2MB expandable to 16MB. There are three operating modes: full caching, write through, and bypass. The basic system, including dual control processors, four-channel interface, and 2MB of cache memory, costs \$139,200 with monthly maintenance of \$220.

**FOR DATA CIRCLE 552 ON READER CARD**

### ANADEX, INC.

Chatsworth, Calif.

#### DOT MATRIX PRINTERS

Booth 4335

Anadex will demonstrate a new receive-only printer, the DP-9620A, and two enhanced-design printers, the DP-9000A and DP-9500A. All feature acoustic noise levels below 55db and are geared for office use. The DP-9620A is a standalone printer with alphanumeric printing speeds ranging from 200cps for a 7 by 9 dot matrix to 100cps for a 13 by 9 dot matrix that produces draft-quality characters. Other character densities are 12cpi, 15cpi, and 16.4cpi. Character repertoire includes 96-character ASCII set with lower case descenders. For graphics, the horizontal and vertical resolutions are both 72dpi (dots per inch). Two standard interfaces are provided: Centronics bit-parallel and serial EIA RS232C. The DP-9000A and DP-9500A are new versions of the previous DP-9000 and DP-9500. Among the design enhancements for the two printers is front access to DIP control switches, lower noise, and a 2.7K FIFO buffer. Both have three print densities: 10cpi at 150cps with a 9 by 9 matrix, 12cpi at 180cps with a 7 by 9 matrix, and 13.3cpi at 200cps with a 7 by 9 matrix. The DP-9000A can print 80 to 132 columns, while the DP-9500A can print 132 to 220 columns. Graphics resolution for both printers is 72dpi vertically and 75dpi horizontally. In oem quantities of 1,000, the DP-9620A will cost under \$1,100, the DP-9000A under \$900, and the DP-9500A under \$1,100.

**FOR DATA CIRCLE 553 ON READER CARD**

### ANN ARBOR TERMINALS

Ann Arbor, Mich.

#### TERMINALS

Booth 2028

Ann Arbor Terminals will be showing the first versions of four new products. The TOUCH 2000 is a capacitance touch-input crt terminal for high-traffic applications. The user touches menu selections on the screen to bring up additional instructions and menus. The price will be under \$2,500. A second product, an as yet unnamed graphics terminal, will provide a high resolution (1024 by 1024) graphics system with 8 bit planes for gray scale (a larger memory plane will be available), advanced high-speed window controller, and vectors drawn at 900 nanosec-

onds per pixel. This unit, which also features a default alphanumeric character set and programmable keyboard, will cost under \$3,000. An ANSI X3.64 compatible terminal called the GURU will also be unveiled, with selectable display formats ranging from 18 lines to 60 lines and from 40cpi to 160cpi. Standard features include horizontal and vertical zoom and scroll display controls (local and remote), full editing, formatting, block or character transmission, printer output, and programmable keyboard. The GURU will cost under \$2,000. The fourth product will be a lower end terminal called GENIE, with a 12-inch screen, 24- to 80-character lines, and a programmable keyboard, for less than \$1,000.

**FOR DATA CIRCLE 554 ON READER CARD**

### AVIV CORP.

Woburn, Mass.

#### TAPE CONTROLLERS

Booth 8128

This vendor is introducing a magnetic tape controller for DEC LSI-11 computers. The controller can interface any standard half-inch tape drive to LSI-11 computers and can generate IBM-compatible tape. Software compatible with Unix and all DEC operating systems, the TFC 922 controller alone costs \$3,300. A full TFS 922 tape system costs \$6,900. AVIV will also offer the TFS 903 cartridge tape system which provides up to 21MB of storage on half-inch cartridges. The recording is in GCR for increased capacity and integrity. This system, software compatible with all DEC operating systems plus Unix, costs \$3,900.

**FOR DATA CIRCLE 555 ON READER CARD**

### BATELLE COLUMBUS LABORATORIES

Columbus, Ohio

#### DBMS

Booth 1918

Batelle is showing a new dictionary-driven relational DBMS called BASIS-DM, which supports flexible data structuring and allows hierarchical, network, and multikeyed access while storing data in simple "flat files"—relations which let users work with simple two-dimensional tables. A primary application is support of textual applications. For the DEC VAX/DMS, BASIS-DM costs \$29,000.

**FOR DATA CIRCLE 556 ON READER CARD**

### BEEHIVE INTERNATIONAL

Salt Lake City, Utah

#### SMART TERMINAL

Booth 7105

The new Beehive product to debut is code named Topper. The desktop intelligent terminal will be targeted initially at users of IBM 3276/3278 terminals. With communications compatibility to the host mainframe, Topper can be used both on-line and off-line to

# IT ASH MVS COSTS

MICS, the MVS Integrated Control System, slashes costs for:

- Processing of Performance Data
- Staff Development and Support
- Report Generation

... and provides the ability to respond to previously "unanswered" information requests.

MICS is used daily in over 160 data centers for:

- Crises Reporting
- Performance Management
- Capacity Planning
- Management Reporting
- Accounting
- Special Studies

MICS is truly a state-of-the-art advancement for data center management. But don't take our word for it, listen to what our users, the people in the trenches, are saying:

*"It takes one-tenth the time to program reports with MICS compared to our old way. Reports that once took up to seven days now take a half day at most."*

—Senior System Programmer

*"We plan to phase out all other reports and use MICS as a single source for system information. By year end—SMF, RMF, TSO/MON, and IMS log data will be in the MICS data base—all reports will be coming from MICS, and all 50 systems programmers will be using MICS."*

—Technical Supervisor

*"MICS saves people. There are five people in our Capacity Planning operation, and while our workload has increased 300% in the past three years, no one has been added to the staff. MICS generates reports in 10 minutes that previously took up to four days to write in cobol or assembler."*

*"If they took MICS away from me, I'd get a job digging ditches before working with raw SMF/RMF data again."*

—Manager, Planning & Performance

*"A systems manager asked for information on tracking certain TSO users. He got his answer in 1 hour. Time savings with SMF tapes have been impressive, the data reduction a tremendous benefit. Morino's support is excellent."*

—Systems Programmer

*"The Morino tech support is great, they have answers here within a day's time; they beat all other vendors. We are MICS bigots. It's the best piece of software we've ever had."*

—Manager Computer Operations

If you want to learn how to slash your MVS costs and respond to "unanswered" information requests, please send for information on MICS.

**ASK ABOUT THE NEW PERFORMANCE MANAGEMENT AND  
CAPACITY PLANNING COMPONENTS**

**MORINO ASSOCIATES, INC.**  
8133 Leesburg Pike  
Suite 602  
Vienna, Virginia 22180  
U.S.A.  
(703) 734-9494



CIRCLE 115 ON READER CARD

**MORINO ASSOCIATES (UK) Ltd.**  
118 Victoria Street  
St. Albans  
Hertfordshire  
England AL1 3TG  
727-37464

## NCC PRODUCT PREVIEW

access either a remote or local database—a boon to employees who do much of their work at home. For a standard model having 64K RAM, one megabyte of mass storage, asynchronous printer interface, and full CP/M operating system, the list price will be under \$5,000.

**FOR DATA CIRCLE 557 ON READER CARD**

### **CANON USA, INC.** **Lake Success, N.Y.** **SMALL BUSINESS SYSTEMS** **Booth 2511**

Canon will offer three desktop computers. The TX 10/15 is a portable computer with a 26-column tape printer, a small display (one line only), 16KB of internal memory expandable to 32KB with either CMOS or PROM boards. The unit, geared for banks, government, and small business users, will cost \$1,295. A second model, the BX-3, has a built-in 80-column dot matrix printer and one-line display, an MC 6809 cpu with 64KB RAM, and dual 5½-inch floppy drives with 320KB of memory each. This unit, for government and professional applications, will cost \$5,495. Another model for small businesses, the CX-1, has a 12-inch crt display, full ASCII keyboard, MC 6809 cpu, and 64KB of RAM with dual 5½-inch floppy disk drives having 320KB of storage each. The full CX-1 system costs \$4,995.

**FOR DATA CIRCLE 558 ON READER CARD**

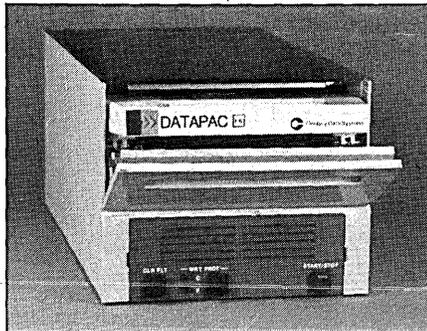
### **CENTURION COMPUTER CORP.** **Richardson, Texas** **SMALL BUSINESS SYSTEMS** **Booth 4032**

Centurion is introducing small business computers under the name Series 5200. The basic 5200 is a desktop model with 64KB of memory, a 1.23MB floppy disk, a crt terminal, and a 24MB Winchester disk drive selling for \$21,222. Access time is 800 nanoseconds. Memory can be expanded up to 256KB; a 32MB Winchester drive is also available. Other optional devices include matrix and line printers, and a character printer for word processing. The 5200 can support up to 10 terminals. Vendor-developed software for the system includes programs for client accounting, distribution management, oil and gas accounting, hospital accounting, word processing, and ADART, a custom report generator.

**FOR DATA CIRCLE 559 ON READER CARD**

### **CENTURY DATA SYSTEMS** **Anaheim, Calif.** **DISK DRIVE** **Booth 5035**

Xerox's Century Data Systems will display its new cartridge disk drive system using Winchester technology. Entering the 8-inch market with 16MB of removable and 32MB of fixed storage, the C8048 is designed to meet



the high performance requirements of large business systems, multiterminal word processing, multifunctional office systems, and larger, general purpose minicomputers. An embedded servo on the removable media improves signal-to-noise performance, allowing greater data storage capacity. A ventilated spindle evenly disperses air over the drive's disks, balancing temperatures, reducing off-track error, and improving data integrity. In oem quantities, the C8048 costs less than \$3,000.

**FOR DATA CIRCLE 560 ON READER CARD**

### **CHARLES RIVER DATA SYSTEMS, INC.** **Natick, Mass.** **DISK SYSTEMS** **Booth 5508**

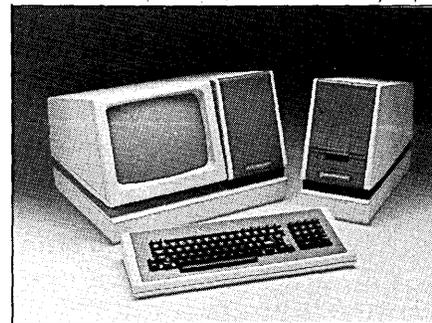
For LSI-11/23 users, this vendor is introducing the RLX3010, a QBUS-compatible system that includes a 31.2MB fixed Winchester combined with a 10.4MB removable Winchester that is software equivalent to four RL02 disk systems. It includes backup power and a front panel diagnostic console, and can be tabletop or rack-mounted, with an optional card back plane. In quantities of 20, the RLX3010 costs \$9,975. For systems houses and large users, the vendor will offer two new Winchester disk drive subsystems. Eight-inch Winchester disks with the following configurations will be shown: DK-40, 33MB and 10MB removable in a single subsystem for SASI bus with software support for the Unos (Unix Rev 7 compatible) operating system; and DK-10, 10MB removable with floppy. In quantities of 20, the DK-40 costs \$9,800 and the DK-10 costs \$6,950.

**FOR DATA CIRCLE 561 ON READER CARD**

### **CIE SYSTEMS** **Irvine, Calif.** **SMALL BUSINESS SYSTEMS** **Booth A762**

This new offspring of C. Itoh Electronics Inc. will unveil a family of small-business systems, dubbed the CIES 680 family. Capabilities range from single-user workstations to large multiuser systems available in configurations from fully packaged systems to unbundled board sets. Sold only in oem quantities, the systems are based on the Motorola

68000 32/16 bit microprocessor and employ Intel's Multibus. (All manufacturing responsibilities will be assumed by Hitachi.) Additionally, the family supports a large software repertoire—Bell Labs' Unix, Motorola's VERSADOS operating system, and an applications software processor called PRO-IV. The low-end CIES 680/10, priced below \$5,500 in quantity, is an integrated workstation with built-in crt, video electronics, and detachable keyboard. It includes an 8MHz M68000 micro with 128KB of high speed RAM, three serial RS-232 and one parallel communications port, a 10MB hard disk for mass storage, and high-density 5¼-in. floppy disk backup drive. At the top of the line is the CIES 680/40, which supports 16 or more user workstations and a range of mass storage peripherals. The 12-slot Multibus chassis in the 19-inch rack



mounting unit supports up to eight Winchester hard disks to a total capacity of 400MB, streamer tape backup, a 300/600 lpm printer interface, and standard 256KB of RAM expandable to 768KB. This model is priced at less than \$12,000 in quantity. Evaluation systems were available last month, and volume deliveries begin next month.

**FOR DATA CIRCLE 603 ON READER CARD**

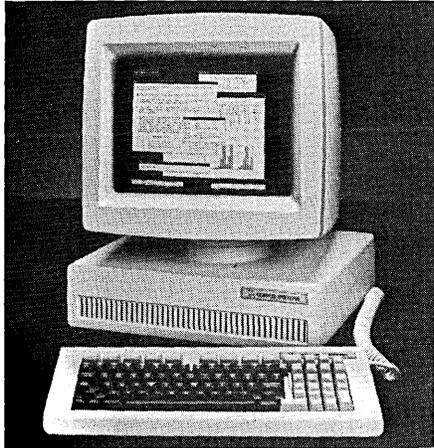
### **COMPUTER AUTOMATION** **Irvine, Calif.** **WORKSTATION** **Booth 7114**

Featured at Computer Automation's booth will be a desktop unit called the Workstation I, modular Naked Mini 4/04 computer system with floppies and/or Winchester disk drives. The basic configuration includes a 16-bit processor; 128KB DRAM; two 1MB, 5½-inch floppy drives; and four asynchronous serial ports. It sells for \$5,300 or \$4,505 in quantities of 100. Three other configurations are available, combining floppies and Winchester drives with printers, programmable function keys, and other options. Unit prices range from \$7,455 to \$10,630 and quantity discounts are available. Vendor-developed or third-party software (such as FORTH, OMNIX, TRIPOS, and CP/M) are available with the Workstation I, which can be used by isos, systems integrators, and software houses.

**FOR DATA CIRCLE 562 ON READER CARD**

**CORVUS SYSTEMS INC.**  
**San Jose, Calif.**  
**PERSONAL COMPUTER SYSTEM**  
**Booth 5916**

The Corvus booth will feature the CONCEPT, a desktop computer system consisting of a 32-bit microcomputer with 256K bytes of RAM memory (expandable to 512K bytes), a 15-inch bit-mapped integrated crt display, and a detached keyboard. CONCEPT can operate as a



workstation on the Corvus OMNINET local network with a disk system containing 6 to 80 megabytes of Winchester disk storage, or as a standalone personal computer when equipped with one or more diskette drives, or with disk storage. Besides a built-in interface to provide a high-speed (1 million bits per second) local network connection, the processor, a Motorola MC68000, also has two RS232C-compatible serial interface ports to connect standard peripherals such as serial printers or modems. CONCEPT supports context switching—suspending one program, executing a second, and then returning to the original program—as well as multiple variable-sized display windows which can overlap. Software provided with the system includes text editing and file management programs, a Pascal compiler to produce native 68000 code, and a program to handle a shared printer. Standard operating system services include concurrent printing, system and user file locking, and network communications. Corvus plans to release additional software packages this year, including electronic mail, DBMS, financial planning and business graphics. The basic system, intended for office and educational applications, costs \$4,995 with 256K bytes of RAM.

**FOR DATA CIRCLE 563 ON READER CARD**

**DATAPRODUCTS CORP.**  
**Woodland Hills, Calif.**  
**DAISYWHEEL PRINTER**  
**Booth 7510**

Dataproducts will introduce the DP-55, a new letter-quality daisywheel printer for use with

word and data processing systems for the office. The DP-55 offers a print speed of 55 characters per second and horizontal resolution of 120 positions per inch with 10, 12, or 15 characters per inch, as well as proportional spacing. The vertical resolution is 48 positions per inch with six or eight lines per inch standard. Separate electronic circuit modules are employed for analog, digital, and interface functions. The boards snap in and out of slots in a tilt-out board cage designed for easy access and board replacement. A range of more than 100 standard plastic and metal print wheels can be used, each with character sets of 88, 92, or 96 characters. In addition to standard RS232C links, interfaces with a wide range of printer personality characteristics are available, including Qume, Diablo, and Centronics protocols. Expandable memory up to 12K bytes PROM and from 1K to 3K bytes RAM allow users to customize operating parameters. With user-oriented features such as quiet operation and a convenient digital display showing job status and printer conditions, plus low maintenance requirements, Dataproducts claims the DP-55's price tag of \$1,790 (oem quantity one) offers a new price-performance standard.

**FOR DATA CIRCLE 564 ON READER CARD**

**DIGITAL COMMUNICATIONS ASSOCIATES, INC.**  
**Norcross, Ga.**  
**STATISTICAL MULTIPLEXORS**  
**Booth 5242**

This vendor will introduce the System 110, a microprocessor-based statistical multiplexor that can be used in a point-to-point configuration or as a slave unit in a full-function network. It can service both terminals and host computers, and can support up to eight ports on a single phone line connecting several clusters of terminals to the host computer. The new System 120 network processor provides the same features as the System 110, but can support up to 32 ports. Both products can be used by medium- to small-sized firms, educational institutions, oems, and end users. The System 110 costs \$1,495; the System 120, \$2,450. A third new multiplexor, the System 125, is a multidrop master network processor to two or more slave processors. It can be configured to support up to 15 slave stations with up to 32 ports assigned to each. The System 125 costs \$3,250.

**FOR DATA CIRCLE 565 ON READER CARD**

**DIGITAL ENGINEERING, INC.**  
**Sacramento, Calif.**  
**TERMINAL ENHANCEMENTS**  
**Booth A513**

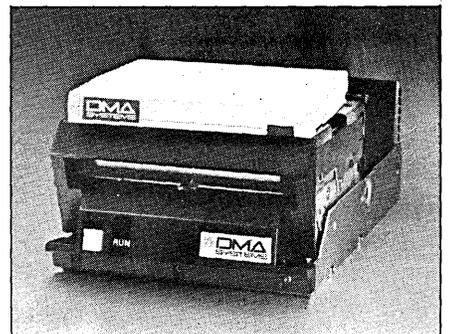
Digital Engineering, a pioneer in graphics upgrades, will unveil its second generation of graphics terminal enhancements, called Retro-Graphics GEN.II. The new computer

terminal upgrade features Tektronix 4010 and 4027 graphics terminal emulation, monochromatics, gray scale and color display formats, standard to medium resolution, 8 bit and 16 bit microprocessors, and compatibility with most industry-standard graphics software. Terminals that can be upgraded with GEN.II Retro-Graphics include the Tele-Video, Lear Siegler ADM Series, ADDS Viewpoint, TI OPTI 900 Model 940, and Datamedia Colorscan. Designed for business, scientific, and engineering applications, the field upgrades provide user-friendly, 4027-like commands which allow the operator to plot points, draw circles and polygons, shade enclosed shapes, and erase selectively. Because the graphics functions are resident in the terminal, complicated charts, designs, and maps can be created quickly, without transmitting large amounts of data to the cpu. For interactive applications, GEN.II-upgraded terminals can be interfaced to an optional input device such as a light pen or digitizing pad, and a variety of output devices including impact and thermal printers, plotters, and cameras. Prices for the enhancements range from \$1,000 to \$1,800 depending on the terminal and options chosen.

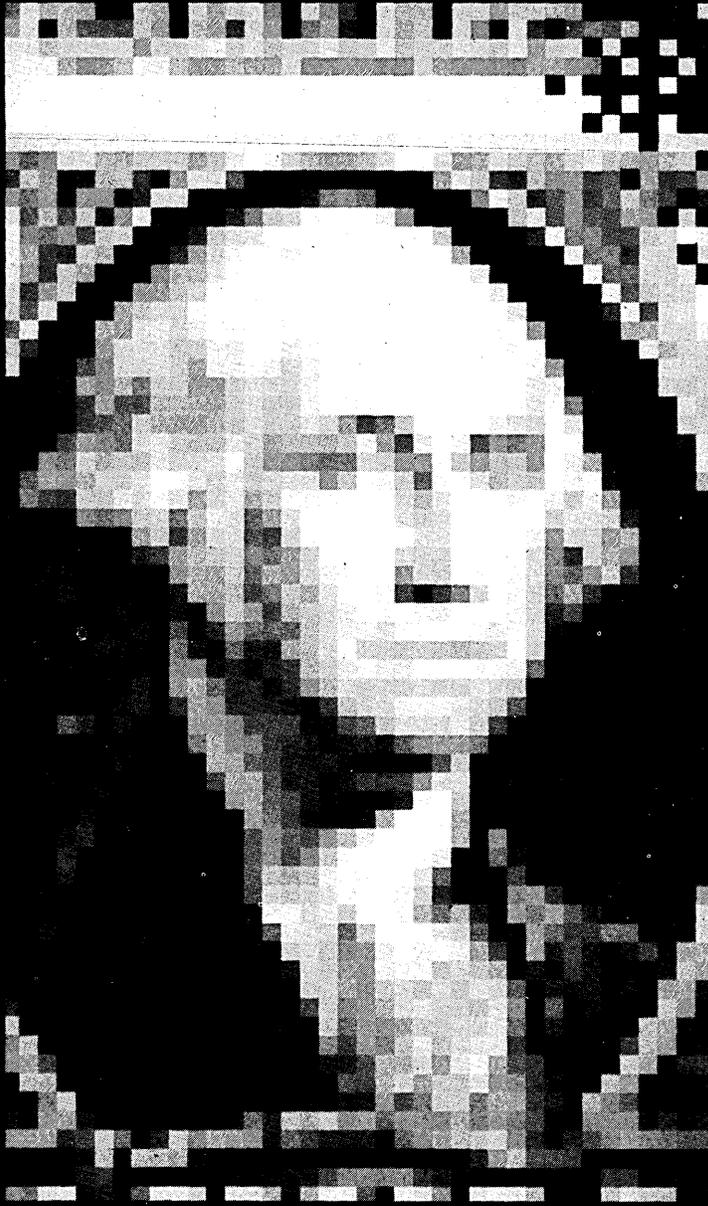
**FOR DATA CIRCLE 566 ON READER CARD**

**DMA SYSTEMS CORP.**  
**Santa Barbara, Calif.**  
**WINCHESTER DISK DRIVE**  
**Booth 1843**

Micro-Magnum 5, billed as the first removable-only 5¼-inch Winchester disk drive using the proposed ANSI standard disk cartridge, will be introduced by this vendor at NCC. At 3¼ inches high by 5¼ inches wide, the device is the same size as the standard 5¼-inch fixed-disk Winchester, and uses the same basic technology as DMA Systems' fixed removable 5¼-inch Winchester. Formatted and unformatted storage capacity of the Micro-Magnum 5 are 5 megabytes and 6.75 megabytes, respectively. There are 306 regular tracks plus five alternate tracks with a density of 454 tracks per inch. Each sector of 33 per track contains 256 bytes plus format and embedded servo data for accurate track positioning. Other characteristics of the drive include 40 millisecond average access time, 5 mega-



**There's never been a time  
when financial control meant more  
to the success of your company.**



And there's never been a financial management system that gives you more control than THE PORTFOLIO<sup>SM</sup>, from United Information Services.

THE PORTFOLIO is the most complete financial management software system on the market today. It's a portfolio of fully integrated, interactive systems designed to give you complete financial planning, analysis, reporting, and control.

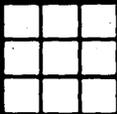
Accounting packages in THE PORTFOLIO include General Ledger, Accounts Payable, Accounts Receivable, Fixed Assets, and Payroll/Personnel. Other products include FORESIGHT<sup>®</sup>, a financial planning and modeling system, FOREGRAPH<sup>SM</sup>, a sophisticated business graphics system, and a corporate tax compliance and planning system named FORETAX<sup>®</sup>.

This means more and better control of your company's cash flow, assets, taxes, budgeting, planning, and decision-making in every area and at every management level. So your company won't just survive the rough times ahead. You'll have the control to actually prosper in spite of them.

Learn all the ways THE PORTFOLIO can help your company do business more efficiently and more profitably. For more information, contact: United Information Services, Inc., Business Information Products Division, 6626 Convoct Ct., San Diego, CA 92111. Attn: National Sales Manager. Or call (714) 560-7070.

Available on:

IBM OS  
IBM DOS/VS  
IBM DOS/VSE  
PRIME  
HP 3000  
UNIVAC 1100  
UNIVAC SYSTEM 80



**UNITED  
INFORMATION  
SERVICES, INC.**

BUSINESS INFORMATION PRODUCTS DIVISION

© 1982, United Information Services, Inc.

**CIRCLE 116 ON READER CARD**

bits per second data rate, less than 90 seconds copy time for 5 megabytes, and a recording density of 8600 bits per inch. In oem quantities of over 1,000, the Micro-Magnum 5 drives are \$995 each and the removable cartridges are \$85 each. Typical applications are in small computer systems for business, local nets, and word processing, where the device may be used as backup for fixed-disk Winchester, as an I/O device, or as primary mass storage. Another application is in multiple drive systems, to provide mass storage redundancy and keep a file on-line.

**FOR DATA CIRCLE 567 ON READER CARD**

**DYNABYTE BUSINESS SYSTEMS**  
**Milpitas, Calif.**  
**SMALL BUSINESS SYSTEMS**  
**Booth 7132**

To supplement its Series 5000 Z-80-based business computers, this vendor will introduce a family of 16-bit microprocessor-based business systems. The systems are capable of processing 8 bit software as well as XENIX, CP86, MP86, and OASIS-16 operating systems. Other features include RAM memory to 1MB, Winchester disk capacity to 80MB, 10 serial ports, ECC memory, multibus and S-100 bus adapters, and communications. The systems can support up to 16 users. Prices start at \$6,995, with configurations ranging up to \$14,995.

**FOR DATA CIRCLE 568 ON READER CARD**

**EXIDE ELECTRONICS**  
**Philadelphia, Pa.**  
**UPS SYSTEM**  
**Booth 1907**

The Series 2000, a new family of UPS systems, is designed for users of mini mainframes, minicomputers, and communications equipment, and can be installed in computer rooms. Batteries and electronics are housed side by side in three compact cabinets to reduce implementation costs. The Series 2000 is available in 10 ratings, from 5 kW to 30 kW, and 30 ratings, from 15 kW to 45 kW. Prices range from \$20,000 to \$50,000.

**FOR DATA CIRCLE 569 ON READER CARD**

**GENERAL ELECTRIC CO.**  
**Waynesboro, Va.**  
**MATRIX LINE PRINTERS**  
**Booth 1614**

The new offering from GE's data communications (Terminet) group is the 3000 Series family of compact, functionally styled tabletop serial printers. The four basic models operate at 180cps, 240cps, and 400cps. Two additional models support word processing applications with 240cps or 400cps draft mode printing, and each operates at 100cps in the high-resolution print mode. These models provide paper-handling capability for con-

tinuous fanfold or semiautomatic single sheet or document feed. A sixth model offers 180cps performance in an 80-column configuration for high-volume output or transaction processing on six-part forms up to 10 inches wide. The paper-handling system provides forms access at 1½ inches above the next print line. The semiautomatic paper feed incorporates a paper-loading guide with a push friction drive and the paper puller. A universal ribbon cartridge fits all models and can be configured for re-inking or carbon film ribbon. The carbon film ribbon, coupled with 144dpi (dots per inch) resolution and .014-inch dot images will support OCR and bar codes. Graphics will be offered at 72 by 72dpi and 144 by 144dpi to match resolution to the application requirement. A variety of fonts to support word processing or label applications will be offered. Depending on configurations, oem pricing in quantities of 100 for the 3000 Series printers will range from \$1,100 to \$2,000.

**FOR DATA CIRCLE 570 ON READER CARD**

**GENERAL ROBOTICS CORP.**  
**Hartford, Wis.**  
**LSI-11-BASED PRODUCTS**  
**Booth 4542**

Four new LSI-11-based products will be introduced at General Robotics' booth. The Super Scorpio computer system contains a 7.5 megabyte 5¼-inch Winchester disk drive and a controller that is software compatible with the DEC RK05. The software emulation provides three logical units, each formatted to 2.5 megabytes of backup capacity. The system may be configured with a DEC LSI-11/2 and 64KB of RAM or an LSI-11/23 with up to 256KB of memory. Pricing begins at \$6,325 in large oem quantities. The vendor will also unveil its first entries onto the LSI-11-based hard disk controller market. Design encompasses 5¼-inch Winchester (Model MWV11), 8- and 14-inch Winchester

(WNV11), and SMD type drives (SMV11), with bit slice microprocessors for easy adaptability. In addition to being used in all of the vendor's hard disk systems, the various controller models can be integrated into the customers' LSI-11 system configurations component modules. Pricing for the controllers in oem quantities is \$1,625 for the SMV11 and \$1,300 for the WNV11 and MWV11. Another new entry into the high-density RAM market is the MLV11, a dual height LSI-11 QBUS-compatible module that includes 128KB of RAM with two independent series asynchronous I/O ports. The MVL11 decodes 22 QBUS address lines and can be configured by switches into a 1 megabyte addressing space. Typical memory access times are 275 nanoseconds, and the asynchronous I/O ports have switchable rates of 50 to 19,200 baud. Two MLV11 modules will directly replace a DEC DVL11-J and MSV11-K. Large oem quantity pricing starts at \$650 for the product, which is designed for oems requiring maximal memory and serial I/O capability in one dual back plane slot. The fourth new offering is a BP44 combination back plane and card cage accommodating eight dual-sized or four quad-sized LSI modules. The unit price is \$250; quantity pricing starts at \$150.

**FOR DATA CIRCLE 571 ON READER CARD**

**GIMIX INC.**  
**Chicago, Ill.**  
**MICROCOMPUTER SYSTEM**  
**Booth A101**

GIMIX's 120KB 6809 micro system supports up to four user terminals and features a 2MHz 6809 cpu, 120KB of static RAM, a 19MB (unformatted) 5¼-inch Winchester hard disk, a 1MB (unformatted) 5¼-inch floppy disk, and four serial I/O ports. Memory is expandable up to 632KB. Added memory, mass storage capacity, and I/O for additional terminals and peripherals are optional. The system's ability to select between two operating systems, un-

CARTOON BY FRANK COTHAM



# Get SNA on

At Northern Telecom, we believe that you shouldn't have to wait for tomorrow to get the technology you need today. So we're not only offering you on-line systems with SNA/SDLC (PU-2 level) compatibility, we're offering them to you today. You can have them working for you within 45 days. No long wait for delivery.

## **The bottom line's good, too.**

Another important fact about our SNA on-line is what it does for your bottom line. Our Model 296C remote system and 294C "large cluster" are both economical, in fact, they're priced substantially below IBM. A low price to pay for such sophisticated technology.

And if you're moving from bisync to SNA/SDLC, you'll appreciate this feature:

at the flick of a switch you can switch protocols. Both models feature a special dual adapter, so you can use either protocol without extra hardware.

## **The human factor.**

To top it all off, these systems are designed for the people who use them. Both are human-engineered with features like a special non-glare display, with an adjustable stand and a keyboard where you can feel the difference.

To find out more about these efficient and economical SNA on-line systems, call your local Northern Telecom representative, or Gary Johnson at 800-328-6760 (in Minnesota, 612-932-8459), or send in the coupon.

We won't keep you waiting.



# line, on time.



To: Northern Telecom Inc., P.O. Box 1222,  
Minneapolis, MN 55440

I would like to know more about your on-line  
SNA on-line.

- Send me more information.
- Have a sales representative contact me.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_ Phone \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

D-5-2

# Imaging the future with IFPS®



## In planning, your reach shouldn't exceed your grasp.

EXECUCOM'S Interactive Financial Planning System, (IFPS®) gives you direct access to a world of alternate images of the future. By asking "what if" and exploring an endless variety of scenarios, you are able to control your business destiny with rational decisions supported by hard facts.

Contact EXECUCOM today for more information on IFPS®—your key to insightful planning.



**Our business is supporting the mind  
with knowledge and technology.**

P.O. Box 9758    Dept. D2-1    Austin, Texas 78766    (512) 346-4980

For further information, contact our Marketing Information Office.  
Poster reproduction of this Howell painting available upon request.

**CIRCLE 118 ON READER CARD**

der software control, makes it usable for software development. The system price of \$8,998 includes OS-9 level 2, a Unix-like multi-user, multitasking operating system, and the OS-9 Debugger, Text Editor, and Assembler. Languages available for OS-9 include BASIC09, Pascal, CIS COBOL, and C. Also included is the GMXBUG/FLEX monitor/operating system combination, a single user (56KB) operating system capable of running any software written for FLEX.

**FOR DATA CIRCLE 572 ON READER CARD**

**INFORMER COMPUTER TERMINALS, INC.**  
**Los Angeles, Calif.**  
**TERMINAL SYSTEM**  
**Booth 5448**

Informer's IBM 3274-51C- and 3276-2-compatible 209 Cluster Controller and Model 315 computer terminal will be displayed for the first time at NCC. Besides IBM's standard features, the 209 includes a 25th status line, a choice of green or white phosphor screen, and interface capability with any ASCII printer. Additionally, the compact Model 315 terminal is available in three package options—data entry, inquiry, and standalone—all of which can be accommodated by a 209 Cluster Controller. The 209 can communicate with IBM communications processors via multi-point binary synchronous communications protocol through standard modems at speeds of up to 9600 bits per second. The introductory price for the 209 is \$4,000, and Informer expects to add soon a daisychain interface to connect terminals in multidrop for communications cost savings. The Model 315 terminal will be offered at \$2,050.

**FOR DATA CIRCLE 573 ON READER CARD**

**INTERNATIONAL POWER MACHINES CORP.**

**Mesquite, Texas**  
**UPS SYSTEM**  
**Booth 7032**

The new FAILSAFE FS-3089 uninterruptible power supply (UPS) system is a 32KW/40KVA UPS that can be located in or near a computer room. The 415Hz FS-3089 is designed for medium to large data processing, communications, and control system users, and can protect the power of the new IBM and Amdahl large computers. It can be modified to a 50Hz or 60Hz UPS as user requirements change. Internal redundancy adds to the system's reliability. Price is about \$40,000.

**FOR DATA CIRCLE 574 ON READER CARD**

**KENNEDY CO.**  
**Montrovia, Calif.**  
**CARTRIDGE TRANSPORT**  
**Booth 1600**

A new cartridge transport from Kennedy combines streaming and start-stop technology, providing high-speed disk backup while

also allowing normal file management operations. In the streaming mode, the Model 6455 stores or restores 20MB of data in less than 10 minutes. Data blocks are written on the fly along with 1.2-inch interblock gaps. In the start-stop mode, the unit permits consolidating files on nonadjacent disk sectors and tracks onto a cartridge using conventional data management techniques. Individual data blocks may be edited or replaced without disturbing previously written records. Using serpentine recording, the four-track transport handles standard 3M-type cartridges. Tape lengths of 300 feet, 450 feet, and 600 feet give unformatted capacities of 11.5MB, 17.3MB, and 21.3MB, respectively. Read/write speeds are 30 inches per second. Data transfer rate is 192K bits per second. The transport incorporates an embedded Picobus formatter which is compatible with Kennedy's Model 6540 cartridge transport and Model 7300, 8-inch 40MB Winchester disk drives. The servo board contains circuits to monitor capstan motor current. In single unit quantities, the Model 6455 with embedded formatter costs \$1,700; oem prices start at \$950.

**FOR DATA CIRCLE 575 ON READER CARD**

**KEYTRONIC CORP.**  
**Spokane, Wash.**  
**ENCLOSED KEYBOARDS**  
**Booth 5505**

Key Tronic is introducing custom enclosure capability to make detached keyboard modules compatible with products used by its present oem keyboard customer base. In addition, the vendor is introducing an off-the-shelf enclosed keyboard called the Model P2492 which includes an 83-station microprocessor-encoded capacitance keyboard with serial ASCII output. The keyboard features the IBM Personal Computer key layout, which complies with ANSI and ISO standards, and has features such as caps lock and a separate numeric/cursor control pad. Other features include full n-key rollover, auto-repeat, plus 5 volt-only operation, and asynchronous 300 baud serial TTL-level ASCII output (9600 baud or RS422 output optional). This 83-station keyboard will be available for \$150 without enclosure and \$213 with enclosure for up to nine units.

**FOR DATA CIRCLE 576 ON READER CARD**

**KIMTRON CORP.**  
**Santa Clara, Calif.**  
**VIDEO TERMINAL**  
**Booth 2532**

This vendor's new ABM 85A video terminal is a low-cost smart crt with a detachable keyboard. It features advanced editing and cursor control, full video attributes (including blinking, blanking, underline, normal and half-intensity, protected and unprotected

fields), local printing, and a high-resolution 22MHZ bandwidth nonglare green display. The unit is microprocessor 8085A controlled and emulates the TeleVideo 925. It operates in conversational or block mode, monitor mode with full 128 ASCII including control codes, and locally or on-line. Communications features include an RS232C serial interface and an optional 20mA current loop (ASCII standard asynchronous), baud rates of 75 to 19,200, and an auxiliary port with an RS2323C interface and baud rates of 110 to 9600bps. The unit lists for \$995.

**FOR DATA CIRCLE 577 ON READER CARD**

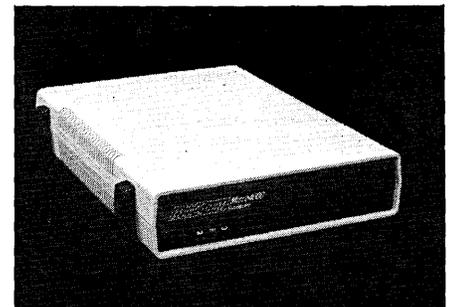
**MDB SYSTEMS, INC.**  
**Orange, Calif.**  
**SERIAL INTERFACE**  
**Booth 2015**

The new MLSI-DLV11-ED from MDB Systems is a single line EIA asynchronous RS232C serial interface with modem control. It is fully compatible with the DEC DLV11-E, and offers the additional advantages of jumper selectable four-level interrupt and troubleshooting capacity. The module has edge-mounted LEDs to indicate data being transmitted or received, plus the status of modem control signals (Data Terminal Ready, Request to Send, etc.) Other features are switch-selectable device addressing, interrupt vectors, and UART parameters. Data rates from 50K baud to 19.2K baud are both switch and program selectable. Single units cost \$430, with oem discounts available.

**FOR DATA CIRCLE 578 ON READER CARD**

**MICOM SYSTEMS, INC.**  
**Chatsworth, Calif.**  
**MODEMS**  
**Booth M103**

Micom Systems' exhibit will feature three new, lower priced models for the 2400bps to 9600bps range in the vendor's Micro4000 modem series. The Model 4024 is a Bell 201 and CCITT v.26-compatible 2400bps modem for use on four-wire, point-to-point or multi-point lines. Available in synchronous and asynchronous versions, it also supports fallback at 1200bps. Average price is \$795. The Model 4048/V27, capable of transmitting over lines which would previously have been unsuited to high-speed use, is compati-



## NCC PRODUCT PREVIEW

ble with CCITT Recommendation V.27 bis, and can be applied to two- or four-wire, full- or half-duplex operation, point-to-point or multipoint. It features fallback operation at 2400bps and its rapid "training" time—18 milliseconds—makes it suitable for multipoint applications. This model costs about \$1,750. A third product, the Model 4096, is one of the smallest (11 × 12 × 3 inches) 9600bps, CCITT V.29-compatible modems. It features fallback operation at 7200bps or 4800bps, and is intended for point-to-point full-duplex, four-wire operation. The Model 4096 costs about \$2,695. All three models operate on unconditioned voice-grade lines, and are available in standalone or rackmount versions.

**FOR DATA CIRCLE 579 ON READER CARD**

### **NCR CORP.** **Dayton, Ohio** **COMPUTER SYSTEMS** **Booth 1127**

To replace its V-8500M and MP processors, NCR is offering a new line of medium and large scale computer systems called the V-8500 Group II Systems. The seven Group II models run under the vendor's Virtual Resource Executive operating system, which provides dynamic resource allocation, virtual storage without rigid memory partitions, and parallel multitasking features. The smallest model is the V-8535 II, an entry-level system available in a 1 megabyte memory configuration for \$59,370. The other three medium scale models are the V-8545 II, with from 1 to 2 million bytes of memory and starting at \$63,240; the V-8555 II with memory sizes ranging from 1 to 4 million bytes and starting at \$82,000, which includes multiprocessor capability (providing about 1.7 times the throughput of a single system in a tightly coupled configuration); and the V-8565 II, featuring a 56 nanosecond cpu and 2 to 6 million bytes of storage, and starting at \$139,000. The high-end group systems, the V-8575 II, V-8585 II, and V-8595 II, are dyadic systems with dual cpus. Each processor has a cycle time of 56 nanoseconds and can be upgraded for multiprocessor configurations.

The first two models offer 2 to 6 million bytes of four-way interleaved memory with prices starting at \$178,250 (V-8575 II) and \$248,000 (V-8585 II). Offering 20% more capability than its sister dyadic systems, the V-8595 II provides 4 million bytes of memory for \$341,000, and can be expanded up to 8 megabytes. Peripherals for the new systems employ a bit-serial-link interface allowing coaxial cable connections. Three-year rental agreements are also available for the new systems, which are geared for general purpose mainframe applications.

**FOR DATA CIRCLE 580 ON READER CARD**

### **NISSEI SANGYO AMERICA, LTD.** **New York, N.Y.** **PERIPHERALS** **Booth 1629**

This oem house, which is majority owned by Hitachi, will demonstrate a number of products new to the U.S. market. The Hitachi CD 2053D is a high-resolution 19-inch color monitor for graphic applications. It features a 720 by 416 dot resolution using a .31mm crt, with TTL or analog interfacing. In oem quantities of 1,000 the price is \$1,100. Also shown at booth 1629 will be the Hitachi FP 1250 band line printer, which prints at 1250 lpm with a 64-character set. The model is designed for heavy duty applications requiring a large daily volume of printed output. Oem quantity pricing is \$10,400. Another product new to the U.S. is the KDS 7860, the Kokusai Electric Co. 8086-based small business computer. The system operates under MS DOS or CMP-86 OS. The price is \$1,700 in oem quantities of 5,000.

**FOR DATA CIRCLE 581 ON READER CARD**

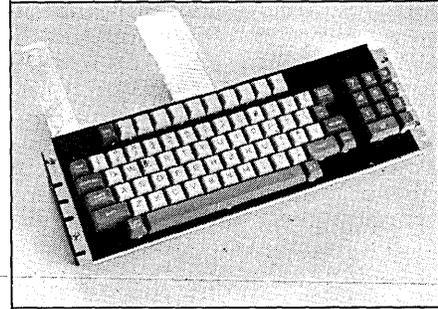
### **NIXDORF COMPUTER CORP.** **Burlington, Mass.** **DISTRIBUTED SYSTEMS** **Booth 6123**

Nixdorf will show its new 8860 family of distributed information systems that use System Network Architecture (SNA) to communicate with Nixdorf and IBM host computers. The family includes the 8860 Model 5, Model 10, and Model 40. Data communications functions are managed by a dedicated microprocessor called the Programmable Line Controller. An integrated remote diagnostic facility is also featured. Models 10 and 40 provide users with development software including ANSI '74 COBOL, Nixdorf's RAPID interactive program generator, and a full set of utilities. Prices for the 8860 range from \$31,700 for an entry-level cluster system to \$144,850 for a large ddp system.

**FOR DATA CIRCLE 582 ON READER CARD**

### **OAK SWITCH SYSTEMS INC.** **Crystal Lake, Ill.** **KEYBOARD** **Booth M235**

Oak Switch Systems will show a new standard 81-position version of the Full Travel Membrane Keyboard the vendor first brought out two years ago. The keyboard is now available to small volume users as well. The 81 positions include a 60-position typewriter layout with standard control keys, an 11-position numeric keypad, and 10 function keys. Plunger and key cap choices offer even further flexibility. An Oak encoder package is also available; the encoder mounts directly onto the back of the keyboard and converts its row/column matrix to an ASCII code. The standard encoder provides TTL ASCII eight-



line parallel output, with strobe. Options provide a choice of tristate, open collector, parallel ASCII, or RS232C serial output. Coding is four-level (unshift, shift, caps lock, and control). All keys are debounced, and auto repeat may be selected for all noncontrol keys. The encoder also includes a choice of two-key rollover or Oak's Entry Error Elimination system, a microprocessor-based n-key rollover function with phantom key lockout provided for all data keys. In quantities of 100, the parallel encoded boards cost \$95 each; the unencoded boards \$55 each.

**FOR DATA CIRCLE 583 ON READER CARD**

### **ON-LINE SOFTWARE INTERNATIONAL** **River Edge, N.J.** **SYSTEM SOFTWARE** **Booth 8019**

On-Line Software's DataVantage is a new IMS database productivity aid. DataVantage ensures that all possible combinations of data are included in the test database application, helps programmers manipulate the individual fields with modification, insert and delete functions, includes a logical database compare facility, and saves and restores multiple copies of the test database in one central location. The software can be used by IBM mainframe shops compatible with IMS DB/DC, CICS-DL/I, and IMS batch, and supports all OS/VS users. The price is \$25,000 until May 31; \$30,000 thereafter.

**FOR DATA CIRCLE 584 ON READER CARD**

### **ORANGE MICRO, INC.** **Anaheim, Calif.** **PRINTER INTERFACE** **Booth A545**

The Grappler, a Centronics-compatible parallel interface for Apple II and Apple II Plus computers, will be featured at this vendor's booth. The Grappler has on-board firmware to reproduce the Apple high-resolution graphics screen onto many popular graphics printers. Users can print hi-res page 1 or page 2 in several different modes; a double-size option is also available. A chart recorder may be simulated by printing successive and continuous graphic pages. The user can also start printing the image at any column or center it on a standard 8½-inch page. Also featured are text commands, including text screen

## NCC PRODUCT PREVIEW

dumps, settings of margins and page lengths, perforation skip-over, and word wraparound with breakpoint on nearest blank. The Grappler interface is compatible with Apple Pascal and CPM, and will currently support Anadex, IDS Paper Tiger, IDS Prism, Centronics 739, NEC 8023, Malibu 200, and Epson MX70 and MX100 printers. Retail price is \$175.

**FOR DATA CIRCLE 585 ON READER CARD**

### **PENTEL OF AMERICA, LTD.** **Torrance, Calif.** **SMALL BUSINESS SYSTEM** **Booth A808**

PenTel's U.S. division is introducing the Penputer PS-850, a small business computer employing a menu-input tablet. The tablet resembles an open loose-leaf notebook placed over a touch-sensitive keyboard surface. Users input data by touching a stylus to coded areas on the tablet face. Because of the speedy input facility, the Penputer can be used for control of orders, sales, inventories, and accounting systems, and is equipped with two 8-inch 2MB floppy disks. Main memory consists of 16K ROM and 64K RAM. The terminal features a 14-inch, 80-character by 24-line crt display. A small attached dot impact printer is optional. The PS-850 is an extension of technology used in the previous PS-820, which featured use of a light pen and light-sensitive screen. System price: \$13,000.

**FOR DATA CIRCLE 586 ON READER CARD**

### **PERTEC COMPUTER CORP.** **Chatsworth, Calif.** **TAPE DRIVE** **Booth 3504**

Pertec's Peripheral Division will display a new half-inch streaming tape transport designed for oem applications requiring reliable, low-cost add-on memory for small- and medium-sized business systems. The StarStreamer features standard IBM and ANSI formats for data interchange and data processing, and provides high throughput rates, with 46 megabytes of storage capacity for backup applications. It incorporates standard interface and format to accommodate existing software packages when operated at 25ips. The transfer rate of 260 kilobytes per second in the streaming mode includes automatic gap extension, reducing demands on the controller. A complete diagnostic package includes auto-diagnostics on power-up, as well as continuous monitoring of power and environmental controls. Single-track error correction and precision tape handling ensure less than one hard read error in 200 or more 10½-inch reels of tape. The StarStreamer's dual density option provides 92 megabytes of storage capacity in the streaming mode, 46 megabytes at 1600cpi and 92 megabytes at 3200cpi. Drawer-mounted loading and front-panel

controls reduce operator training, and mounting dimensions are 8.751 inches high, 22 inches deep, and 17 inches wide. Oem quantity pricing starts at under \$2,400.

**FOR DATA CIRCLE 587 ON READER CARD**

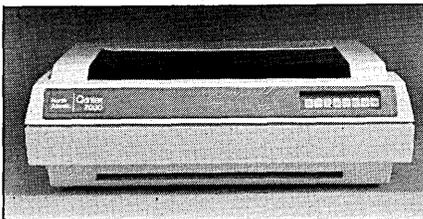
### **PRINTEK, INC.** **Benton Harbor, Mich.** **PRINTERS** **Booth A664**

Two new dot matrix character printers will debut from Printek. The Model 920 operates at 340cps in a 9 by 9 character format. The Model 920 operates at 200cps. Both printers feature multifunction capabilities of dp print, business graphics, and correspondence print. The printers can be used with small business systems, graphics systems, word processing gear, and telecommunications terminals. List prices are \$1,925 for the Model 910 and \$2,595 for the Model 920.

**FOR DATA CIRCLE 588 ON READER CARD**

### **QUANTEX DIVISION** **North Atlantic Industries, Inc.** **Hauppauge, N.Y.** **DOT MATRIX PRINTER** **Booth 4516**

Quantex's new Model 7030 is a quad mode impact printer with several word processing functions, including proportional spacing, left and right justification, and continuous



underline capability. Its four operating modes suit different applications: letter quality (37cps), memo quality (75cps), compose copy (150cps), and draft copy (180cps). Graphics resolution is 72 by 144 dots per inch vertically, and 144 dots per inch horizontally. Standard print resolution is one 180cps font for draft copy. The printer's standard interfaces are Centronics parallel and RS232 serial including current loop. Its horizontal formats are 8 or 13.6 inches, with 136 characters per line at 17.2 characters per inch. The vendor hopes to sell the 7030 as a full function printer to be used in place of high-speed draft printers and letter-quality printers. The unit price is \$1,900, or \$1,350 in oem quantities.

**FOR DATA CIRCLE 589 ON READER CARD**

### **SECOND SOURCE COMPUTERS, INC.** **Tustin, Calif.** **MINICOMPUTER** **Booth M158**

This vendor will show a new 16 bit minicomputer that is a single-board computer with an

on-board map (bypassed in V77-200) mode. Standard memory size is 256KB of error-check memory with a cycle time of 495 nanoseconds. Memory is expandable to 1 million bytes. I/O architecture is Sperry Univac MCO compatible with standard DMA rates of 250KHz and block mode DMA of 1MHz. The instruction set is compatible with the Sperry Univac V77-800 running Vortex II operating system, with software performance compatible to the V77-600 minicomputer. Peripherals planned for the initial system will be existing products and an SMD interface using block mode DMA. Future products will include a low-cost floppy, streaming tape, floating point, and data communications. In single quantities the basic 256KB system costs \$7,000.

**FOR DATA CIRCLE 590 ON READER CARD**

### **SHUGART ASSOCIATES** **Sunnyvale, Calif.** **DISK DRIVES** **Booth 3512**

Shugart's new entries are the SA200 minifloppy disk drive and the SA810 and SA860 8-inch floppy disk drives. The minifloppy is intended for use with personal computers, word processors, intelligent typewriters, workstations, and terminal add-ons. It features 125KB (single density) or 250KB (double density) of unformatted capacity, and is 2.05 inches high—less than a third the height of standard minifloppy drives. The SA200 is compatible with most existing minifloppy media and is interface compatible with the industry standard SA400/450. It fits under the keyboard, and can be tilted 10 degrees without affecting performance. A removable faceplate further increases the amount of space available to systems designers. The SA810 (single-sided) and SA860 (double-sided) drives are half the height of standard 8-inch floppies, allowing 8-inch drive users double capacity by simply replacing one standard drive with two new ones. Double-sided, double-density models offer capacity of 1.6MB. In quantities of 5,000, the SA200 costs \$118. In quantities of 500, the SA810 costs \$385 and the SA860 costs \$450.

**FOR DATA CIRCLE 591 ON READER CARD**

### **TEC, Inc.** **North Hollywood, Calif.** **SMART TERMINAL** **Booth 7011**

This crt manufacturer is introducing the 630C, a smart terminal with a magnetic stripe card reader keyboard to protect confidential files. Each operator must have a magnetic stripe card containing such data as a user identification number and security level code. Applications include credit card sales transactions, airline ticketing, security and identification, audit trailing, banking trans-

## NCC PRODUCT PREVIEW

actions, and medical records. Other key features include encoded cards to IATA standards, with ABA and thrift standards as options; six function keys capable of generating 16 two-character code sequences; separate cursor control and edit cluster; and software-controlled keyboard lock/unlock, as well as local and remote tty lock keys. Ergonomic features include detachable keyboard, tilt-swivel mechanism for the terminal, and nonglare phosphor display in green and yellow. Display features include 25 lines of 80 characters formed in a 6 by 8 dot matrix in an 8 by 10 field, 96 displayable ASCII codes, upper and lower case characters and control codes, raster scan character generation, and blinking block cursor with software-controlled display/nondisplay of cursor. Among the switch-selectable features are eight data transfer rates from 110 baud to 9600 baud; 10 or 11 bit serial asynchronous ASCII data with odd, even, or mark parity; EIA RS232C interface; half- or full-duplex; line, page, or partial page transmit; and protected fields with transmit or unprotected data-only or all data. End-user prices start below \$2,000, and oem pricing and customization are available.

**FOR DATA CIRCLE 592 ON READER CARD**

### **TECSTOR, INC.** **Huntington Beach, Calif.** **DISK DRIVES** **Booth A741**

Tecstor will unveil the Sapphire family of Winchester disk drives. The three models each have an SMD interface, an integral power supply, and self-checking diagnostics. The Sapphire 80, offering 80MB of storage, will cost \$4,450 in quantities of 250. In similar quantities, the Sapphire 165 (165MB) will cost \$4,950, the Sapphire 200 (200MB) \$5,450.

**FOR DATA CIRCLE 593 ON READER CARD**

### **TEKELEC INC.** **Santa Monica, Calif.** **TESTERS** **Booth A554**

This manufacturer of testing equipment will unveil the TE 820, a pulse code modulation (PCM) tester, and the TE 9001, a data communications simulator. The TE 820, which costs \$9,750, combines a simulator and analyzer in one device. The analyzer can simultaneously and independently monitor the PCM line, while the simulator generates multiframe data at up to 2.048Mbps, which is looped or responded to by user PCM equipment at the other end of the link. The unit conforms to CCITT standards, and measurements can be read by an IEEE bus. The TE 9001 is a user-definable simulator of high-speed data communications protocols. Under scenario control it will simulate X.25, SDLC/SNA, I PARS, HDLC, and other protocols with densities up

to one flag between frames, and speeds above 128Kbps. The TE 9001 costs \$18,000. Both devices are geared for data communications developers, network users, and R&D labs.

**FOR DATA CIRCLE 594 ON READER CARD**

### **TELEGENIX, INC.** **Cherry Hill, N.J.** **LARGE DISPLAY TERMINAL** **Booth 7006**

Telegenix is offering a video data terminal with a 10-foot display. The flat-panel device, called the TDS2000, is readable from 100 feet away in bright light. Several smaller models will also be available, and all models are compatible with most computer and communications networks. The vendor developed the large screen for users in the communications, transportation, and utilities industries who need large audience, bright light displays.

**FOR DATA CIRCLE 595 ON READER CARD**

### **TELERAY DIVISION** **Research Inc.** **Minneapolis, Minn.** **CRT TERMINALS** **Booth 5706**

A smart multipage crt terminal called the Model 16 will be introduced at Teleray's booth. Its major features include four pages of display memory, expandable to eight—either volatile or nonvolatile; the capability to transfer "excess" display memory into function memory; redefinable logical line and page length; and redefinable keys. Standard function memory is 512 bytes, programmable up to 32 functions. In the eight-page, nonvolatile version, for example, if only two display pages are needed, the remaining 23,040 bytes (which include the attribute memory pages no longer needed for display purposes), can, with an appropriate ESC sequence, be designated as additional functional memory. Up to 64 (32 shifted/unshifted) keys can be redefined with ESC sequences to represent alternate characters, codes, or sequences. The standard four-page display format can be translated into a larger number of



display pages by simply redefining logical line and page length. Character sets include 96 ASCII and 32 control characters, 64 mosaic graphics, and 64 line drawing and special symbol characters. Display attributes include dim, underline, blink, inverse video, and blank (security fields), plus smooth scrolling up or down at either six or 12 lines per second. There is also a screen-saver feature, which automatically drops display brightness to zero after 10 minutes of terminal inactivity and instantly returns the display to normal (without loss of displayed information) upon receipt or entry of any data. The Model 16 is ANSI X3.64 compatible, operates in either half- or full-duplex (with or without local echo), transmits in block mode (line, message, window, page, or memory) as well as character mode, and has a full performance I/O auxiliary port. Designed for all asynchronous applications, the Model 16 lists for \$1,545.

**FOR DATA CIRCLE 596 ON READER CARD**

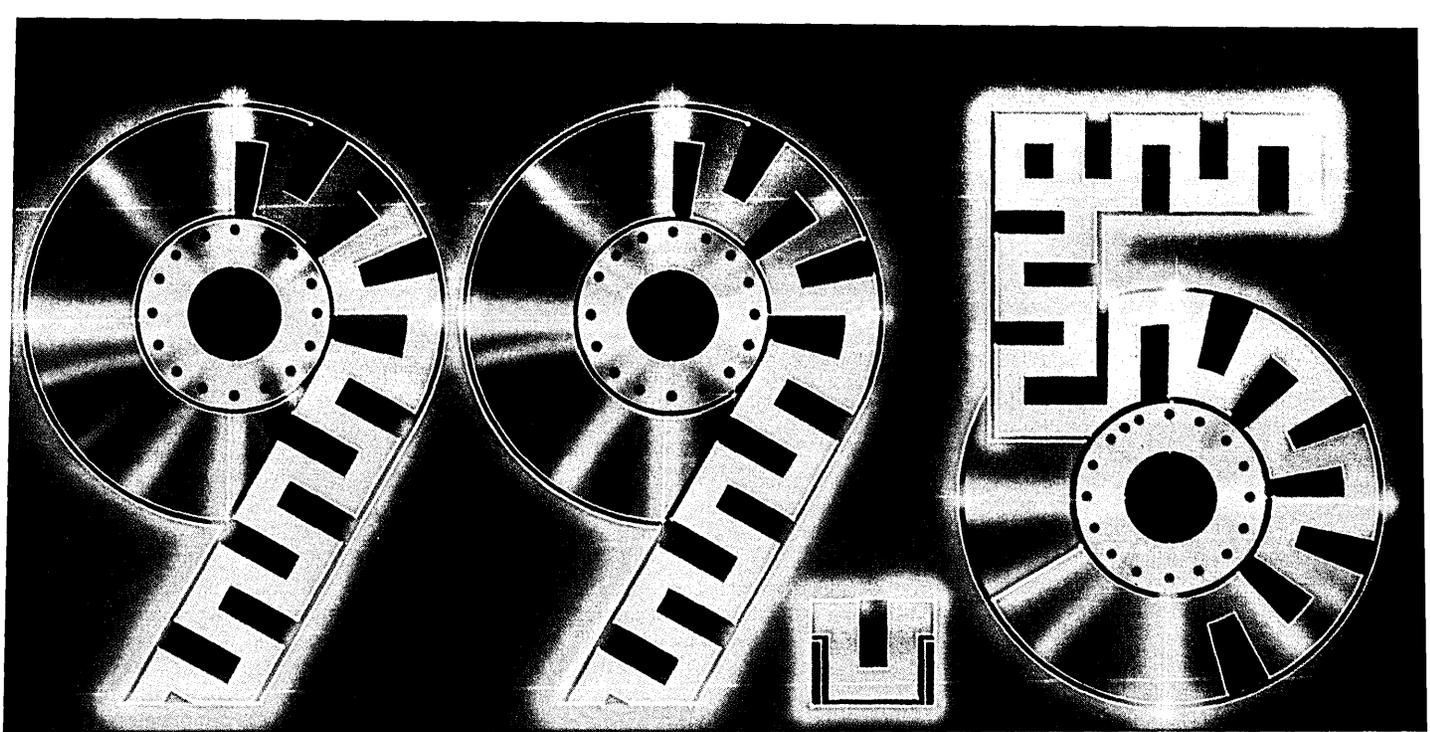
### **TELEVIDEO SYSTEMS, INC.** **Sunnyvale, Calif.** **SMART TERMINAL DEVICES** **Booth 7128**

TeleVideo will unveil four additions to its smart computer terminal and computer systems product lines: two new crts and two storage devices. The Intelligent I is a smart terminal with 64K bytes of RAM, which gives it local processing capability. Retail price is \$1,695. The Model 970, an extension of TeleVideo's Model 950 smart terminal, offers expanded memory and additional operating and printing functions, with a price of about \$1,400. To expand the memory and increase the versatility of the company's TS806 computer system, TeleVideo will introduce the TS806C and TS806H storage devices. The multi-user, cpu-based TS806 is configured with 64K bytes of RAM, a 10MB 5¼-inch Winchester disk drive, and a 500KB floppy disk. The TS806H gives the computer system the expanded power of another 10MB, 5¼-inch Winchester disk drive. The TS806C tape cartridge backup to the TS806 further enhances storage with 17.2MB of tape storage capacity. Prices for these devices are \$3,600 for the TS806H and \$3,995 for the TS806C.

**FOR DATA CIRCLE 597 ON READER CARD**

### **TELTONE CORP.** **Kirkland, Wash.** **DATA CARRIER SYSTEM** **Booth 234**

This vendor's data carrier system is available in a two- to eight-channel package that can be expanded into a large-scale, low-cost local data communications network. Called the DCS-2, it adds a data channel to existing PABX telephone systems for simultaneous voice and data communications on local telephone



# 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



## NCC PRODUCT PREVIEW

pairs. Terminals with plug-in components can be placed wherever a telephone is located, without tying up a phone. The dedicated, full-duplex, asynchronous data links run at speeds up to 9600bps. System range is limited to 5,000 cable feet between the telephone site and PBX interface point. If the distance between PABX wire center and the computer room exceeds several hundred feet, a DCS-2A system with integral multiplexors may be used to concentrate 32 channels over a phone company T1 digital carrier or private four-wire circuit. A complete two-channel Mini-File starter system costs under \$1,500, including a card file, dual channel termination card, and two station units. A complete eight-channel system costs approximately \$474 per channel (The RJ71C jack that provides the interface to the PABX system can be ordered from the PABX service provider.)

**FOR DATA CIRCLE 598 ON READER CARD**

### TEXPRINT, INC.

Burlington, Mass.

#### PRINTER/PLOTTER ENHANCEMENT Booth 7906

DEC PLOT, a new plug-in electronic module for DEC LA120 terminal printers, provides a precision dot-addressable plotting feature over the entire page, while maintaining the speed, flexibility and reliability of the conventional LA120 printing mode. Applications include charts, diagrams, maps, formatted reports, and other graphic data. DEC PLOT software conforms to SEC graphic protocol

standards. It is compatible with most DEC graphic terminal products, used with the vendor's TEXPLOT, the portable graphics terminal based on TI's Silent 700 equipment. It can also be used on timesharing services. Only three simple commands—and none of the ACSII control characters—are required for plotting, so existing software programs may be modified for graphics without rewriting systems software. As an upgrade option, DEC PLOT provides graphics output flexibility from existing terminals at a cost of less than 30% of the host terminal, according to the vendor. Single DEC PLOT modules cost \$595.

**FOR DATA CIRCLE 599 ON READER CARD**

### UNIVERSAL DATA SYSTEMS

Huntsville, Ala.

#### MODEMS

Booth 5025

Several new modems will be introduced by this vendor. The new 201B version, costing \$845, offers an advantage over the popular Model 201 2400bps data modem: it has an antistreaming feature that can break a "locked-up" connection after a user-selected delay of three to 54 seconds. Self-test capability, both local and remote, is built in, as are a 511 test pattern generator and analog and digital loop test functions. The new configuration is available as an oem card, a rack-mountable card, or in a standalone case. The 201C data modem has been enhanced with a strapable satellite communications option plus antistreaming protection to improve per-

formance in multidrop systems and testing functions. It costs \$915. Another variation to the 202 family, the 202S, will also be unveiled. The 202S is operable over two-wire DDD circuits or four-wire private lines. It features auto-answer capability and the strapable satellite option. An integral talk/data switch allows telephone voice communications when the data link is not in use. The 202S also includes the test modes, and costs \$515. To the 212 family, the vendor will add the Model 212LP and the 212A modems. Priced at \$495, the 212LP is a manual answer unit requiring no external AC power, offering full-duplex 1200bps asynchronous operation. FCC-certified for direct connection to the dial-up network, the Model 212LP is compatible with the high-speed 1200bps asynchronous channel of the Western Electric 212A. UDS' 212A is a full-featured, Bell-compatible modem that, at \$695, is priced low enough to offer a savings to data communications users utilizing full-duplex 300bps and 1200bps channels in the same system.

**FOR DATA CIRCLE 600 ON READER CARD**

### U.S. DESIGN CORP.

Lanham, Md.

#### DISK STORAGE SYSTEM

Booth M252

U.S. Design is introducing the CSS-800 mass storage system, a DEC-compatible Winchester disk storage system containing a 35MB or 70MB Winchester disk drive with a 17MB cartridge tape drive for backup. It includes two integral controllers, with multiported memory, that allow simultaneous disk and tape operations. The CSS-800 is configured with a compatible host interface for the QBUS, Unibus, or Multibus, and emulates DEC's RK07 disk drive and TU10 tape drive. Full track transfers and data caching are implemented by using a 32K buffer. In oem quantities of 100, prices are \$9,300 for the 35MB disk and \$10,300 for the 70MB disk, both with the tape backup.

**FOR DATA CIRCLE 601 ON READER CARD**

### ZENTEC CORP.

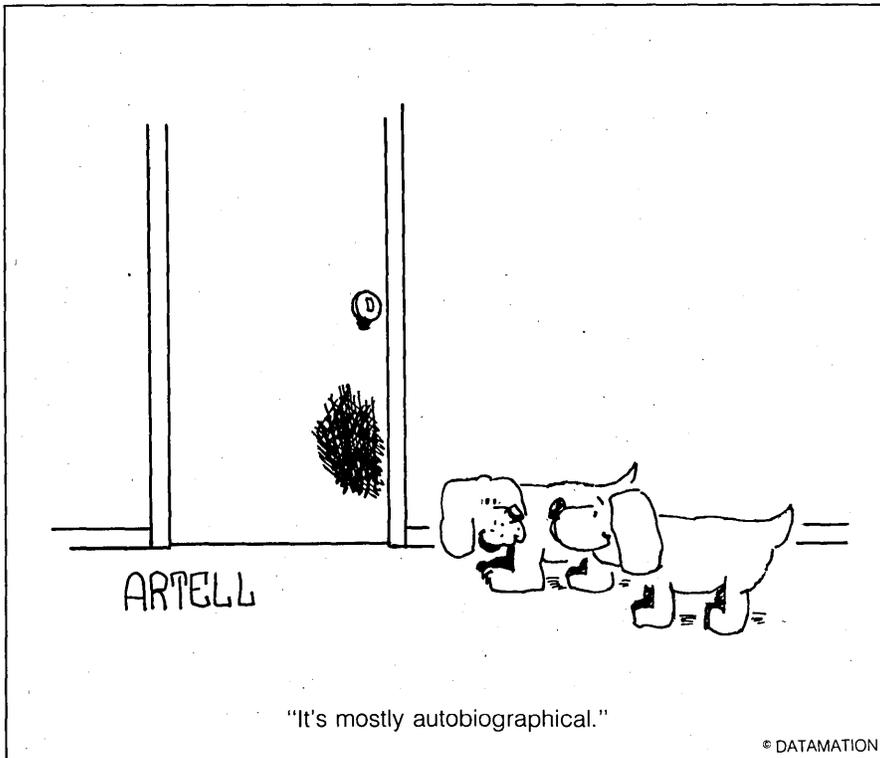
Santa Clara, Calif.

#### SMALL BUSINESS SYSTEM

Booth M115

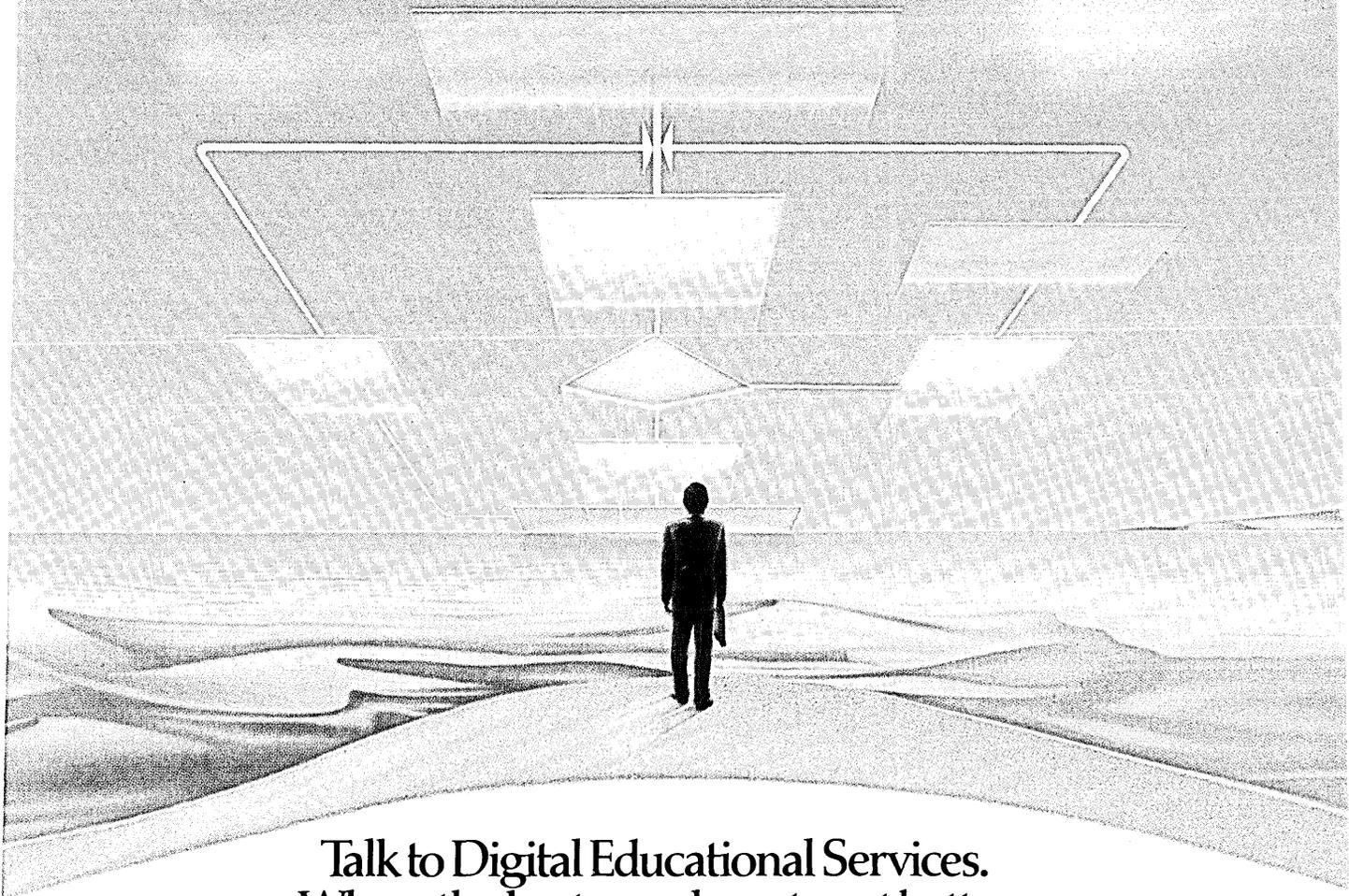
Zentec's booth will feature a small business computer based on an 8MHz 8086 microprocessor which can support up to six intelligent workstations. The machine uses the XENIX operating system. Peripherals include 5MB and 10MB 5½-inch Winchester disk drives and 738KB 5½-inch flexible disk drives. Disk and workstation I/O are controlled by dedicated microprocessors. The workstations have their own 8085A and 16KB of memory. Multibus support is optional. Oem pricing starts at \$12,000.

**FOR DATA CIRCLE 602 ON READER CARD**



CARTOON BY MICHAEL ARTELL

# 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.

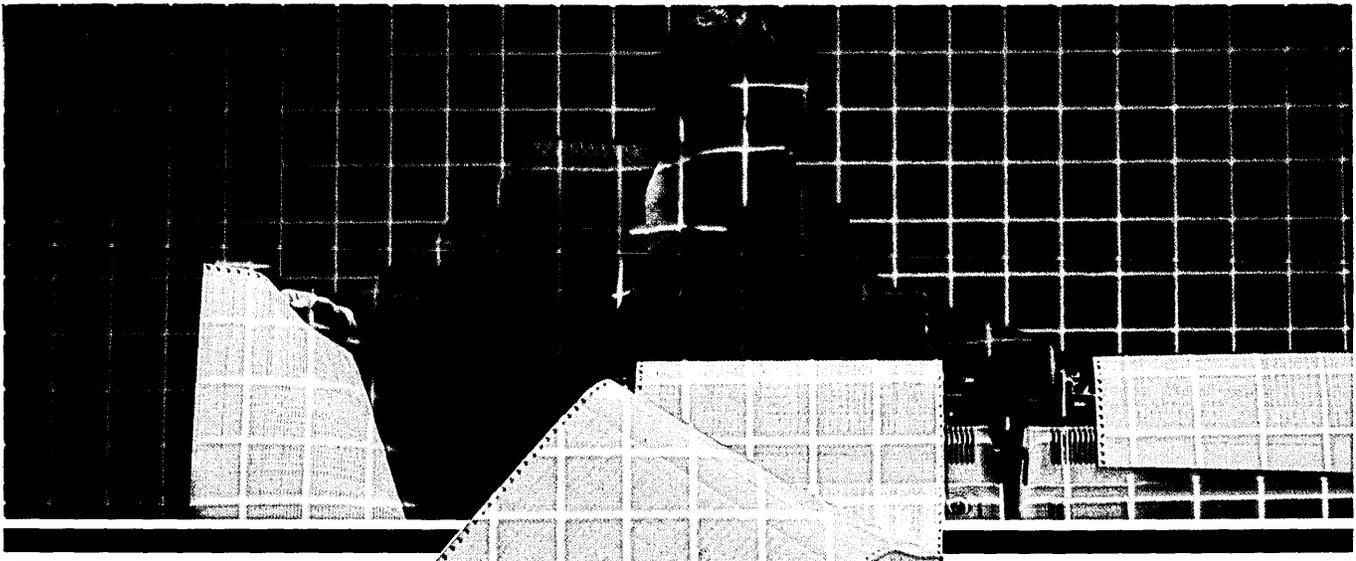
No matter how your people learn from Digital, you can be sure they'll get a practical high-quality education. Because the programs they'll take are the same programs we use to train Digital's own computer professionals.

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.

# DATA PROCESSING GROWTH ON DEMAND.



As your business expands, so do the demands for managing business information. When it's up to you to respond, you need an information source that has today's and tomorrow's growing room built in.

That's why at Martin Marietta Data Systems, we offer you responsive data processing growth—an efficient, economical way to put “stretch” in your information management capabilities, without putting a strain on your current data processing operation.

## **GROWTH YOU CAN MANAGE. COSTS YOU CAN CONTROL.**

When you take the in-house route to expand your information processing capabilities, you often have to leap ahead to a whole new computer to bring on the additional power you need—even though the bulk of that power may go unused as much as 50% of the time.

When you come to us for computing services, you can get *exactly* the amount of information processing capability you need to get your job done.

No matter how much or how little power you require, you can tap into

our state-of-the-art, IBM and CDC computer network to stretch your processing capabilities. Since you pay only for what you need and use, you can achieve 100% utilization 100% of the time.

In fact, you can use our Computing Services to extend your current resources without burdening your budget with the overhead costs of installing and maintaining hardware you may not need full time. And, you'll minimize the recurring costs associated with expanding your in-house operation.

It all adds up to *cost-controlled linear growth*. You can grow your information processing capabilities and provide better, more immediate service to your users—without putting excessive demands on your in-house operation, or your company's bottom line.

## **SOLUTIONS WITH AN EXTRA MEASURE OF SUPPORT.**

No matter what your information processing needs, you have our support every inch of the way.

Including:

- Access to our nationwide network of centralized computer centers 24 hours a day, seven days a week.
- State-of-the-art IBM and CDC hardware.
- People with practical experience in implementing data communications and distributed data processing systems.
- An extensive library of systems and application software.

## **TAKE A CLOSER LOOK.**

We can integrate our information processing, software and service offerings according to your needs, to give you solutions that measure up to your demands.

To find out how our Computing Services can become your best solution, phone (301) 982-6500, or write our U.S. Headquarters. We'll send you a free brochure that explains our service in more detail.

**MARTIN MARIETTA DATA SYSTEMS** ◊  
Marketing Services, D/D,  
6303 Ivy Lane,  
Greenbelt, Maryland, 20770.

**MARTIN MARIETTA**

CIRCLE 120 ON READER CARD

**Who should decide how computer resources are used, corporate management or market forces? The answer will shape the way a company uses database technology.**

# SERVICE OR PROFIT CENTER?

**by Alton R. Wheelock**

Today we find that most decentralized corporations have structured their central computer resource in one of two forms—the service center or the profit center. When properly employed, either structure results in improved organizational effectiveness and efficiency and assists in determining how much will be spent in the long run on computer activities.

Therefore, the choice of structure in many cases has been a matter of management's preference and convenience. Where user/managers are sufficiently sophisticated in computer matters to take advantage of a competitive computer services market, there is a strong temptation to move from the administratively more cumbersome service center to a fully decentralized profit center.

There is, however, evidence that the choice of structure should no longer be a matter of preference and convenience. There are key differences in the decision-making processes between the service center and the profit center; and because of the nature of database technology, these differences may result in database systems that fail to meet the total information needs of the corporation. If these needs are to be met, the computer resource structure should match that of the overall corporation. More specifically, two tiers of structural "fit" should exist: 1) between the overall corporate structure and the central computer resource, and 2) between the computer resource and the ownership/control of its data and technical skills.

What is there about database technology that raises this concern? What are the decision-making differences? What has been the relevant experience in companies that have successfully achieved operating databases? Let us turn first to the nature of database technology.

Database technology permits data to be stored in a form that has two key characteristics: 1) data are completely independent from the numerous computer application programs that manipulate them, and 2) data may be shared by many corporate users. These innovative qualities have given rise to the

notion that data are corporate resources, the sharing of which ideally should extend horizontally, across functional and divisional boundaries, and vertically, across managerial boundaries to top management levels—a "global" concept. An alternative concept, a "divisional" database, holds that sharing occurs only within specific boundaries—within a division, for example. Obviously, the latter arrangement would produce an assortment of mini bases, falling short of the global concept.

There is nothing in database technology, however, that guarantees which conceptual form will evolve from the process of adopting the technology. The form that evolves is a function of the decisions that managers make. That basic fact turns the discussion to the structure of the computer resource, for there are differences in decision making between the service center and the profit center. How does the structure of the computer resource affect the assimilation of database technology?

The structure of the central computer resource governs the extent to which a global database can evolve in a decentralized, divisionalized corporation. The service center permits this evolution; the profit center inhibits it. To explain this, it is necessary to examine briefly the profit center, the service center, and certain problems involved in the sharing of data.

The in-house profit center is expected to operate side by side with an outside competitive market. As a result, both prices and quality of service are subject to competitive pressures. The computer resource manager is free to sell surplus capacity to outside users. He has the flexibility to make investment and divestment decisions, and, through pricing, to promote or restrain usage according to supply-demand considerations, in keeping with his role as a profit-driven manager. In short, his sights are on his customers to anticipate and satisfy their demands efficiently, and he is rewarded on that basis.

For the pressures of the competitive market to be felt, however, users must be free to turn to the outside market to meet their needs. This requires that decisions concern-

ing those needs be decentralized to the users who make independent evaluations based on the cost/benefit balance in the development and operation of the systems they choose to buy. Two corollaries accompany this concept. First, top management should refrain from usurping the freedom given the decentralized users; second, the decentralized users should be sophisticated enough to determine and articulate their data processing needs and to evaluate competitive proposals for meeting them.

When these conditions prevail, efficiency is achieved through competitive pressure on the seller, and effectiveness is achieved by delegating decisions concerning resource allocation to financially responsible users who have access to a free market. In the long run, these decisions determine how much money is spent on the computer. (The question of how much to spend in total on computer services is essentially another resource allocation problem, except it is posed at the corporate level rather than the user/manager levels.)

## THE SERVICE CENTER

The service center, by contrast, does not operate in a competitive market and is not expected to make a profit. Users are not permitted to turn to outside sources. In light of those constraints, transfer prices are not competitively set; they tend to be oriented toward some version of full- or partial-cost recovery. Most pricing practices not only have serious dysfunctions in matching demand and supply but also lead to improper resource allocation decisions.

To remedy these shortcomings, the service center is typically placed under the general supervision of a central steering committee which oversees the setting of transfer prices. Also, final approvals for the development of computer applications are centralized in the steering committee. In this fashion, the steering committee takes up the responsibility for assuring that the major development decisions made are best for the corporation, creating a decision-making environment that is only partially decentralized.

## In a database environment, the user is no longer permitted to determine unilaterally the content or quality of the data.

In the pre-database environment, each computer application contains its own file of data and is designed to meet the specific need of the user responsible for its existence. In a very practical sense the user "owns" the application model and its associated data in their entirety. He makes the financial commitment to select, collect, and maintain the data input; he is in control of data quality, being free to set his own update and accuracy standards. He is free to add or delete according to his perception of their value against the cost of their maintenance and storage. He is the sole user of that application and is free to change its character, restrict its use by others, or discontinue it. In short, he is at once the supplier, controller, and sole user of his numerous application models and their associated data.

This condition does not exist in the database environment. There, the owner is expected to supply his data to a central data management facility where the data will be shared with other users. As a supplier, he is no longer permitted to determine unilaterally the content or quality of the data. He must abide by the needs of the several users who, along with him, will draw on the data for their own purposes. He is not free, based on his judgment alone, to add or delete data in the shared data file. Other users will have access to his data (and he to theirs), barring any measures to preserve security and privacy. He and the other users will want data to be stored in the shared file in a manner that optimizes the performance of their individual tasks, although it is probably inevitable that some users will be served less efficiently than others.

Under database conditions, these control aspects are centered in a new organizational position known as the data administrator. He is the person responsible for taking

the overall view in matters pertaining to the bases. He performs the initial data analysis to ensure the relevance of the data to the needs of the total group of users. In doing so, he must rely on the judgment and wishes of the suppliers and potential users of the data. The data administrator supervises the data collection and conversion processes, determines storage strategies and methods of access and retrieval, and assures the accuracy, currency, and integrity of the data by establishing and enforcing standards. He must provide for documentation and backup of the global file and must establish control measures aimed at preserving privacy and security. It is a paradox that many of those tasks can be performed only with the cooperation of those who, in the very process, lose the direct controls they previously possessed and who possibly hold views that conflict with the administrator's broader corporate view.

Enough has been presented to indicate that movement to a global database would involve a substantial loss of autonomous ownership and control by users/managers over their applications-dependent files of data. In regard to security, managers would face the prospect of relying on the data administrator to prevent misuse of confidential data for which the managers remain basically responsible. Therefore, in a highly decentralized organization many users may prefer to install their own divisional databases. If they do so, they reap the benefits but they also bear the costs. They have no desire to increase those costs by developing a larger and more complex global system. Indeed, it would be illogical for them to do so. In short, they can and may adopt database technology for their own benefit, in which event the global database will not result.

In the case of the profit center, one may inquire why its manager would permit

that to happen. To answer this question, we must consider the bargaining leverage that the outside competitive market and the freedom to use it give to a division manager. It is technologically possible for a manager to assemble a database development proposal to meet his own needs and to request bids from both inside and outside sources. Indeed, minicomputers are available with database management software a division manager can use to build his own in-house database capability. A manager could thus force the issue and obtain his divisional database merely by threatening to go to competitors or by procuring his own. To avoid losing a customer, the profit center manager would not press the issue of a global database even though he might consider that action more appropriate. As an added constraint, it may not be within the scope of his charter to press for the sharing of files across operating divisions. If the profit center manager does wish to press the issue, the charter notwithstanding, his logical recourse would be to take up the matter with top corporate management, a step that probably would be viewed with great displeasure by his customer.

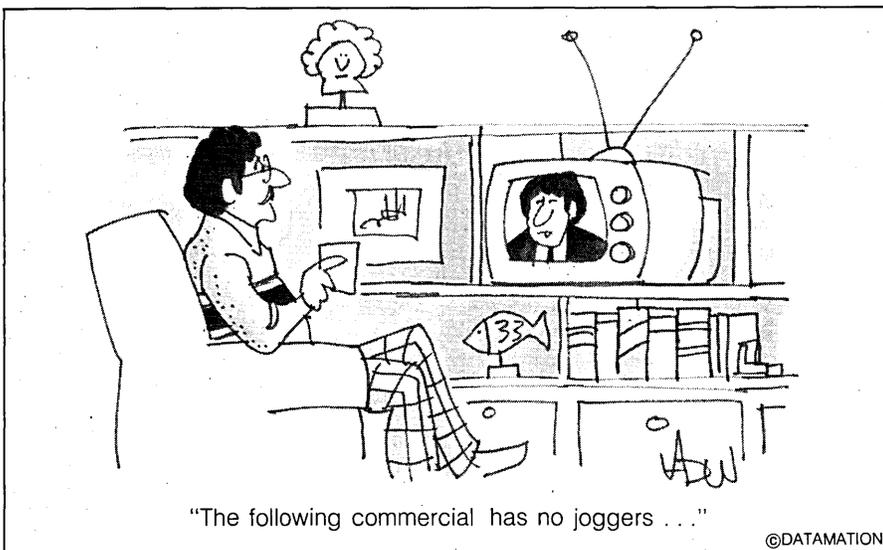
Under the service center arrangement, however, the leverage effect of the competitive market is absent and the policy-setting mechanism for central direction of a global database effort is present in the form of a steering committee. To the extent that the steering committee oversees the budget of the service center and the computer-related budget lines of the divisions, it can enforce adequate review and modification of development proposals to ensure that they conform to policy standards and meet overall corporate needs. If the need is for a global system, then that will be the direction that development efforts take. Thus, the service center permits the evolution of global databases, whereas the profit center inhibits that evolution.

### THREE CASE STUDIES

Can practical evidence be found to support this notion? What additional structural concepts would be useful to managers involved in the task of assimilating database technology in an organization?

The histories of three decentralized multinational corporations should provide some insight. All three corporations achieved operating databases in some adequate form. Two employed the service center structure; and global databases evolved; one employed a profit center, and divisional databases resulted. In addition, a synthesis of the findings leads to the concept of a two-tiered structural fit consisting of a match at the corporate-to-computer resource level and a match within the structure of the computer resource itself.

*Company A:* This is a divisionalized,



Do you know  
where DBMSs  
will be in 1985?

...would you like to  
go to a *Free Seminar*  
and find out?

CCA, the leader in software for information storage and communication, invites you to a free seminar on "DBMS in the '80s." The seminar will discuss:

- The major challenges confronting data processing executives in the 1980s.
- How CCA's Model 204 DBMS—the most advanced DBMS available for IBM systems—is being used by America's leading corporations to meet these challenges.
- How CCA's Distributed Model 204 DBMS, the world's first general-purpose distributed DBMS, will tie together databases residing on different machines and make the location of data transparent to the user.
- How CCA's VIEW System uses graphic interfaces to provide the user with "keyboard-free" interaction for complex databases.
- How CCA integrates DBMS and office automation technology.

Free Seminars will be offered on the following schedule.

To reserve your space at the free seminar, call Theresa Pinheiro at 617-492-8860.

May	June
4 Richmond, VA	3 Wilmington, DE
5 Washington, DC	3 Princeton, NJ
11 San Francisco, CA	8 Santa Clara, CA
12 New York, NY	9 Dayton, OH
18 Indianapolis, IN	10 Columbia, SC
19 Philadelphia, PA	15 Springfield, MA
20 Boston, MA	22 Portsmouth, NH
25 New Orleans, LA	29 Dallas, TX
26 Oklahoma City, OK	
27 Little Rock, AR	

# Computer Corporation of America

Cambridge, New York, Houston, San Francisco, Chicago, Washington, Los Angeles  
International Affiliates: Tokyo, London, Berne, Milan, Toronto, Melbourne, Paris

**CIRCLE 121 ON READER CARD**

decentralized multinational corporation organized into six divisions that operate as profit centers. Each division has a high degree of line and staff authority aimed at achieving quick reaction in dealing with day-to-day problems and with changing market conditions. Decentralization is not absolute, however. Long-range planning is performed by corporate management. Personnel matters, including hiring levels, are under the direction of a corporate vice president. Energy and materials management are centralized at the corporate level.

Five of the operating divisions produce a wide range of chemical products for five distinct markets. The sixth division produces "building block" chemicals required by the other divisions, which typically take some 70% of the total output, the balance being sold in the outside market. Shifts in the assignment of product responsibility between divisions have occurred in the past and can conceivably recur in the future. The rate of technological change in both product and manufacturing process is relatively high.

This company, although nominally decentralized, operated under a management philosophy that provided for central control over specific functions and resources. It could be termed a partially decentralized corporation.

It follows that such an organization required a pattern of information flows that could accommodate its character of partial decentralization. Corporate staff officers required vertical flows to perform their functions at the corporate level, and the vertical flows themselves required horizontal flows and inputs to function properly. For example, only by having access to a shared file of personnel data integrated across the corporation's numerous divisions could the personnel vice president effectively exercise his responsibility for controlling and allocating the corporation-wide limitation on hiring levels. It was also necessary that the data files be flexibly constituted so that realignments of product responsibilities among divisions and changes in product and process technologies would not automatically require massive data file reorganization and updating. A wide-ranging shared file capability—typical of a global database—would be required to meet the need for interdivisional flexibility and for information flows vertically and horizontally oriented.

Just as Company A was not decentralized in an absolute sense, neither was its central computer organization, which was established as a service center with a corporate steering committee. Applications decisions were centralized; proposals exceeding \$100,000 were subject to final approval by the steering committee. Although each operating division "owned" its own systems de-

TABLE I

**A SUMMARY OF THE ELEMENTS OF STRUCTURE IN THREE COMPUTER RESOURCE CENTERS**

STRUCTURE AND ELEMENTS OF STRUCTURE	COMPANY A	COMPANY B	COMPANY C
1. Computer Resource Structure	SC	SC	PC
2. Locus of Applications Decisions	C	C	D
3. Ownership/Control of Data	C	C	D
4. Ownership/Control of Traditional Skills	C	C	D
5. Ownership/Availability of Database Skills	C	C	C/D
6. Source of Funding	partial D	total D	total D
7. Evolved Database Form	global	global	divisional

Legend: C—Centralized  
D—Decentralized  
SC—Service Center  
PC—Profit Center

velopment capability, the central computer organization retained operational control over development activities and resources by means of a strong and uniquely effective "dotted line" relationship.

Global databases evolved in Company A. The first to become operational was an order entry and inventory control system that crossed both divisional and functional lines. Data in support of the personnel function were integrated in a global system. Other global forms included customer order processing, distribution and operations control, and order billing.

*Company B:* This is a decentralized multinational corporation organized along product lines into three "groups" and one "international group," each an independent profit center controlling its plants and its own distribution system.

Decentralization is not absolute. Materials management is centralized at corporate headquarters, as are research and development. Central management is exercised over the production of components common to the various product lines. Capital investment decisions are centralized at the corporate level.

Electrical and electronic components and communications equipment are produced and sold to a wide range of customers, large and small, government and nongovernment. There is a high degree of commonality of parts and components among the numerous product lines. The rate of technological change in both product and process is high.

It is evident that a management philosophy similar to Company A's prevailed in Company B. The company was decentralized only in its operating responsibilities. The commonality of parts and components, and

the rate of change in the field lend substance and credibility to the notion of central management of the materials function. Information flows were required to take on both vertical and horizontal dimensions because of the commonality factor and the central organization for management of materials.

Just as Company B was not decentralized in an absolute sense, neither was its central computer resource, which was organized as a service center under a corporate steering committee. Applications decisions were centralized. The entire computer resource—hardware, software, and technicians—was centrally controlled and centrally "owned" by the service center. No development capability existed outside the computer organization.

The databases that evolved were global in form. The first shared system was integrated across the assembly, subassembly, parts, and components lists of the three groups, because of the high degree of commonality previously mentioned. This system became known as the manufacturing database and eventually was expanded to include all inventory, from raw materials to finished goods, as well as accounts payable, suppliers and purchasing data, cost accounting data, production scheduling data, and stock location information. Access to the base was available at various management levels; e.g., plant level entry was possible for production scheduling purposes, and corporate entry was possible for the centralized materials management function.

*Company C:* This is a truly decentralized corporation made up of a holding company and four major wholly owned subsidiaries operating as independent profit centers, each with its own board of directors and



# TI printers earn their reputation the hard way.

Today, more than a hundred thousand Texas Instruments Printers are tackling some of the toughest printing jobs throughout the world. From news wire services to airline ticket printing, or generating printouts of payroll checks, invoices and reports. Any demanding task that calls for clear, hard copies of the information you need.

Texas Instruments can offer you a wide variety of printers.

Thermal printers that are virtually silent. High-speed multiple copy impact printers. Plus a choice of print speeds to fit your application. And all have one common denominator. Consistent reliability that's proven through rigorous testing and uninterrupted on-the-job performance.

You can also count on the support of our worldwide factory-trained sales and service organiza-

tion that's just a phone call away.

If your business is tough on printers, go to the people who set the standards. For more information on our complete printer line, contact Texas Instruments, P.O. Box 202145, Dallas, Texas 75220; or call 1-800-231-4717; in Texas, 1-800-392-2860.

*TI invented the integrated circuit, the microprocessor and the microcomputer.*



**TEXAS INSTRUMENTS**  
INCORPORATED

# "Crocker provides 25-second worldwide banking 24-hours a day thanks to the unique capabilities of the Tandem NonStop<sup>™</sup> Network"

David Brocke, President

"With the Crocker COMPAS Network<sup>™</sup> worldwide international funds transfers (FT) can be completed instantaneously. Transactions which used to take anywhere from days to weeks. A network of Tandem NonStop Systems in New York, San Francisco, London and Hong Kong is the backbone of our COMPAS system, and we can make work wire or line connections to all of our own and other correspondent banks, custom offices, and all major credit cards and bank networks such as SWIFT, OASIS, BANKWIRE and WIRE ON CALLS, including our own handles all.

"Full around the clock capabilities of the Tandem Non-

Stop<sup>™</sup> systems are the key to our 24-hour, 365-day-a-year, 25-second worldwide banking. The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service.

"The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service. The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service.

"The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service. The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service.

"The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service. The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service.

"The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service. The Tandem NonStop<sup>™</sup> Network is the only system that can provide this level of service.



...and importance. ...security and ...ability in ...

A black and white photograph of a desk. In the foreground, a round analog clock with a large winding knob is prominent. Behind it, several stacks of US dollar bills are visible, along with a computer terminal or printer. The scene is lit from the side, creating strong shadows and highlights.

**The NonStop Company.**  
Tandem. We couldn't have done it  
without providing worldwide sup-  
port in sales, training, service and  
manufacturing.

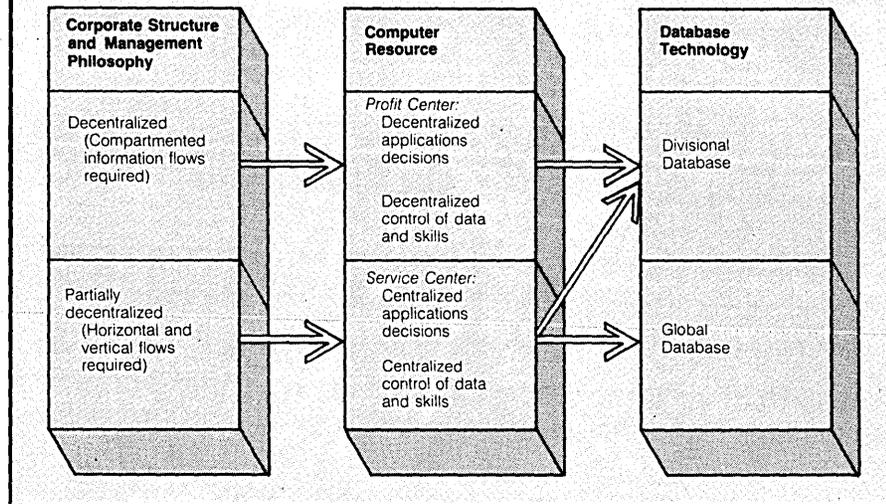
**For information on how a  
Tandem NonStop Computing  
System can improve your  
company's competitive pos-  
ture and P/L statement, call  
your local sales office or Tandem  
Computers Incorporated, 19333  
Vallco Parkway, Cupertino, Cali-  
fornia 95014, U.S.A. Toll Free  
800-538-3114 or (408) 725-6000  
in California.**

# TANDEM

## NonStop Computing Systems

FIG. 1

## TWO STRUCTURES FOR ORGANIZING THE COMPUTER RESOURCE



chairman/ceo. No significant corporate resource or activity is centrally managed by the holding company.

Three subsidiaries manufacture products in three distinctly different categories aimed at three distinctive markets: electrical and mechanical components for original equipment manufacturers and end users of automobiles, trucks, and off-road vehicles; heavy tools and pumps for owners and builders of industrial plants and power-generating facilities; and aircraft engines. The fourth subsidiary operates a worldwide network for the distribution of commercial automotive and truck parts and components. The manufacturer of automobile components is a high-volume producer requiring a high degree of manufacturing process control. Its rate of technological change is slow. The remaining two manufacturers are low-volume producers requiring little process control but experiencing rapid technological change.

Company C's corporate structure was truly decentralized; no major staff function was centrally controlled. The three manufacturing arms were clearly organized to supply different products to distinct markets. Virtually no commonality of products, components, or customers existed among the three subsidiaries. The rates of change in technology and process control varied among the three. Under these conditions, it was evident that shared data files crossing divisional (group) and managerial boundaries would serve no purpose of sufficient value to justify the added cost of global systems. The need was for "compartmented" flow patterns—the divisional form of database.

Just as this corporation was highly decentralized, so was its computer resource, which had been created as a profit center several years before database technology came on the scene. This was reflected in the computer center's operating policies: 1) no pressure was to be exerted on subsidiary companies to bring their data processing requirements to central computing; 2) decisions concerning applications development and the ownership of systems development capabilities were to remain with the subsidiary companies; and 3) the use of subsidiary-owned data was to be restricted to the subsidiary; data were not to be shared by or released to any other corporate element without express approval.

When the potential of database technology was recognized by the managers, a pool of technicians skilled in the development of database systems was established in the central computer organization. Teams from this pool were available to user/managers on a contract basis.

No global database evolved in Company C, even in the accounting and financial areas. The monitoring of budgets, for exam-

ple, was done through controller channels running directly to the subsidiaries, not through central computing. Divisional databases existed at the subsidiary levels. There was a high degree of possessiveness concerning data, as reflected in the third policy statement listed above. One of the subsidiary companies did in fact choose to exercise its freedom to use an outside source for its computer needs.

In summary, the service centers in Companies A and B allowed the evolution of global databases and Company C's profit center allowed the evolution of divisional databases. In view of the policy statements governing the operating of the profit center, it is difficult to imagine how global systems could have come about in Company C.

### COMPUTER/ CORPORATE FIT

Among the three corporations, there were differences in their rates of technological change, the markets they served, and the aggregation of products they manufactured. There were also differences, major and minor, in their corporate structures and management philosophies, information flow needs, and structure of their computer resources. In spite of those differences, all companies achieved database forms appropriate to their information needs. One relevant variable common to all three cases is that whatever the company's corporate structure and management philosophy were, its organization for computer services reflected that structure and philosophy. The partially decentralized service center served the partially decentralized corporation; the fully decentralized profit center served the fully decentralized corporation. In short, a structural fit existed between the corporation and its computer resource.

A closer look at the three corporations indicates that the concept of structural fit extended to a second level—within the internal structure of the computer resources them-

selves. This insight is gained by examining the answers to four questions.

- Where were decisions made concerning computer applications to be developed?
- Once decisions were made, who owned or controlled the relevant data?
- Who owned or controlled the technical resources necessary to carry out the decision?
- Who provided the necessary funds?

The answers to these questions are summarized in Table I. It is worth noting at the outset that although the funding of development efforts from some appropriate source was a necessary condition, it was not a sufficient condition to dictate the ultimate form that database took. Specifically, there was no positive relationship among the companies between the source of funding (Table I, line 6) and the resulting database form (line 7); neither was there a positive relationship between the source of funding and the locus of decision making (line 2). There was, however, a positive relationship in all three companies among the computer structure (line 1), the locus of applications decision making (line 2), and three substructural elements—ownership/control of data (line 3), ownership/control of traditional skills (line 4), and ownership/availability of database skills (line 5). In short, in all three cases the substructural elements of data and skills control reflected the structure and decision-making rules of the computer resources themselves.

Thus the three computer centers, all of which reflected their respective corporate conditions, repeated the fit at the second tier—between the structure of the computer resource and the substructural elements of data and skills ownership and control, excluding the source of funding. As was observed in the previous discussion, despite important differences among the companies and their computer resources, all three database efforts met corporate needs successfully. This is largely attributable to the fact that all three computer resources possessed the attri-

CHARTS BY CYNTHIA STODDARD

# **SCIENCE/SCOPE**

An improved process of growing silicon for laser detectors provides the highest-purity silicon available in the world. With the float zone crystal process, a polycrystalline silicon rod is heated in a vacuum chamber, producing a zone of molten silicon that passes from the bottom to the top of the rod several times, thus removing impurities and providing for growth of a highly pure crystal. The silicon can be used for laser seekers, designators, trackers, and range finders. Hughes developed the process for the U.S. Army and Air Force.

Ambitious manned missions in space will become possible with development by NASA of advanced solar-power platforms capable of electric-power output as high as 100 kilowatts or more. Hughes, under contract to the NASA Lewis Research Center, is building a breadboard 25-kilowatt dc-to-dc power converter that uses a transistorized series-resonant inverter. This module provides the basic building block required to match solar-array characteristics to payload requirements. The 25-kilowatt converter will utilize technology demonstrated earlier by Hughes in development of a lightweight 10-kilowatt converter that operated at over 91 percent electrical efficiency.

Costs of complex hybrids in military electronics have been cut up to 30 percent by an innovative laboratory serving as a "halfway house" between engineering and manufacturing. The Hughes Producibility Lab makes producibility verification models using manufacturing equipment and processes. In this way it thwarts production problems by ensuring that hybrids are designed to meet assembly-line capabilities. Reliability also improves. Manufacturing engineers work with design engineers to eliminate parts, adapt automated processes, develop automatic testing, and redesign substrates to minimize the number of wire bonds between integrated circuits and discrete components. The lab has demonstrated its worth by ensuring the production rate of the F/A-18 strike fighter radar.

A new version of the 1802 CMOS microprocessor offers faster speed, increased output drive, and other improvements. The new CPU chip, designated the Hughes HCMP 1802A, is a pin-for-pin and functional replacement for the 1802. It operates with a guaranteed minimum frequency of 3.2 MHz versus the 1802's guaranteed minimum frequency of 2.5 MHz at 5 volts. Selected parts of the new device can achieve 5 MHz operation. An internal Schmitt trigger has been added at the RESET input for simple R-C interfacing that can provide a power-on reset.

Hughes is seeking engineers to develop advanced systems and components for many different weather and communications satellites, plus the Galileo Jupiter Probe. Immediate openings exist in applications software development, data processing, digital subsystems test, microwave/RF circuit design, power supply design, digital communications, signal processing, spacecraft antenna design, system integration test and evaluation, and TELCO interconnection. Send your resume to Tom W. Royston, Hughes Space & Communications Group, Dept. SE, Bldg. S/41, M.S. A300, P.O. Box 92191, Los Angeles, CA 90009. Equal opportunity employer.

*Creating a new world with electronics*

**HUGHES**

HUGHES AIRCRAFT COMPANY  
CULVER CITY, CALIFORNIA 90230

(213) 670-1515 EXTENSION 5964

## The service center permits the evolution of global databases; the profit center inhibits it.

bute of an internal structural fit.

That this attribute should be relevant makes intuitive good sense. A service center having centralized authority to decide to adopt the global database form would encounter fewer obstacles if it were to control the data to be shared and the technical resources needed to carry out the task. Similarly, decentralized user/managers who decided to adopt their own divisional databases would encounter fewer obstacles if they controlled their own data and also owned (or could readily obtain) the requisite technical skills.

This is not to say, however, that if a service center entered a period of adopting database technology with an existing structural misfit (i.e., the service center did not control data or skills), it therefore could not make the required adjustment to obtain control. Rather, it is to say, that having to obtain that control compounds the problem of assimilating the technology in global form. The effort for this may be delayed, and if emotions concerning ownership and control run high, it may be thwarted altogether.

The concepts of the first and second tiers of structural fit—corporation to computer resource and computer resource to control over

data and technical resources—can be joined to yield the display shown in Fig. 1. The service center is shown as capable of evolving divisional database because if it can produce the more elusive global systems, it must also have the requisite control and authority to produce divisional databases if the need becomes evident.

The three-part question management has faced in the past regarding selection of an appropriate structural form for the computer resource has centered on how best to achieve effectiveness and efficiency in employment of the resource, and how much to spend in total on it. Either the service center or the profit center can meet these needs, but as user/managers and their staffs have become more sophisticated in computer matters, there has been a strong temptation to move toward the profit center structure, thereby calling on the efficient marketplace to achieve those goals. The underlying assumption in such cases has been that the decisions decentralized managers make in their own best interests are also best for the corporations.

With the arrival of database technology, however, decisions that decentralized

managers make in the name of effectiveness, efficiency, and total budget may not result in the best method of applying the new technology. In short, a fourth dimension has been added—the question of whether the decisions result in the best application of database technology, given the information flow requirements of the corporation.

The concept of a two-tiered structural fit displayed in Fig. 1 provides one means of addressing that question. The service center represents the more flexible of the forms, as it is capable of providing either global or divisional databases, according to the needs of the corporation it serves. The profit center is shown as producing divisional databases for the decentralized corporation, but inhibiting the development of global systems.

Alton Wheelock is on the faculty of the School of Business at James Madison University, where he teaches Accounting Information Systems at the graduate and undergraduate levels. He is chairman of two small corporations, and holds an MBA from the Harvard Business School and a DBA from the University of Virginia.

# High Performance PDP 11/70 Tape Subsystem

INFORMATION  
PRODUCTS  
SYSTEMS

Improve PDP 11/70 Tape performance by 400%

The IPS 7016 Subsystem provides Tri-density 800/1600/6250 BPI performance without software changes. Call 1-(800)-231-7972

#### Features:

- ◇ No Software changes required
- ◇ Extended Hardware Error Correction
- ◇ 500 IPS Rewind
- ◇ High Data Recovery
- ◇ Fast Backup
- ◇ Less Tape Mounts

- ◇ Fewer Operator Errors
- ◇ Use Less Tape
- ◇ Reduce Archival Storage Area

Information Products Systems, Inc.

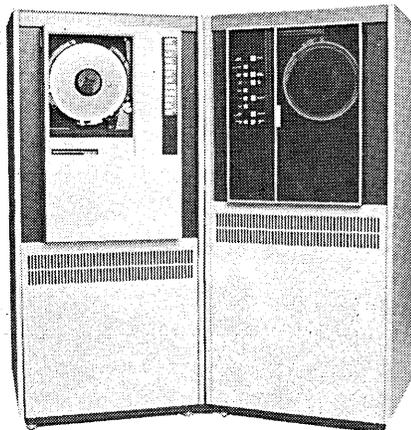
The number one supplier of high performance tape subsystems for the energy exploration market.

Disk and tape subsystems available for DEC, P-E, Raytheon and Data General Computers.

6567 Rookin St./Houston, Texas 77074-5073/Phone (713) 776-0071

TELEX 792413 IPS-HOU.

Regional Offices in California and Pennsylvania.



CIRCLE 124 ON READER CARD

# Uniq computer systems arrive with UNIX\* support you wouldn't believe!

**RUTE STRENGTH. PROGRAMMING POWER FOR OUR PRODUCT DEVELOPMENT GROUP.** That's what you get from the Uniq combination of Digital's VAX, the world's leader in powerful 32 bit interactive computers, and UNIX System III, Bell Laboratories' latest version of their credible time-sharing operating system. And more. A lot more. Because the real strength behind a Uniq computer installation is single vendor support—support you wouldn't believe.

**UNLIKE SOME UNIX VENDORS LOVE 'EM AND LEAVE 'EM IS NOT OUR POLICY. UNIQ TAKES CARE OF ITS OWN • YOU GET ...**

A 5 year warranty on the operating system ... an industry first!

Access to RTAC™, a Remote Technical Assistance Center staffed by UNIX-experienced engineers.

Your choice of computing power ranging from the low-cost PDP-11 series to the VAX-11/780 supermini.

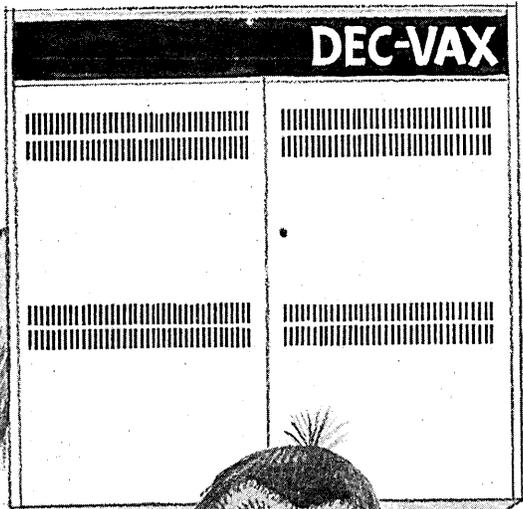
A series of comprehensive week long training sessions on UNIX and C language.

**FINANCIAL STRENGTH TO MATCH SYSTEM STRENGTH.** Rigorous financial screening, done annually as a Digital requirement of Authorized Distributors, is your assurance of dealing with financially sound organization ... an important consideration in protecting your investment. Hundreds of companies, including large engineering firms, are smoothly operating with Uniq-installed computer systems.

**FOR THE REST OF THE STORY ON WHAT MAKES UNIQ UNIQUE CALL OR WRITE FOR OUR FREE BROCHURE.** If you need a product development environment requiring an interactive, highly portable, time sharing system, with command language tailoring, source code control, graphics and a workbench capability that allows 48-plus programmers to simultaneously develop applications ... you need UNIQ. Call us NOW for details concerning this exceptional opportunity.



Why buy UNIX from WE\* when it comes with support from US.\*\*  
\*Western Electric  
\*\*Uniq Systems



Uniq Computer Corporation  
28 S Water Street,  
Batavia, IL 60510  
312/879-1566

Washington, D.C. 202-737-3020 San Francisco 415-362-0470

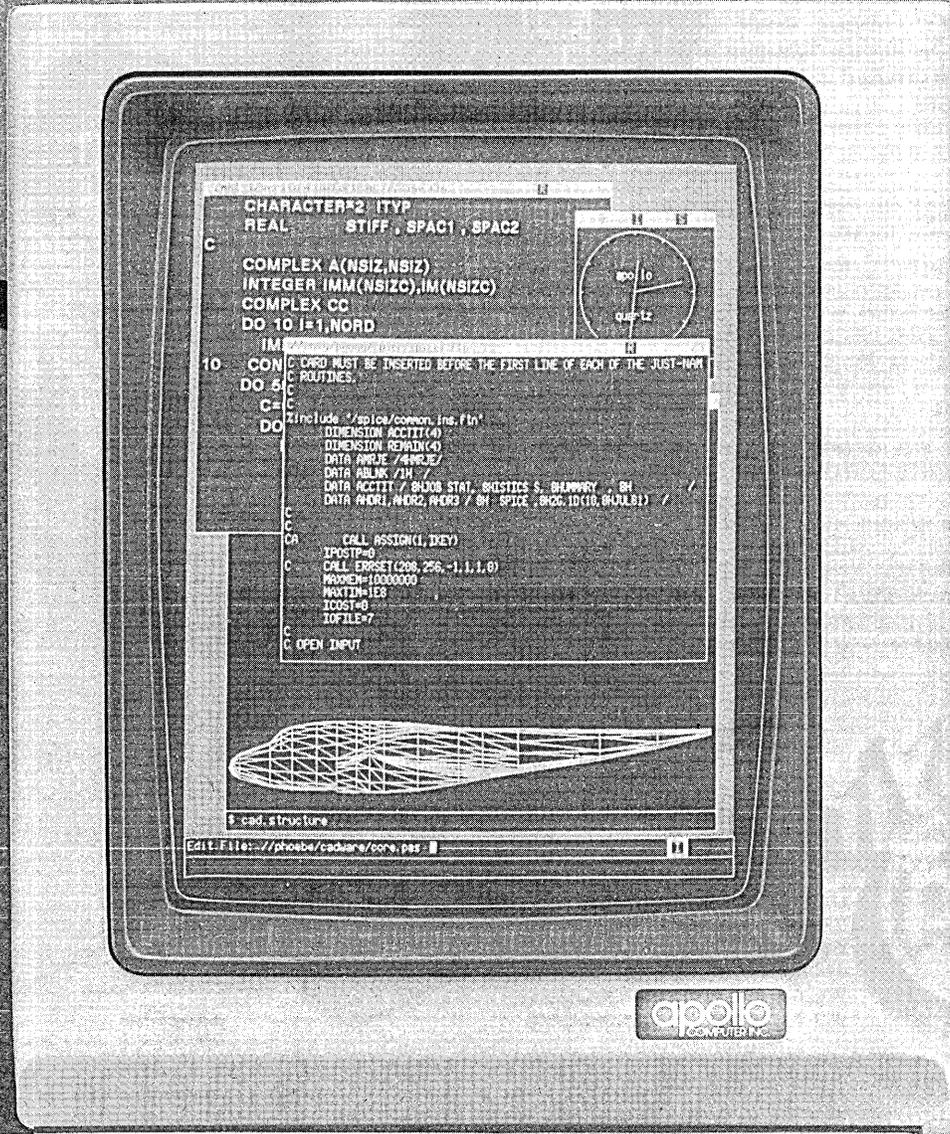
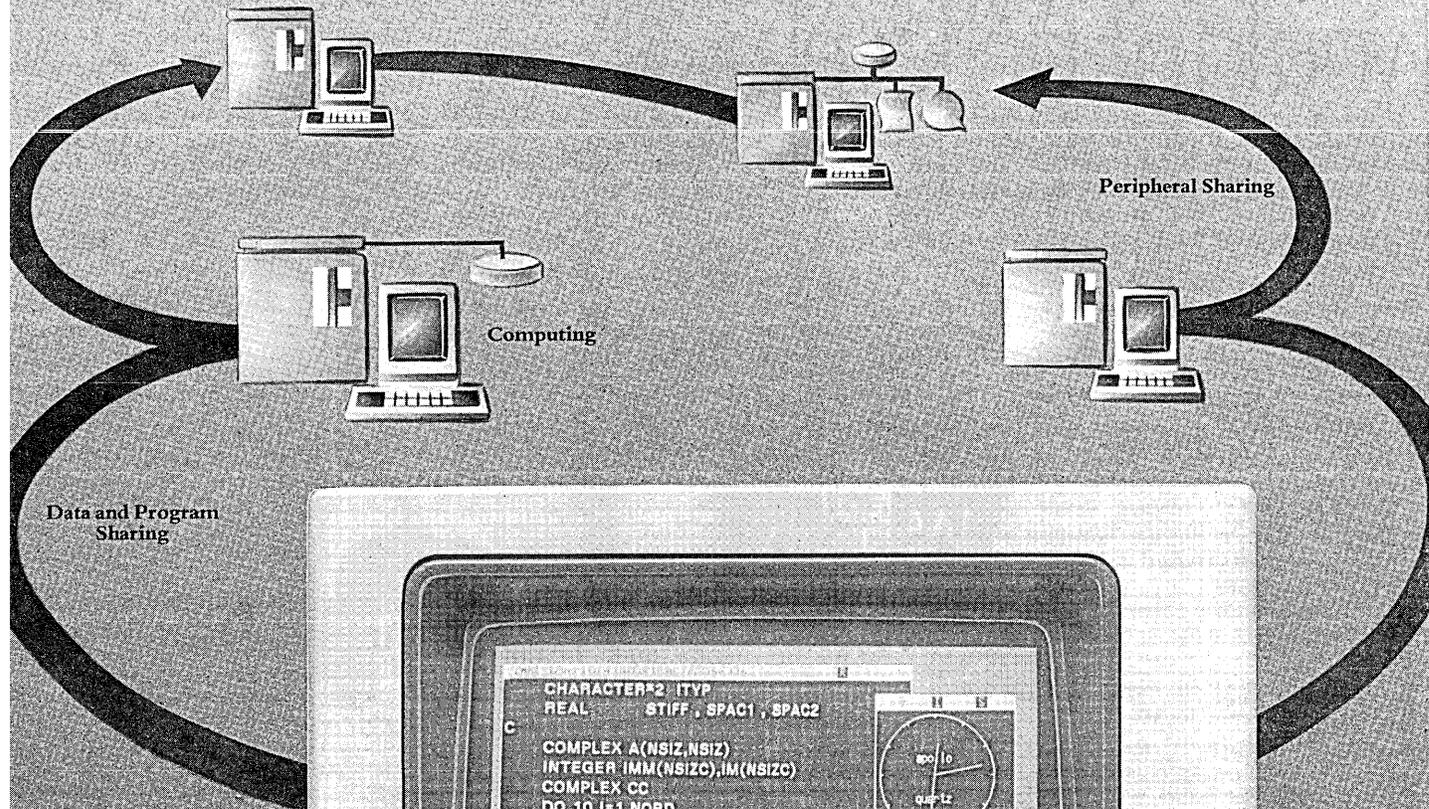
UNIX and UNIX System III are trademarks of Bell Laboratories

Subsidiary of  
Digital Systems House

AUTHORIZED  
**digital**  
COMPUTER DISTRIBUTOR

CIRCLE 130 ON READER CARD

# Domain Processing



# Unlimited computing power on every desktop.

Until now, there were only two ways to run your big and small jobs: on a massive batch mainframe, or on an interactive supermini.

The mainframe, while powerful, made you wait for results. The supermini was more responsive, but expensive to expand. And response time slowed every time another user was added.

Now you have an alternative that is powerful, responsive, and that grows economically—Domain\* Processing.

Domain Processing provides three computing essentials:

Mainframe capabilities on every desk, so you can run big programs like finite element analysis;

High resolution graphics, and the computing power to support it, to let you do interactive design applications; and

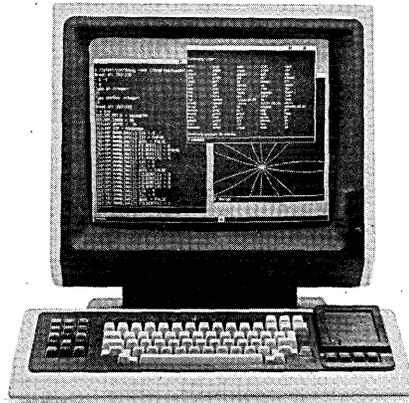
A 12 Mbit/second network that lets all the users share resources—data, peripherals, and software—automatically, at disc speeds, while running their programs, big or small, at the same time without affecting one another.

## Processing Alternatives

	BATCH	TIMESHARING	DOMAIN PROCESSING
Type	Large mainframe (e.g. Cray)	32-bit supermini (e.g. VAX)	Networks of dedicated high performance computers (Only Apollo)
Typical Use	Very large computations	Interactive, real-time	Interactive and large-scale computations
Applications	Very heavy CPU-cycle applications	Multi-user, low to medium CPU cycle applications	Any number of users in heavy CPU-cycle graphics intensive applications
Typical Entry Cost	\$3,000,000 to \$8,000,000	\$150,000–\$300,000	\$35,000–\$50,000
Incremental processor cost	\$3,000,000 to \$8,000,000	\$150,000–\$300,000	\$25,000–\$50,000

## TACKLES THE BIGGEST JOBS

Each user's Domain system node has a 32-bit processor, 16 Mbytes of virtual address space, and up to 3.5 Mbytes of high-speed physical memory. That means you can run very large, single-program applications such as NASTRAN, circuit design simulations, architectural/electrical construction applications and many others. Or, with Domain's inter-process communications, you can run multiple program applications. Or, you can configure an entire network for running in a distributed multiprocessing way.



## ADVANCED GRAPHICS THAT WORKS THE WAY PEOPLE WORK

Domain Processing's high resolution, bit-mapped displays give you multiple windows into different, concurrent processes—as if you were working at your desk with sheets of paper. You can move these windows anywhere, make them any size, and overlay them in whole or in part. Domain System users typically have two or three processes active, although they can display up to fifteen. You also have a choice of a vertically oriented 15-inch display or a horizontally oriented 19-inch display, so you can work in the format that fits your application.

## Performance per user

*In most multiuser systems, response time declines as the number of users increases. In Domain Processing, each user gets a consistently high level of performance dedicated to his job.*

## BROAD PRODUCT RANGE

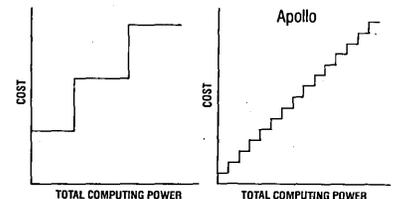
With Domain Processing, you get the peripherals, options, and software you need to handle the most demanding applications.

A performance enhancement option gives you cache memory and single and double precision floating point hardware. Disk storage includes 33 Mbyte and 66 Mbyte Winchester and 300 Mbyte disk drives.

A Domain System's comprehensive software, including ANSI FORTRAN 77, Pascal, screen editor, high level language debugger, and the system's advanced distributed virtual memory operating system is geared

to support Domain Processing's multi-level interaction. And a growing library of third party software can provide the support for your scientific, engineering, modeling, CAD/CAM, and decision support applications.

## Growth costs



*Domain Processing reduces your initial system cost by allowing you to install only the computing power you need. Larger systems typically force you to buy expensive and wasteful excess capacity. A Domain Processing network is expanded in cost effective, manageable increments. With a large system, expansion usually means adding another expensive processor.*

## A Computer Architecture That Extends Virtual Memory Network-Wide

*Today's applications demand a different approach to computing. Apollo Computer is the only company to extend demand paging across a network, so you can get information anywhere in the network as fast as you could if it were stored locally.*

## FIND OUT MORE AT A TECHNICAL SEMINAR

Domain Processing seminars are scheduled for Boston, New York, Washington, Philadelphia, Chicago, Detroit, Dallas, Houston, San Francisco, and Los Angeles. To find out what Domain Processing can do for you, or when the next seminar will take place in your area, write or call Ed Zander, director of marketing, at Apollo Computer Inc., 19 Alpha Road, Chelmsford, Massachusetts 01824 (617) 256-6600.

\*Distributed Operating Multi Access Interactive Network

# apollo

computer inc.

The Company That Invented Domain Processing

CIRCLE 131 ON READER CARD

**Previous models, argues the author, have caused managers to repeat the mistakes of the past.**

# AN MIS MODEL FOR CHANGE

by Harvey Gand

Many MIS organizations are failing the business community they are chartered to serve. Why? For many reasons, including:

- MIS management and methodology are driven by technical expertise and innovation rather than sound managerial principles. The result is an MIS organization that cannot effectively respond to strategic business requirements because it lacks comprehension of and empathy with corporate goals.
- Multiple, varied, and immediate user needs compound an unstable internal MIS situation caused by rapid technological, business, and personnel changes. The contemporary MIS manager concerns himself with daily survival at the expense of tomorrow's plans.
- Rapid proliferation of computer hardware and software throughout the company because of dramatically improved price/performance has emphasized the need for strong central MIS control. The reality of the situation today is uncoordinated development efforts, redundant processing capabilities, overstaffing, excessive MIS budgets, and a total lack of standard approaches to problem solving and project control methodology.
- An unsympathetic corporate management that passes complete responsibility to the MIS executive to plan, coordinate, develop, and implement information systems to support the goals of the total organization. The problem can be further magnified by an MIS manager who is more technician than executive.
- An academic community that produces information scientists steeped in technical skills, jargon, and the latest innovations but woefully lacking in business perspective, managerial principles, and user empathy. The result is professionals who are highly educated but unable to perform meaningful problem solving in the real world of business.

These problems add up to an environment where the MIS organization must be able to retain control but still respond to rapid change, all while keeping the long-term company goals in view. Currently used MIS models have failed to help organizations meet these responsibilities.

The most popular contemporary model is probably the one developed by Gibson and

Nolan (Cyrus F. Gibson and Richard L. Nolan, "Managing the Four Stages of EDP Growth," *Harvard Business Review*, January-February 1974). It emphasizes historical life cycles and crises points within MIS organizations across a broad industry spectrum. The model delineates four stages of department growth that are in turn manifested by application development, growth of personnel specialization, and management techniques customarily applied in each of the four stages.

The four stages of MIS growth according to the Gibson and Nolan model are:

*Initiation.* This is the embryonic stage, and key questions to consider are "What is the reporting structure within and above the MIS department?" and "What is required for the users to overcome any possible fear of the computer?" This stage is categorized by cost-reducing applications that are generally accounting-directed (e.g. Payroll, Accounts Payable, General Ledger, etc.), personnel who are employed for general technical proficiency, and lax management controls coupled with loose budget constraints.

*Expansion.* Successes achieved in the initiation stage result in an expanded application development emphasis on the MIS role in the total organization. Thus, the MIS function is given free rein to attempt further achievements in all areas of the company. There is a proliferation of systems in all functional areas; personnel within MIS are recruited more for application skills than for technical abilities; and department management is oriented toward growth and results rather than planning and budget control.

*Formalization.* Significant growth with usually disappointing results shifts the emphasis to stringent departmental controls. There is a hiatus of significant new applications development while executive management uncovers the reasons for runaway MIS costs and dissatisfied users, and later is assured that proper monetary and project controls are in place. If any new developments are considered, they emphasize control (e.g., Inventory, Purchasing, Master Production Schedule, etc.). Additional personnel are required to stabilize the MIS environment and correct past system/program problems. The

MIS management is directed to develop strict controls, especially in the areas of budget and project standards.

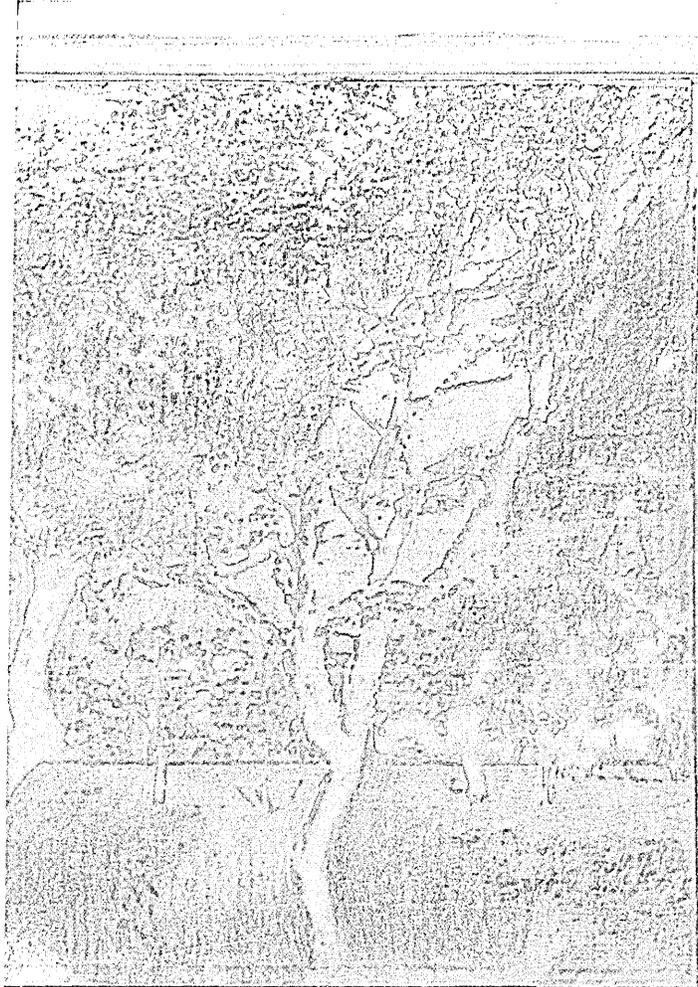
*Maturity.* In this final stage of MIS growth, the authors present an MIS function that has stabilized its own internal resources, corrected past system errors, and is poised to undertake new development in a planned and controlled environment. Most applications are integrated using state-of-the-art concepts and technology, and are components of a strategic MIS plan. Department personnel are specialists in technical fields such as database administration, networking, and teleprocessing support. MIS management is steeped in principles of effective management evidenced most by budget control.

In summary, Gibson and Nolan proclaim that their research reveals that most, if not all, MIS organizations follow this evolutionary cycle of growth. Because of this, the authors claim that review and knowledge of these growth patterns enable MIS management to anticipate and plan for the needs of the next growth cycle while avoiding the pitfalls. They further suggest that comprehension of the model provides a framework for communication for both the edp manager and the senior managers to whom he reports.

## DEFECTS OF THE MODEL

Gibson and Nolan's model sounds effective. And, in fact, the evidence at hand, especially the number of installations that follow their methodology, supports that view. But I submit that their approach contains severe limitations that foreordain MIS organizations to repeat the mistakes of the past. To wit:

The authors base their findings solely on the way MIS organizations have evolved over the years. It is important to realize that much of this evolution was unplanned, and perhaps based on expediency. The point is that because it happened in a particular way does not qualify that course as the correct or proper one. Thus the followers of this approach are doomed to emulate the four stages of the model, and at best, minimize the disruptions, costs, and turmoil evidenced at each period of growth. The outlook of MIS management is to apply a predetermined



mechanistic life cycle to the department growth with no opportunity to plan and react to unforeseen change.

In this same vein, the historical perspective provides no alternatives to minimize or avoid specific growth stages or crises altogether, or more importantly, plan for future growth. The model does not support a future perspective to assist MIS management in controlling internal resources while servicing company objectives.

The driving force behind the model is budget control, as evidenced by strong/weak management and stringent/loose expense planning. The real criterion of successful MIS is the service level applied to the users, or user satisfaction. The emphasis on monetary control in the model does not balance with the need for user support levels.

MIS management is encouraged to delegate upward to an executive level steering committee the planning, prioritization, and problem resolution stemming from new development. This compromises both the credibility and effectiveness of the MIS executive.

The authors proclaim that technical innovation within MIS can be achieved only through organizational instability and reduced service. Conversely, high customer satisfaction and department control require technical stagnation. Neither perspective is valid. A balance between the two views is not only possible but essential to provide innovative system solutions while retaining qualified professionals.

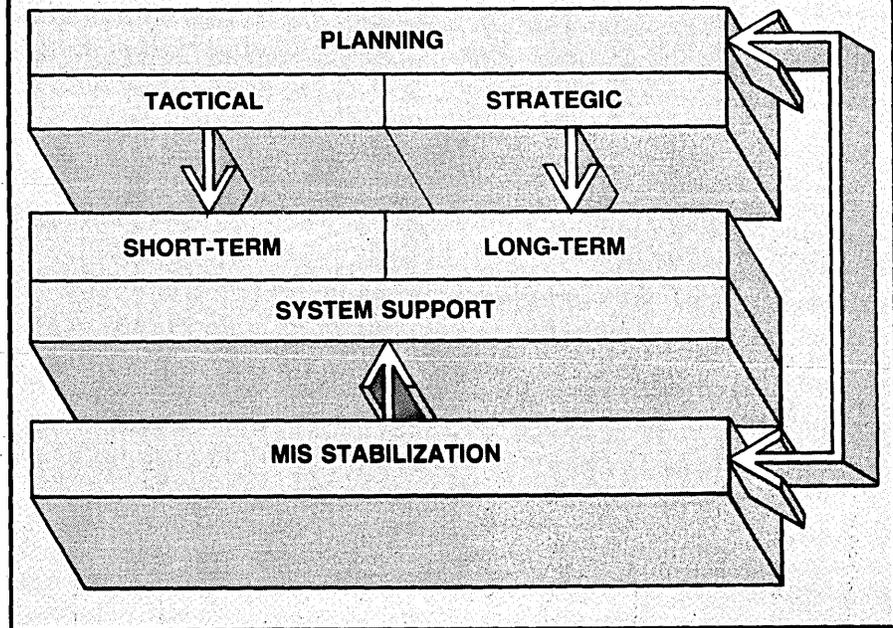
The model demands that centralization be emphasized at certain stages of MIS growth. But industry trends in hardware/software development promote the decentralization of both machine power and functional system use, and this move to distributed processing appears to be accelerating.

In summary, Gibson and Nolan have presented a methodology that locks MIS management into a view of the past. Further, it provides no tools for coping with a climate where users are clamoring for more, not less, control over their processing destiny. What is now required is a new model that adjusts to the pressures of immediate needs while never losing sight of the internal departmental stability essential to significant systems development in support of the company's objectives. I have termed this new model the "MIS model for change."

The MIS model for change is designed to anticipate and minimize the disruption of rapid change while maintaining a stable department environment to effectively service the corporate strategic objectives. The main goals of this new methodology are:

**MIS stabilization.** In this area, the emphasis is on controlling the internal departmental resources in a way that provides technical innovation with system development

FIG. 1  
**THE MIS MODEL FOR CHANGE**



and production stability.

**System support.** This goal touches upon successful definition, prioritization and implementation of the applications or subsets that are most appropriate to achieving the company's short- and long-range objectives.

**Planning.** Defines a controlled reaction to a dynamic and constantly changing environment that affects the business, company, department, technical, and personnel spheres in which MIS must operate, and a mechanism to incorporate that change into the system support.

## CONTROL OF CHANGE

The new model's watchword is "control of change." The perspective of this model is on the present and the future rather than the patterns of the past.

This new methodology is depicted in Fig. 1. The model portrays the relationship of the three components rather than priority, duration, sequence, and resource commitment. These nonrelationship considerations will be detailed in subsequent examples of the actual model in use. For now it is sufficient to say that the planning and MIS stabilization components of the model drive the system support component, and this in turn provides constant feedback to the two drivers. Let's turn to each model component in detail.

**MIS stabilization.** This component provides department management with a mechanism for defining and controlling the internal resources needed to provide system support. Included in MIS stabilization is the personnel recruitment process, which is concerned with such things as optimum organization structure, job descriptions, hiring, career paths, training, and performance reviews. Another aspect of stabilization is the setting of policies and procedures. These will

range from data center guidelines for operators and data entry and control personnel to a formalized project control mechanism that encompasses everything from program specification definition to production turnover. The point is that the MIS stabilization component forces management to define and act upon those requirements needed to provide department stability. Only in a controlled environment can MIS provide meaningful and sufficient system support.

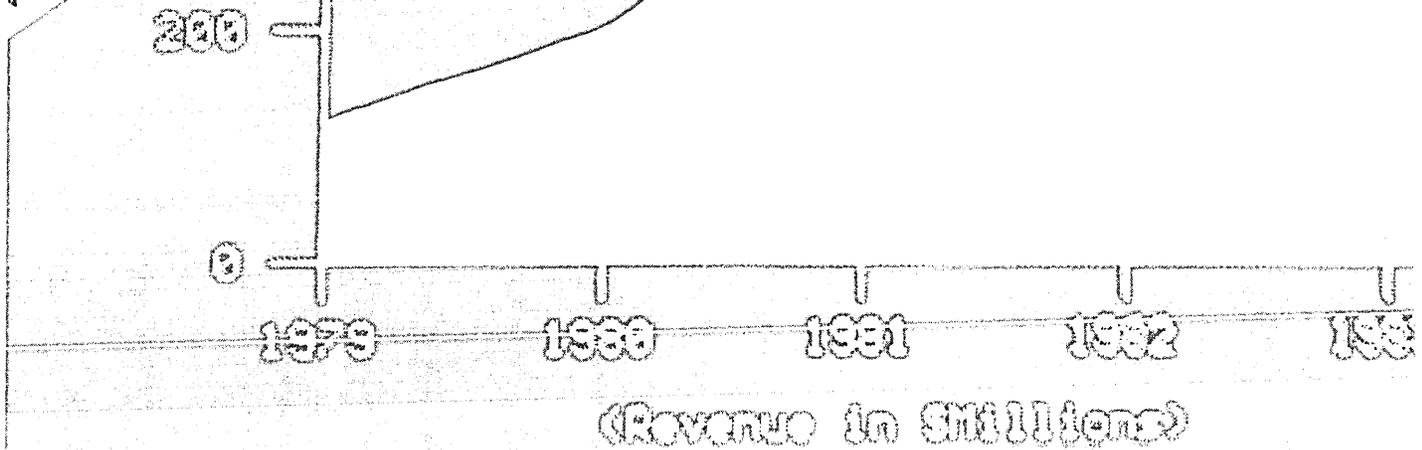
**Planning.** The activities under the planning component range from servicing user requests to strategic plan development. Emphasis in the tactical area is on the users' requirements in the short term. In the strategic portion, the planners are considering the company's long-range objectives and asking, "What is required three to five years from now from a system support perspective?" The model dictates that planning is an integral part of the routine MIS activity.

**System support.** The raison d'être of MIS is user system support, and the main component of the model is servicing of user requests. These can range from simple program modifications or enhancements to installation of far-ranging integrated on-line systems.

The driver component of MIS stabilization affects system support by providing a stable, secure, and controlled creative atmosphere, while the planning component anticipates the user needs and builds those requirements into the development/production schedule. As system support continues, constant and meaningful feedback is provided to the MIS stabilization component for additional or revised department resources, and to the planning component for tracking against schedules. The three components of the model provide a basis for supporting the goals of the company while ensuring a stable MIS environment that anticipates change.

Graphics  
Language  
Breakthrough

Money Back Guarantee



## New Intelligent Graphics System<sup>SM</sup> provides high-function programming. Easily. Quickly.

### Powerful Interpretive Graphics Language

- Most advanced graphics language available for a micro, patterned after Siggraph Core Standard
- Device-independent output: same image can be displayed on color CRT, plotter, printer or camera
- For input, supports light pen, digitizer and keyboard
- Simplified implementation of graphics. Powerful commands mean enhanced productivity.

### Professional Graphs with IGS<sup>SM</sup>

- 7 selectable type styles can be displayed in any size, color or orientation

- Over 150 commands, all English-language, like: PIE, PIE SLICE, BAR, LINE, GRID, AXIS, POLYGON, FILLS, ROTATE, PAN, SCAN, CONVERTER
- Automatic labeling and scaling of grids and axes

### Introductory Prices Include IGS Software, Terminal \$3940\*

- Model 830-IB-IGS<sup>SM</sup> 8-color CRT, 117-key keyboard, dot addressable with readable bit map (as shown) Desktop \$5700\*
- Model 806S-R, 19" 8-color CRT in Industrial Cabinet, 117-key keyboard, dot addressable with readable bit map, 64K user RAM, CP/M<sup>SM</sup>, MRASIC and dual 5" double density disk drive with 960K storage

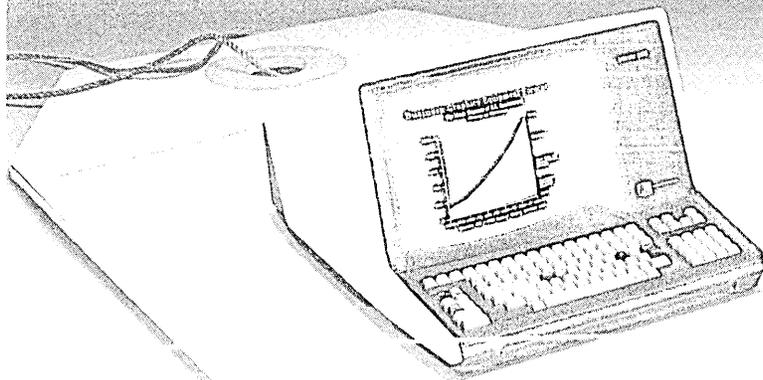
### Graphics Workstation \$11,830\*

- Desktop as described above, plus Hewlett-Packard's HP 7220C 8-pen color plotter and Summagraphics Bit Pad II digitizer, all program-supported by IGS.

### Terms/Ordering Information

Prices good for the first 100 orders received, cash with order. Use in for 30 days. If you are not pleased, your only cost would be transportation charges to and from Norcross, Georgia. For further information, contact Marketing Services, Call 404/449-5295.

Preview this unique system by purchasing the 200-page Users Manual: \$45



**Intelligent  
Systems<sup>SM</sup>**

AFFORDABLE COLOR GRAPHICS

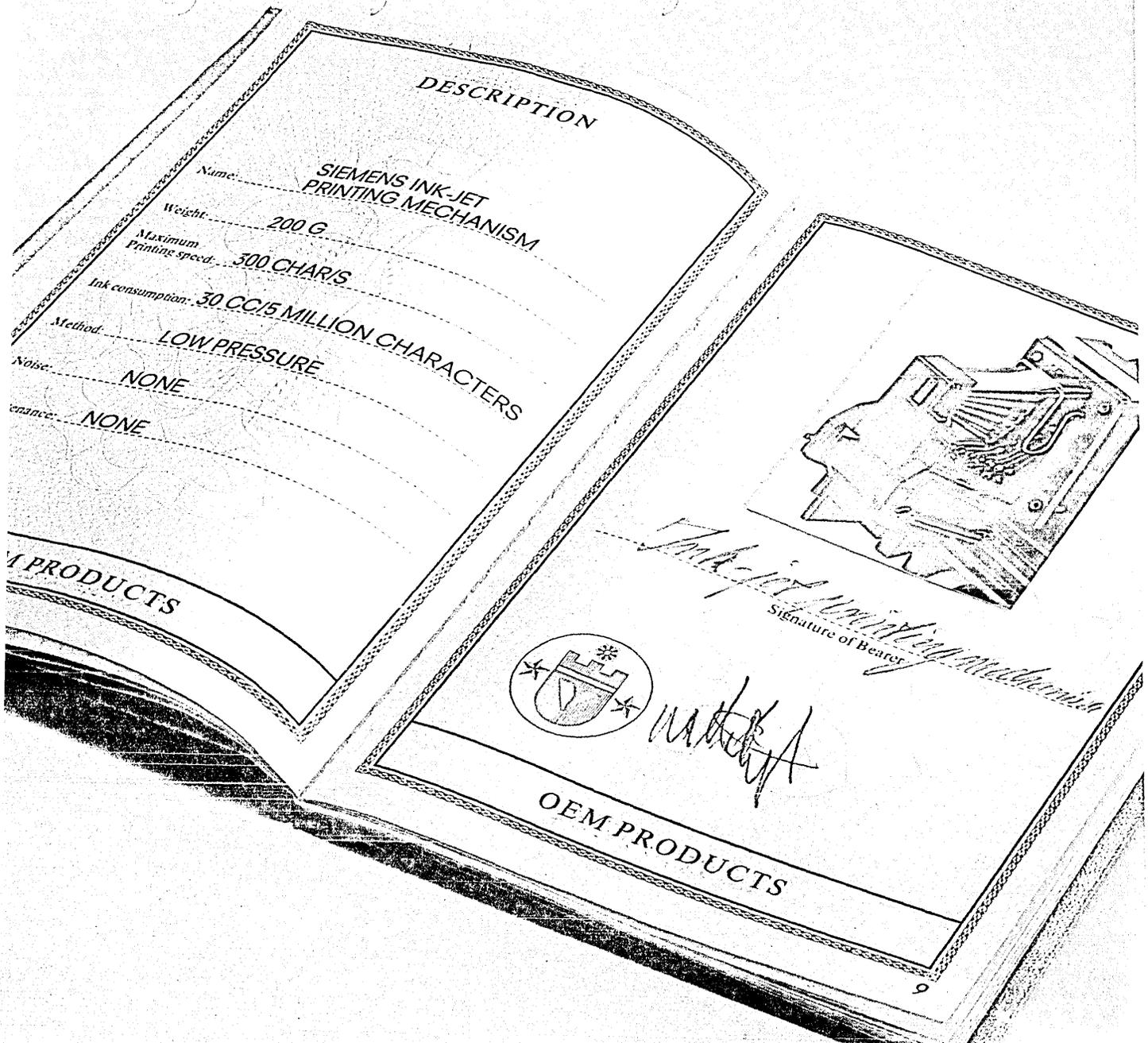
225 Technology Park/Ailanta Norcross, GA 30092  
404/449-5295 TWX 810-766-1581

**CIRCLE 132 ON READER CARD**

\*U.S. Domestic prices.

# SIEMENS

The first high-quality,  
low-cost silent ink-jet system.  
Lighter, faster, and econ



# em for the OEM Market. nical.

The unique ink-jet printing method developed by Siemens works on a low-pressure principle that provides maintenance-free operation. Because there are no moving mechanical parts in the ink-jet head, no routine maintenance is required.

Any character from any typestyle can be formed out of individual droplets of ink ejected from twelve nozzles in response to electrical pulses.

**Silently but surely, our silent ink-jet printer is making conventional printers obsolete, while making color printing an economical reality.**

The printer's ink supply is held in easily replaceable plastic cartridges which can be sealed for transport and storage. Each cartridge is equipped with a special seal for quick replacement in the printer. Siemens' specially formulated ink is black, lightfast, indelible, waterproof and instant-drying, and applicable to plain paper.

### **Replacing ink is fast and simple.**

As text communication becomes increasingly more important in today's business office, terminals are becoming an integral part of individual workstations. Because of its practically inaudible operation, no other printing system is better suited for this purpose than ink-jet printing. Its economy, reliability, and exceptional print quality make it superior to any other conventional system.

To receive more information about ink jet mechanisms and printers please contact:

Siemens Corporation  
OEM Data Products Division  
240 East Palais Road, Anaheim,  
California 92805 (714) 991-9700  
telex 685 691

Siemens AG  
Communication Terminals OEM Departement TE V 4  
Postfach 700072  
D-8000 München 70  
Telex 5288 351

**CIRCLE 133 ON READER CARD**

# The real criterion of successful MIS is the service level applied to the users, or user satisfaction.

## KEY ROLES IN LIFE CYCLES

Realize that all three components of the model play key roles throughout the life cycle of the MIS department, but to varying degrees. As the department is formed and grows to maturity, emphasis shifts from one component to another in regard to priority, sequence, resource allocation and duration. Fig. 2 depicts a newly formed MIS organization. In addition to the components of the MIS model, I have added X and Y axes to denote time and effort, respectively. The axes are not designed to show specific increments, but to relate the components to each other in terms of time and effort required to achieve specific stages of growth. Following are the details of each component in this formative stage of MIS growth.

**MIS stabilization.** Because the department is new, the task of organizing it and creating a stable, creative atmosphere will get the most time and effort.

- Defining the department organization, including organizational structure, reporting relationships, personnel in specific positions, recruitment, job descriptions, training, career paths, and procedures for performance review.

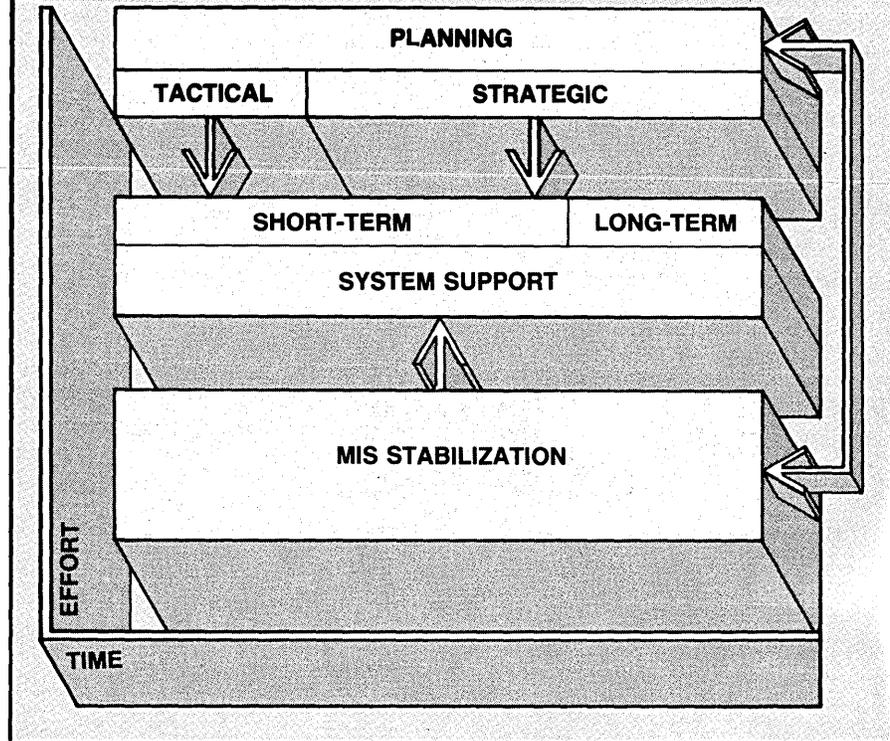
- Drawing up policies and procedures that define the responsibilities and methods of the data center, data entry, control, development, software support, and the librarian function. Specific examples are documentation for all systems development including system, program, and user documentation standards; control of user requests for system service; and control procedures including input receipt and logging, machine setup, verification, and final user distribution of all output. This is an opportunity to thoroughly define the departmental checks and balances required to control the dynamic MIS environment.

- Evaluating the hardware/software combination to ensure that the mix is adequate to support both the tactical and strategic goals of the company. If appropriate, this component will set the standards for developing, presenting and implementing any upgrades to the data center hardware/software.

- Establish performance mechanisms to monitor both the development and data processing functions of MIS. These should include not only hardware and software performance, but also evaluation of MIS personnel performance on systems development, software maintenance, data entry, and all areas of the department.

The above examples should give some idea of the types of stabilizing activities considered under this component of the model. The department resources have been directed inward to organize and prepare the MIS function to undertake long-term application development in support of corporate goals.

FIG. 2  
**A NEWLY FORMED MIS ORGANIZATION**



**Planning.** In the planning component of the model at this stage of department growth, the emphasis is on preparation of a long-term system strategy, but activities in tactical planning are, at first, of a higher priority. Thus, the newly appointed department manager must first address the short-term needs of the users to establish credibility. This may range from implementing expedient solutions to high visibility system problems to cleaning up an outstanding backlog of user requests. The idea here is to quickly mobilize the department resources to service immediate user needs. Once this has been accomplished, planning then turns to definition of a complete system strategy for the entire company. Some key elements of this strategy are:

- The MIS system strategy is a reflection of the company's business plan. Application development is prioritized by the needs of the company in support of marketing strategy, product development, manufacturing plan, profit forecast, and the like.

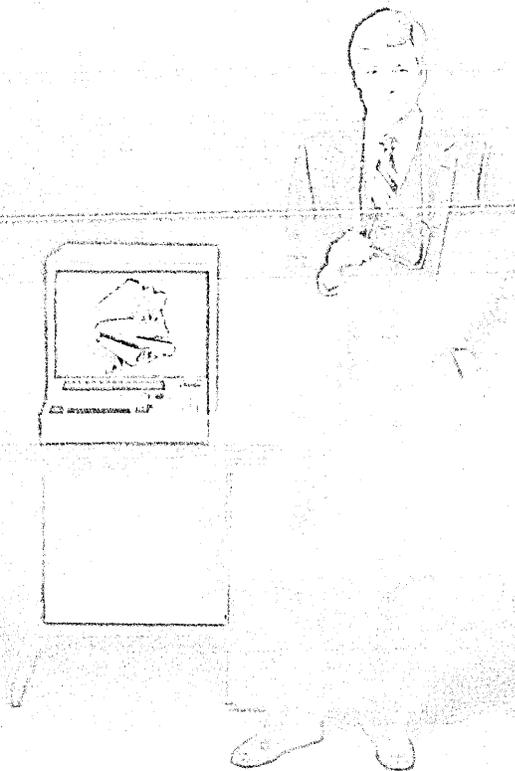
- Top management of the company must be committed to development and implementation of the plan's recommendations. This involves heavy investment of time and effort to identify all system requirements.

- The resultant development efforts and end-product systems must be user-owned. The user community must recognize its responsi-

bility and commitment to development and implementation. The strategy should contain application priorities, cost/benefit analyses, resources required, and detailed implementation schedules, at least for the initial phases. Further, the plan should use a three to five year horizon for new application planning, which usually corresponds to the business plan time frame.

**System support.** As mentioned earlier, system support is the MIS function's reason for being. From the outset, resources must be committed in support of user requests. As the tactical plan is quickly produced, resources are allocated in support of short-term user requests. These may be program fixes or changes or enhancements to standalone systems, but in every case, the emphasis is on expedient solutions to immediate business problems. This will create credibility and confidence with the user community, thus allowing time for the strategic system plan development and the MIS stabilization efforts. At this stage, some time and effort is also spent on long-term system support. There may be some systems that are appropriately installed as part of a total permanent solution even though the system strategy has not been formalized. If this is the case, the only caveat is to have the mechanisms of the MIS stabilization component in place to ensure that the results are consistent

# Command Performance



Performance: The single most important feature to consider when *buying* color graphic display equipment. And the most important benefit in *owning* an Aydin product. Aydin has conducted a quiet revolution in color graphics since 1967. Take a look at the record.

Aydin's performance is measured in *advanced technology*:

- A 1024 × 1024 raster graphic monochrome CRT display, introduced in 1968.
- The world's first color graphic CRT display installation in an electric utility control center, in 1969.
- The highest speed bit-slice technology full-graphic color CRT display, introduced in 1975.
- The world's first multi-processor, multi-user color graphic display computer, introduced in 1978.

Aydin's performance is measured in *user availability*:

- Successful achievement of display subsystem availability targets as high as 99.98%.
- High availability display configurations with single-point failure protection.
- A full QA program meeting MIL-Q-9858A.

Aydin's performance is measured in *service to customers*:

- An unprecedented 18-month warranty for OEM customers, 12 months for end users.
- Free training for all OEM customers.
- Multiple customer service outlets in the U.S. and throughout the world.

Aydin continues the revolution in color graphics and even more performance is yet to come. Watch for our future product announcements. Because you demand it, Aydin commands performance.

**Aydin Controls**  
Command Performance in Color Graphics.

414 Commerce Drive, Fort Washington, PA. 19034  
Phone: (215) 542-7800 TWX: 510-661-0518 Telex: 6851057

**CIRCLE 134 ON READER CARD**

AYDIN CONTROLS offers a complete line of color and monochrome CRT display products, ranging from monitors to desktop terminals to standalone display computers and related software products for high resolution graphic and image processing applications.

*Aydin sets the standard.*

See us at NCC Booth # 7028 & 7029

and merge properly with the recommendations of the application strategy.

### DRIVING SYSTEM SUPPORT

Note that the planning component drives the short-term system support by prioritizing user requests, tracking against schedules, and providing MIS visibility to the users. Also, the MIS stabilization component drives system support by providing support networks such as departmental policies/procedures, software, hardware, personnel resources, program development tools, and the like. The system support component, in turn, provides feedback to planning on user service levels, and to MIS stabilization on additional procedural mechanisms, resources, or support components needed to maintain or improve those levels.

In summary, at the early stage of MIS department growth, internal resources are allocated to stabilizing the department and planning for the short-term and, more importantly, to planning long-term support of the company business plan. Wherever possible, resources are also devoted to meeting immediate user needs.

Fig. 3 depicts the same department after the long-term system strategy has been developed. There is no definite time period for the department to move into this variation of the model. It depends on completion of required elements of MIS stabilization, strategic planning, and perhaps several user requests in the system support area. The time frame is contingent upon executive commitment, resources, MIS management capabilities, and other critical factors. There is no "right" time frame. What is important is that the model adjusts the components to the priorities at hand in the following manner.

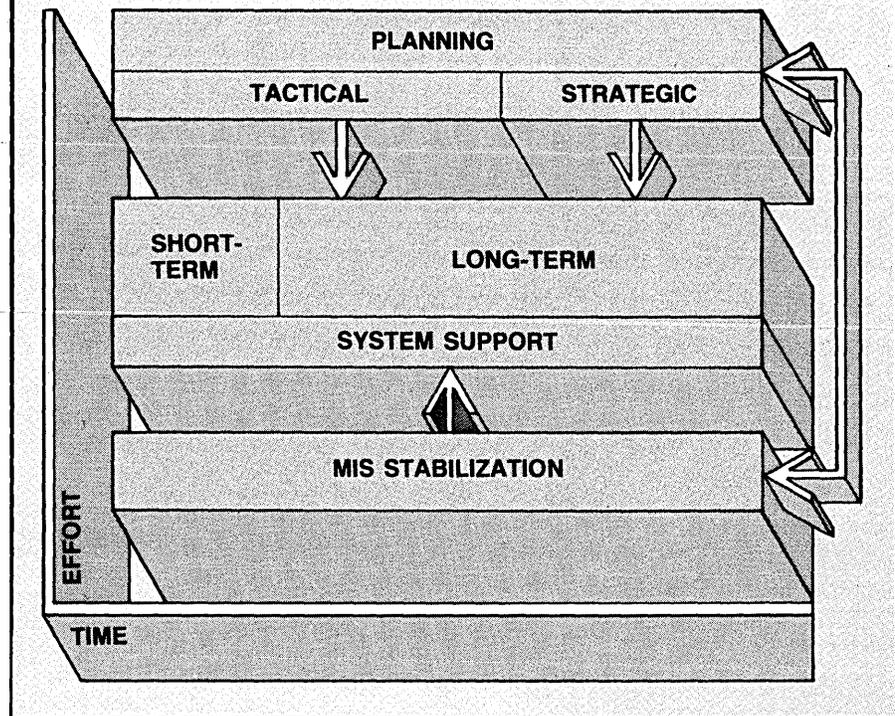
**MIS Stabilization.** The necessary controlled climate has been created within the department at this point, so the MIS stabilization component here deals with modifications to already established guidelines. All the project control, documentation, reporting mechanisms, and machine, software, and personnel resources are in place to support significant application development.

**Planning.** With the publication of the MIS system strategy, efforts are directed toward maintaining the implementation schedules for the long-term application development.

**System Support.** The emphasis switches from short-term support to installation of total, permanent system solutions in support of company goals. Note that at this stage time and effort are concentrated on permanent solutions. Still, there will always be a need to support de facto user needs, and these requests are handled under short-term system support.

FIG. 3

## THE MIS DEPARTMENT AFTER LONG-TERM SYSTEM STRATEGY HAS BEEN DEVELOPED



MIS stabilization continues to drive system support with the guidelines of the department, and planning also drives the development component through schedules and tracking. System support, in turn, provides feedback to revise and enhance support networks or add new ones, and to report progress against the schedules.

The MIS model for change balances user needs with management planning and departmental stability. Components of the model expand or contract as needs dictate, but throughout the department life cycle the three components allocate resources properly. Thus, the model can be applied regardless of the age or position of the department and can be used to shape the future.

Why use this particular model to control the MIS function? Several reasons are obvious. The model does not lock the department into a repeat of past mistakes. It provides flexibility by emphasizing one component over another as needs dictate. The model adapts quickly to change without compromising departmental control.

The model for change provides an opportunity to obtain the greatest payback of the MIS resource for the company. The methodology ensures that efforts are not undertaken before the MIS resource is prepared to handle them.

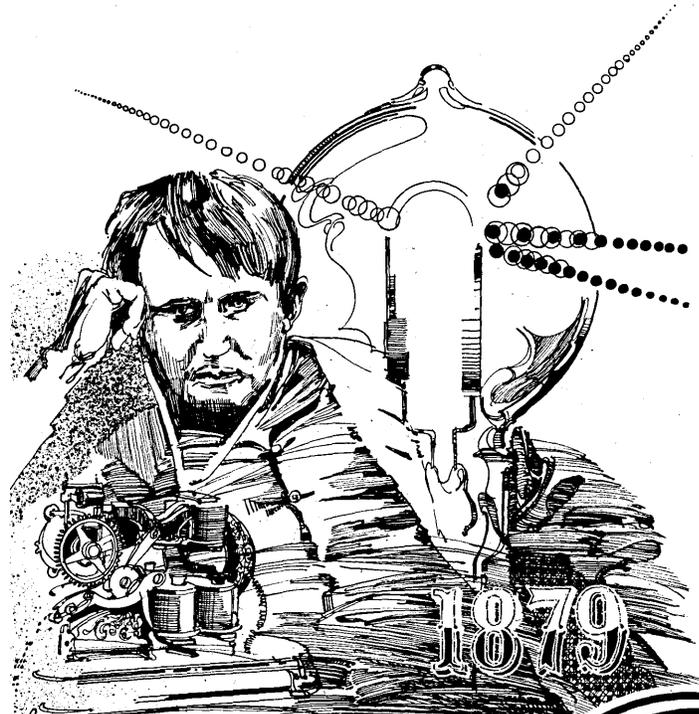
Communication between MIS management and the user community, including executive management, is greatly enhanced because the model provides a necessary forum for explanation of MIS needs. Thus the hiatus needed to attain department stabilization is understood by all as a prerequisite to

significant applications development. Further, it justifies expense as a function of the department's current area of concentration.

Throughout the MIS department life cycle, user needs are addressed. Users develop an understanding of the department, and are less likely to conclude that MIS is unwilling or incapable of supporting application development.

Change is something we must respond to daily, for it makes up the bulk of our lives. Contemporary MIS management methodologies have forgotten this simple fact. With the role of the MIS department expanding, especially in light of the complexity and technical innovation inherent in the electronic office, a new model for directing MIS is clearly needed. This model must be able to provide consistent and meaningful user support, control internal resources, and adapt quickly to change. The model presented here provides a framework for addressing the needs and goals of any MIS department at any stage of growth, and thus provides the best opportunity for attainment of the company's tactical and strategic plans. \*

Harvey Gand is director of management information services at TRW-Fujitsu, Los Angeles, Calif. He has been involved with MIS for 15 years, mostly with manufacturing companies. Gand received his MBA from Pepperdine University, Los Angeles; before joining TRW-Fujitsu, he worked at Lexitron Corp., a division of Raytheon, and Victor Business Products, a division of Walter Kidde.



At General Electric, our roots go back to Thomas Edison. It was in his tradition that we introduced the first fully electronic printer with LSI circuitry in 1969.

Since that beginning, we've introduced other innovations, and evolved a complete line of new and better printers as we concentrated on advancing the quality and reliability of electronic printing technology.

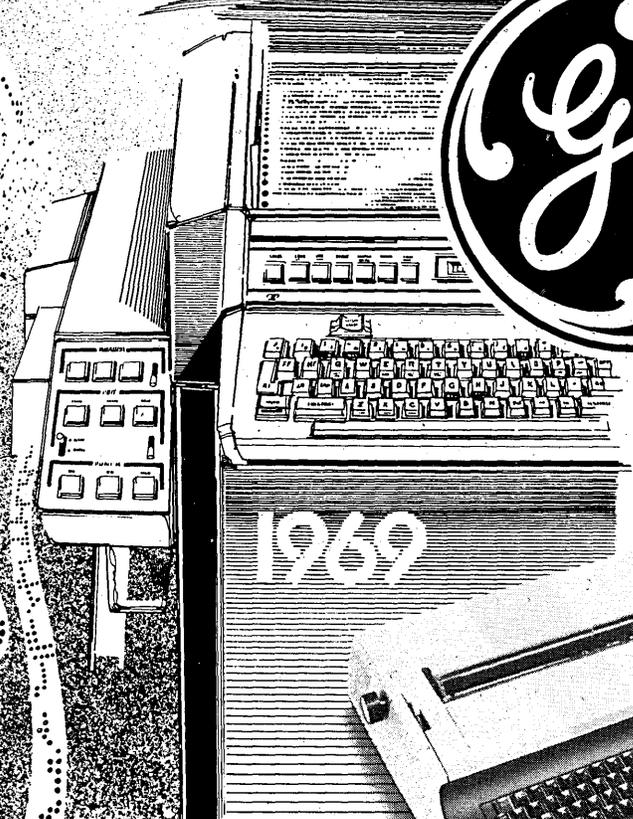
Today, General Electric is a full-line printer supplier with over a decade of expertise meeting a wide range of printing requirements. Cost effective General Electric printers are rugged and reliable, with a variety of printing speeds to meet your needs. Matrix and fully formed character printing. Interfaces to fit most systems. Plus worldwide GE service to back them up.

The GE line printer family includes the GE 340, GE 510 and GE 200. The GE 340 is a low cost, 425 lpm fully formed character printer that's an industry leader in price/performance. The GE 510 dual mode line printer combines GE 340 data processing output with letter quality printing at the change of a ribbon. A dual-hopper single sheet feeder is available for correspondence applications. The GE 200 matrix line printer delivers the highest throughput in its class — over 400 lpm for highly formatted data.

GE teleprinters include the GE 2000 series and the GE 200. Stylish, compact, lightweight, easy to use, our office-quiet GE 2120 (120/150 cps) and GE 2030 (30/60 cps) matrix printers are setting industry standards for desktop machines. The



Behind every  
GE printer  
is a tradition  
of innovation.



GE 200 at 200 cps is a throughput champ, built to take it in heavy-duty cycle applications.

And the newest addition to this extensive line of printers is the GE 3000 family. Six high quality output printers that combine single-design simplicity with remarkable application flexibility.

Our special application printers round out the industry's most comprehensive printer line. Specialized GE 200 printers include Forms Access, Dual Forms Split Platen, Red/Black Printing and Single Document Insertion models.

All GE printers come with a full complement of standard features as well as an impressive list of options and accessories.

With such a wide range of choices, you can be confident that there's a General Electric printer that meets your needs precisely. Efficiently. Effectively. Look for your printing solution in our family of printers.

General Electric ... we're the industry leader in electronic printing. We pioneered the industry in the first place.

**First In Electronic Printing.**

See us at the NCC  
Booth No. 1614

For the solution to your printing needs, call TOLL FREE 1-800-368-3182.  
General Electric Company, Data Communication Products Department FA21, Waynesboro, VA 22980. In Virginia, call 1-703-949-1170.

**GENERAL  ELECTRIC**

CIRCLE 135 ON READER CARD



# YES. YOU CAN BUY A UNIX SYSTEM FROM SOMEONE ELSE.

Heaven knows, there's enough people out there who offer them.

But before you make a decision, you should know about one computer company whose only business is to help you make the most of UNIX.

Plexus.

Because we focus on nothing but UNIX, we can offer more in terms of performance, business opportunity and support.

A case in point:

Our P/25 and P/40 minicomputer systems. From the ground up, they're made for UNIX. With a multiprocessing architecture that complements the multiprogramming abilities of UNIX — as it overcomes typical performance bottlenecks of disk transfers and terminal interactions.

So you can handle up to 24 terminals, dozens of programs and a multitude of processes. All simultaneously. All at full speed. And all at a cost per user less than half that of most minicomputers.

But we realize performance isn't everything. Which is why we planned for something else.

Your growth.

Our multiprocessing architecture, for instance, lets you keep adding performance — without ever starting over. And we made

it possible for you to grow on your own terms — instead of someone else's — by designing our minicomputers around not just UNIX, but the other standards of the industry.

From the standard Multibus interface. To standard communication and networking protocols. To standard software packages like COBOL, BASIC and C.

And then take support. Because when it comes to UNIX, we have it all. Full software engineering support, UNIX software maintenance and even a software referral service for your OEM programs.

Fact is, of all those someones who offer UNIX, we're the only ones who support not only it, but you — with a field engineering force that'll back you up no matter what field you're in.

Not that we have to stop there. If you're serious about UNIX, contact us: Plexus, 2230 Martin Avenue, Santa Clara, CA 95050, (408) 988-1755. And we'll be glad to tell you about all the other no-nonsense advantages we offer.

To us, UNIX isn't part of being all things to all people. It's everything.

**PLEXUS**

# WHY SO MANY IBM OWNERS DON'T DEMAND IBM SERVICE.

Thousands of IBM owners nationwide have turned, instead, to MAI/Sorbus® for service.

Why?

First, we charge about 20% less for a service contract than IBM.

Second, many times we offer something they won't get from the maker: regular preventive maintenance. Your Sorbus service representative is on the job. Helping to prevent minor problems from becoming major ones.

So, if your IBM System/3, 34, 360, 370, or even an old unit record system is still performing—great. Forget who sold it to you: remember who keeps it working.

Demand Sorbus service.



Sorbus Service Division of  
Management Assistance, Inc.  
50 E. Swedesford Road  
Frazer, PA 19355  
(215) 296-6000

CIRCLE 137 ON READER CARD

# PEOPLE

## PRICE IS RIGHT

Any executive who rises to the top of a multibillion-dollar corporation understandably can tick off a list of victories. Robert M. Price, the president of Control Data Corp., can do that, of course. But for Price, it wasn't the victories that left the indelible marks; it was the flops. When he tells those unhappy stories today, he does so with a trace of a grimace.

As a young mathematician not too long out of college, Price was put in charge of a complicated computer project. His employer had ordered a big new computer and Price's four-man team was designated to prepare a sophisticated simulation model for it. The team worked on the software systems project for more than two years and spent nearly \$1 million.

One day, the big new computer came in and Price's team began to fit the simulation model to the computer. "We were very proud of our work, but six months later it was in total disuse," Price recalls. "Top management had simply neglected to see how the simulation model would fit in with the total management process. We were terribly disappointed that they didn't use it."

Price learned that there was a moral to the story: when you mess with computers you'd better look at the total management process or you're likely to have problems. As far as Price is concerned, however, there is a Hollywood ending to the story. The hard lesson he learned from that early flop formed the foundation of a personal business credo to him on his move into top management. He now possesses what can only be described as a fetish for looking at the broad management picture and fitting the small pieces cohesively into the whole.

To illustrate, Price likes to tell an-



ROBERT M. PRICE: "You just can't have something as expensive and crucial as software be subservient to a bad pricing system."

other story. A few years later, a man in the accounting department came to Price complaining about a problem that he thought was an isolated difficulty. Since Price by that time was tuned into the overall management picture, he could quickly see that the situation had very broad ramifications for their company. "We solved his problem easily and in the process we literally saved the company millions of dollars," Price said. "The secret was that we looked at the whole cloth. Unfortunately, we tend too often just to automate the books in management information systems and not to look beyond the issue at hand."

Those early front-line experiences have made Price something of a unique specimen in that before becoming a business manager, he worked first as a user of computers for nine years at such varied places as the University of California's Ra-

diation Lab in Livermore, General Dynamics, and Standard Oil of California. For the thousands, even millions, of American business managers who are beginning to make use of the new computer technologies moving into management circles, Price holds the role-reversal distinction of having been at the same place a long time ago.

Even though he is president of one of the world's largest and most successful computer firms, Price now considers himself to be a business manager who just happens to use computers. He doesn't use his extensive programming and systems analysis background in his work. True, he has computer terminals at his easy disposal, but they are simple to use and not unlike the terminals used by many managers without computer backgrounds.

Just outside Price's office in the Control Data Tower in Minneapolis, his secretary has a terminal she uses primarily for word processing. The terminal can also access CDC's Cybernet timesharing network, and Price occasionally will sit down at the terminal and access Cybernet's databases. Sometimes, Price performs some limited modeling on the terminal.

When Price was asked recently what he last used the terminal for, he paused, thought for a moment, then said it was to check out some statistics and pricing figures on a competitor. At home, Price has a CDC Plato educational terminal that he says seems to get used mostly for demonstrating Plato's capabilities to his friends. And, like many another home computer terminal, Price's Plato terminal is used by his children.

In short, Price would have you believe that he uses computers in much the same way as computers are used by any forward-thinking executive who could be a novice in computing. However, those nine years as a top software systems analyst, coupled with his magna cum laude in mathematics from Duke and his master's degree in math from Georgia Tech, haven't exactly been tossed out the window. When CDC

## PEOPLE

technical staff encounters a particularly sticky problem, Price can occasionally be lured in to do a little high-level software troubleshooting. Said one CDC man of Price's technical background: "It's like playing on a baseball team where you know the manager can always come in and pinch hit in the top of the ninth inning."

With nearly 30 years of computing behind him, Price would seem to be just the man to ask what changes in computing today's business managers can expect.

For one thing, Price sees the whole area of software continuing to emerge as an area of particular importance. "The real educational process in software began more than 10 years ago, when IBM and the other manufacturers unbundled software and hardware," said Price. "At first many customers looked at unbundling as a devious means by which manufacturers were able to raise prices. But they gradually began to realize there were real costs associated with software."

Price believes computer users are still undergoing a relatively painful process of understanding the true value of software. While he feels the software value awareness factor has come a long way since unbundling, he thinks it may be another 10 years before the value of software vis-à-vis hardware is fully appreciated by computer users. "This will continue to be a gradual

process," says Price. "You can't change the culture overnight. But you just can't have something as expensive and crucial as software be subservient to a bad pricing system."

Not surprisingly, Price arrives at his views on software by looking at the "total process" at Control Data. While the company is strong in everything in computing from supercomputers for scientific computation to small computers sold in stores—and Price has to consider everything in between in that universe—the company's main thrust is in software services. And the sometimes nagging dilemma in that universe is software pricing.

At CDC, the vice president of operations services who is in charge of management-systems needs—including data processing, word processing, information databases, and data communications—reports directly to Price. CDC management believes by tying all management-systems needs up in one bag the company can monitor the total management situation better. Sometimes these internal needs suggest an external business opportunity.

For example, Price likes to point to an internal CDC business advisors program in which the company has compiled an elaborate employee skills database. While CDC employee skills can be called up quickly from the database for internal use within

Control Data, the skills database can also be tapped into by CDC's various outside consulting activities for small business.

CDC employees are encouraged to consult part time for the company's various small business advisory endeavors. For instance, a CDC programmer with a background in dairy farming might be called upon to work with a farmer through CDC's Rural Venture Inc. program. Other employees might work in CDC's City Venture, the firm's successful inner cities development program. One interesting wrinkle of CDC's employee skills database is that CDC employees list only the skills they *want* to list in the database so they are more likely to be called upon to consult in a situation where they will be enthusiastic.

What is the wave of the future in computing?, Price was asked. As far as Control Data is concerned, it is the company's Plato computer-based education system. "Plato is the most complete man-machine interface ever developed," said Price. "It's easy to use, and getting easier as the technology improves. The ultimate in computing will be to have someone without a computer background who has great knowledge in his field—whether he be a physicist or an economist or anything in between—use the Plato system. That's the technology that's inherent in Plato."

—W. David Gardner

# GLITCH HUNTERS

**The story continues.** Introducing Maxichek III with breakout adaptor—the newest addition to the Maxichek family. It's the latest development in hand-held, microprocessor-based data analyzer technology now being offered by Astrocom. Continuing in the highly regarded tradition of Minichek, Astrocom's original pocket-sized BERT test kit, Maxichek takes the state of the art one step further. With Maxichek III, a built-in breakout adaptor has been added to enhance Maxichek's comprehensive error tracing capability for installing and servicing terminals, multiplexers and modems. And now it can be used as a terminal exerciser and data monitor. All three testers are battery operated, human engineered for easy use and, within their range of

problem-solving parameters, are probably the simplest, least expensive glitch hunters on the market. For more information write or call: Astrocom Corporation, 120 West Plato Boulevard, St. Paul, MN 55107. (612) 227-8651.

**astrocom corporation**

Delivering solutions in data communications.



CIRCLE 138 ON READER CARD

*"DO YOU  
READ ME?"*

**N**obody needs to tell you that one of your headaches today is getting over the "language barrier"

Especially if you use CICS.

It's tough to find trained specialists who have mastered the complex CICS language. And it's expensive to have to use them for ordinary jobs.

But what someone needs to tell you about is Central Software.

Central Software was born to break the language barrier—and others as well. Anybody on your staff who knows COBOL, PL/I or Assembler can talk to CICS easily and quickly. Central Software was developed to

operate exclusively under CICS. It is compatible with IBM 370/115 or larger mainframes.

This versatile software package also has the ability to simplify the development of production applications that fit *your* specific needs. Most importantly, it speeds up the work, and eats up the backlog that plagues you, as your CICS specialist will tell you.

We'd like to send you a brochure that spells out the Central Software advantages. Or give you a *free* demonstration by calling us at (703) 556-1900.

## CENTRAL SOFTWARE SPEAKS YOUR LANGUAGE.

PLANNING RESEARCH CORPORATION

### CICS Users!

Mail to:  
PRC Program Products  
Division  
1500 Planning Research Dr.,  
McLean, VA. 22102

I've read you! Please...

- Send me your brochure, "The art of communicating in a straightforward manner."
- Call me to arrange for a free demonstration. **CIRCLE 139 ON READER CARD**



name \_\_\_\_\_  
 position \_\_\_\_\_  
 company \_\_\_\_\_  
 CPU OpSys \_\_\_\_\_  
 phone ( ) \_\_\_\_\_  
 address \_\_\_\_\_  
 city \_\_\_\_\_  
 state zip \_\_\_\_\_

# Baby Blue CPU PLUS

# Baby Blue

FOR THE IBM PERSONAL COMPUTER

## IBM PC owners — Have a Cigar!

Your Personal Computer is no longer alone. Baby Blue CPU Plus has arrived, bringing with it access to more than 20,000 field-tested programs written for the CP/M-80\* operating system.

Our blessed event is a complete hardware-and-software solution to the problem of a terrific machine with very little software. Neither an emulator nor a conversion utility, Baby Blue is a computer within your computer that runs real CP/M programs. It even lets you mix CP/M and DOS programs on the same disk, and lets them share data files.

This new arrival is versatile, too. Besides opening the immense CP/M software catalog to you, Baby Blue also takes the place of the IBM 64K-byte Memory Expansion Option. For both functions, Baby Blue is cradled in just one of your system's expansion slots.



**(212) 489-0444**

or write XEDEX Corporation,  
1345 Ave. of Americas, New York, NY 10105

### Specifications:

*Printed-circuit board:* 11 x 4 in.

*Memory:* 64K bytes 200-nanosecond dynamic RAM, with parity (nine 64K chips)

*Processor:* Z80B\* Running at 4.77 megahertz (system clock speed); can be started, stopped, reset or interrupted (NMI) by host system

*Bus:* IBM Personal Computer

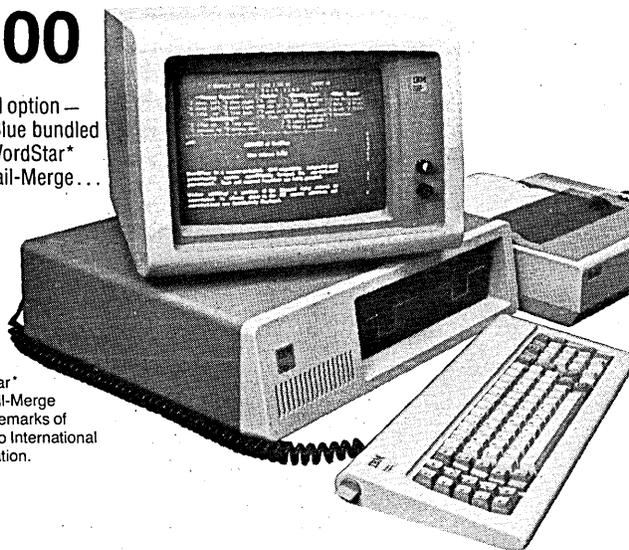
*Terminal emulation:* Televideo 950 (subset)

### Baby Blue CPU Plus

**\$600**

Special option —  
Baby Blue bundled  
with WordStar\*  
and Mail-Merge...  
\$980

WordStar\*  
and Mail-Merge  
are trademarks of  
MicroPro International  
Corporation.



Baby Blue CPU Plus and Baby Blue are trademarks of XEDEX Corporation \*CP/M is a registered trademark of Digital Research. \*Z80 is a trademark of Zilog, Inc.

CIRCLE 140 ON READER CARD

# HARDWARE

## OFFLINE

IBM's System/23 Datamaster small business computer appears destined to become a hot oem product as the firm readies new software and a hard disk. Expected is a 30 megabyte disk which will require a 128 byte add-on memory card. New software will be added to let systems houses "get inside" the machine and develop applications above and beyond those one can write with the machine's current BRADS package. Sources close to the machine say marketing responsibility has been handed over to Donald Estridge, director of entry systems, who helped deliver the firm's personal computer last August. It's not clear if the Datamaster will make it to distributors' shelves.

Noted industry analyst Bob Fertig is throwing a two-day bash May 6-7 in Tampa, where he and others will discuss future markets, IBM vs. AT&T, and other topics. Reservations can be obtained from Enterprise Information Systems, Inc., Box 1154, Greenwich, CT 06836. Phone (203) 629-3512.

Control Data is racking up orders for its Cyber 205 supercomputer at a good clip. With three orders booked in the first quarter of this year, it expects to ink at least eight more by year-end. Last year it got eight orders, and the year before, when the \$9 million machine was introduced, it received four orders. No cancellations have been received so far and installations should be up to six systems by mid-'82. One machine a month will be shipped next year, CDC says. Meanwhile, the company will soon unveil a new line of general purpose mainframes to replace its aging 7600 series.

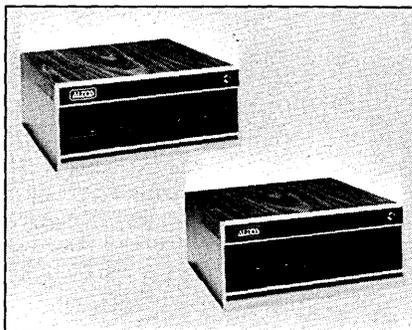
## NCR MAINFRAMES

A new line of medium- and large-scale computers replacing the V-8500M and MP processors has been introduced by NCR Corp. The firm also lowered memory prices, added special pricing for specific software configurations, and repackaged several disk drive configurations. The new computers are the V-8500 Group II systems that are claimed to offer up to 66% greater price/performance than the systems they replace. Seven models, designed to be software-compatible and usable with all but a few older peripherals, span the previous systems in performance, NCR said. The smallest machine is the V-8535-II, an entry-level system offering about 75% of the power of the V-8555M, the previous entry-level system. It carries a purchase price of about 56% of the previous machine. The largest machine is the V-8595-II, which ranges in main memory up to 8 megabytes. Like the next two smallest systems, it is a dyadic machine and is claimed to offer approximately 20% more power than the V-8585-II, which is similar in performance to the original V-8585M. Volume deliveries are set to begin in this quarter of the year, NCR said. NCR CORP., Dayton, Ohio.

**FOR DATA CIRCLE 301 ON READER CARD**

## MULTI-USER MICRO

This new family of microcomputers is said to enable up to three users to share hard disk-based files and therefore lower per-

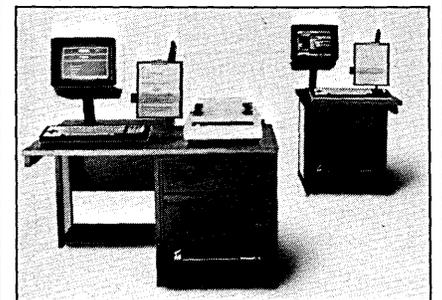


station costs. Based on the 4MHz Z80A microprocessor with 196K bytes of main memory, the new Series 5 computers are designed to run CP/M, MP/M, and Oasis operating systems. Typical applications are word processing, general accounting, engineering, and business forecasting. A multi-tasking feature enables different applications to be run concurrently. The machine comes in two versions, one with the 5-megabyte 5¼-inch hard disk and the other with only a 1-megabyte 5¼-inch diskette drive. The systems permit one of four serial ports to be configured as an 800Kbps multi-drop network port, while another can be configured for asynchronous or bisynchronous communications. The serial ports have independently selectable rates. Prices are said to be in the \$2,000 per workstation range. ALTOS COMPUTER SYSTEMS, San Jose, Calif.

**FOR DATA CIRCLE 303 ON READER CARD**

## TELECOM TERMINAL

This multiport terminal includes a 5-megabyte hard disk to store up to 2,000 pages of



400-word messages, a removable 8-inch floppy disk, and a keyboard display. It is designed to connect to telex, TWX, leased or DDD lines through any of its six ports. Fully concurrent, it can accommodate two workstations complete with keyboards, crts, and printers. Operators can prepare, send, and receive messages concurrently. SIDEREAL CORP., Portland, Ore.

**FOR DATA CIRCLE 304 ON READER CARD**

## HARDWARE

### WORD PROCESSOR

This new standalone word processing system is hoped to compete strongly with the large number of such systems introduced by IBM and others over the past two years. The machine's basic specs include a 15-inch display screen, central processor, 5¼ inch diskette drive, storage of 127 pages of text, a 40-cps daisywheel printer, and keystroke memory mode. The model 3003 is said to be the firm's "base product" for at least the next four years, according to a top execu-

tive. The screen displays 28 lines of text plus three lines of formatting information, status, and prompts. Standard text editing features include insert and delete by character/word/line/sentence/paragraph/page; text move, including the ability to manipulate columns of text or numbers; automatic decimal alignment, and global search/replace of multiple character strings at once, the firm said. A temporary memory of 1,000 characters can be used to store information used in revisions and text creation. Graphics can



also be inserted under operator control. In single units, the machine is priced at \$8,900, but volume orders will be "aggressively" discounted, the firm noted. PHILIPS INFORMATION SYSTEMS, Dallas, Texas.

**FOR DATA CIRCLE 307 ON READER CARD**

### HARDWARE SPOTLIGHT

### ELECTRONIC PUBLISHING

There's been a minor revolution going on in printing lately, mostly due to the word processor and the laser printer. Both products were pioneered by Xerox, which has led the way in putting electronics to work in creating documents. After all, the firm helped create the technology to produce the mountains of paper inundating offices, so it might as well get in on the typesetting and document preparation end of the process as well. Now, the firm has produced a system that adds graphics—from half-toned photographs to simple bar charts—to its already broad line of electronic printing systems.

Aimed at the more than 50,000 in-house and commercial printing facilities Xerox says are located in the U.S., the graphics system combines one of the firm's electronic printers and a scanning system that digitizes images inserted by the user. All components of the system are tied together by the firm's much-touted Ethernet so that a variety of text input devices such as computers, word processors, and minicomputers can be used.

The new Xerox 1050 scanner scans, crops, scales screens for photographs, compresses, labels, and transmits graphics to one of several electronic printers where the graphics and text are merged, according to Robert V. Adams, president of the Printing Systems division.

To bring its electronic printers into new markets, the firm has introduced a mid-range model, the 8700, and a low-end machine, the 2700, which join the well-established model 9700. The 8700 prints up

to 70 pages a minute while the 2700 produces 12 pages a minute, Xerox said, noting that the high-end 9700 machine puts out as many as 120 pages a minute. Each machine, however, produces copies with a resolution of 90,000 dots per inch.

Xerox is hoping to tap what it sees as a \$30 billion market for in-house printing of engineering manuals, reports, sales and service manuals, and newsletters. That work has previously been done by the more costly methods, Xerox claims, of manual paste-up and production and has been subject to rising labor costs and mix-ups as work is moved from one department to another and back again. The in-house market, the firm believes, is at least twice the size of the commercial printing and publishing industry, another market it hopes to tap with its new publishing system. The system is hoped to appeal to cost-conscious corporations as well as to local print shops that can generate enough volume to justify the \$30,000 to \$70,000 investment required.

The company described the system as simplifying the entire publishing process as well as giving it new flexibility. Because text and images are stored electronically, copies of finished documents can be called up by a computer and printed on demand. Moreover, if changes need to be made for a revised edition of a document, they can be made electronically and a new edition produced quickly and easily. Collation is simplified as well because the electronic printers emit pages in the order that they are required.

Xerox priced the new 8700 page printer at \$212,000 in a typical on-line configuration. On a two-year lease, with a printing volume of 400,000 pages a month, the price starts at \$7,100 a month. The new 2700 printer, designed for low-volume office use, is \$18,995 in single quantities. The firm has used the machine before in its Ethernet print server, which handles output from Xerox word processors. The firm said the entire printing system would be available in the U.S. beginning in September 1982 for use with the Xerox 9700 printer, and in the first quarter of 1983 for use with the model 8700. XEROX CORP., Printing Systems division, El Segundo, Calif.

**FOR DATA CIRCLE 300 ON READER CARD**

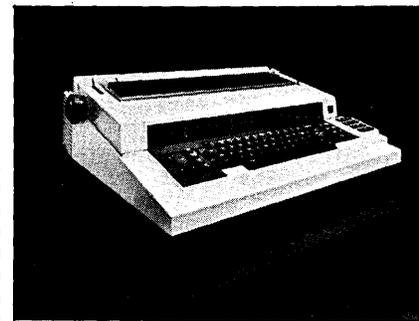
### LOCAL NET

Interface cards to attach the IBM home computer and Multibus-based systems to this vendor's Desnet local network have been introduced. The network is claimed to run on baseband, broadband or fibre optic cables and the appropriate versions of the interfaces will be made available. Using the HDLC and CSMA protocols, the network can connect different microcomputers, peripherals, and gateways to other networks, according to a spokesman. Deliveries are set to begin this spring. A baseband interface for IBM machines will carry a single quantity purchase tag of under \$1,000 in its baseband version. The Multibus version will sell in a similar configuration for under \$2,000, Destek said. Sales will be to OEMs and through retail outlets. THE DESTEK GROUP, Mountain View, Calif.

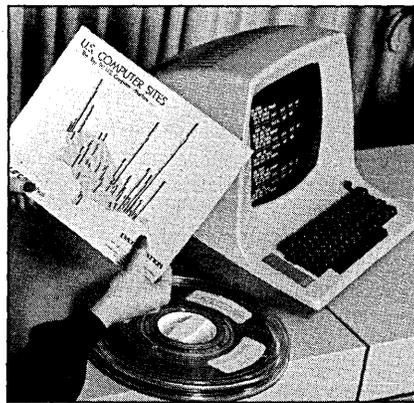
**FOR DATA CIRCLE 302 ON READER CARD**

### ELECTRONIC TYPEWRITER

This company has made a name for itself by offering systems that can upgrade IBM electric typewriters to be full word processors. Now, to enhance its standing in the hotly



contested office automation market, the firm is offering its own electronic typewriter. The Aries I unit, priced at \$1,390, also can be expanded into a CRT-based secretarial workstation. Features include a back-space error correction, interchangeable daisywheel print elements, on-line memory, automatic return, title centering, and paragraph indentation. A \$450 adaptor expands the typewriter so it can at-



# VISUAL GRAPHICS TERMINALS.

## For those waiting for high-resolution at low cost.

High quality graphics doesn't have to be expensive. The new VISUAL 500 and VISUAL 550 terminals emulate the Tektronix® 4010 but cost only about half as much. And they have 768 x 585 resolution for sharp text and graphics display on a large 14" screen.

Both the VISUAL 500 and VISUAL 550 are compatible with standard business, laboratory, and scientific software including PLOT 10,™ DISSPLA,® TELL-A-GRAF,® SAS/GRAPH and DI3000/GRAFMAKER.

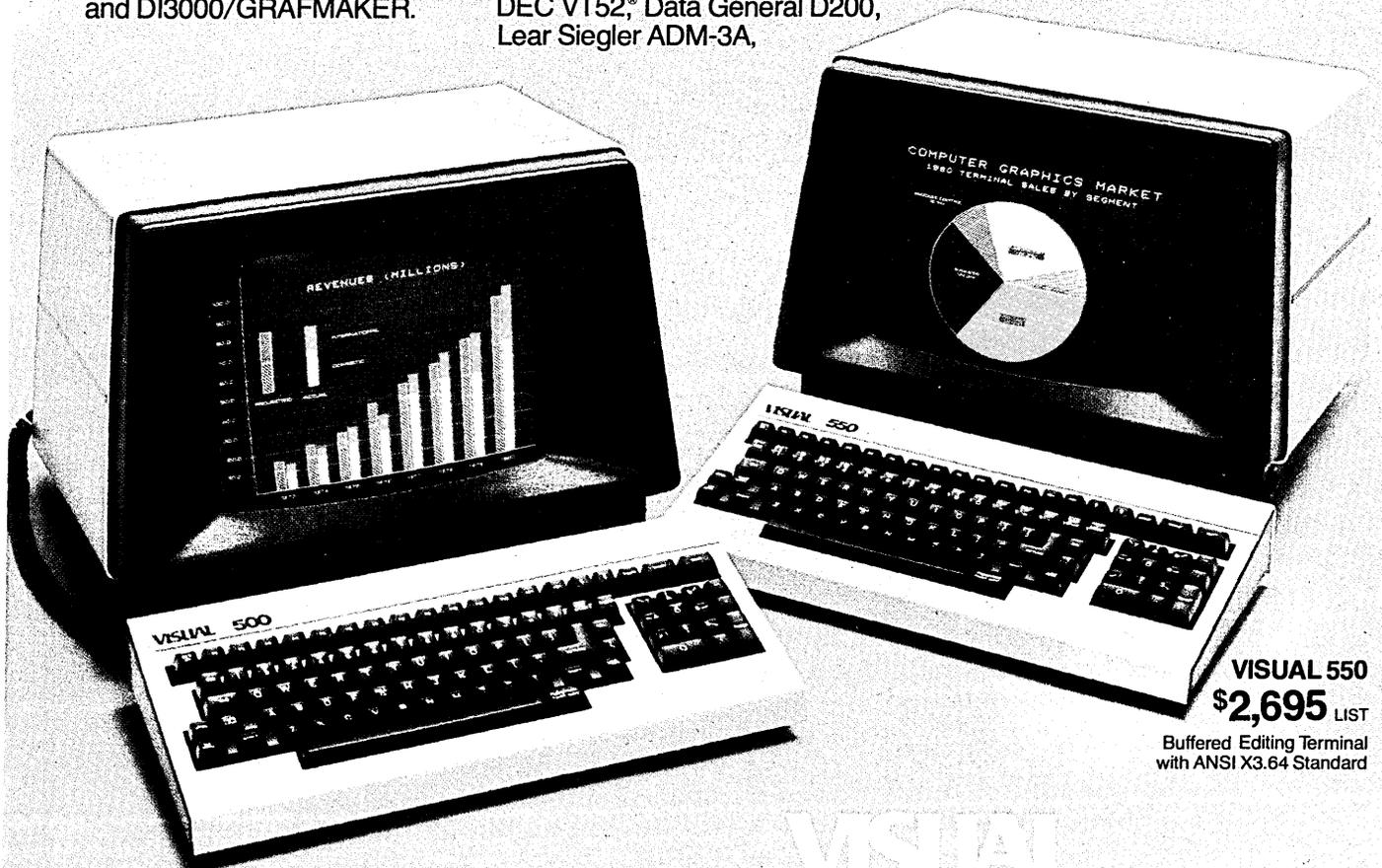
Advanced graphics features include: Resident vector draw, point plot, rectangle draw, multiple linestyle and patterns with rectangle pattern fill. Raster scan technology provides fast data update and develops a bright display image.

Powerful alphanumeric operation is also provided, displaying 80 characters by 33 lines with separate display memories for alpha and graphics modes. The VISUAL 500 provides switchable emulations of the DEC VT52,® Data General D200, Lear Siegler ADM-3A,

and Hazeltine 1500 terminals. The VISUAL 550 is a block mode terminal which complies to the ANSI X3.64 standard.

VISUAL 500 and VISUAL 550... the latest in the industry's finest line of video terminals. Call or write for details.

Service available in principal cities through Sorbus Service Division of Management Assistance Inc.



**VISUAL 500 \$2,495** LIST  
Character Mode Terminal with Emulations

**VISUAL 550**  
**\$2,695** LIST

Buffered Editing Terminal  
with ANSI X3.64 Standard

**VISUAL** See for yourself

Visual Technology Incorporated  
540 Main Street, Tewksbury, MA 01876  
Telephone (617) 851-5000. Telex 951-539

CIRCLE 141 ON READER CARD

## HARDWARE

tach to the firm's Aquarius I system which, priced at \$4,890, offers a crt, a 70-page diskette drive, and a software-driven word processor. SYNTREX INC., Eatontown, N.J.  
**FOR DATA CIRCLE 305 ON READER CARD**

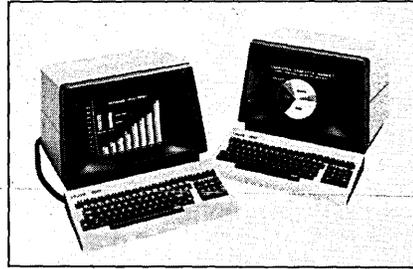
### BURROUGHS LOOK-ALIKE

This crt terminal is designed to emulate the Burroughs TD830/MT983 family and is one of several such emulation products from Beehive. Standard features include a detached keyboard with 16 user-definable function keys, numeric keypad, upper/lower case characters, printer interface, scrolling, background print operations, line drawing, and self diagnostics. Designed to operate in asynchronous or synchronous modes, the terminal supports "all major Burroughs polling protocols." Memory can be expanded to 36K bytes as an added cost option. Desk space required is less than 400 square inches. List price is \$1,995, with deliveries set to begin this spring. BEEHIVE INTERNATIONAL, Salt Lake City, Utah.  
**FOR DATA CIRCLE 309 ON READER CARD**

### GRAPHICS TERMINALS

Designed for laboratory, scientific, and business applications, the new Visual 500 and 550 graphics terminals extend this vendor's product line into a new market segment. The two units display a resolution of 768 by 585 pixels on a 14-inch screen and

emulate the Tektronix 4010 terminal, according to a company spokesman. Features include vector draw, point plot, rectangle draw, multiple line styles, and patterns with rectangle pattern fill. Raster scan technology is said to provide fast data update and bright display imagery. Both machines can also run in alphanumeric mode, displaying



33 lines of 80 characters each. Each has a detachable keyboard and tiltable screen. The Visual 500 emulates the DEC VT 52, Data General D200, Hazeltine 1500 and Lear Siegler ADM-3A. The block mode model 550 complies with ANSI X3.64 standards. List price is \$2,495 for the model 500 and \$2,695 for the model 550. VISUAL TECHNOLOGY, Tewksbury, Mass.

**FOR DATA CIRCLE 306 ON READER CARD**

### AIRPORT TERMINAL

Aiming to capture a piece of the IBM airline reservations terminal business, number two

in the business has come out with an IBM-compatible terminal. Univac's new UTS 4000 PARS airline terminal is said to be compatible with IBM's PARS/ALC protocol, and is equipped with a special keyboard, special microcode, and a low-cost multiplexing technique. Univac is runner-up to IBM in installed airline reservation systems, but it thinks it has a chance to gain a piece of IBM's action with the new terminal. The terminal, which is now available, offers a wide range of operating characteristics. Up to 31 terminals can be attached to a new multiplexor that handles PARS protocols, Univac said. The purchase price of a single unit, including cluster mux capability, is \$3,500. The monthly price on a five-year lease, including maintenance, is \$118. Discounts are available for volume orders. SPERRY UNIVAC, Blue Bell, Pa.

**FOR DATA CIRCLE 308 ON READER CARD**

### NUMBER CRUNCHER

A 32-bit array processor designed to work in Intel Multibus-compatible computers has been introduced by Sky Computers. Designed to handle full floating-point arithmetic, the processor is said to run at a full megaflop (one million floating point operations per second). Typical applications are signal processing, robotics, seismic exploration, graphics medicine, and statistics, all of which require fast, accurate floating-

# FREE From DIGITAL System Builder Catalog

Spring/Summer

Over 1300 items listed

Now you can order genuine Digital parts directly from our warehouse. Our catalog offers the complete Digital line—from cabinets

to cables to Power Distribution Systems. And all parts are fully described with complete specifications. To order,

call our toll-free number today.

Call for our FREE catalog  
800-258-1710\*

AD CODE: HI

Digital Equipment Corporation, Accessories and Supplies Group, 460 Amherst Street, Nashua, NH 03063.

**digital**

\*In NH, AK, HI dial 1-603-884-6660

CIRCLE 142 ON READER CARD

*Winchester*  
**LOOKING FOR NEW SOLUTIONS?  
PLESSEY'S THE ONE  
TO WATCH.**

**See the world's only DEC-compatible 5-1/4" Winchester with fully integrated back-up. Come to NCC Booth 4055.**

Want the newest, DEC-compatible Winchesters? You want Plessey. We're unveiling a 5-1/4" Winchester with completely built-in back-up. In floppy or streaming tape—the only 1/2" streaming tape device for DEC systems.\*

You get high-reliability, high-speed Winchester technology. Software transparent ease of use. Absolute plug compatibility. And Plessey quality. All at NCC.

**Keep your eye on Plessey.**

We're growing. With new technology. New products. New ideas. New systems.

Our 5-1/4" Winchester is just the beginning. And you can add it to your own system... or get it with one of ours.

So if you're looking for DEC-compatible Winchesters... or a chance to see something really new at NCC—drop by booth 4055.

When it comes to new Winchesters, Plessey's the one to watch.

TOLL FREE: 800-854-3581  
714-557-9811



**Plessey Peripheral Systems**

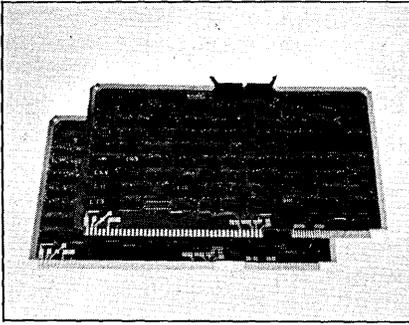
1691 Browning Avenue  
Irvine, CA 92714

See us at NCC booth 4055.

\*DEC is a registered trademark of Digital Equipment Corporation.

**CIRCLE 143 ON READER CARD**

# HARDWARE



point arithmetic performed on large arrays. The SKYMNK-M two-board set offers a 48-bit extended precision mode for highly accurate computations and a choice of real, complex, and integer instructions. Software support is under the MP/M-86 operating system. Pricing is under \$4,000 in oem quantities with deliveries 30 days ARO. SKY COMPUTERS, INC., Lowell, Mass.

**FOR DATA CIRCLE 310 ON READER CARD**

## FAMILY OF MUXES

A new series of multiplexors designed to increase the efficiency of data transmission lines has been introduced by this datacom vendor. The statistical DCX product is said to handle between 4 and 240 channels of asynchronous and synchronous data concurrently. They are designed for point-to-point as well as multipoint networks provid-

ing concentration, contention, data switching, data compaction, and statistical information to manage a network through its cycles of growth.

The DCX series comes in four models: the 815 for up to 8 channels, the 840 for up to 240 channels, the 850 for up to 240 channels with complete user switching, and the 825 for up to 32 channels. Purchase prices are from \$1,700 to \$250,000. PARADYNE CORP., Largo, Fla.

**FOR DATA CIRCLE 311 ON READER CARD**

## NETWORK PREP

A microprocessor development system is designed to hang off an Ethernet local network so it can share data, files, and programs with other similar machines and large peripherals.

The NDS-II takes advantage of the compatibility between all Intel development systems introduced since 1975 when the MDS-800 was unveiled. New software is available to take advantage of shared hardware and databases and to manage large software development projects in which several systems are used to work on various interlocking parts of a big program. The basic system consists of the development system, an Intellink controller, system control console, a 5¼-inch floppy disk drive, a 35-megabyte hard disk, software, documentation, and interconnecting cables. The

U.S. price is \$39,950. Older Intel development systems can be upgraded for as little as \$2,000, depending on the model. INTEL CORP., Santa Clara, Calif.

**FOR DATA CIRCLE 312 ON READER CARD**

## NEW MAINFRAMES

Fleshing out its H Series of mainframes, IBM introduced in late March the 3083 groups E, B, and J computers which are field-upgradable to the 3081 group K mainframe. The new group E is up to 2.8 times faster than that of an IBM 4341-2 and the group J is up to twice that of the group E. Also introduced were a new cooling unit for use with the 3083 machines that carries heat from the processor by circulating water which is cooled by room air conditioning. First customer shipments of the groups B and J are scheduled for the first quarter of 1983.

Shipments of the group E will be in the second quarter of that year. The new cooling unit won't be available until the third quarter of 1983, IBM said. Purchase prices for the new machines, which retain 370/303X compatibility, range from \$1.12 million for an 8-megabyte, 8-channel model E, to \$3.2 million for a 32-meg, 24-channel model J. The cooler can be purchased for \$72,000. IBM CORP., Town of Rye, N.Y.

**FOR DATA CIRCLE 313 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.
<b>DEC</b>	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 DECScope	1,895	162	90	61
	VT101 CRT DECScope	1,195	115	67	43
	VT125 CRT Graphics	3,295	315	185	119
	VT131 CRT DECScope	1,745	167	98	63
	VT132 CRT DECScope	1,995	190	106	72
VT18XAC Personal Computer Option	2,395	230	128	86	
<b>TEXAS INSTRUMENTS</b>	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
<b>LEAR SIEGLER</b>	TI810 RO Printer	1,595	162	90	61
	TI820 KSR Printer	2,195	211	117	80
	ADM3A CRT Terminal	595	57	34	22
<b>DATAMEDIA</b>	ADM5 CRT Terminal	645	62	36	24
	ADM32 CRT Terminal	1,165	112	65	42
	ADM42 CRT Terminal	1,995	190	106	72
	EXCEL 12 CRT Terminal	1,895	162	90	61
<b>TELEVIDEO</b>	EXCEL 42 Smart Buffered CRT	995	96	54	36
	COLORSCAN 10 Color CRT	3,195	307	171	116
	925 CRT Terminal	850	82	46	31
<b>NEC SPINWRITER</b>	950 CRT Terminal	1,075	103	57	39
	Letter Quality, 7715 RO	2,895	278	154	104
<b>GENERAL ELECTRIC</b>	Letter Quality, 7725 KSR	3,295	316	175	119
	2030 KSR Printer 30 CPS	1,195	115	67	43
<b>HAZELTINE</b>	2120 KSR Printer 120 CPS	2,195	211	117	80
	Executive 80/20	1,345	127	75	49
<b>EPSON</b>	Executive 80/30	1,695	162	90	61
	MX-80 F/T Printer	745	71	42	27
<b>TIMEPLEX</b>	MX-100 Printer	895	86	48	32
	E0400 4 Channel Stat Mux	1,525	147	82	55
	E0800 8 Channel Stat Mux	2,050	197	110	74

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



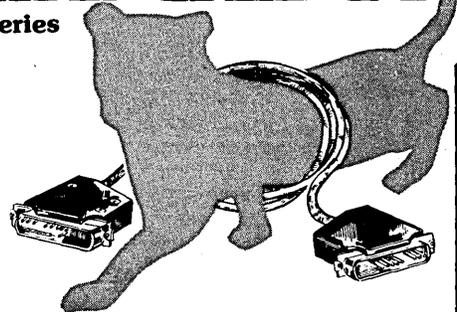
**TRANSNET CORPORATION**

1945 ROUTE 22 • UNION, N.J. 07083 • (201) 688-7800  
TWX 710-985-5485 800-526-4965 OUTSIDE N.J.

**CIRCLE 144 ON READER CARD**

# EIA RS232C DATA CABLE

Panther Series



Quick delivery of quality Interface Cables  
Stocked in 4, 12, 16, 25 Conductors  
Standard 10, 25, 50, 75 Ft. Lengths  
Panther Custom and Extended Lengths



**COMPUTER CABLE & PRODUCTS, Inc.**

Affiliate of VERTEX ELECTRONICS, INC.

147 Gazza Blvd, Farmingdale, NY 11735 • (516) 293-1610

HOTLINE: (800) 645-9434



**CIRCLE 145 ON READER CARD**

# LOWER DATA TRANSMISSION COSTS

**Eliminate 75 percent or more of your phone lines with M/A-COM DCC's Stat Mux**

With our CM9100 Statistical Multiplexer, 2 to 32 data lines (with speeds of up to 9.6 Kbps) are concentrated into 1 composite data link (with a speed up to 16 Kbps). CM9100 multiplexing typically reduces your data telephone line costs by as much as 75 percent or more.

## Error-Free Messages

Our stat mux detects and corrects transmission-induced data errors transparently to your system. If input transmission becomes too demanding, the CM9100 regulates the rate of incoming data by one of several methods that you select for each port at each end of the link. Improved performance is obtained by the mux's extensive memory which can provide up to 32 KBytes of buffering.

## Modems

- Integral 9,600 bps and 4,800 bps
- CCITT compatible
- Automatically adjusts to line conditions
- Comprehensive link diagnostics

## Compatibility

- No system hardware or software changes required
- Handles both async and bisync data
- RS232C Interface
- UL listed

## Affordable Quality

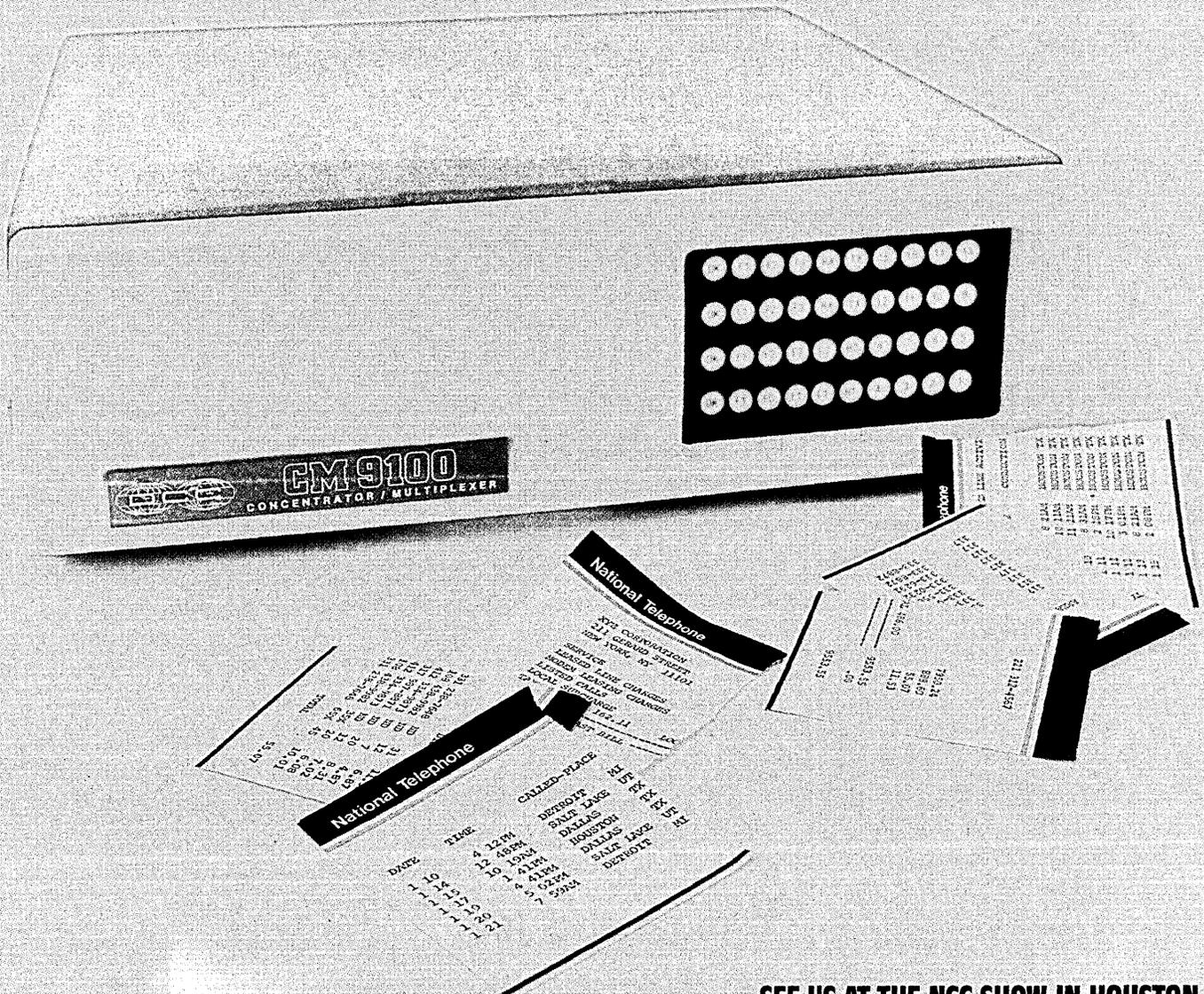
We're the company who introduced packet-switching equipment to the U.S. on a large scale. And because of our experience, we can offer the best to you at an affordable price.

Contact us at the DataCom Products Division for more information on how statistical multiplexing with our CM9100 can save you money. Telephone (301) 428-5600 or TWX (710) 828-0541. Write 11717 Exploration Lane, Germantown, MD, 20874.

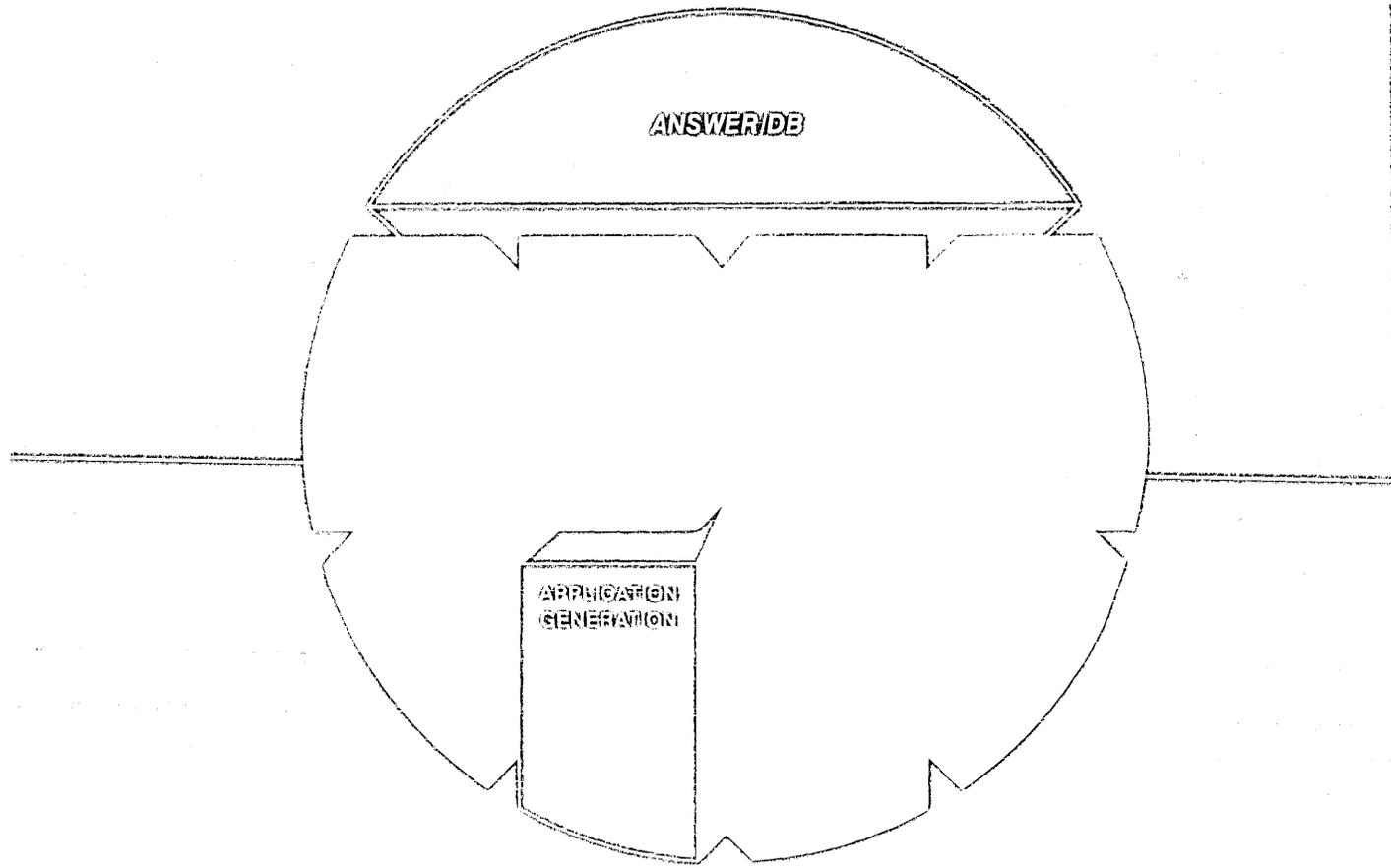


Leading the Way in Data Communications Technology

**CIRCLE 146 ON READER CARD**



**SEE US AT THE NCC SHOW IN HOUSTON, JUNE 7th-10th, Booth #1133**



Together, we can reduce your programmers workload by allowing users to generate reports interactively — when they want — without any loss of security or resource control.

With *Answer/DB*, users can develop their own online information access systems. Yet the actual processing occurs in background, preserving your computer resources.

Multiple reports for multiple users can be processed in a single data pass. Information can be retrieved from both batch and on-line data bases — in a variety of data communication environments including MVS/DC, CICS/VS and TSO. Reliability is also assured.

**Question: How can you give users easy access to their information without shackling your computer resources?**

**Together, we can manage it.**

**Answer™/DB**  
**An Implementation System**  
**from Informatics®**

be stored in highly efficient code for future reference. *Answer/DB* security checks screens every request before it is honored.

*Answer/DB* is, at the same time, completely responsive to the user. Inquiries and report requests are entered interactively in an easy-to-learn natural language syntax. Extensive diagnostics allow non-DB personnel to create their own error-free requests. Users can retrieve multiple data bases and files as a single user-oriented logical data view. Turnaround time is reduced; productivity of the professional DB staff is increased.

Any further questions? *Answer/DB* is free by giving us a call. Or fill out the coupon and mail it today.

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

Send me complete details on Answer DB  
 Have a sales representative call me

Name	Title	
Company		
Address		
City	State	Zip
Telephone		
Computer	Operating System	



**informatics inc**

Your Information Management Partner

D282

CIRCLE 14 ON READER CARD

# SOFTWARE AND SERVICES

## UPDATES

Fulfilling promises for its personal computer, IBM has come out with a COBOL compiler from Microsoft and an updated version of VisiCorp.'s VisiCalc. The COBOL is said to be a version of the ANSI 1974 standard with extensions to support color and screen formatting. The new VisiCalc accommodates up to 256K bytes of main memory as well as additional serial and parallel printer interfaces. IBM is selling the COBOL package for \$700 at its product centers while VisiCorp is supplying the new VisiCalc free of charge to warranty registrants.

Another mainframer has taken to Digital Research's CP/M operating system. This time it's Sperry Univac, which wants to add personal computing capabilities to its UTS 40 workstations that operate remotely to 1100 series mainframes. Univac plans to offer an 8080 assembler as well as a variety of utilities to systems houses that opt for the UTS 40 CP/M package. It is to be available to customers in October, Univac says, adding that most CP/M applications packages will be usable on the system.

We hear Beckman Instruments has a pocketful of venture capital it wants to sink into software technology firms, among others. The West Coast components and instrumentation firm has been quietly advertising for software companies to present themselves to its corporate planning office in Fullerton, Calif.

A Dr. Ivo Stang in Dallas is offering a \$2 pamphlet that promises to expose the "cult of computing" and other "abnormalities of the programming mentality." From what we've seen, he's right on target. Send checks to P.O. Box 140306, Zip 75214. Not for the squeamish.

## NETWORKING SOFTWARE

New additions to the DECnet Phase 3 software from Digital Equipment include versions of the networking package for the RSTS/E, IAS, and RT-11 operating systems. Phase 3 software is said to support adaptive routing multipoint communications, network command terminals, and other features that give users more control over large computer networks. All three operating systems run on the popular PDP-11 minicomputer family. DEC said the new products were tested in production at Farm Credit Banks of Springfield, Mass. The adaptive routing feature ensures that if a network line fails, data are automatically rerouted over another path. Users can dynamically connect to nodes within the network, exchange programs, and share data and not have to worry about how the network operates. With deliveries set for this spring, the new products are priced as follows: \$4,300 for DECnet/E, for the RSTS/E operating system; \$6,000 for DECnet-IAS; and \$2,000 for DECnet-RT. DIGITAL EQUIPMENT, Maynard, Mass.

**FOR DATA CIRCLE 325 ON READER CARD**

## FILE MANAGER

This vendor has enhanced its models 83 and 85 personal computers with a software package designed to file documents, extract

reports from them, and generate graphics. File Manager can update, search, sort, and translate data to a string file for use with other packages such as Visicalc PLUS. It is designed to take advantage of the HP computers' soft keys. The firm says each file in its software can contain up to 1,000 forms, with each form containing up to 1,000 alphanumeric characters. The total size is limited primarily by the amount of mass storage capacity available to the processor. The software carries a \$200 list price tag in the U.S. HEWLETT-PACKARD, Palo Alto, Calif.

**FOR DATA CIRCLE 326 ON READER CARD**

## TRAINING COURSES

A series of self-paced training programs for users of Eclipse, Nova, and microNova computers have been made available by the machines' maker, Data General. Designed to give trainees an overview of each system, the courseware includes videotape, audiotape, and written materials aimed at oems and dp professionals at user organizations. The courses cover the AOS operating system, advanced programming techniques for the MP/Pascal language, maintenance for the 6100 series of disk drive, and maintenance of the Nova 4 machine. Prices are \$695, \$595, \$750, and \$2,250, respectively. The company said the courses can help

## SOFTWARE SPOTLIGHT

### SHOP FLOOR CONTROL

A new software package designed to run on Univac V77 minicomputers controls operations on manufacturing shop floors in an interactive mode. The Unipacs software uses a common database with other Univac UNIS manufacturing software systems. Said to go beyond mere planning, the new package controls resource usage, monitors events as they occur, and keeps track of labor. The system determines capacity needs and schedules work orders by using either backward or priority scheduling techniques. It also assures that orders will be released to the shop floor in sufficient time

for on-schedule order completion, according to the company. The package is designed to run on the V77-800 minicomputer with 512K bytes of main memory, a 132-column printer, and 145 megabytes of disk storage. The package carries a one-time license fee of \$50,000 which includes the Vortex II operating system, VTAM communications software, data management software, and the Total database management system. Monthly support carries a charge of \$300. The purchase price for the minimum hardware configuration is \$118,103. SPERRY UNIVAC, Blue Bell, Pa.

**FOR DATA CIRCLE 327 ON READER CARD**

## SOFTWARE AND SERVICES

users minimize work load scheduling difficulties and reduce travel costs for training. Each is a self-study course and is offered in addition to the on-site classes the firm offers as a standard service. DATA GENERAL, Westboro, Mass.

**FOR DATA CIRCLE 328 ON READER CARD**

### JOB SUBMITTER

A new package from this vendor enables end users of IBM mainframes to tailor and submit batch jobs from any CICS terminal. The JOBS package eliminates the need for knowledge of JCL programming, according to the vendor. Users are able to select job models by stepping through a hierarchy of menus, some of which can be password-protected if necessary. Instructions and comments built into the job models lead users through the JCL tailoring process, and error-checking logic in the models validates user entries before they are built into the final jobstream. Running under CICS release 34 and above and DOS/VSE 1.5 and above, the JOBS package is said to give users more control of job submission and improve turnaround time. Available for a one-time fee of \$5,400. DAPSCO, INC., Dayton, Ohio.

**FOR DATA CIRCLE 329 ON READER CARD**

### HYPERCHANNEL SOFTWARE

The new Netex package enables different application programs running in any of a variety of mainframes to communicate with one another without regard to actual network configurations. Using the firm's Hyperchannel interprocessor network hardware, the package is offered in a variety of modules designed to run in IBM, DEC, Univac, and CDC mainframes. The Netex software is said to support standard Hyperchannel networking and user-written applications programs. A bulk transfer module can help move large quantities of file data between differing processors with translation of character information. Monthly charges for the Netex modules range from \$320 to \$560, depending on the host operating system. Hyperchannel adapters are priced at approximately \$40,000 per unit. NETWORK SYSTEMS CORP., Brooklyn Park, Minn.

**FOR DATA CIRCLE 331 ON READER CARD**

### CODE-DECODE

Encryption of proprietary data such as software, files, and electronic messages is bound to become the leading method of protecting sensitive information. This vendor has come out with a package of encryp-

tion routines that conform to the National Bureau of Standards standards and that are written in FORTRAN for implementation on a wide range of computers. The company says its routines deliver the strong block ciphering algorithm for those users who do not have the strict timing requirements required of assembly language versions. The routines handle the many bit permutations and substitutions by expanding the algorithm into a byte-oriented system. Bit unpacking and packing routines are provided for conversion to and from standard DES format. Also included is FORTRAN's source code for generating pseudorandom, legal DES 64-bit keys. With documentation, the code carries a one-time fee of \$950. PRIME FACTORS, Oakland, Calif.

**FOR DATA CIRCLE 330 ON READER CARD**

### MICRO ANALYST

This package for Apple computers is designed to do for the departmental planning process what Visicalc has so spectacularly done for individual planners. Senior Analyst is designed to help several people in a corporation create, share, and exchange planning data, calculation rules, and report formats. Developed by startup Business Solutions, Inc. of Long Island, N.Y., the package requires two disks and the language card (or 16K memory card) for execution. The software handles standard arithmetic as well as linear regression forecasting, allocation, cyclic, cumulative total, lag, and compound growth rate functions. A virtual processing technique is said to enable the simultaneous viewing of any model in two independent modes. A print spooling feature permits data to be entered as a report is printed on a low-speed printer. The package is sold exclusively by Apple for \$300. APPLE COMPUTER CORP., Cupertino, Calif.

**FOR DATA CIRCLE 332 ON READER CARD**

### VAX SOFTWARE

Digital Equipment has targeted the CAD/CAM market as a particularly lucrative one for its VAX line of 32-bit machines. To that end, it has signed cooperative marketing agreements with five software firms that offer packages in a variety of areas. DEC plans to make joint sales calls with representatives from those firms and help configure complete systems for specific customer needs. The deals are as follows: microprocessor software development tools from Boston Systems Office; electronic simulation packages and a schematic data entry package from Comsat General Integrated Systems; for a solid-geometry CAD/CAM package from Matra-Datavision; integrated-circuit layout verification packages from NCA Corp.; and a gate array design program from Silvar-Lisco. Prices vary according to configuration. DIGITAL EQUIPMENT, Maynard, Mass.

**FOR DATA CIRCLE 333 ON READER CARD**



"I didn't see it and I didn't hear it. It was one of those stealth cars."

© DATAMATION

CARTOON BY SIDNEY HARRIS

# Smith-Corona introduces the only daisy wheel printer for under \$900.\*



You're putting together a desktop computer system for your office or home. And you want to add a letter quality printer so you can do word processing, too. But you don't want to spend a fortune.

Until now, you really had little choice but to settle for dot matrix printers. True, dot matrix doesn't produce letter-perfect printing, but daisy wheel printers just cost too much. That is, they did.

Now, Smith-Corona® offers a daisy wheel printer at such an incredibly low price, you can't afford *not* to get it. (The fact is, you won't find a daisy wheel printer *anywhere* at a price so low.)

The Smith-Corona TP-I™ printer operates with microprocessor controlled daisy wheel technology, and is available with either standard serial or parallel data interface. It is compatible with most microcomputers currently on the market. And, unlike many printers, it's made in America.

Best of all, the TP-I produces results identical to those of our very finest office typewriters—printing with real character. So it can be used to send out letters that have to look perfect. As well as financial statements, inventory reports, direct mail campaigns, manuscripts. Even a letter to your son in college!

Anything at all you need printed.

The basic TP-I will handle letter or legal sized paper. An option that will be available soon will enable it to handle either fanfold or single sheet paper.

The TP-I is easy-to-use—just turn the power on, load the paper, and away it goes. There are drop-in ribbon cassettes and a choice of easy-to-change, snap-on daisy print wheels for a variety of fonts.

So stop thinking you can't afford a daisy wheel printer. Because, thanks to Smith-Corona, a printer with real character is no longer expensive. **Smith-Corona**

Please send me more information on the Smith-Corona TP-I daisy wheel printer.

Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Company Name \_\_\_\_\_  
 Business Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Mail Coupon to:  
 Dwight P. Newcomer, National Sales Manager—Office Products  
 Smith-Corona  
 65 Locust Avenue  
 New Canaan, Connecticut 06840 DM-5

\*Manufacturer's suggested retail is under \$900, but prices may vary.

**CIRCLE 148 ON READER CARD**

# Introducing the Freedom 100.™

## Intelligence for \$595.

Now there's a high performance smart terminal with the one thing smart terminals have always been missing — a low price. It's the new Freedom 100 from Liberty Electronics. And you can see it for the first time ever at the NCC.

The Freedom 100 comes with a complete six month factory warranty. If anything goes wrong, we'll fix it — or send you a replacement unit — within three days of receipt. If we don't, you get \$100. Cash.

The Freedom 100. It's the first in a long line of Freedom Series terminals with extraordinary price/performance standards. Like never before.

Standard Features	Liberty Freedom 100™	ADDS Viewpoint	Lear Siegler ADM 21	Televideo® 910 Plus	Televideo® 925
7 X 9 Dot Matrix	✓				
25th Status Line	✓				✓
Video Attributes By Character	✓		✓	✓	✓
Attributes Req No Display Space	✓	✓			
Line Drawing Character Set	✓				
Screen Tilt	✓	✓			✓
Read Cursor Address	✓		✓	✓	✓
Detachable Keyboard	✓	✓			✓
Separate Function Keys	9	3	1	1	11
Insert/Delete Line Key(s)	✓		✓		✓
Insert/Delete Character Key(s)	✓		✓		✓
Clear EOL/EOP Key(s)	✓		✓		✓
Print Key	✓			✓	✓
Block Mode	✓		✓	✓	✓
Time of Day					✓

### See it in action at NCC booth A300.

 **LIBERTY**

Liberty Electronics USA  
100 Clement Street  
San Francisco, California 94118  
(415) 751-7560

Freedom 100™ is a trademark  
of Liberty Electronics USA.

**CIRCLE 149 ON READER CARD**

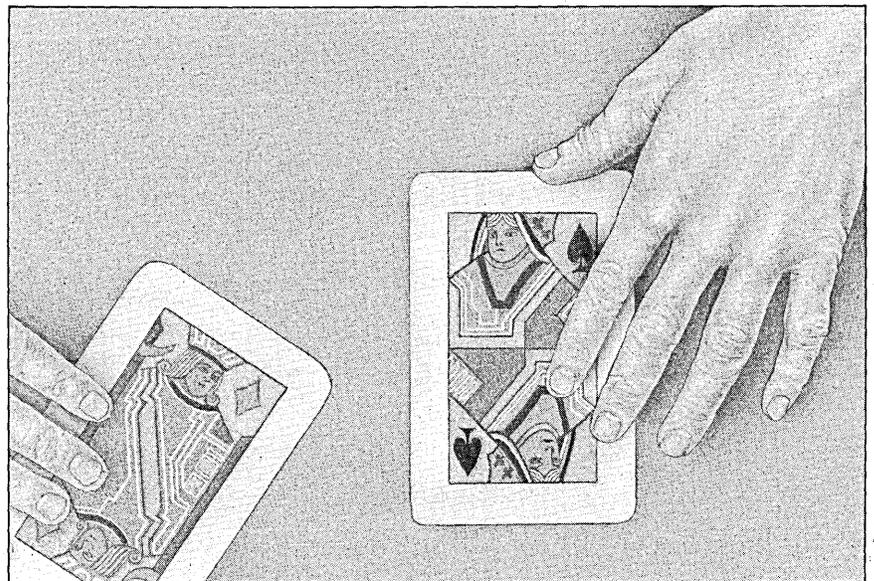
# SOURCE DATA

## BOOKS

### **THE MICROCHIP: APPROPRIATE OR INAPPROPRIATE TECHNOLOGY?** by Alan Burns

*The Microchip: Appropriate or Inappropriate Technology?* is interesting as a reflection of a personal struggle waged by some of the younger generation of computer specialists who came of age as professionals in the 1970s. This was the period when ecology became ultrafashionable; participation and community were in, centralization and bureaucracy were out; big was bad, small was good. College students were weaned on Illich, Schumacher, Roszak, and Reich. Technology was suspect because of its association with big business and big government. A specter with the face of Big Brother haunted the computer world. Some satisfied their yearnings for a principled choice by opting out of established career paths; most managed to persuade themselves of the rectitude of convention.

The author, a lecturer in computer science, recapitulates, perhaps unwittingly, the process by which he convinced himself of the rectitude of his own professional choice. He sets the stage for the story of his interior journey by presenting alternative views of the future, and by describing "appropriate" technology. Here we encounter an all-too-familiar cast of characters, optimists and pessimists, whose musings on the future are presented again for the nth time. We discover that "the microcomputer is an extension of our intellect," our homes are about to be invaded by computers, work will be transformed, the cashless society is coming, education and health care will undergo marked changes, governments will become more and more dependent on computers to "fulfill their administrative and political objectives," and so on. What is more, Burns argues, the shape of the future is up to us. "Technology is not apolitical; the micro may be compared to a building block, which is itself neutral but when part



of a working structure it reflects the desires and wishes of whoever designed or controls that system."

When the author turns his attention to the microprocessor itself (chapters 2 and 3 on evolution and assessment of microelectronics constitute more than half the book), his enthusiasm for the new technology shines through his uneasiness. The ultimate resolution of his personal struggle becomes clear. One anticipates the concluding sentence of the work: "The microchip can be misused (indeed, its own assembly bears more than a taint of exploitation) but 'misuse' it would be, for structurally the microchip is an appropriate technology."

This book contributes very little that is new to the discussion of the social impact of information technology. Most of the topics (history of computing, privacy issues, computer-communications and politics, education and health care) have received better and more systematic treatment elsewhere. The continual rediscovery of issues in response to each technical innovation signals the failure of computer science departments and other educational programs

for computer specialists to pay more than lip service to the social impacts of information technology. A systematic body of literature exists on empirical and theoretical aspects of the computer's role in society. So does an active group of dedicated researchers and several professional groups such as the Special Interest Group on Computers and Society of the Association for Computing Machinery, and the International Federation of Information Processors' Technical Committee on the Relationship Between Computers and Society. Those writing in this area do their readers a disservice by not familiarizing themselves with the literature and current research.

Notwithstanding these shortcomings, *The Microchip* contains some useful material for American readers unfamiliar with the European discussion of microelectronics. Burns reviews the European debate on the employment impacts of microelectronics, the implications of computer-communications, and privacy protection.

European discussion of microelectronics has focused on employment. Policy-makers find themselves poised on the horns

## SOURCE DATA

of a dilemma. On the one hand, if no programs are launched to stimulate the microelectronics industry and to assist other industries in making use of the technology, vigorous marketing by American and Japanese firms will weaken European industry's position and swell the ranks of the unemployed. On the other hand, it is feared that the productivity increases promised by microelectronics will eliminate more jobs than the new industry will create. Burns illustrates the problem with a quote from Jenkins and Sherman concerning the prospects for the United Kingdom: "There is a choice. Remain as we are, reject the new technology, and we face unemployment of up to 5.5 million by the end of the century. Embrace the new technology, accept the challenge, and we end up with unemployment of about 5 million," (*The Collapse of Work*, London, Methuen, 1979).

Burns presents three possible futures:

1. Job displacement lags behind job creation. This scenario is based on the assumption that the employment implications of microelectronics resemble those of other technologies, meaning that jobs will not be lost at a significant rate and others should easily be created in new industries;
2. Job creation lags permanently be-

hind displacement. This pessimistic view "is based on the belief that the very nature of the new technology involves structural job loss." Even the new industries generated by microelectronics will be highly automated and employ a minimal work force;

3. Short-term job loss, long-term gain. Here the job destroying aspect of microelectronics is seen as a transient effect of the new technology.

The policy response of most European governments has been to invest in microelectronics and to develop programs that assist industry in using technology to increase productivity. One might conjecture that this policy is being followed in the hope that despite the possibility of net job losses, microelectronics will generate enough revenue (at the expense of other countries) to cover the additional transfer payments occasioned by unemployment. A similar bias is evident in the policy response of the British Trades Union Congress (*Employment and Technology*, TUC Interim Report, London, May 1979). The TUC recommended coping with reduced employment opportunities by containing import penetration, increasing government services, and reducing working time to spread around the available jobs.

On the whole, this book strikes me

as a set of lecture notes hastily expanded to book length with a random selection of citations sprinkled over it. The haste with which it was brought to market is apparent from the very large number of typographical errors in the text. The author demonstrates a good grasp of many of the issues he discusses, but he seems unaware that most of what he has to say has been said before.

—Abbe Mowshowitz

## LEARNING WITH COMPUTERS by Professor Alfred Bork

Professor Alfred Bork has written numerous technical papers during the past 10 years, but only recently did he assemble 32 of his best works into one volume. *Learning With Computers* focuses on the use of the computer as a learning device. As such, it presents a panoramic view, reflecting many types of usage, but all representing variations on the theme of computer assisted instruction (CAI). The book's seven chapters illustrate the work of the Physics Computer Development project, and the Educational Technology Center at the University of California at Irvine.

Many of the topics presented have been reviewed by other more elementary books, and several of the papers might be considered dated. All of the papers have a new set of photographs from a computer screen using a Tektronix terminal. The author's more recent work has moved to microcomputers and personal computers, but his initial projects in this direction are not yet complete, so there are no pictorial examples.

The book begins with an overview composed of five short papers written during the last 10 years. In each case, the material outlines the role of the computer as a learning aid, and attempts to focus on the future of computers in education. The themes developed in this overview are detailed in later chapters. The first paper is intended for very general audiences and is kept at an elementary level. The second paper, however, was delivered at a NATO Advanced Study Institute in Belgium, and was an introductory "charge" to the participants of a two-week workshop. The third paper was originally presented at a "Computers in the Undergraduate Curriculum" meeting at Dartmouth College, and concluded with a discussion of a beginning physics course. The fourth paper provided a philosophic basis, concentrating on several erroneous attitude "myths," which Professor Bork wishes to correct. The final section in this overview stresses the personal computer and a number of activities that are characteristic of the work going on at Irvine and other leading centers.

In a collection such as this, compiled largely from orally developed papers, there is bound to be repetition. Several of the ideas, especially those central to the ap-



"Will the witness now sing the praises of the defendant?"

© DATAMATION

CARTOON BY HENRY MARTIN



**Build your computer room  
on a solid aluminum foundation**

# FLOATING FLOORS

**Accept no substitute.**

*(100% USA materials & labor)*

There is only one Floating Floor System. And it's the only floor system specifically designed to overcome possible costly problems in computer rooms. For instance . . .

- True infinite access is provided by completely stringerless assembly.
- Quick access to underfloor, anywhere, anytime.
- No chance of iron oxide particles entering air supply to play havoc with computer information.
- Static grounding is inherent in construction.
- Unequalled lightness, rigidity and strength.
- May be easily changed around or added to in the future.

To get complete details on why Floating Floors\* are the best choice for critical computer room areas, send for our free brochure. A comprehensive AV presentation is available on request.

## **FLOATING FLOORS, INC.**

795 Berdan Avenue, Toledo, Ohio 43610,

Mailing Address: P.O. Box 6627, Toledo, Ohio 43612-0627  
TEL. (419) 476-8772 TWX 810-442-1719

*In Canada:* Bruce (EDP) Services Ltd., 3650 Weston Rd., Weston, Ontario M9L 1W2, Telephone (416) 741-0854.

\*FLOATING FLOORS is a Registered Trade Mark of Floating Floors, Inc.

**CIRCLE 150 ON READER CARD**

## SOURCE DATA

proach developed in the author's Educational Technology Center, recur in many of the papers. The author supports repetition as a method of reinforcing and highlighting concepts. The papers are essentially self-contained, with frequent referencing from one paper to another.

A strong argument is made for the importance of computer graphics, particularly as a learning aid. The Irvine group is well known for its stress upon visual information. This second section reviews the many ways graphics can be used to help the learning process. Professor Bork uses the term "graphics" in a more general way than is customary. He feels that anything associated with the layout of the computer screen, be it illustrative, pictorial, or textual is a graphic component. The second paper in this area is more specialized—it discusses the role of adding graphic capabilities to the particular computer language, APL. This approach has become part of the standard Xerox APL Program, and is one of the few systems supplied as part of a standard language by the vendor. The work at Irvine, however, has moved on to concentrate on Pascal.

Professor Bork has provided a list of dialogs available on the Irvine timesharing system, but, as noted before, it does not reflect the recent work on personal computers. Even in the timesharing network, how-

ever, the group worked with many different materials that served a variety of pedagogical purposes. The list is useful in that most of the material is presently used by students. This section lists and reviews all of the recent projects at the University of California, Irvine, which use microcomputers.

The next chapter's six papers illustrate a variety of physics activities. First is a review of the computer in the mechanics area of physics, with emphasis on involving the student as programmer, followed by papers on astronomy and computer simulations. Bork argues that simulations have a special role in building student intuition. He feels that this is an important goal of college education, yet one that is neglected in conventional lecture approaches, perhaps because it is so difficult to achieve. He indicates that computer education can be particularly valuable in providing each student with a wide range of personal experiences that aid in developing insight and intuition. He sees this as an experimental base for later, more formal learning.

How the computer fits into the classroom alongside other types of teaching and learning modes is covered next. Many of the basic ideas of computer managed instruction are worked into this section. Professor Bork points out the value of on-line testing, which provides immediate assistance to students in trouble. Such a blend of

learning and testing is possible only with the computer. While well over 1,000 physics students have been through the University of California course over the past five years, the dialogs still run in a timesharing mode rather than in the newer personal computer environment.

The final section of the book discusses the nature of the computer learning field. It is changing rapidly. Not only is the hardware improving and decreasing in cost, but techniques for producing good learning materials are also advancing. Developers cannot ignore the likely evolution of computer education if they expect to develop materials of long-range impact.

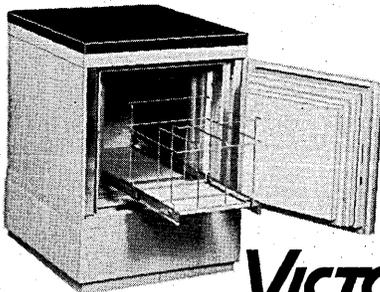
Bork is concerned with the issue of moving CAI (computer assisted instruction) courseware from one machine to another. Problems develop in both the sociological and hardware areas. Since the videodisk arrived on the scene, hybrid systems combining computers and digitally stored video and audio will have considerable influence on educational systems in the future. The term "intelligent videodisk" indicates this intimate combination. In this selection, Professor Bork also discusses the use of computers in learning-at-a-distance environments. The last paper in this section is a book review of George Leonard's views of the computer in education, as expressed in *Education and Ecstasy*. It emphasizes the

## 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 151 ON READER CARD

Latest Edition

## GEJAC INC.

Specialists in Software for DEC Computers

## ANNOUNCING RECORD PDP-11 PERFORMANCE

### SRF Version 2

Designed to help managers meet cost/performance standards for the DP Center.

With SRF your PDP-11 can cope with heavier demands and eliminate performance problems without making expensive hardware purchases.

### Tailored, Easily-Read Reports

SRF reports now provide information on how the system devices and tasks use:

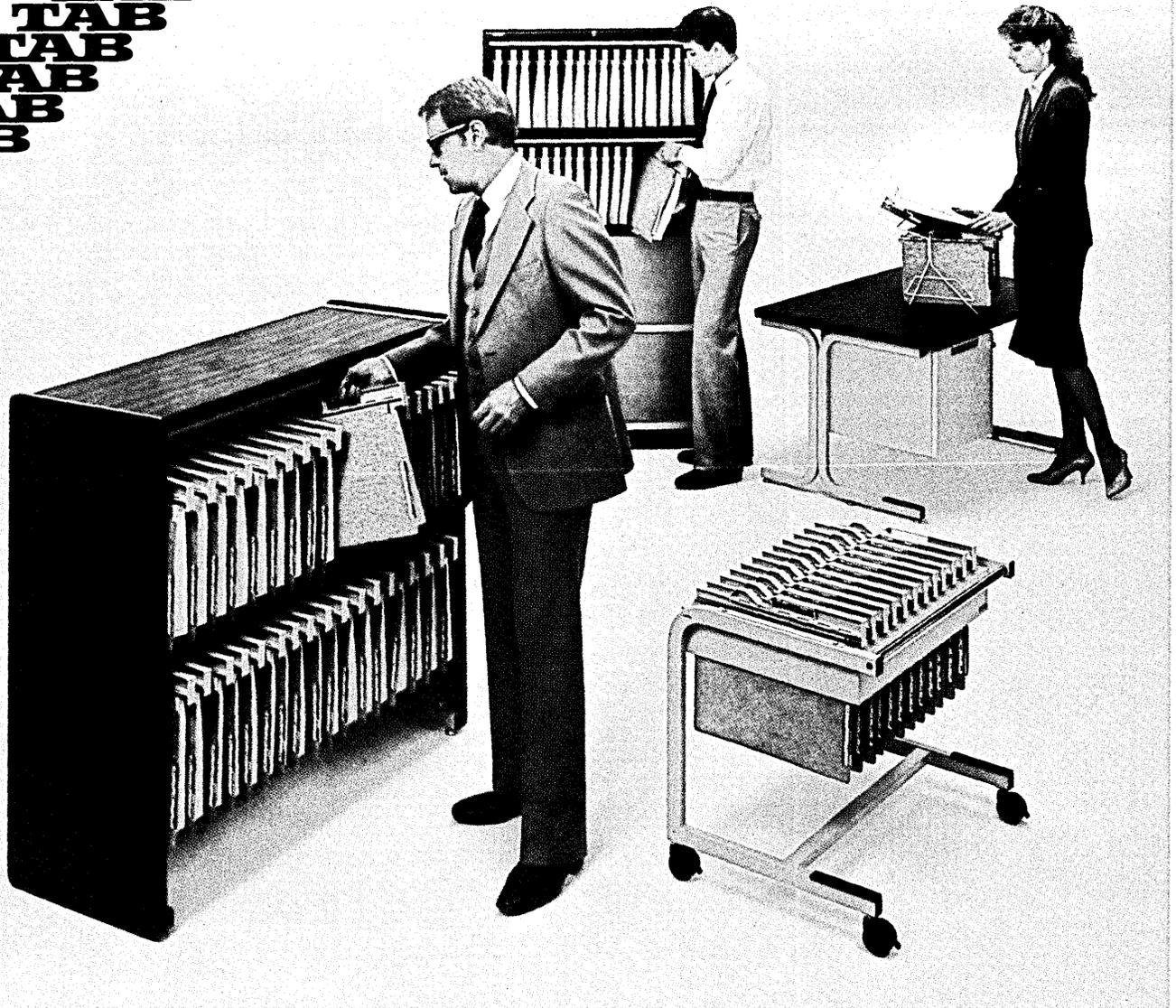
- Pool
- CPU
- Checkpoint
- Overlays
- Shuffler
- Memory
- I/O

GEJAC • P.O. Box 188 • Riverdale • MD • 20737 • 301-864-3700

PDP is a registered trademark of Digital Equipment Corporation

CIRCLE 152 ON READER CARD

TAB  
 TAB  
 TAB  
 TAB  
 TAB  
 TAB  
 TAB

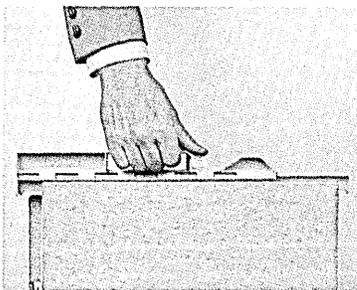


# Introducing HANDLE-IT:<sup>TM</sup> The complete new system that puts printout to work...

As you read this sentence, over a mile of printout has been created by American business. Getting this computer output into organized, useful form is a challenge that we welcome.

## A total printout management system from TAB<sup>®</sup>

TAB's System Designers began with a tough, comfortable handle that will accommodate every printout size, and can be color-coded for filing efficiency. The handle is molded with a single-point suspension hanger that slips in and out of our full selection of equipment. The choices in-



clude desk organizers, cabinets, modular storage racks...and file trucks to keep groups of information moving smoothly.

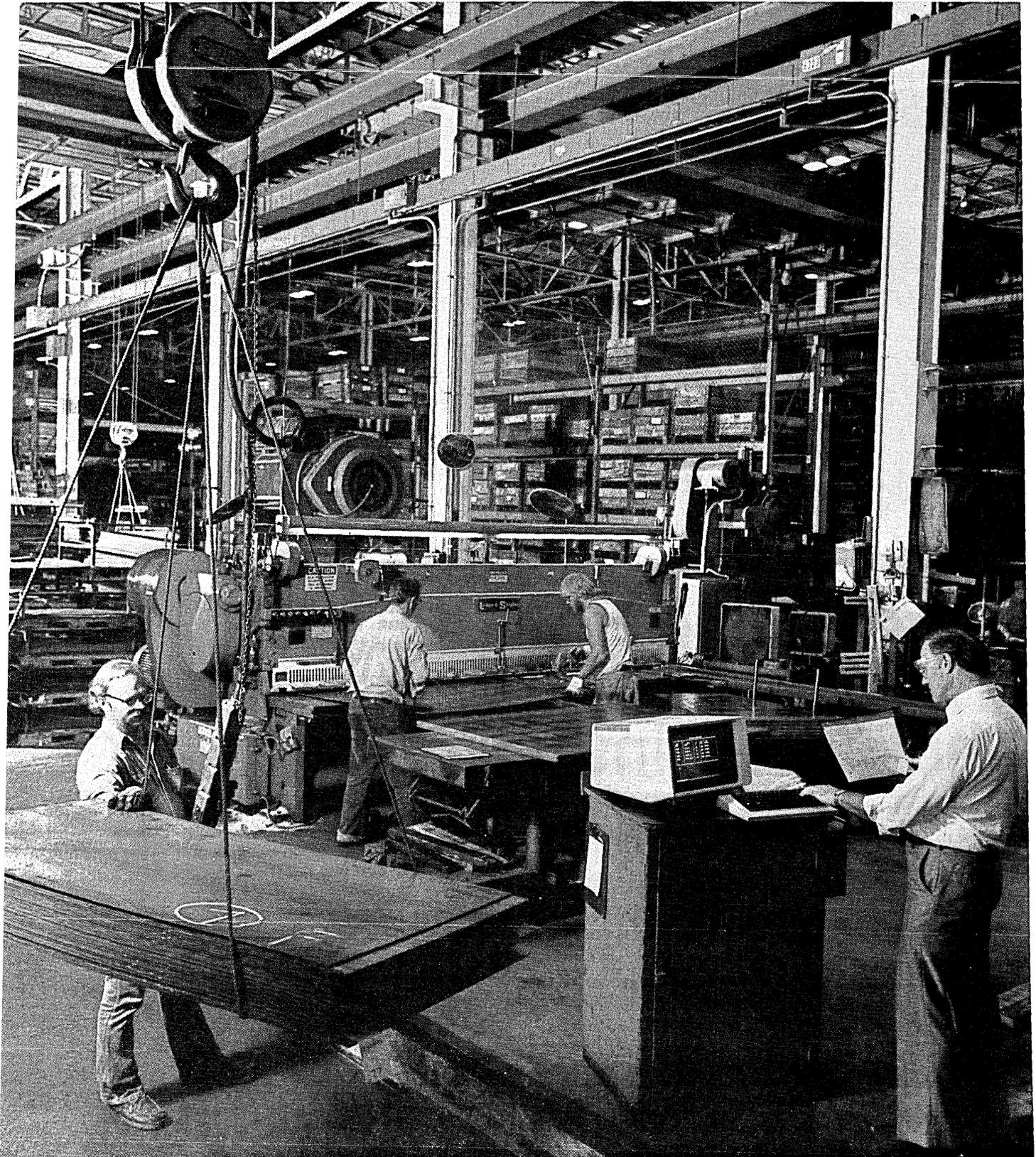
**Your TAB representative makes it simple...and keeps it simple** Our TAB Team will work with you to analyze your needs. Together, we'll establish a cost-effective HANDLE-IT System that will grow with your business. TAB has everything you need for computer room and office data management. We're in the Yellow Pages under "Data Processing Supplies" or write us at 2690 Hanover Street, Palo Alto, CA 94304.

**TAB**  
 PRODUCTS CO

The filing systems team.

CIRCLE 153 ON READER CARD

# ***FINALLY, THERE FOR WHERE IT***



# 'S A COMPUTER COUNTS MOST.

*Your shop floor.*

*Because you need to know everything that's going on there every minute. If you're going to exercise the kind of control that can mean more profit.*

*Introducing UNIPACS. Sperry Univac's new Universal Production Activity and Control System. The first computer system designed specifically for manufacturing shop floor control to execute the MRP plan.*

*Put simply, UNIPACS' purpose is to allow you to direct and control activity on your shop floor as it occurs. So that you can monitor performance in time and cost.*

*For by doing that, you can increase your total productivity. And, very likely, your profitability.*

*With UNIPACS, you'll be able — for the first time — to schedule work with maximum efficiency. Measure manpower and facilities use effectively. Manage inventory more intelli-*

*gently. And that's just the beginning of what UNIPACS will do for you.*

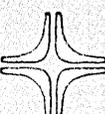
*UNIPACS is, after all, a real-time, interactive system. So you can "talk" with it at a moment's notice. As well as get a moment-by-moment account of your shop floor operation. At any moment.*

*UNIPACS is easy to use. And quick installation is another UNIPACS virtue.*

*For more information, write Sperry Univac, Department 100, P.O. Box 500, Blue Bell, PA 19424. Or call toll free 800-523-2496. (In Pennsylvania, call 215-646-3378 collect.)*

*Sperry Univac's UNIPACS. We call it an integrated hardware, software and manufacturing applications system. But in a short while, you may come to call it something else.*

*The computer you can count on. Where it counts most.*

**SPERRY  UNIVAC**  
*The computer people who listen.*

## SOURCE DATA

point that in a rapidly moving area such as learning with computers, we must have visions of the future.

George Leonard's concept of the future is not the only possible scenario, but it is an interesting one in terms of the way the 21st century educational system will be structured; naturally, computers play a major role in this school of the future.

The book closes with Bork's 1978 Millikan Lecturer Award lecture called "Interactive Learning." In Professor Bork's own words, "we are on the onset of a major revolution in education, a revolution unparalleled since the invention of the printing press. The computer will be the instrument of this revolution. Although we are at the very beginning, the computer as a learning device in current classes is, compared with all other learning modes, almost nonexistent—the pace will pick up rapidly over the next 15 years. By the year 2000, the major way of learning at all levels and in almost all subject areas will be through the interactive use of computers."

Perhaps it is to be expected that someone who spent more than 15 years involved with "branching, adaptive, and interactive CAI educational programs" would produce what might be called a "nonlinear book." Professor Bork's collection will offer a considerable challenge for a beginner or dilettante, but for the growing number of

people associated with computer education, his contribution is the important one. His book represents a valuable addition to the computer-education bookshelf. It's also likely that its content will someday occupy several thousand frames of the "intellectual storage and reference" region of 21st century learning machines. Digital Press, Digital Equipment Corp., Bedford, Mass. (1981, 280 pp., \$28).

—Dr. Harvey J. Brudner

## REPORTS & REFERENCES

### RATE DIGEST

The Center for Communications Management, Inc. (CCMI) has published the fourth edition of its Interstate Services Rate Digest. The digest provides a combination of rate tables and mileage charts that enables users to price interstate private line and toll telephone service and to do comparative analyses of the various service offerings. All measured-use and full-period interstate common carrier services are covered, in addition to all specialized common carriers, domestic satellite carriers, and value-added network carriers. This latest edition of the digest also includes a directory of resale carriers, interstate and international rates for Alaska and Hawaii, and a listing of services offered in the "top 400" metropolitan areas. Each copy of the digest comes with a

calculator (selected for its adaptability to telecom functions) and a year's worth of monthly service updates. Cost: \$350. CCMI, P.O. Box 324, Ramsey, NJ 07446, (800) 526-5307. In New Jersey, (201) 825-3311.

### INTERNATIONAL POLICY

"Science and Technology Policy for the 1980s" was published in late 1981 by the Organization for Economic Cooperation and Development (OECD). Member countries of the OECD include Austria, Canada, Denmark, France, Italy, Japan, The Netherlands, Spain, the U.K., and the U.S. The OECD's Committee for Scientific and Technological Policy meetings during March of '81 produced the four main reports discussed in this volume. Basically, the book deals with the ways science and technology resources can help meet economic challenges now, and "lay the base" for world economic development in the next 10 to 20 years. International cooperation is stressed. The OECD office in the U.S. is located at 1750 Pennsylvania Ave. N.W., Suite 1207, Washington, DC 20006, (202) 724-1857.

### PESOS TO POUNDS AND BACK AGAIN

The effects of a recent accounting rule for the translation of foreign currencies and financial statements are explained in "Foreign Currency Translation," by Peat, Mar-

# WATS UP DOC?

With WATS rates on the rise, optimization might be just what the doctor ordered for an ailing budget. Whatever your data communications needs are, CCMI's Information Services has the right prescription for any digital disease.

- Database for AIOD/SMDR Processing
- Customized Database
- Common Carrier Rate Guides
- Tariffs—Full Service
- Special Reports and Monthly Newsletters

For a Complete Catalog  
Call Toll Free: 800-526-5307  
In New Jersey Call (201) 825-3311



Center For  
Communications Management, Inc.  
... network health insurance

CCMI, P.O. Box 324, Ramsey, NJ 07446

# IT TAKES A TOUGH CICS COURSE TO MAKE A SMART PROGRAMMER.

Not all CICS courses are alike.

SysEd offers challenging, "hands-on" training for motivated programmers who want to be real pros and are willing to work.

Our experienced instructors specialize in using real-life programs and design problems. Whether it's Command Level, Macro Level, Internals, VSAM or advanced Application Design, they encourage students to bring in their own projects to enhance the workshop sessions.

Classes are held at SysEd's fully-equipped classroom/computer facilities in New York City and Chicago. Class size is limited so applications are accepted on a first come first serve basis.

Customized course offerings are also available for on-site sessions at company installations.

For information, call Dave Shapiro (212) 889-3386.

# SYS-ED™

ONE PARK AVENUE, NEW YORK, NY 10016 • (212) 889-3386  
A Division of INTEGRATED COMPUTER SOFTWARE, INC.

CIRCLE 155 ON READER CARD

CIRCLE 156 ON READER CARD

***We wouldn't say we were the  
best in the world.***

***Unless we could prove it.***



How do we prove it? With better communications services than anyone else offers.

Services like Databridge<sup>SM</sup> for example. Databridge allows you to send text and data directly from your computers, word processors, teleprinters, and other sophisticated terminals.

Without ever rekeying.

Or Timetran<sup>®</sup>, which automatically accepts and relays your messages. Your operator never has to re-dial a busy machine, or worry about differences in time zones.

Or Insure<sup>SM</sup>, which will accept your incoming telexes, and hold them until you're ready. That makes certain you never miss an important message because your machine is busy.

Or ARX (Automatic Retransmission Exchange).

ARX is designed to give you a flexible message switching service that can be custom fit to your individual needs. Including off-network service if required.

There's also one-touch dialing, departmental billing, multi-address capacity.

And much more.

Of course, these services are only the beginning of ITT World-com's whole spectrum of services.

Services like these will not only provide you with better communications today.

They'll help you be ready for whatever happens tomorrow.

We'd like to tell you more about us. Write for our booklet: Marketing Department (A/PR), ITT World Communications Inc., 67 Broad Street, New York, N.Y. 10004.

One look at what we offer should be all the proof you need.

***ITT World Communications Inc. ITT***

## SOURCE DATA

wick, Mitchell & Co. The rule, Statement of Financial Accounting Standards (SFAS) 52, was issued in December '81 by the Financial Accounting Standards Board to replace Rule SFAS 8, issued in 1975. Application of the new rule is not required until financial statements for calendar year 1983 are issued. The booklets are available from each of the 100 U.S. offices of Peat, Marwick, Mitchell & Co. The address is 345 Park Ave., New York, NY 10154.

### CONTRIBUTIONS ACCEPTED

The Project Management Institute (PMI), a professional society for those practicing, consulting, and/or teaching project management, is updating its survey of software packages for managing projects. In addition to scheduling packages, the survey will include estimating, resource management, materials control, equipment management, and cost control applicable to project-type work.

To be included in the survey, the package must be currently available for use through purchase, lease, or service bureau arrangements. Any service bureaus, software vendors, computer vendors, or individuals who wish to have their packages included should contact Dr. Francis M. Webster, 2143 S. Hammond Lake Dr., West Bloomfield, MI 48033. Standardized survey forms will be sent to all who request

them. The completed forms will be published along with some analysis and will be available for purchase from PMI. The deadline for submissions is June 1, 1982.

### NOT FOR STUDENTS ONLY

More than 1,000 books from over 170 publishers appear in the 15th edition of the "Annual Bibliography of Computer-Oriented Books." Published by the University of Colorado's Computing Newsletter, this year's bibliography has added over 300 new books. All introductory books published before 1979 were deleted. The directory's 63 categories are broken down by type (reference, textbook, handbook) and style of presentation (programmed instruction, case study, or narrative). Copies are available for \$4 from *Computing Newsletter*, Box 7345, Colorado Springs, CO 80933. (If an invoice is required, the cost is \$6.)

### SEMINARS

#### BINARY BE-BOP

MIT's Experimental Music Studio is offering two workshops this summer: Techniques of Computer Sound Synthesis, June 21-July 2, which explores the latest developments in digital audio processing, and Workshop in Computer Music Composition, July 5-30, where composers learn to use the computer as a musical instrument.

Both courses will provide hands-on experience, but no special technical knowledge is required. There will be guest lecturers for both courses. For the techniques workshop, Barry Blesser, president of the Audio Engineering Society, MIT's Marvin Minsky, and Bernard Gordon, president of the Analogic Corp., will be lecturing. At the composition workshop, Charles Dodge, Bruce Pennycook, and Mario Davidovsky will lecture and be available for consultation. For additional information, contact the Director of the Summer Session, Room E19-356, Massachusetts Institute of Technology, Cambridge, MA 02139.

### FUTUREWORLD

Billed as a "Futurist Assembly to Explore How New Technologies Will Change the Quality of Life," the theme for the Fourth General Assembly of the World Future Society is "Communications and the Future." The future of telecommunications, computers, broadcasting, films, newspapers, and even interpersonal communication will be discussed. Exhibits will feature the latest communications technology plus the blueprints and prototypes of forthcoming developments. Meeting is set for July 18-22 in Washington, D.C. For further information or registration, contact the World Future Society, 4916 St. Elmo Ave. (Bethesda), Washington, DC 20014, (301) 656-8274.

**SCRED**  AOS  AOS/VS  
 RDOS  DOS  MP/OS

**Pascal**  AOS  AOS/VS  
 RDOS  DOS  MP/OS

...two ways  
to soften your  
**Data General**  
**hardware**

**SCRED** Screen editor for DG and non-DG terminals.

**PASCAL** ANSI/IEEE standard with extensions.

**Rational Data Systems**

205 East 42 Street New York City 10017  
212-697-5855 TWX 710-581-6016

CIRCLE 158 ON READER CARD

## CALL GLASGAL FOR THE BEST IN DATA COMMUNICATIONS EQUIPMENT

Firms whose products are stocked for quick delivery include:

Micom	Haleyon
General Datacomm	Gandalf
Racal-Vadic	Spectron
Paradyne	Ventel
Ark Electronic Products	Com/Tech Systems
Electrodata	Kaufman Research
Prentice	Anderson Jacobson
Craig Data Cable	Dataprobe
Intecom	PCI, and many others

Just call to place your order or call for free and expert systems configuration advice (Authors of Basic and Advanced Techniques in Data Communications published by Artech House Telecommunications magazine). Same day shipment of most items.

Modems 50 to 14,400 BPS, all types of Multiplexers, Cables, Line Drivers, Limited Distance Modems, Modem Eliminators, Acoustic Couplers, Data Access Arrangements, Automatic Calling Units, Patch Panels, Switches, Port Selectors, Protocol Converters, Encryption Units, Async to Sync Converters, Error Control Units, Data Monitors, EIA Breakout Boxes, Bit Error Rate Testers, Phone Line Testers, Dial Backup Equipment, Phone Line Bridges, Modem and Port Sharing Units, Equipment Cabinets, Inverse Multiplexers, and our exclusive *Data Detective Kit*.

Installation and on-site maintenance available in N.Y. Metro Area.

CALL 201-768-8082

GLASGAL COMMUNICATIONS SERVICES INC.

103 First St., Harrington Park, N.J. 07640

CIRCLE 159 ON READER CARD

# SUPPORT SYSTEMS

## BY LIEBERT

# COMPUTER

### Increased computer uptime, everytime.

In every follow-up study conducted on Liebert Power Management Centers with exclusive DATAWAVE™... the results show **significant computer uptime gains!** This means that virtually all electrical power fluctuations that adversely affect the computing process **are eliminated!** And, the savings in increased uptime, clearly justify the cost!

**Why is Liebert the best equipment value?** Because the Power Management Center is **the only** total computer room power system that combines distribution, monitoring and 100% effective conditioning!

### PORT SYSTEMS BY LIEBERT-COMPUT

Liebert Corporation, 1050 Dearborn Drive, P.O. Box 29186, Columbus, Ohio 43229. Phone 614-888-0246 Telex 246-655 Liebert WOGN

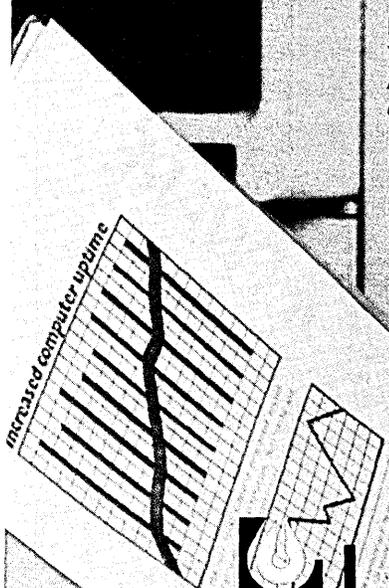
Please send the complete "Downtime Analysis" conducted by a major New England utility.

Name: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Have a salesman call

CIRCLE 160 ON READER CARD

D52



We help make your computer investment pay off.

See us at booth numbers 7909 - 7914

BY LIEBERT-COMPUTE

# The Marketplace...

## ADVERTISERS' INDEX

### SOFTWARE & SERVICES

Amcor Computer Corp.....	220
Atlantic Management Systems, Inc. ....	221
Bancroft Computer Systems, Inc. ....	221
Barron-Phillips.....	220
Dataware, Inc.....	221
Dataware, Inc.....	221
Dataware, Inc.....	221
Duquesne Systems, Inc. ....	220
Duquesne Systems, Inc. ....	222
J.D. Edwards & Company.....	220
EEC Systems.....	220
Evans Griffiths & Hart, Inc. ....	221
NDD, Inc.....	222
Plycom Services, Inc.....	221
RSTS Professional.....	220
Viking Software Services, Inc. ....	221

### BUY, SELL, LEASE

Advanced Systems Concepts, Inc. ....	223
Alberta Government Services .....	222
Northern Telecom Canada, Ltd.....	222
C.D. Smith & Associates, Inc. ....	222
Thomas Business Systems, Inc.....	222

### DP MARKETPLACE

Downtown Book Bazaar.....	223
---------------------------	-----

### TIME & SERVICES

Electronic Interface Associates, Inc.....	223
---	-----

### PERSONAL COMPUTING

Micro Management Systems, Inc. ....	223
-------------------------------------	-----

### JOB MARKETPLACE

Detroit Plastic Molding Co.....	223
RSVP Services .....	223

## SOFTWARE SERVICES

### 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 500 ON READER CARD**

### Elegant Software

For IBM S/34 & S/38 Computers

General Ledger/Financial Reports
Accounts Payable
Accounts Receivable
Payroll/Personnel
Order Processing
Inventory Management
Mailing Lists
Fixed Assets
Oil & Gas
Job Cost

**J. D. Edwards & Company**  
Two Denver Technological Center  
Englewood, CO 80111  
303/ 773 3732

Dallas/ 214/ 484 8911  
Newport Beach/ 714/ 751 5302

**CIRCLE 502 ON READER CARD**

### LEX-11 WORD AND DATA PROCESSING FOR VAX, PDP-11 AND LSI-11

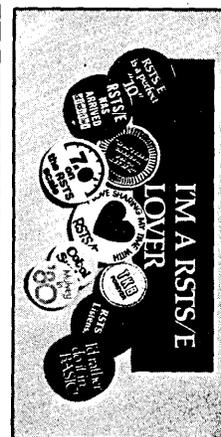
- Integrated word, data list processing
- Supports RT-11, TSX-PLUS, RSX-11M, RSTS/E, UNIX, IDRIS, IAS, VMS
- Fast, friendly, flexible
- Calculator, Graphics
- Spelling Dictionary, Forms
- Custom modification easy
- ASCII Formated Files
- Report Writer, Data Entry
- OEM Discounts

**EEC Systems, Dept. DAM**  
286 Boston Post Road  
Wayland, Mass. 01778  
Phone 617-358-7782 or 443-6376

**CIRCLE 501 ON READER CARD**

### RSTS PROFESSIONAL

P.O. Box 361, Ft. Washington, PA 19034  
(215) 542-7008



**INSIDE:**  
Articles of interest to DEC computer people... valuable reading for users of all operating systems... expanded to include VAX section... more!  
**RSTS PROFESSIONAL** an international quarterly.  
Subscriptions, information...  
Box 361, Fort Washington, PA 19034,  
(215)542-7008.

## 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 504 ON READER CARD**

**DEC  
RSTS  
APPLICATION  
SOFTWARE**

ACCOUNTING SYSTEMS  
• ACCOUNTS RECEIVABLE  
• PAYROLL  
• GENERAL LEDGER FINANCIAL MANAGEMENT

BUSINESS CONTROL SYSTEMS  
• ORDER PROCESSING/BILLING  
• INVENTORY CONTROL  
• SALES ANALYSIS

DEC GOLD STAR RATED  
100 MILLION  
DOLLAR  
AWARDED

**amcor computer corp.**  
a kaneb company  
1900 Plantlida Dr., Louisville, KY 40292 502/494-9920  
Regional Offices - Atlanta, GA / Campbell, CA



**CIRCLE 505 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 46563  
(219) 935-5121

CIRCLE 506 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 507 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 508 ON READER CARD

## TIRED OF REINVENTING THE WHEEL?

Our new multicompany FINANCIAL REPORTING SYSTEM will help end your General Accounting Problems. (in RPG II) (Compatible A/P and other systems)

13 Digit Acct. #, Budgets, Comparative, Quarterly, Allocations, Consolidations, Departments, Billion \$ amounts, Recurring entries, Change in financial position.

**BANCROFT COMPUTER SYSTEMS, INC.**

P. O. Box 1533, W. Monroe, LA 71291  
(318) 388-2236



CIRCLE 509 ON READER CARD

## Forms Manager (On-Line Data Entry/Data Validation)

Smooth Sailing For  
All Vax & PDP\* Users

Developing "Fill-In-The Blanks"  
Forms For Interactive Systems Is  
Now A "Fill-In-The-Blanks" Process

Compare the Viking Forms Manager  
(VFM) With FMS\* Or Other Systems to See

- ▲ **EASIER TO USE:** More special functions for the end user—fewer program statements for the developer.
- ▲ **MORE EFFICIENT OPERATION:** Immediate field editing lowers error rates—efficient I/O conserves computer resources.
- ▲ **COMPLETE DATA ENTRY SUB-SYSTEM:** User friendly data capture/data validation systems can be operational in minutes.
- ▲ **BROADER CHOICE OF TERMINALS:** The Viking Forms Manager allows you to select the hardware that's best for you.

Call or write for literature today

**VIKING SOFTWARE SERVICES, INC.**  
2800 Center Building • 2815 East Skelly Drive  
Tulsa, Oklahoma 74105 • 918-745-6550

\*VAX, PDP and FMS are registered trademarks of Digital Equipment Corporation

CIRCLE 510 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 511 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 512 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 513 ON READER CARD

# RSTS SECURITY

'against all enemies,  
foreign and domestic'

## LOCK-11

NDD 70 James Way, Southampton, PA 18966  
(215) 364-2800

CIRCLE 514 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 515 ON READER CARD

BUY, SELL, LEASE

SYSTEMS • PERIPHERALS • PARTS

# DG

*Phil Thomas*  
305/392-2006

# DEC

*Bryan Eustace*  
305/392-2005

*Jennifer Eustace*  
305/392-2007  
TELEX 807-219

BUY • SELL • TRADE • LEASE

## THOMAS BUSINESS SYSTEMS, INC.

CIRCLE 516 ON READER CARD

# DEC

SYSTEMS  
&  
COMPONENTS

C.D. SMITH &  
ASSOCIATES, INC.  
12605 E. Freeway,  
Suite 318  
Houston, TX 77015  
713-468-2384

CIRCLE 517 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 518 ON READER CARD

# Alberta

GOVERNMENT SERVICES

FOR SALE BY PUBLIC TENDER SALE  
82P-66 I.B.M.: 370/168 MP COMPUTER,  
CONFIGURATION INCLUDING 5 ME-  
GABYTES C.D.C. UMS-3 MEMORY

EQUIPMENT IS CURRENTLY IN OP-  
ERATION, WILL BE DISCONNECTED  
AND PACKED BY I.B.M. AND WILL BE  
AVAILABLE IN JULY 1982

TENDER CLOSING 9:00 A.M., JUNE 10,  
1982

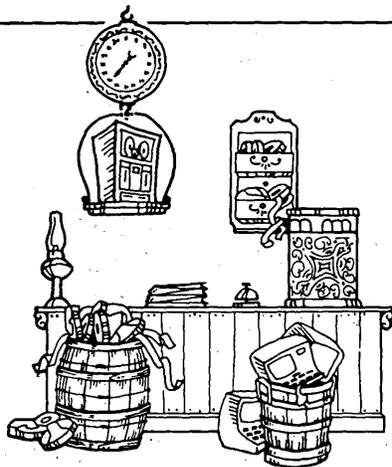
BID FORMS AND FURTHER INFORMA-  
TION AVAILABLE FROM:

ALBERTA GOVERNMENT SERVICES  
Surplus Sales Branch  
12115 Fort Road  
Edmonton, Alberta  
T5B 4H2  
Telephone: (403) 427-3482

J.T. Kyle  
Deputy Minister

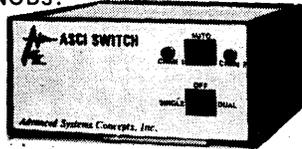
CIRCLE 519 ON READER CARD

# MOVE THE GOODS.



**USE THE  
DATAMATION  
MARKETPLACE  
ADVERTISING  
SECTION  
CALL KATHY  
800-223-0743  
OR SHIRLEY**

TIRED OF CHANGING  
CABLES AND TURNING  
KNOBS?



## ASCII SWITCH

- Computer Controlled or Manual
- Command Code User Selectable
- Select one of two Peripherals
- Select one of two Computers
- Asynchronous to 19200 Baud
- No External Power Needed

Call or write

ADVANCED SYSTEMS CONCEPTS, INC.  
P.O. BOX Q, ALTADENA, CA. 91001  
(213) 684-5461 or 794-2308

CIRCLE 520 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 522 ON READER CARD

### JOB MARKETPLACE

#### EMPLOYMENT SERVICE FOR PROGRAMMERS AND ANALYSTS

National Openings With Client Companies  
and Through Affiliated Agencies

Scientific and commercial applications • Software  
development and systems programming • Telecommuni-  
cations • 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 211, Dublin Hall  
1777 Walton Road  
Blue Bell, Penna. 19422  
(215) 629-0595



#### RSVP SERVICES

Employment Agents for Computer Professionals

CIRCLE 524 ON READER CARD

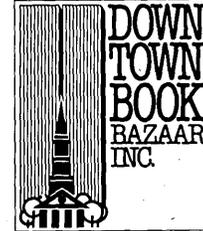
### DP MARKETPLACE

## Save \$ on Computer Books!

We offer a 10% discount on  
computer books from Addison-  
Wesley, Wiley, Sybex, and Murach.

Fast, reliable service and low  
shipping charges for mail orders.

Write for FREE catalog (or stop  
in to see us in lower Manhattan).



DOWNTOWN  
BOOK BAZAAR,  
Dept. D  
172 Fulton St.  
(near World  
Trade Ctr.)  
New York, N.Y.  
10007

CIRCLE 521 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 PURE RADIO SHACK EQUIPMENT  
PERSONAL Learn To  
COMPUTER "Do It Yourself"  
Headquarters And Save Money

#### MICRO MANAGEMENT SYSTEMS, INC.

Parcel Division  
DEPT. NO. 17

115C Second Ave. S.W. • Cairo, Georgia 31728  
912-377-7120 Ga. Phone No.

CIRCLE 523 ON READER CARD

### SALES REP WANTED

With contacts in computer industry  
for Midwest major plastics molder  
now making large computer low  
pressure housings, covers and cabi-  
nets. 313/979-5000, M. Ladney.

CIRCLE 525 ON READER CARD

# INNOVATION

**Free Space Fragmentation.  
Poor Data Set Placement.  
Over Allocated Data Sets.  
Multi-Extent Data Sets.  
Inaccurate VTOC's.**



**COMPAKTOR is a Disk Management Utility Program which can reorganize Direct Access Volumes.**

### Free Space Consolidation

COMPAKTOR, in most cases, will consolidate all of the free space into one or two large free space extents.

### Data Set Consolidation

COMPAKTOR will merge multi-extent data sets into one extent.

### Reclaim Space

COMPAKTOR permits the user, with the release option, to free up the allocated but unused portion of a data set. Temporary and any user-specified data sets can also be scratched.

### VTOC Management

COMPAKTOR has the ability to move and expand the VTOC. A complete analysis of VTOC is performed by COMPAKTOR.

### Data Set Placement

Flexible user-specified data set placement. Data sets can be positioned to a relative or absolute position either singly, as a group, or in sequence.

### Reports

COMPAKTOR's "simulation" function provides track maps of a volume both before and after reorganization. Comprehensive volume, data sets, and VTOC reports are provided.

### 3000 Users

COMPAKTOR, available since 1978, has a proven record of reliability and efficiency.

### Free 60 Day Trial

COMPAKTOR is available for OS, VS and MVS operating systems. COMPAKTOR is available as an option to FDR.

For Further Information  
or Free 60 Day Trial, Call or Write . . .



970 Clifton Ave., Clifton, NJ 07013-2793 • (201) 777-1940

CIRCLE 170 ON READER CARD

## ADVERTISING OFFICES

Sales Manager: **John M. Gleason**  
New York, NY 10022  
875 Third Ave.  
(212) 489-2579

Eastern District Manager:  
**Francie Bolger**  
New York, NY 10022  
875 Third 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. Filiatrault**  
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 Lastargues**  
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  
Meierskappel/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

**IBB** a company of  
The Dun & Bradstreet Corporation



# TAKE CONTROL OF YOUR DATA!

## FOCUS ON THE DATA INSTEAD OF THE PROGRAMMING.

Get the information you want, when you want it, without straining your regular data processing workflow... or waiting in line for IT to accommodate YOU!

FOCUS is the new, 4th generation language that makes the information center concept work. It lets non-programmers generate their own queries, reports, and graphs without waiting for professional programmers to "squeeze their jobs in somehow." And it does it with simple English statements that you can put to work after only two hours instruction.

Thinking of implementing an Information Center? Start thinking of FOCUS. FOCUS reads all your data files... VSAM, QSAM, IDMS, ADABAS, TOTAL, IMS as well as stores data in FOCUS' own shared relational database structures. FOCUS helps programmers and non-programmers handle reporting and application requests in one tenth the time.

It's the most cost-effective way to get the most from your IBM or compatible mainframe.

For details, call the FOCUS representative at the IBI office nearest you, or write to Don Wszolek, Information Builders, Inc., 1250 Broadway, New York, New York 10001.

 **FOCUS**

New York: (212) 736-4433  
Washington, D.C.: (703) 276-9006  
Dallas: (214) 659-9890  
Chicago: (312) 789-0515  
Los Angeles: (213) 615-0735  
Palo Alto: (415) 324-9014

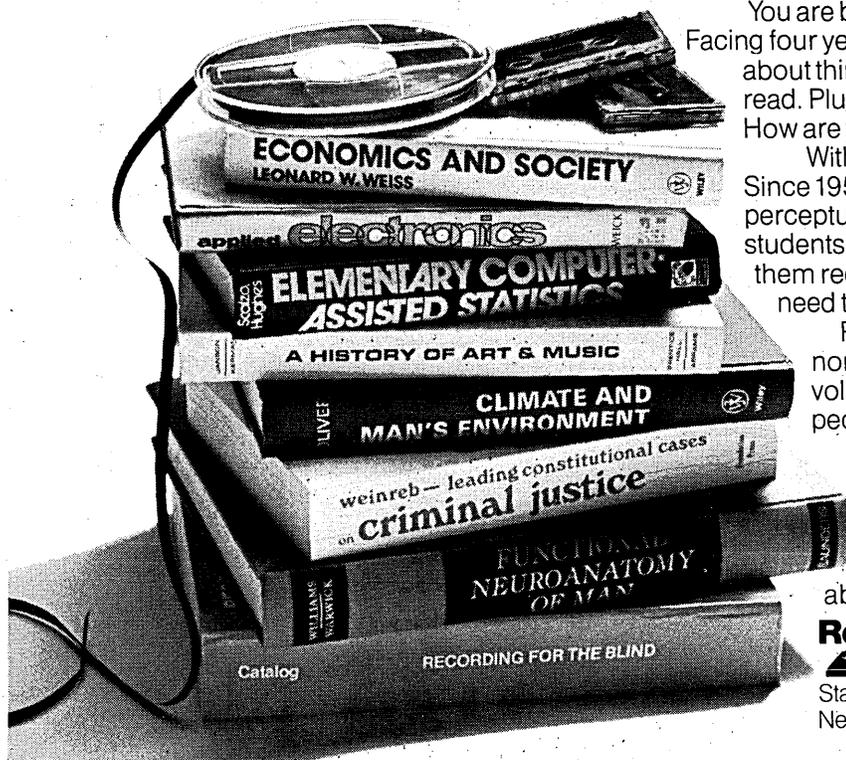
# ADVERTISERS' INDEX

Acme Visible .....	115
Amdahl.....	232
Anderson Jacobson .....	120
Ann Arbor Terminals.....	65
Apollo Computers .....	178, 179
Appleton Papers .....	111
Applications Software .....	105
Applied Digital Data.....	24
Astrocom .....	194
AT&T .....	82, 83
AT&T Long Lines.....	163
Auerbach Publishing.....	236
Aydin Controls .....	187
*Ampex .....	192-27
*Anadex .....	192-10, 192-11
BBN Computers .....	127
Calcomp.....	9
*Callan Data Systems .....	192-14, 192-15
Cambridge Systems .....	237
Cardinal Computers .....	58
Cavri .....	8

Center for Communications Management .....	216
Codex.....	144, 145
Computer Cable & Products .....	202
Computer Corporation of America .....	169
*Condor.....	192-45
Connecticut General.....	79
*Control Data Corporation.....	192-17
Control Data.....	132, 133, 240
Convergent Technologies.....	91
Cullinane.....	98, 99
*Cynthia Peripherals.....	192-28, 192-29
DASD.....	242
Data General .....	146, 147
Datagraphix .....	32, 33
Dataswitch.....	54, 55
Dataware .....	84
Datec .....	231
Decision Data Corp. ....	81
Destek .....	72
Digilog .....	60
Digital Communications Corp.....	203
Digital Computers.....	47
Digital Equipment Corp.....	106, 107, 165, 200

ESP Digital Systems.....	39
Execucom.....	77, 158
Exide Electronics.....	125
*Falco Data Products .....	192-7
Floating Floors.....	211
Gejac .....	212
General DataComm .....	85
General Electric .....	189
Genstar Rental Electronics.....	73
Glasgal .....	218
Government of Canada.....	76
*Heins Balancing Service .....	192-24
*Hewlett Packard.....	192-2, 192-3
Hewlett Packard .....	20, 21, 141
Honeywell.....	40, 41
Hughes Aircraft.....	175
*Human Designed Systems.....	192-9
IBM.....	56, 57
Informatics .....	15, 204

## Close your eyes. Now have someone read this to you.



You are blind. A student. Facing four years of college. With about thirty-two textbooks to read. Plus fifty supplemental texts. How are you going to manage?

With Recording for the Blind. Since 1951, we've helped over 53,000 blind, perceptually and physically handicapped students get through school. By sending them recordings of the books they need to read. Free.

Recording for the Blind is non-profit, and supported by volunteers and contributions from people like you who can imagine what it's like to be blind.

Your tax-deductible donation will help our students meet their educational goals. We'd all be grateful.

If you want to know more about us, write:

**Recording for the Blind, Inc.**

 an educational lifeline.

Station E, 215 East 58th Street  
New York, New York 10022, (212) 751-0860.



**Customer Support Representatives:**

**TECHNICAL CAREER**

**The Choice Is Yours...**

**MANAGEMENT CAREER**

**At Amdahl,  
regardless of your choice,  
you'll reap the same rewards for  
your efforts.**

Perhaps your strength lies in managing others. Or, perhaps you'd rather continue your technical career path, but are afraid you'll stymie our professional growth. Not at Amdahl! Whatever your choice — technical or management — you'll be rewarded equally for your contribution.

We're looking for exceptional people with in-depth experience in IBM operating systems internals and/or large IBM hardware support (field engineering). We'll provide additional training and professional development to enhance your expertise.

Discover the advantage for your career as a member of the Amdahl Support team — the best in the industry! A team backed by the unique Amdahl support philosophy: "An unidentified system problem — no matter what vendor's components make up the rest of the system — is an Amdahl problem". Opportunities exist throughout the country in our Support Centers, Education Center, and in many of our 90 Field Offices. Write us today at **Amdahl Corporation, Dept. 5-093, Product Support & Services Technical Recruiter, MS-300 CSL, P.O. Box 470, Sunnyvale, California 94086.** We are an equal opportunity employer through affirmative action.

**amdahl**  
*Discover The Advantage*

CIRCLE 174 ON READER CARD

# READERS' FORUM

## SMART MONEY

I am standing at the track next to a huge fellow in a purple jacket. This fat man is perturbed with his choice for the previous race. Without patience for his handicapping technique, he flings his bay-colored Mattel horse analyzer to the mud, where it sticks like a dud V2 rocket. A distracted-looking man muttering to himself on the rail to the Fat Man's right jabs a toe at the device. "I pay 25 bucks for that piece of junk," the Fat Man explains. But the distracted guy loses interest in the Mattel device, preferring to rip up a handful of pari-mutuel tickets instead. The Fat Man looks at him as if he were a freak in a sideshow, spits out his panatella, and walks back toward the clubhouse with me.

At the bar the Fat Man orders a large wax-paper container of beer, which he empties swiftly. He orders another, which is similarly disposed of. "I lose \$600 so far," he says to no one in particular. Then he looks down at his *Daily Racing Form*, which is covered with all sorts of cryptic writing. "Scientific handicapping," he declares gruffly, "the precision of previous results. Is it any better than those scruffy touts who stand out front and offer you the winners?"

The sixth race is about to go off, so the Fat Man turns his substantial form toward the racetrack. Across the infield the horses are being led to the gate. This fact makes the Fat Man more voluble. "The model I developed on a 3033 and further refined on my Apple has Minor's Gift going away in this one." This strikes most people as unusual, as Minor's Gift is a sprinter, and the last time she runs in a route she is beaten by nine and a half lengths. But the Fat Man is believing in his scientific method of handicapping and will hear nothing to suggest that Minor's Gift doesn't stand a chance. In fact, the Fat Man will entertain no nonscientific opinions about horseracing.

At 3:30 this race goes off, and Minor's Gift is fourth at the quarter but begins looking for a hole in the fence soon thereafter. At the end Minor's Gift is running dead last. A filly named Decorous pays \$13.80 to win, a sum that makes a group standing beyond the Fat Man's shoulder most happy.

"I use multiple regressions, I relate prior performance to future performance, I establish coefficients," the Fat Man mumbles, after emitting a very unscientific groan as the toteboard flashes its red numbers. "I correlate, use cluster analysis. What's it get me? This guy here likes the sound of a filly's name and wins \$13.80." He shakes his head and orders another container of beer. "Maybe it's the track," he offers, even though it is fast and the sky is clear.

The Fat Man becomes fractious when he goes to the window to put down his bet for the seventh race. He bumps into a small, weasely man and knocks cigar ashes down the front of the man's jacket. The Fat Man curses and puts his money down on

Meteorite, a 5-1 graduate that seems to stand a better chance than Minor's Gift.

The Fat Man then moves over to the rail, where he can watch the race on the inner dirt track with me. Meteorite runs well and comes down the stretch leading by a head. The Fat Man is elated now, convinced once again in the efficacy of correlating past results. Meteorite crosses the wire by a half a length. The Fat Man smiles and extends his arms toward me in a magnanimous gesture. "Correlations," he shouts. But the light shines on the toteboard, signifying a beef entered against Meteorite. This does not perturb the effusive Fat Man, who is now thinking of the \$6.80 he stands to collect as a result of his payoff variable system. "This'll mean a new array processor," he says to me happily.

A more pessimistic man, such as myself, would have figured that when the red protest light comes on, it means trouble. But the Fat Man has already begun walking back to the pay window, dreaming of peripherals, when the announcer declares the judges have disqualified Meteorite and placed the colt fourth, out of the money. From a distance I can see the Fat Man stop dead in his tracks and cock his head in a position of painful disbelief. He walks back to where I can again hear him muttering to himself. "Forty thousand cards, 500 races, God knows how much computer time, and he goes and gets himself disqualified. How can this be, statistically? How do I quantify temperament, or the trainer's or the jockey's motives? How do I lose?" This is most sad to hear, coming from such a large man.

He is beyond plaintive now, and sounds like Job beseeching his Creator. The Fat Man is overwhelmed with his ignorance, and is incredulous that his system does not permit him to foresee disqualifications, rain, or equine irregularity. Such distraught behavior is particularly untoward at the track, and various parties are straining to see the source of the moaning.

In an attempt to cheer him up and discontinue the rubbernecking of fellow handicappers, I remind the Fat Man that no less a person than Charles Babbage was unable to come up with a mechanical system for handicapping the horses, much to the distress of Lady Byron, who loses substantial jewelry in the attempt.

But the Fat Man does not listen to me. He hears something else. A bright thought enters his head. "Pace," he says. "There are courses for horses. Maybe if I try Hialeah or Bowie. If the value of the variance continues to be negative, then. . . ." Revived by this unusual announcement, the Fat Man begins to scribble on his *Form*. Again convinced of the solubility of the track, he pencils in his choice for the eighth.

The Fat Man's choice, Proud Northern, runs so poorly that he is eased up by the jockey Borden and does not even manage to finish the race. If the Fat Man were anything less of a rationalist he might by now begin to suspect some sort of larcenous conspiracy.

What, I ask the Fat Man, did he do before he got his micro? "Lose," is the reply. "When I begin with the micro I win big for maybe two, three weeks. I get visions of Gulfstream Park in winter,

palm trees, Havana cigars. Then I start seeing a lot of hayburners. Horses that are buted up. How can I figure in drugs? How do I simulate rainfall?"

The Fat Man walks down to the paddock to look at his choice for the ninth, a \$10,000 claiming black filly called Tuk'n Run. She is a looker for a horse, and I am impressed. Intuition would suggest her as a good choice, but the Fat Man strives to ignore or, at best, discount intuitive hunches. Leaning on the paddock rail, he looks sadly into his wallet. "This stuff ain't really money. It's just what you use to keep score."

When the race goes off, Tuk'n Run begins wide, behind Bend the Rules and Debbie's Radar. The pace is good for Tuk'n Run, who is a length and a half behind Debbie's Radar at the stretch. At the wire she is driving, and for a moment it appears she will overcome Debbie's Radar. But Debbie's Radar holds on to win by a head. The Fat Man slumps as if he has taken a bullet. "Why doesn't that horse have a bigger head?" he asks.

The line between handicapping and touting is a thin one, I know. And the smart money, as Yellow Kid Weil reminds, doesn't go to the tracks. Believers in horse systems are often like those who believe in the existence of creatures from outer space. But plungers persist in their belief that horses can be figured, if the database is sufficient and all the variables are considered. The Fat Man will continue to code in the *Form* nightly, in the hope that someday he will succeed with his digital handicapping.

But now he is a strange-looking person, out by the track as dusk approaches, searching for that Mattel horse analyzer he had so disgustedly parted with earlier.

"It's just a piece of trash. It doesn't work on sufficient variables. I don't even use it seriously." I walk toward the rail, offering a cursory look for the missing toy.

After a while we both give up. The Fat Man shows signs of rebounding from his state of fugue. "Well, kid, there's always the second tomorrow. If I play it right, I can get my event control block, and I can even up."

In the next day's second there's a horse with a name that I like, but I don't say anything to the Fat Man.

—Raymond Onion  
Belmont, New York

# THE PYGMALION APPROACH

The software designer can be thought of as a teacher with a pupil—the computer—that is uncooperative, to say the least. Just as the average child gets all the imagination knocked out of him by his parents and is then taught at school to follow rigid patterns of thought, so the computer, meagerly endowed at birth with gray matter, is fed an arid formula labeled Operating System, weaned on low-protein Assemblers and Compilers, and raised on a thin gruel of Database Management and High Level Languages. Unlike *Oliver Twist*, he doesn't know how to ask for more. He has learned everything by rote, and even in his dialogs with his masters he mumbles a subhuman gibberish.

"Wait a minute," you'll object, "we're talking about a machine, not a human being or an animal." Well, if you can program a human being to act in a certain way, as Dr. Higgins programmed Eliza Doolittle to speak and act like a lady, maybe you can program a machine to give the illusion of being human-like. Or you can use the word "teach" in both cases. In both cases the subject is drilled to follow a complex pattern of behavior according to cues. In the case of the computer, however, we only have to tell it (correctly) once. But in the case of Eliza Doolittle, comes the rejoinder, we are building a few insignificant patterns on top of an enormous amount of intelligent behavior which the computer lacks. There it goes, the word "intelligent," the great unbridgeable divide. At the time George Bernard Shaw wrote *Pygmalion* there was a dividing line in England between "ladies and gentlemen" and the common folk. Little by little, the line has blurred. Maybe we are seeing a similar blurring of the dividing line between intelligent and nonintelligent behavior. In any case, I don't care whether you consider the computer "really," "essentially," or philosophically intelligent or dumb. All I care about is that, like Eliza, the computer should be capable of being programmed, drilled, or taught to mimic a certain narrow range of behavior successfully enough to fool some of the people some of the time.

If you have this Pygmalion attitude, you begin to think of the computer, with its baggage of software, as something you can mold the way a teacher molds a young mind. But with this difference: you can get into the circuitry and build on it. In fact, you have to if you want to bring the creature only up to the level of a rat that can find its way to food through a maze. The essence of the Pygmalion approach is to assume or make believe that the machine can do whatever you ask of it; and when it turns out that it can't, you break down your instructions into ever more detailed levels until you reach the primitives that are understood. This is none other than the top-down approach as described, for example, by Dijkstra. You may be defeated by complexity long before you get to the primitives, but you are never defeated by language barriers because you teach the machine to understand the language you are using. If that is too difficult, you communicate with it in some simpler language that you can teach it or that it has already learned.

Consider the way a child is taught table manners. Whenever she says something like "I want more pie," she is reprimanded and told to say something like, "Please may I have some more pie, Mom?" If the child is very small her mother may be satisfied with her just adding "please" to the original statement. The mother has been programmed by her mother to chide her daughter every time she fails to say "please" when requesting something. As adults we know that most other adults respond more readily to polite requests than to curt orders; it's been drilled into us. Could we program a computer to make a similar distinction?

You may wonder why on earth we should want to program a computer to do something so useless. One of the advantages of working with a machine is that you can't hurt its feelings. On the

CARTOON BY BRAUN SAVAGE



© DATAMATION

# Check out a real data base management system.

## CHECKLIST

Does Your DBMS Provide These 10 Essential Features?

1. **Data Integrity:** Does it protect against data corruption, erroneous data entry, and unauthorized relationships?
2. **Physical Data Protection:** Can you roll back your data base to a prior point? Recover or restart in case of damage?
3. **Data Security:** Does it provide optional data encryption and separate definitions for read/write access to the item level?
4. **Data Independence:** Can the data base structure be modified without changing previous programs?
5. **Integration:** Does the DBMS eliminate data redundancy?
6. **Performance:** Does it allow concurrent multi-user access with active and passive locking? Are response times acceptable even for very large data bases?
7. **Ease of Use:** Can many-to-many and recursive relationships be directly defined? Can programs be written in any major programming language? Are instructions short and simple?
8. **Query Report System:** Can ad hoc queries be easily made with non-procedural, English-like statements? Are sophisticated reports available from pre-defined queries? Nested queries?
9. **Portability:** Does the DBMS run under CP/M™, MP/M, CP/M-86, MP/M-86, PC DOS™, UNIX™? On Z80™, 8086, 8088, 68000, and PDP-11™? Does it run with COBOL, Pascal, FORTRAN, PL-7, Compiled BASIC and C?
10. **Support:** Are professional training, regular product updates, enhancements, and professional consulting all available?

Contact  
In US:  
ISE-USA  
P.O. Box 248  
Lafayette, Indiana 47902  
Tel: (317) 468-2581

In Germany:  
ISE ADY/ORG GERMANY  
Bohnstr. 19  
8000 Munich 40  
Tel: (089) 1920-71-74

In France:  
ISE-CEGOS  
16111 Charbonneaux  
2091 Rond Point du Pont de Sèvres  
92516 Boulogne Billancourt Cedex  
Tel: (01) 46 81 104

In Switzerland and Austria:  
ISE ADY/ORG SWITZERLAND  
Mannstrasse 17  
CH-8008 Zurich  
Tel: (01) 32 02 70 11

In Sweden:  
ISE-DATA/SWEDEN  
Box 1055  
Horsösgatan 11  
171 21 Solna

In Belgium:  
ISE INTERNATIONAL  
P.O. Box 248  
Lafayette, Indiana 47902  
Tel: (317) 468-2581



ISE is an international consortium of the world's leading consulting and software firms, representing over 5,000 professionals around the world.

Professionals know the difference.

If you can't answer "YES" to these questions, send for our comprehensive booklet, "How to Evaluate and Select a Data Base Management System."

MAIL TO: Your local ISE affiliate.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ (area code) \_\_\_\_\_ (ext.)

Z80 is a registered trademark of Zilog; PDP-11 of Digital Equipment Corp; CP/M of Digital Research; UNIX of Western Electric; PC DOS of IBM.

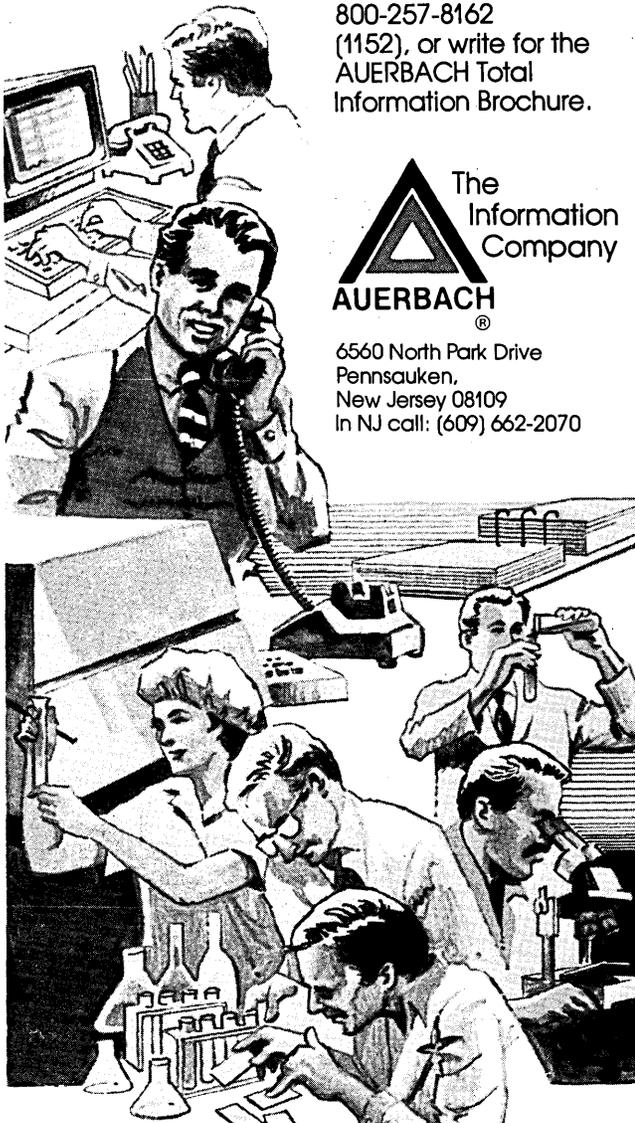
CIRCLE 175 ON READER CARD

# Your DP Hardware is only as sophisticated as your DP Management Skills

The most sophisticated data processing hardware can be as outmoded as an abacus, unless there is proper direction by the DP Manager. Skillful management represents the difference between failure and success. You are successful if you support corporate goals and satisfy information needs. But who satisfies your information needs?

Only AUERBACH provides well written, concise and sophisticated information on both management & technical issues, plus free, instantaneous information by phone. The facts and advice you need to make quality decisions from a business and technical perspective. Let AUERBACH help your company be successful by helping you manage successfully.

Call toll free, 800-257-8162 (1152), or write for the AUERBACH Total Information Brochure.



6560 North Park Drive  
Pennsauken,  
New Jersey 08109  
In NJ call: (609) 662-2070

CIRCLE 176 ON READER CARD

## READERS' FORUM

other hand you usually can't get it to make a little extra effort for you either. It treats boors and gentlemen alike and it can't recognize its friends. The following is a typical man-machine dialog. Incidentally, another elementary function the machine is unable to perform is that of distinguishing the sex of its interlocutor, so this could well be a woman-machine conversation. (Throughout these dialogs non-underlined words transmitted by people are ignored by the machine. Square brackets mean that the enclosed characters are not echoed on the screen for security or privacy reasons.)

### DIALOG A

- 1) Man: Hello.
- 2) Machine: Please identify yourself.
- 3) Man: Account number [38462] password [WILLIAM]
- 4) Machine: Ready.
- 5) Man: Run TAX.
- 6) Machine: TAX running under JRX. Date 810915 Time 1615. Do you wish to consult the menu?
- 7) Man: No.
- 8) Machine: Please state option required.
- 9) Man: YRENDTAX.
- 10) Machine: Do you wish to enter new data?
- 11) Man: No.
- 12) Machine: State years separated by commas.
- 13) Man: 1981.
- 14) Machine: 1981 Income \$48,319 Tax \$8,436. More?
- 15) Man: FASTOUT.
- 16) Machine: Have a good day.

This is not a snappy dialog. We only tolerate lines 2 through 12 because we are still fascinated with the computer as a mechanical toy. Suppose William is in a hurry and in no mood to play. We could program RJX to respond like this:

### DIALOG B

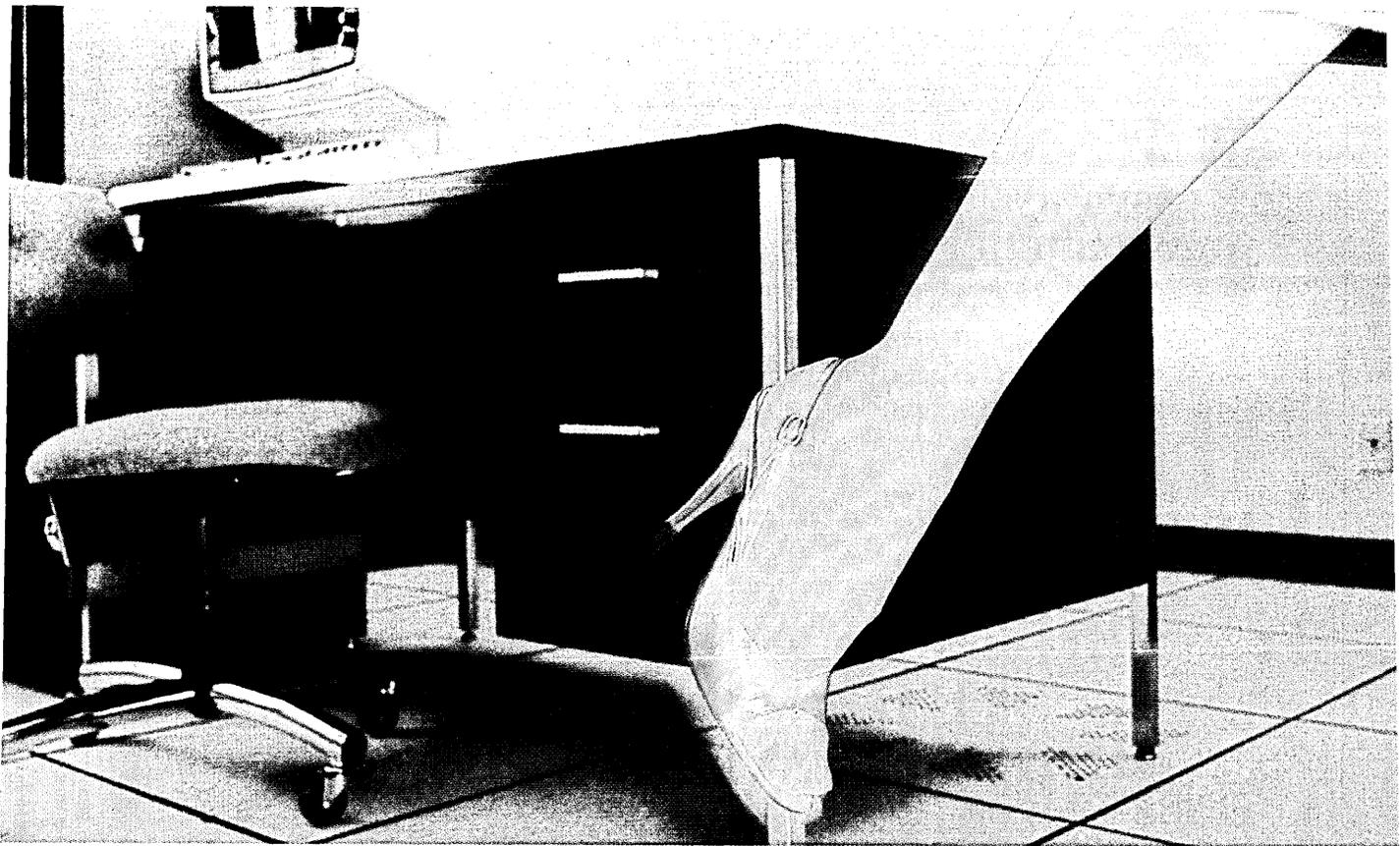
- 1) William: Urgent.
- 2) RJX: Please give account number, password and program to be run, separated by commas:
- 3) William: [38462], [WILLIAM], TAX.
- 4) RJX: Do you wish to consult the menu? If not, state option and years separated by commas.
- 5) William: YRENDTAX, 1981.
- 6) RJX: 1981 Income \$48,319 Tax \$8,436. Have a good day.

The cues given by William in lines 1, 3 and 5 cause RJX to respond in a more businesslike fashion than in Dialog A. But RJX would do the same for anyone who knew what cues to give. A great many of our transactions in life are carried out with a bare minimum of explicit instructions, as when we sit down in our favorite restaurant and say to the waiter "the usual, Joe, please." Wouldn't it be nice if William could establish a cozy relationship with RJX whereby this sort of dialog could take place:

### DIALOG C

- 1) Bill: RJ, this is \*[Bill]. Please give me my tax for this year.
- 2) RJ: Sure, \*[Bill].  
1981 Income \$48,319 Tax \$8,436.  
OK? [short pause]  
Have a good day.

In this dialog the character \* tells RJ not to echo the succeeding characters up to the next space or punctuation mark. On receiving its nickname "RJ," RJX expects Bill to be on its list of friends.



## HOW TO GET DATA SECURITY, NOT INTERFERENCE, SO YOU CAN GO ABOUT YOUR BUSINESS.

Many things can get in data processing's way when a company decides on a computer security system.

More people must be hired to maintain most systems, and more machine capacity is taken up for security. This is not the case with ACF2, however.

The ACF2 system can easily be used, changed, or updated with a minimum of machine use. ACF2's phased implementation capabilities allow for smooth transition in centralized or decentralized security control environments.

ACF2 protects by default so data owners have complete control over access. In addition, a series of reports are generated to assure auditors that corporate

assets are well protected. In short, ACF2 is a system that helps everyone.

ACF2 can provide this protection in any computer using IBM's MVS or VS1 operating systems.

Call us now to learn how ACF2 does its job and lets you do yours.

### ACF2: COMPUTER SECURITY THAT'S ALWAYS THERE SO YOU DON'T NEED TO BE.

The Cambridge Systems Group, Inc., 24275 Elise, Los Altos Hills, California 94022, Tel: (415) 941-4558 — Telex: 357437

Representatives:

CSG Limited 7 Cavendish Square, London, W1M 9HA U.K. Tel: (01) 580-1222 — Telex: 299512

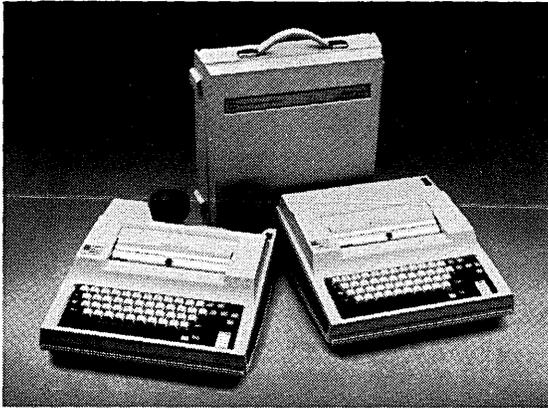
8 Rue Jouy de Boudonville, F-78100 St-Germain-en-Laye, France Tel: (3) 451-3285 — Telex: 697773

ACF2 was developed by SKK, Inc. Rosemont, Ill. **SKK**

CIRCLE 177 ON READER CARD

AUTHORIZED  
DISTRIBUTOR  
of  
TEXAS INSTRUMENTS  
DATA TERMINALS

## MTI gives you 2 easy ways to take your computer along at 120 cps.



Texas Instruments 785 & 787 Portable Data Terminals

**1. TI 785-120 cps** features bi-directional thermal printing, operator programmable answerback memory and a built-in originate-mode acoustic coupler with Vadic 3400 and Bell 113A compatibility.

**2. TI 787-120 cps** features bi-directional thermal printing, operator programmable answerback memory, a built-in direct-connect modem with Vadic 3400, Bell 113A and 212A compatibility, memory dial-up and originate/automatic answer operation.

MTI's Texas Instruments *Silent 700\** Portable Data Terminals bring your computer as close as the nearest telephone and electrical outlet.

They're ideal for inventory reporting and control, insurance program planning or any application that requires fast, reliable printing and versatile communications capabilities.

We intend to be very competitive. Whether you buy, rent or lease, MTI is the one source for all the terminals, peripherals, systems, applications expertise and service you'll ever need. And all of this at hard-to-beat prices. Call MTI today.

New York: 516/621-6200, 212/767-0677, 518/449-5959

Outside N.Y.S.: 800/645-6530

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, Racal-Vadic, Digital Engineering Retro-Graphics, Cipher, Priam, Epson, SMS, Able Computer, Elgar and 3Com.

\*Trademark of Texas Instruments

## READERS' FORUM

He's there all right. If he weren't, RJ might respond:

RJ: Glad to know you \*[Bill]. We're going to have to go through this step by step. Just say THANK YOU when you're satisfied.

Please identify yourself.

[... see Dialog A, lines 3-12]

Bill: 1981.

RJ: 1981 Income \$48,319 Tax \$8,436.

More?

Bill: Thank you, RJ.

RJ: Got it. More?

Bill: No thank you.

RJ: Got it and filed it.

Have a good day.

Now Bill is in the little green address book and RJ knows what he wants ("the usual") when he asks for tax this year. Returning to Dialog C, Please is the cue for RJ to search Bill's command file for tax this year where navigational aids will be found.

A year has passed and Bill greets his old friend RJ once again and asks for his 1982 tax. He gets this reply:

### DIALOG D

1) RJ: Sure, \*[Bill].  
1981 Income \$48,319 Tax \$8,436.  
OK?  
...

RJ is still pretty dumb and needs further training. So Bill continues quickly:

2) Bill: No RJ. Please take note that THIS YEAR means this year.  
3) RJ: I know that \*[Bill]. Try again.  
4) Bill: THIS YEAR means 1982.  
5) RJ: Got it. Now I'll file this routine:  
RJ : State years.  
\*[Bill] : 1982.  
OK?  
...

Bill is about to acquiesce but checks himself just in time.

6) Bill: No, RJ. [Thinks. Consults training manual.]  
Please print out Special Time Names.  
7) RJ: TIM : Current time of day hh:mm:ss  
MO : Current month, example JAN  
DAT : Current date yymmdd  
DYW : Current day of week, example SUN  
DYM : Current day of month dd  
YR : Current year 19yy  
8) Bill: RJ, please get this: THIS YEAR means YR.  
9) RJ: RJ : State years.  
\*[Bill] : YR.  
OK?  
10) Bill: Thank you, RJ. Thank you very much indeed.  
11) RJ: 1982 Income \$52,416 Tax \$9,183.  
OK? [short pause]  
Have a good day.

Dialog D is an example of a training session in which both Bill and RJ learn something. Maybe Bill will forget the special time names but RJ will not forget what Bill means by this year. Within the training session, the cue please means "I am going to give you some special instructions." The cue RJ given by Bill means "cut out the courtesies and give me a quick answer." For example, in line 8, on hearing its name, RJ omits the line "Got it. Now I'll file this routine:" and gets right down to business. Similarly, in line 11,

CIRCLE 178 ON READER CARD

Brilliance, Intelligence and Economy in One High Resolution Terminal.

# RAISE YOUR GRAPHICS STANDARD!

Price/performance you couldn't get before in a high resolution raster terminal no matter how far up you climbed—it's yours in the Genisco G-1000.

The G-1000 high resolution (1024 x 792) desk top terminal offers extraordinary brilliance and contrast with full raster erasability, *plus* the intelligence of a Z-8001 microprocessor and 16K each of RAM and PROM. The price is less than \$9,000 in OEM quantities.

What you get for your money is the industry's only true raster replacement for the Tektronix 4014-1 terminal (plug to plug and software compatible) and a

no-end-in-sight expandable, fully programmable tool for CAD/CAM, plot previewing, mapping and many other present and future applications.

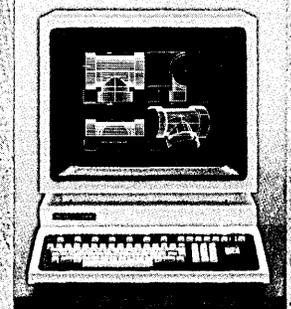
Expand your G-1000 capability with an optional alphanumeric overlay and memory to 512K bytes RAM and 32K PROM for distributed processing applications. Attach a graph tablet and/or one of several hard copy devices.

No matter how you look at it, it comes out on top. Raise your graphics standard. Call or write for a G-1000 brochure to Genisco Computers Corporation, 3545 Cadillac Avenue, Costa Mesa, CA 92626, (714) 556-4916.

**Genisco**

GENISCO COMPUTERS CORPORATION

CIRCLE 179 ON READER CARD



See us at NCGA  
Booth #604

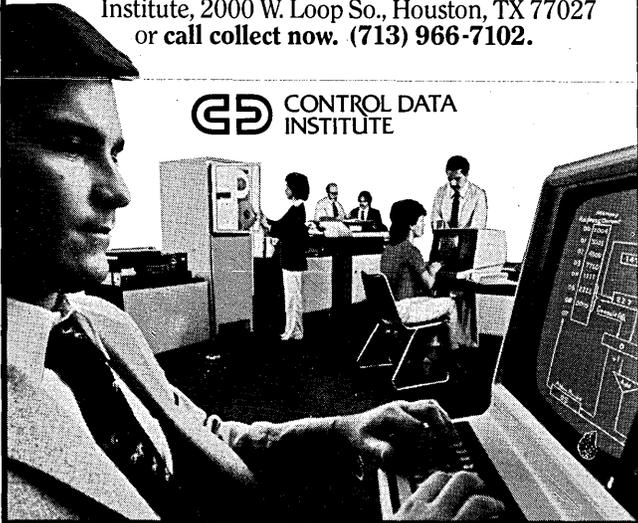


Ken Hodges

## Get the programmers you need from a leader in computer training.

Control Data Institute (CDI) is one of the world's leading EDP entry-level personnel training organizations, and an educational service of Control Data Corporation.

CDI graduates are trained in popular languages and qualified to work with virtually all modern hardware and systems. For information about nationwide, cost-free recruiting, write Al C. Swinney, Control Data Institute, 2000 W. Loop So., Houston, TX 77027 or call collect now. (713) 966-7102.



CIRCLE 180 ON READER CARD

### ATTRACTIVE OPPORTUNITIES SENIOR PROJECT MANAGERS AND CONSULTANTS FOR \$\$\$\$ MILLIONS PROJECT IN SAUDI ARABIA

It is truly an exciting experience!

The National Information Center has **IMMEDIATE OPENINGS** to review and control the development and implementation of the largest network software project in Saudi Arabia and one of the largest software projects ever contracted worldwide. The project has been granted to a major software firm. Your job is to work within a team to ensure the proper progress of work according to given specifications in one or more of the following areas.

**Project Management and Control:** Review project plan and activity network, review proposal standards and specification design, prepare test data for program and system testing, advise on System Modification, and ensure proper integration of the project tasks and elements.

**End User Support:** Assist users in defining requirements, analyze and re-define work flow procedures, plan user activities for conversion and data gathering, and assist in actual conversion, phased implementation and post implementation.

**Training:** Help in the area of basic DP training, supervise the contractor training obligation, participate in the establishment and teaching of the new Training Institute.

**Hardware/Telecommunication:** Review hardware and telecommunication requirements, review data communication requirements, and advise on axially devices such as micrographic hardware and testing equipment.

**Qualifications:** Ph.D., Master or B.S. degrees in Computer Science or Electronics Engineering or related disciplines or equivalent experience. The applicant is expected to have sufficient experience in project control and the management of software/hardware/communication projects.

**Environments:** On-line TP and ADP Systems using large scale UNIVAC Computers and CSTS Operating System with various communication devices and multilingual terminals Arabic and English.

**Salaries and Benefits:** Competitive salaries and allowances depending on the individual's qualifications.

**How to Apply:** Apply with complete resume on academic, professional and personal data. Three references and copies of degrees including home and office addresses and telephone numbers to:

University of Petroleum and Minerals  
Attention: Dr. Al-Sagr (NATIC)  
2223 West Loop South, Suite 410  
Houston, Texas 77027

or  
Dr. Abdulaziz N. Al-Sagr (Box 128)  
Dept of Systems Engg & Computer Science  
University of Petroleum & Minerals  
Dhahran, Saudi Arabia

CIRCLE 181 ON READER CARD

## READERS' FORUM

RJ does not start by saying, "Sure, \*[Bill].\*" RJ knows when Bill's patience is beginning to wear thin.

In the sample dialog given above we see that the designer has done two things:

1. made the machine respond appropriately to the cues of polite conversation; and
2. endowed the machine with the ability to file special routines for particular users and retrieve them upon receiving the appropriate requests.

This amounts to making the machine friendly to, and to some extent teachable by, the users. This kind of system will require more design and programming effort than most business systems. The main benefits are a user community that enjoys using the system, and learning that moves in both directions—the software teaches and is taught.

The designer of friendly, teachable systems needs to know something about the psychology of learning or have an intuitive feel for it. He should write software that will behave, to some extent, as if it were human. This is well within grasp, as demonstrated by the designers of the best games.

Readers will note that RJ, our hypothetical system, is sexless. This is because I do not wish to encourage designers to fall in love with their creations as Pygmalion fell in love with the statue he carved. What is more, she bore him a child. The implications of this for computer science are too profound to be dealt with in this article.

—Edward R. Lawrence  
Monterrey, Mexico

## THROUGH THE LOOKING GLASS

Are you an "Alice in Wonderland" planner when it comes to system design? Do the latest technical marvels blind you to reality? Are any of these tales all too familiar to you?

A, A public utility purchased a minicomputer system to automate utility billing and record keeping. The manager was pleased with his new system but began to get caught up in the euphoria. "Why not get one of those new handheld microprocessors I've been reading about so we can automatically dump the meter readings into the computer? It would save time and we'd have fewer entry errors."

Using this "planning" and some searching, a vendor was located. About \$40,000 worth of handheld recorders and interface equipment was purchased and turned over to the chief engineer (who also handled all the dp) for incorporation into the system.

First off, the automated meter reading system had never been interfaced with the organization's brand of minicomputer, so the software vendor was given the task. After great delay and added expense, the system was ready for demonstration. It all worked as designed, but there was one catch: the handheld recorders would only accept a four-digit input, whereas the majority of the meters used required five-digit entries. After much soul-searching, everyone involved concluded you couldn't cram a gallon into a quart container, and the chief engineer had to scrap the system.

B. A city purchased a minicomputer system to handle utility and trash collection billing as well as city financial accounting. The installation was a success and chugged along merrily until year-end wrap-up.

When the auditor came in to wrap up the fiscal year, he found the system had not been programmed to collect the key information he needed to close out the books according to state regulations. He therefore had to hand-generate a year's worth of information and specify what had to be reprogrammed for future years. City officials still blush every time the price of this fiasco is mentioned.

# TSO ANSWERS

TSO is great,  
but like other versatile capabilities,  
you control it—easy and inexpensive;  
or it controls you—difficult and costly.

To gain control you need answers to the following  
critical questions about TSO service,  
performance, use and mis-use:

- *Which users are not adhering to standards and guidelines;  
or causing a security or destruct violation?*
- *What are the service and performance trends for applications  
that run under TSO (i.e., APL, SAS, etc.)?*
- *Is poor reponse time user-specific or installation wide?*
- *What is the volume and trend of the 17 major system malfunctions?*
- *How do you compare the service and performance of your  
TSO system relative to similar installations?*

If you want to control TSO, the TSO/MON program product, TSO Performance Statistics, and our TSO Management articles will assist you in finding the answers. They have for over 450 installations worldwide; write, or call for information.

**MORINO ASSOCIATES, INC.**  
8133 Leesburg Pike  
Suite 602  
Vienna, Virginia 22180  
U.S.A.  
(703) 734-9494



**MORINO ASSOCIATES (UK) Ltd.**  
118 Victoria Street  
St. Albans  
Hertfordshire  
England AL1 3TG  
727-37464

CIRCLE 182 ON READER CARD

**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. 190
NEAT/3 to COBOL	Circle No. 191
DIBOL to COBOL	Circle No. 192
COBOL to COBOL	Circle No. 193
FORTTRAN to FORTRAN	Circle No. 194
DOS ALC to OS ALC	Circle No. 195
MAP to COBOL	Circle No. 196
COBOL ISAM to COBOL VSAM	Circle No. 197
CCP to CICS	Circle No. 198

Job control language translators also available.



**DASD™**

Member of the Cap Gemini Sogeti group

**PEOPLE/PRODUCTS/RESULTS**  
DASD Corporation • Corporate Services Center  
9045 North Deerwood Drive • Dept. 228  
Milwaukee, WI 53223 • 414-355-3405

## READERS' FORUM

C. A land development organization contracted with a service bureau for monthly statement processing. The service bureau used payments collected by the client's bank as data inputs for payments, credits, account aging, etc.

High employee turnover at the bank caused this interface task to be handed off quite often. During one quarterly period, all the collections "got lost" within the bank for three days. In a panic to get the data inputs to the service bureau, the bank used the services of a "helpful" outside person who was "going over to the service bureau." This person, not understanding the situation, got sidetracked, and failed to deliver. Only after the service bureau operator badgered the bank did the "helpful" person remember the promised inputs. Needless to say, the quarterly statements went out late.

D. A second land development organization contracted a service bureau to handle its volume of statements that had grown too large for manual processing. Unfortunately, the organization's local manager didn't know how to read the reports, so he referred all land customers' inquiries to the service bureau. The service bureau started charging the client for all these calls because the bureau operators were only supposed to process the client's data.

E. A large military test facility installed an automated financial accounting system to expedite financial status reports for management decision-making. A 48-hour turnaround time was expected. When it began running to five days or more, people started to investigate the delays. Did the delays stem from data collection, data entry, processing, output collating, report printing, report distribution, or what?

It turned out that the head accountant chose to cross-check each automated run against his manually generated results. He interpreted management's desire for accuracy to mean "replicate the figures manually," rather than "make sure the computer processing is correct."

F. Another military facility installed an expensive project management system on their third generation computer complex to cut down on budget and schedule overruns. Being on a somewhat autonomous matrix management system, the project managers didn't have enough "clout" to force the functional organizations to tighten up. This was bad enough, but top management took "current surplus" project funds that had been set aside for the future and transferred them to incept managers who were currently overrunning their budgets. Effective managers soon gave up trying to manage their costs, and the whole system fell into disuse.

G. A municipal government organization purchased a mini-computer system designed specifically for lay users (clerks, secretaries, etc.) to eliminate hiring dp specialists. The new computer terminals quickly became status symbols. Because the user groups couldn't or wouldn't form a steering group to schedule computer usage and basic system protocol, management had to hire a dp specialist to take charge.

Farfetched? Not really. Truth is usually stranger than fiction—only identities have been omitted to "protect the innocent." Although the above cases deal only with computer-oriented applications, things are not all that different in other specialty areas, be they engineering, medicine, urban planning, school systems, or whatever. These cases exemplify the current state of system awareness and understanding.

When you study situations like these from a fundamental system standpoint, you realize that the technology involved has little to do with the underlying causes for system degradation or failure. The weak links may have shown up earlier, but almost always, it is the people process that fails.

Getting an understanding of a user's needs that's adequate for system design is a long-standing, industry-wide problem. There are several reasons (singularly and in combination) for this:

1. A computer is usually desired for something other than a bona fide need. "Being progressive" or "staying competitive" are two of the most popular "needs" today. What it boils down to is a form of "keeping up with the Joneses." As a result, the so-called

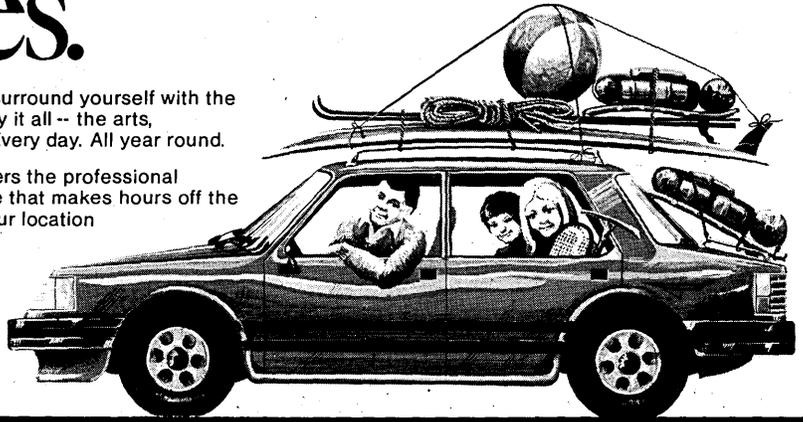
# In Los Angeles, your great escape could take place in minutes.

As a Data Processing specialist at Northrop, you'll surround yourself with the benefits of a climate and location that lets you enjoy it all -- the arts, educational opportunities and the great outdoors. Every day. All year round.

Located in Southern California, Northrop offers the professional opportunities you seek plus the flexibility of lifestyle that makes hours off the job exceptionally pleasurable. And, you'll appreciate our location with easy access to beach, desert, and mountains.

If you're up for the challenge of membership in a department that supports corporate information systems activities at every level, look into career opportunities at Northrop.

Make the Great Escape that could last a life time.



Low Desert - 45 min.

High desert - 98 min.

Beaches - 10 min.

Forest - 25 min.

Mountains - 30 min.

Big mountains - 40 min.

Very big mountains - 240 min.

Skiing - 70 min.

Better skiing - 180 min.

Sailing - 15 min.

Golf - 17 min.

Running - change your shoes

Cricket - 23 min.

Disneyland - 45 min.

Hollywood Bowl - 45 min.

Universities - 30 min.

Surfing - 10 min.

Knott's Berry Farm - 45 min.

Rollerskating -

change your shoes again

Universal Studios - 50 min.

## Scientific Applications Programmer Analysts

Experience with IBM 3033, Engineering and Graphics Applications, FORTRAN.

## MVS Systems Programmers

Using SMP4, TSO and SPF maintenance tools.

## Computer Operations Personnel

Console Operators, Control Clerks, Tape Librarians.

## Numerical Control Systems Support

Knowledge of IBM, APT-AC systems, FORTRAN, ASSEMBLY and familiarity with numerical control environment.

## Data Base Analysts

Experience in IMS Data Base and Data Communications.

## Business Applications Programmers

To design and maintain business, finance, and manufacturing applications on large scale IBM computers.

## Documentation Control Analysts

Analyze, coordinate and develop programmer and operations documentation for business applications.

We will arrange a personal interview for you. We will fly you to California, travel and accommodations paid, or we will send a representative to your location. Investigate the opportunities outlined above by sending your resume to:

Barbara Nettles, Dept. NDP-DM 4201  
P.O. Box 4625, Long Beach, CA 90804

# NORTHROP

## Making advanced technology work

Northrop Corporate Data Processing Center  
Equal Opportunity Employer M/F/H / Proof of U.S. Citizenship Required

CIRCLE 184 ON READER CARD

## NCR Scripps Ranch

# ONE GREAT ENVIRONMENT DESERVES ANOTHER

The design and development of interactive software systems thrives at NCR Scripps Ranch. Our modern, quiet, facility designed with a professional in mind

houses a newly developed technical library. We're the creators of some of the world's most innovative commercial software systems and taking on more challenges has created opportunities for the following:

- Software Tools Developers
- Operating Systems Analysts
- Systems Program Analysts
- Firmware Systems Developers
- Quality Assurance Systems Analysts
- Performance Measurement Analysts

Add the stimulating professional environment of NCR Scripps Ranch to the relaxing, fulfilling environment of San Diego, and you have found the perfect lifestyle. You will be pleasantly surprised at the variety of affordable housing options available.

Our competitive salaries, our ideal working conditions, our atmosphere of growth through challenge, and our San Diego location combine to make an NCR Scripps Ranch opportunity deserving of your most careful consideration. Send us your resume today:

# NCR

Complete Computer Systems  
We're an Equal Opportunity Employer

Dept. X-68  
Sharon Jordan  
Personnel Resources  
Systems Engineering  
NCR Corporation  
9900 Old Grove Road  
San Diego, CA 92131



San  
Diego

## READERS' FORUM

need has never been seriously addressed.

2. The user does not thoroughly understand his current work process, let alone one he might need in the future. He's usually too busy for these details. Invariably, whatever is in operation is undocumented or out of date because most "managers" don't realize the actual work process seldom matches company policy. If it did, most organizations would grind to a halt. People at the working level are quite ingenious at finding ways to get the job done while making it appear that they're following "official" policy.

3. As with the work process, the actual decision and responsibility network seldom matches the "official" version. Also, too few people realize that "reviewing" or "passing on" things only serves to hold up action-taking decisions. It is an impediment or a block, rather than a help.

4. The user is so familiar with whatever he does that he takes for granted everyone else's knowledge of his duties—including computer system vendors. For him, it is a "given" and therefore goes unstated, undiscussed, or unexplained until too late.

5. Much of the work process has grown on precedent for so long that the basis for changes and "improvements" has ceased to be questioned. This is very closely allied to reason No. 4.

6. Those people unwilling to face or correct an outdated work process have brought operations to the point of saturation, desperation, and even panic. Based on partially understood capabilities and the "mystique" that surrounds computers, users believe that a computer will somehow resolve any problem "if you just program it right." Users generally believe they don't have the time or money to closely examine their work process for flaws. In such a situation the user will be content, and even anxious, to grab at superficialities as a basis for automation, thereby virtually guaranteeing an extensive series of changes at best, or system failure at worst.

7. Those who have hands-on experience during the actual process are not brought into the need assessment and definition process. Someone one or two levels removed speaks for all the rest (above, below, and to all sides) on what is needed by the working levels. These knowledgeable people may be excluded intentionally or unintentionally.

8. Often the user jumps to the conclusion that "what worked for Sam will also work for me." This is where the touted case study approach falls to pieces. No two situations are ever identical; Sam isn't telling everything, and Sam's goals and planning are usually entirely different. Unfortunately, Sam's apparent success usually causes self-induced pressure to do likewise to "remain competitive" (and so back to No. 1).

This collection of reasons can be called "bottoms up" system design. It results from what is known as "Alice in Wonderland" planning, taken from an exchange between Alice and the Cheshire Cat. As the story goes, Alice arrives at the intersection of several roads. She's lost and sees the Cat sitting there:

*Alice:* Would you tell me, please, which way I might go from here?

*Cat:* That depends a good deal on where you want to go to.

*Alice:* I don't much care where . . .

*Cat:* Then it doesn't much matter which way you go.

*Alice:* . . . so long as I get somewhere.

*Cat:* Oh, you're sure to do that, if you only walk long enough.

No matter how technically sophisticated, progressive, or competitive it is, taking any old path does not constitute a true system. It may look like a system and cost like blazes, but that's where the similarity ends.

—Warren Eberspacher  
Durango, Colorado

If you'd like to share your opinions, gripes, or experiences with other readers, send them to the Forum Editor, DATAMATION, 666 Fifth Ave., New York, NY 10103. We welcome essays, poems, humorous pieces, or short stories.

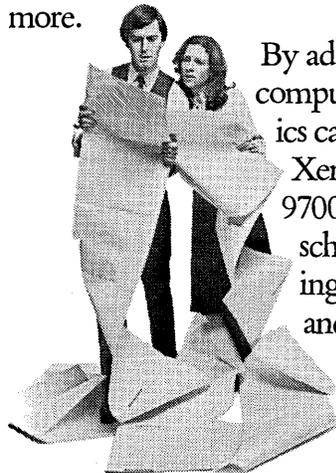
# Xerox Frees Information.

Again.

We first freed information when we invented electronic printing. It let you put digital information into a form people could use.

Our Xerox 9700 Electronic Printing System took computer information and, instead of giving you unwieldy computer printouts, printed up perfect documents in an easy-to-handle 8½" x 11" size. At 120 pages per minute.

But now, still using laser technology, we've freed information even more.



NOBODY'S A FAN OF FANFOLDS.

By adding a computer with graphics capability, or the Xerox 1050 scanner, our 9700 can even print schematics and line drawings and let you enter in and capture graphics so you can merge them with your text.

Which means you won't have to keep going back to the layout department or outside printing sources to turn out great looking price lists, manuals or even catalogs.

If your output needs aren't as fast as 120 pages per minute, you can save yourself some money with the new 8700 Electronic Printing System. Among its other features, it allows you to create forms, store them electronically, and then print out the form and the information that goes on it all at the same time.

All in all, Xerox Electronic Printing Systems can free information better than ever before.



ELECTRONIC PRINTING. AT LAST OUTPUT CAN MATCH INPUT.

To find out how much better, write to:  
Keith Davidson, Xerox Printing Systems Division,  
880 Apollo St., P1-60, El Segundo, California 90245.



NO MORE BACK TO THE DRAWING BOARD.

He'll help you get your information where it belongs.

Into the hands of your people.

## XEROX

XEROX® the 9700, 8700 and 1050 are trademarks of XEROX CORPORATION.

CIRCLE 2 ON READER CARD

## THE TERMINAL THAT TELLS YOU WHERE IT HURTS.

Because the Teletype® 4540 terminal is so reliable, there's one feature people rarely see—its unique ability to diagnose its own problems.

Built into every component of the 4540 is a diagnostic system activated by a simple yet thorough test. In an instant, a visual display tells you where the problem lies. Whether it's in the communications facility or in the terminal itself.

If it's in the terminal, the 4540's compact modular design makes it easy to swap components and get back on line in a hurry.

The 4540 also offers a wide variety of applications-oriented printers. Plus a long list of standard features that let it adapt to human beings, instead of the other way around.

The full-featured, reliable Teletype 4540. You may never need its self-diagnostics, but it sure won't hurt to know they're there.

### THE TELETYPE 4540.

Not just another 3270-compatible tube.



Teletype Corporation, 5555 11th Street, San Diego, CA 92121  
Teletype is a registered trademark of Teletype Corporation.

(619) 932-2000

CIRCLE 3 ON READER CARD