

## Evaluating Software Packages



Software package ratings, page 138. Also: interactive graphics, data processing in Brazil, and software reliability...

# Series 9000 Hotter than ever for '75.

Sometimes when you're way ahead, there's a tendency to relax. The Kennedy OEM Series 9000 is the ultimate in tape transports, but we're not about to relax. So for '75, we've made Series 9000 an even better buy. For instance:

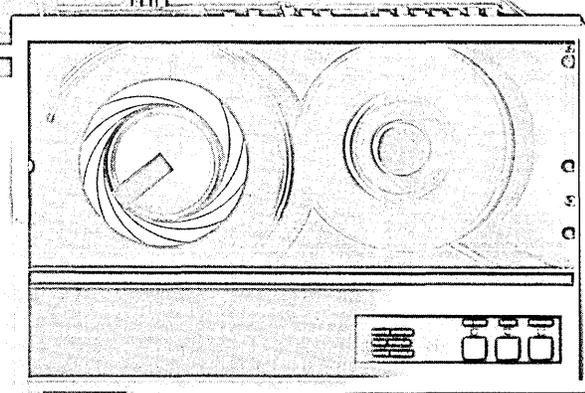
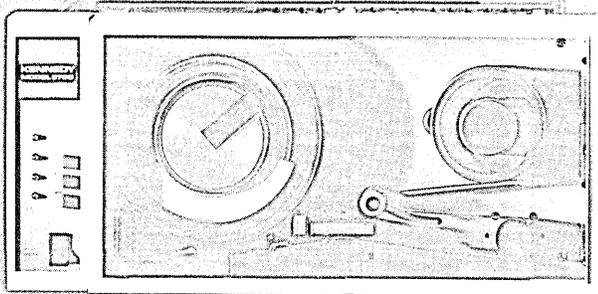
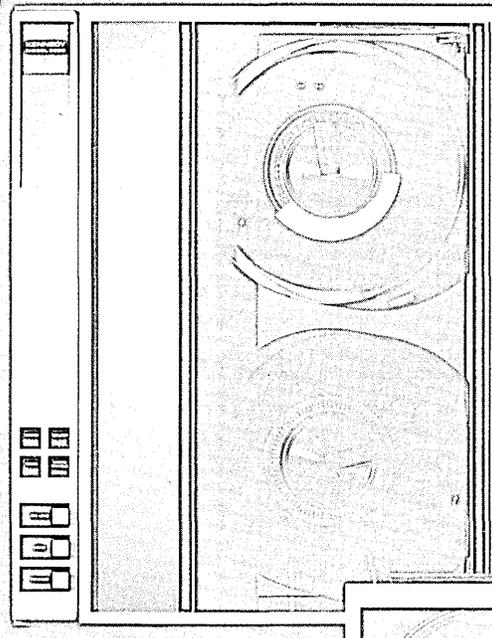
1. We've added a position arm anticipatory sensing system. It's a linear, non-contact position sensor, requiring no lamp source and assuring performance for the life of the machine.
2. All Series 9000 transports (including our new 75 iPPER) have interchangeable electronics, reducing stocking costs and down time.
3. For options, we offer our own ferrite heads which expands performance life by a factor of 5.
4. For simplicity of customer electronics, we offer 7 and 9 track NRZ1 and PE formatter and popular mini-computer controllers.

We've kept the features that makes Series 9000 the best. Features such as 7 and 9 track, 800 NRZ1, 1600 PE or 800/1600 NRZ1/PE. We still have our front-accessible off-line test panel; our marginal skew check; threshold scanning to automatically compensate for drop-outs or drop-ins; our Read-After-Write shortened skew gage; simplified tape path and quick-release hubs.

Naturally, the performance is improved, too. Data transfer rates of 72 KHz, tape speeds from 10 to 75 ips, and much more.

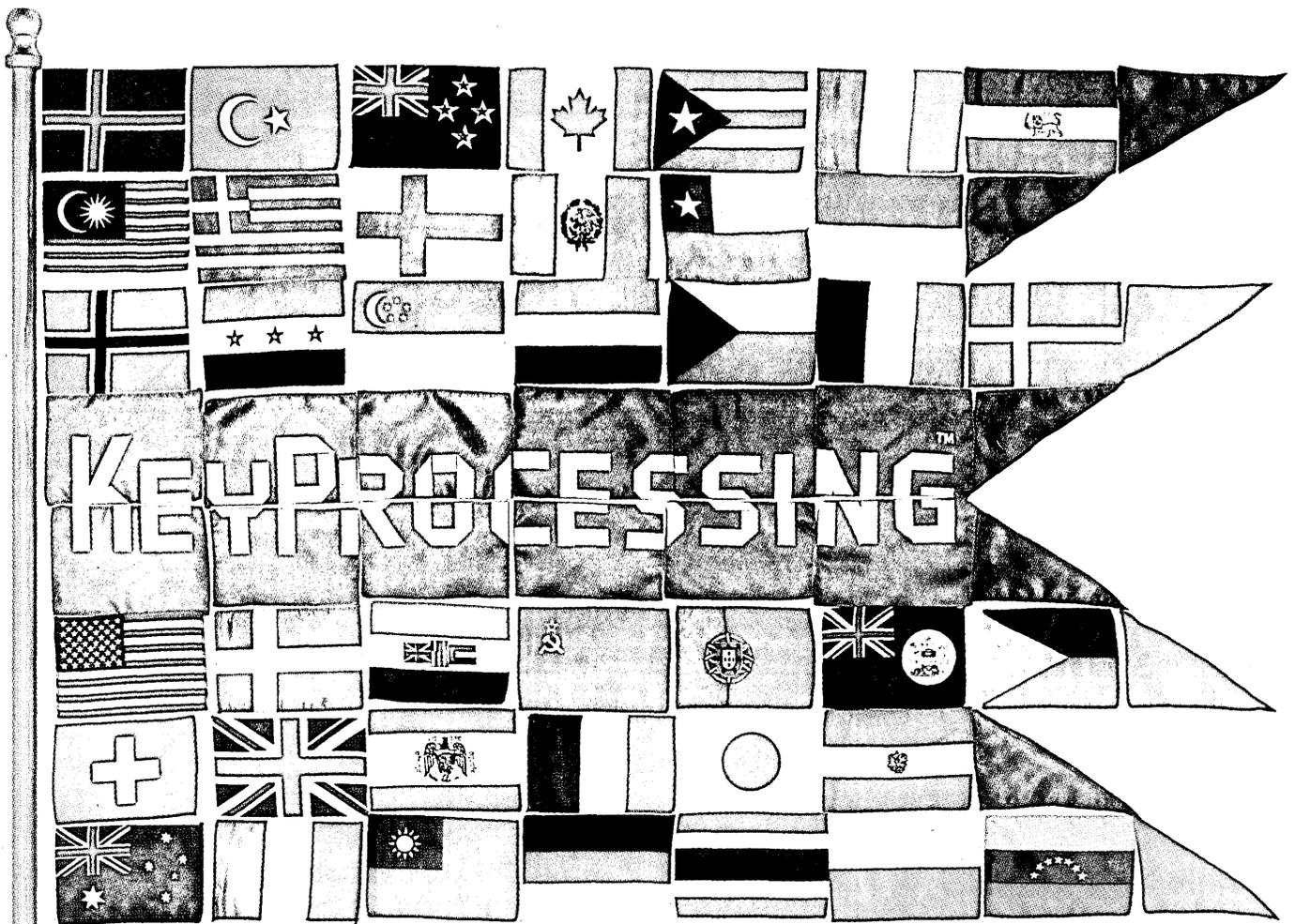
Being first is a responsibility we don't take lightly. Series 9000 for '75 is still the finest O.E.M. digital tape systems you can buy, as shown by the decisions of major mini and large scale computer manufacturers.

With system 9000, you can relax—because we don't.



**KENNEDY CO.**

50 W. WOODBURY RD., ASTAGENA, CALIF. 91001  
(213) 788-0853



**Our name  
will get to you**

**So will  
our newest  
KeyProcessing™  
System**

**The CMC 1800**

**Heralding the next generation**

of data entry, the CMC 1800 does it all — foreground editing, background editing, remote job entry, and provides modularity for future growth — all at a price that's hard to beat.

**The CMC 1800 starts small**

with just a few keystations, storage for 25,000 80-character data records, and a processor with 64K bytes of core memory. But it grows big with storage for over 300,000 records, 160K bytes of memory, KOBOL™ (Keystation On-Line Business Oriented Language), RPG II, and up to 64 keystations.

**The CMC 1800,**

while the newest member of the KeyProcessing Family, is a family all by itself. It's cost effective for keypunch replacement applications, throughput oriented for high volume requirements, and sophisticated enough to handle today's jobs and tomorrow's challenges.

CIRCLE 4 ON READER CARD

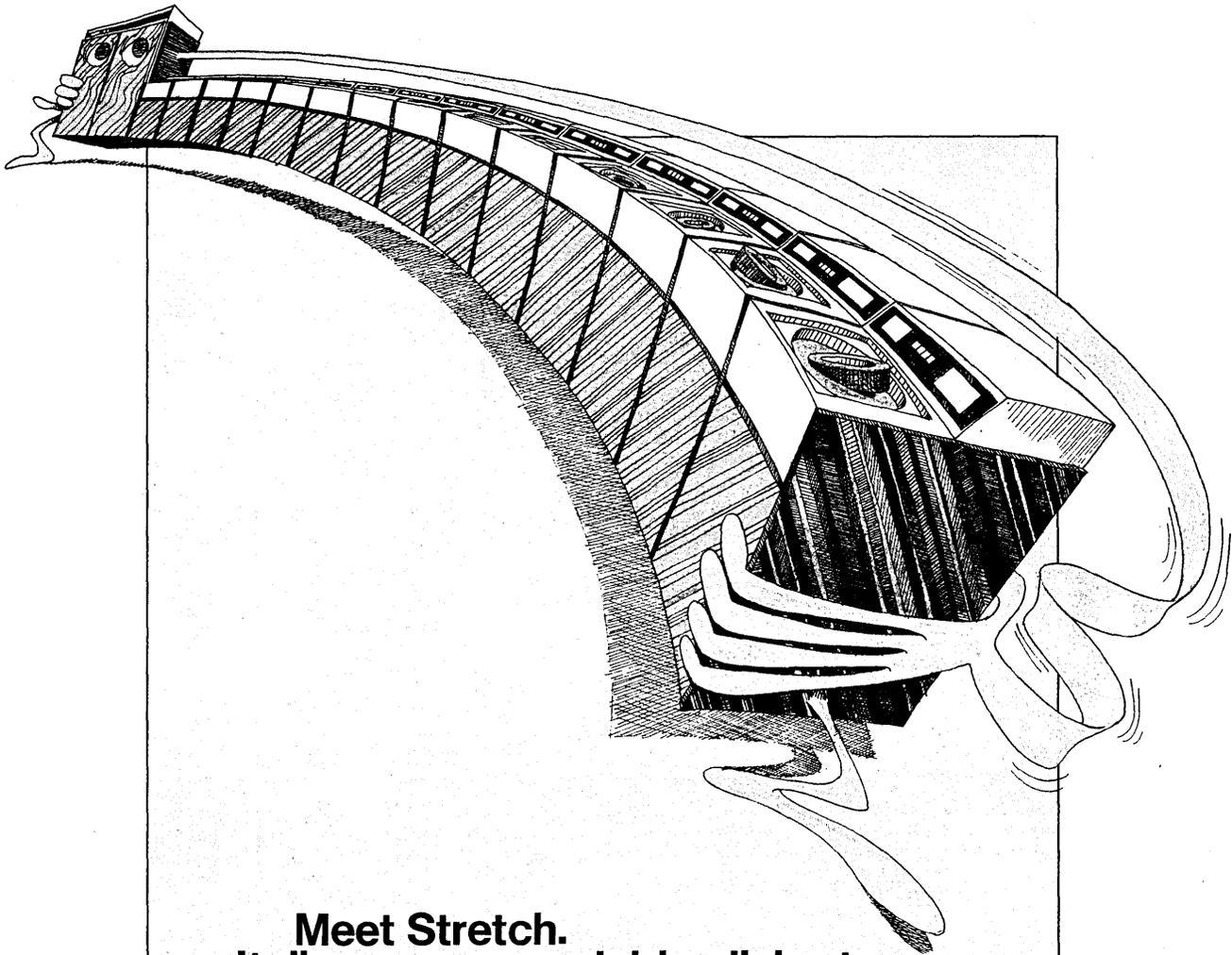
**CMC KeyProcessing Systems** are installed throughout the world.

**Get to us,** you'll be pleasantly surprised. Call or write today for more information.

**CMC**

KeyProcessing is a trademark of **Computer Machinery Corporation**

2500 Walnut Avenue, Marina Del Rey  
P.O. Box 92300  
Los Angeles, California 90009  
Telephone: (213) 390-8411



**Meet Stretch.**  
**Itel's new expandable disk storage subsystem.** These days, nobody wants their capital tied up in storage capacity that's not used. But how do you pay for just the capacity you need?

With Itel's Stretch, Model 7833/7330, the new modular-design disk storage subsystem that grows with you.

Highly flexible in its configurations, Stretch consists of one or two storage control units with up to sixteen 100 or 200 megabyte disk drive units in any combination.

Start out with a subsystem of just the right size for your present requirements. Then, when you want more capacity, you simply add units. As often as necessary.

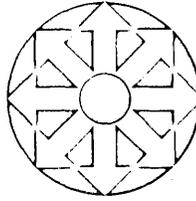
Fully plug-compatible with the IBM 3330, Itel's Stretch satisfies both today's direct access storage requirements and tomorrow's common data base needs in a multiple systems environment. At less cost.

At Itel, we couldn't have acquired over half a billion dollars in IBM computer leasing experience without making you a better deal.

**Your financial alternative.**

**ITEL**  
CORPORATION  
DATA PRODUCTS GROUP

One Embarcadero Center, San Francisco, California 94111. Phone (415) 983-0000



# DATA<sup>75</sup>MATION<sup>®</sup>

VOLUME 21 NUMBER 12

This issue 133,000 copies

DECEMBER 1975

## FEATURES

### Interactive Graphics

Long considered expensive toys, interactive graphics systems may have just turned the corner toward becoming practical tools. Systems now in use justify themselves in saving time, eliminating redundancy, and reducing errors. Recently announced turnkey systems should prove to be cost savers as well.



### 50 INTERACTIVE GRAPHICS COMES OF AGE

**Eric Teicholz.** Minicomputer-based turnkey systems are the ones to watch; their market may triple in the next three years.

### 54 SHIP MODELING WITH INTERACTIVE GRAPHICS

**W. Barkley Fritz and Charles R. Lansberry.** The time required for generating and checking models has been cut in half.

### 63 BRAZIL 1976 — ANOTHER JAPAN?

**G. B. Levine.** In a country where agriculture and mining are still more prominent than industry, computers are coming on strong.

### 70 THE COMMUNICATIONS NETWORKS SNARL

**Louis Pouzin.** Will users be snarled in incompatible nets or "SNA"-red forever?

### 77 LANGUAGES FOR RELIABLE SOFTWARE

**Jacob Palme.** Common compilers do not lend themselves to producing reliable programs.

### 85 2ND U.S.A. — JAPAN COMPUTER CONFERENCE

**F. John Postas.** Everything from IBM's time-sharing services to how to find Koala bears in eucalyptus trees.

### 93 THE 1970s: A PERIOD OF PAUSE AND APPRAISAL

**Edward K. Yasaki.** Current technology may be taking us in directions we don't want to go.

### 138 USER RATINGS OF SOFTWARE PACKAGES

**Daniel J. Tanner.** It's not what the vendors say about software products that is important. Here are the users' views.

### 193 THE FORUM

**Robert L. Patrick.** It's time for women to get down to some serious competition with men.

## NEWS IN PERSPECTIVE

### 102 COMMUNICATIONS

The seven-year wait for the FCC to allow direct attachments to telephone company networks could be longer if AT&T goes to court. Everybody wants to communicate, especially at AT&T.

### 105 SECURITY

Computer criminals beware!

### 107 BANKING

Too many cooks, or maybe one.

### 109 STANDARDS

Voting begins on card standard.

### 111 TIME-SHARING

An industry in transition.

### 113 TRAINING

It's not your usual programming class.

### 120 INTERNATIONAL

Market in Mexico: El Dorado for some. Who will market Unidata's machines?

### 128 PRIVACY

Proposed law would cover "secondary" users.

### 130 BENCHMARKS

Room at the top; Call to the colors; Narrowing the lines; "A focus on future products;" Digital Computer Controls will appeal; Last to go; Second Cyber 170 down under; Wider career paths.

## DEPARTMENTS

### 7 LETTERS

Nurd theory validated, licensing programmers, degrees or not degrees, and others.

### 11 PEOPLE

John W. Fairclough: personalizing terminals; Sam Irwin: automotive techniques; Mary Ann Furniss: Southern hospitality.

### 17 LOOK AHEAD

### 22 CALENDAR

Early '76 conferences appeal to all dp interests.

### 27 SOURCE DATA

Dijkstra reviews the NSF report on the feasibility of software certification; plus reports, vendor literature.

### 49 EDITOR'S READOUT

The EFT Commission: Too little, too late.

### 158 HARDWARE

A radical design that uses arrays of microprocessors points the way toward future computer architectures.

### 174 SOFTWARE

"ECCSL" simplifies setting up hybrid computing runs; a relational data base time-sharing service debuts.

### 178 SOFTWARE MARKETPLACE ADVERTISERS' INDEX

### 187 ADVERTISERS' INDEX

ABOUT THE COVER. The survey in this issue is intended to take some of the guesswork out of software package selection by revealing what is under the package "wrappings." Cover by Barbara Benson.

# Data dynamite.



TDK's high-resolution, computer grade data cassettes marry flawless mechanical performance with 100% error free ANSI, ECMA and ISO certification.

Exclusive "SD" formulation eliminates drop-outs and drop-ins, offers a storage density of 800 BPI and 1600 FCI with outstanding physical tape tuffness.

Available in three models: the HR 850 series, white and black (100% ANSI, ECMA and ISO), and the HR 300 AW (100% error free but not ISO certified).

Contact us today for full specifications and an "immediate delivery" quotation on both TDK-branded and private-label data cassettes.



World's leader in tape technology.

TDK, 755 Eastgate Blvd., Garden City, N.Y. 11530 (516) 746-0880

CIRCLE 71 ON READER CARD

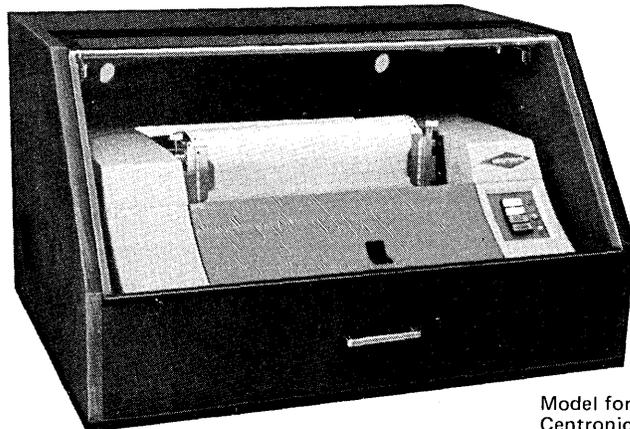
## new sound controller

(for Line Printers, Teletypewriters)

Gates introduces new walnut grain sound controllers for most noisy LINE PRINTERS and other noisy terminals. Acoustically effective, functional, and we have 250 models. For information write us or call toll free 1-800-358-8265, or call:

S.F.	391-6948	N.Y.C.	682-5844
L.A.	626-3320	Boston	426-7777
Wash., D.C.	527-1115	Detroit	885-1900
Chicago	498-1898	or call 1-800-358-8265	

**GATES**  P.O. Box 1406  
Santa Rosa  
California 95403



Model for Centronics shown

CIRCLE 116 ON READER CARD

## DATAMATION

### EDITORIAL STAFF

<b>Editor</b>	John L. Kirkley
<b>Articles Editor</b>	Richard A. McLaughlin
<b>International Editor</b>	Angeline Pantages
<b>European Editor</b>	Nancy Foy
<b>Communications Editor</b>	Phil Hirsch
<b>Industry Editor</b>	W. David Gardner
<b>Products Editor</b>	Michael Cashman
<b>Source Data Editor</b>	Daniel P. Schlosky
<b>Calendar Editor</b>	Gloria Tidstrand
<b>Reprints Editor</b>	Laura R. Ochinerio
<b>News Editor</b>	Tom McCusker

### Bureau Managers

<b>San Francisco</b>	Edward K. Yasaki
<b>Los Angeles</b>	Edith D. Myers
<b>Washington, D.C.</b>	Phil Hirsch

### New York

<b>New England</b>	Pamela Evans
<b>Correspondents</b>	Angeline Pantages
<b>Minneapolis</b>	W. David Gardner

### Southwest

<b>Australia</b>	James K. Johnson
<b>Editorial Advisor</b>	Robert F. Alexander
<b>Technical Advisor</b>	Frederick A. Bland
<b>Contributing Editors</b>	Robert L. Patrick

### Lowell Amdahl

<b>Paul Armer, Howard Bromberg, Philip H. Dorn, Louis B. Marienthal, Ray W. Sanders, Milton R. Wessel, F. G. Withington</b>
---

### EDITORIAL OFFICES

**Headquarters:** 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Phone (213) 559-5111. **Eastern:** 35 Mason St., Greenwich, CT 06830, (203) 661-5400. 134 Mt. Auburn St., Cambridge, Mass. 02138, (617) 354-2125; 9805 Singleton Dr., Bethesda, MD 20034, (301) 530-7271. **Southwestern:** 2711 Cedar Springs, Dallas, TX 75201. (214) 744-0161. **Western:** 2680 Bayshore Frontage Rd., Suite 401, Mountain View, CA 94043, (415) 965-8222. **Foreign:** 8 Pellerin Rd., London N. 16; (01) 249-1177; 64/90 Blues Point Rd., McMahons Point, NSW 2060, Australia.

### GRAPHIC DESIGN & PRODUCTION

<b>Art &amp; Production Director</b>	Cleve Marie Boutell
<b>Advertising Production Manager</b>	Marilee Pitman
<b>Production Assistant</b>	Alberta R. Martin

### CIRCULATION

35 Mason Street, Greenwich, CT 06830
<b>Circulation Manager</b> Suzanne A. Ryan
<b>Marketing Research Manager</b> Deborah Dwelley
<b>Publisher</b> James M. Morris
<b>Assistant Publisher</b> F. Douglas De Carlo

Circulation audited by Business Publications Audit

Member  American Business Press, Inc.



Circulation audited by Business Publications Audit

Member  American Business Press, Inc.



DATAMATION is published monthly on or about the first day of every month by Technical Publishing Company, 1301 South Grove Ave., Barrington, Illinois 60010; Arthur L. Rice, Jr., Chairman of the Board; James B. Tafel, President; Gardner F. Landon, Executive Vice President. Executive, Circulation and Advertising offices, 35 Mason Street, Greenwich, CT 06830, (203) 661-5400. Editorial offices, 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Published at Chicago, Ill.

DATAMATION is circulated without charge by name and title to certain qualified individuals who are employed by companies involved with automatic information handling equipment. Available to others by subscription at the rate of \$24; \$40 Air Mail annually in the U.S. and Canada. Reduced rate for qualified students, \$14. Foreign subscriptions are available for £16.80 or for the equivalent of \$40 U.S. in most West European currencies. 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. No subscription agency is authorized by us to solicit or take orders for subscriptions. Controlled circulations paid at Columbus, OH and Form 3579 to be sent to Technical Publishing Company, P.O. Box 2000, Greenwich, CT 06830. © Copyright 1975 Technical Publishing Company. © "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 Beslow Associates, Inc.

DATAMATION is circulated without charge by name and title to certain qualified individuals who are employed by companies involved with automatic information handling equipment. Available to others by subscription at the rate of \$24; \$40 Air Mail annually in the U.S. and Canada. Reduced rate for qualified students, \$14. Foreign subscriptions are available for £16.80 or for the equivalent of \$40 U.S. in most West European currencies. 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. No subscription agency is authorized by us to solicit or take orders for subscriptions. Controlled circulations paid at Columbus, OH and Form 3579 to be sent to Technical Publishing Company, P.O. Box 2000, Greenwich, CT 06830. © Copyright 1975 Technical Publishing Company. © "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 Beslow Associates, Inc.

# IBM

IS NO

# ADR

IBM is good. Making hardware. But software is what makes it go. And IBM doesn't have to live on its software. And has never had to compete for survival in the software products marketplace.

**ADR IS THE OLDEST.** Applied Data Research has competed successfully in the software market for 16 years, more than any other independent software products company.

**ADR IS THE BIGGEST.** ADR serves its client companies with over 4500 installed products. By far, more than any other software firm.

**ADR DELIVERS.** Every day ADR's products increase programmer productivity. Help manage computer applications. Bring discipline and security to data processing activities.

**ADR SUPPORTS WHAT IT SELLS.** When it comes to service, no one gives you more after the sale. As a result, more than one third of our clients have returned to purchase a second, third, or fourth ADR product.

**ADR IS WORLDWIDE.** ADR is international. Over 50 offices staffed by ADR-trained personnel throughout the world.

**ADR GETS IT TO THE BOTTOM LINE.** Where it counts. ADR software saves money.



## APPLIED DATA RESEARCH, INC.

Software Products Division  
Route 206 Center, Princeton, New Jersey 08540  
Telephone: (609) 924-9100

Please send information on:

- MULTI-PRODUCT CORPORATE PRESENTATION.**
- SAM™.** Provides information to analyze cost and performance of proposed hardware and software and to forecast future system requirements.
- ROSCOE™.** Permits your programmers to develop and execute programs in a conversational mode on-line to the computer.
- MetaCOBOL®.** A COBOL system to improve all aspects of COBOL programming, management and efficiency.
- AUTOFLOW® II.** As a management tool, AUTOFLOW II assists in creating and sustaining a controlled system development environment.
- The LIBRARIAN®.** Simplifies and safeguards the maintenance and retrieval of your IBM 360/370 applications programs.
- PI SORT™.** Frees your costly computer equipment by reducing sort times by as much as 50%.

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

Company \_\_\_\_\_

Address \_\_\_\_\_

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

Telephone \_\_\_\_\_

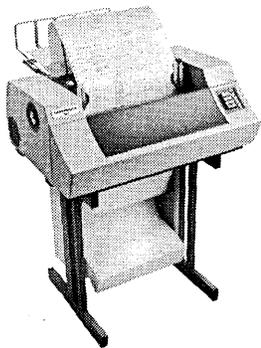
Computer Configuration \_\_\_\_\_

# Time was when high speed printing meant a high speed line printer.

## Times have changed.

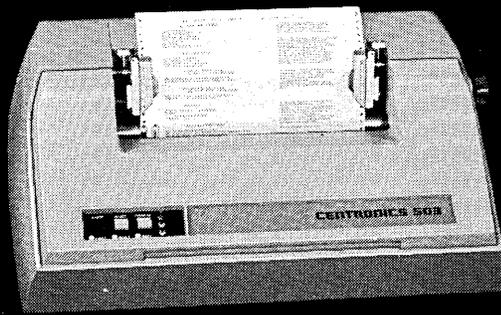
And so have printers. No longer is high speed line printing the sole realm of the expensive line printer.

Centronics has changed all that. Our new 103 and 503 serial impact printers can give you up to 340 lines per minute. Not only are they the fastest, most efficient serial impact printers you can buy, but, in some applications, they can keep pace with line printers costing twice as much.



How do they do it? By a unique combination of printing speed, slew rate and intelligence. Both the 103 and the 503 are 165-character-per-second, 132-column printers.

Both are bidirectional — which is the intelligence part. They print right-to-left, left-to-right at 70 to 340 lines per minute. Moving to the nearest character on the next line to be printed — wherever it may be. There is no carriage return and no carriage return deadtime (in the 400 milliseconds it takes to effect a carriage return, these printers print 80



characters). A big boost for throughput.

If performance is why you buy a printer, you want to learn more about our model 103. If economy is your thing, the model 503 gives you the best

performance for the money anywhere. Our catalogs and spec sheets give you complete information. Send for your copies today.

We want to change your mind about printers. Centronics Data Computer Corp., Hudson, New Hampshire 03051.

## CENTRONICS<sup>®</sup> PRINTERS

ATTN: Marketing Services  
Gentlemen,  
Tell me more about your high speed printers.  
The 103 and the 503.

- Send catalogs and spec sheets.  
 Have a salesman call.

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

# letters

## Communicating by degrees?

I have some comments to share with respect to Mark Wallis' letter ("Don't burn that sheepskin yet," Oct., p. 7).

For the most part, I agree with Mr. Wallis. If I don't know the person applying for a job, I place a great deal of importance on whether or not he has a degree, and for the very reasons Wallis listed: it shows the ability (1) to set one's sights on a long range goal and attain it, and (2) to put up with a lot of "manure" on the way and succeed in spite of it.

However, I disagree that "it is difficult for a person to attain a degree without being able to communicate his thoughts satisfactorily, both in writing and orally." Most of our educational institutions have not stressed the importance of communication skills. I draw this conclusion from the several years of having the sad experiences of seeing potentially talented people (degree or no) being pushed aside or passed over because they were not able to communicate well.

E. E. GRIFFITH  
Staff Consultant  
Compata, Inc.  
Woodland Hills, California

... As a non-degreed person and a technical writer, I have had to sift, sort, and merge through various scraps of technical information forwarded to me from *graduate* engineers. To make sense out of some gibberish, to edit verbose fog, to make clear and concise sentences from poorly organized facts is a daily challenge. This has happened in more than one company.

RONALD V. REGAN  
Computer Programmer/  
Technical Writer  
Whitesboro, New York

## Structuring in Cobol

In recent articles in *DATAMATION* and elsewhere a great deal has been said about the difficulty of writing "structured" code using COBOL or FORTRAN. In our company we have used COBOL for writing "structured" code for about two years. We find COBOL a workable language for "structured" coding, but only two deficiencies keep it from being completely satisfactory.

First I should explain that what we call "structured" code is not GOTOless code. We do restrict GOTO statements to branching downward and to not leaving a group of performed paragraphs. This is a satisfactory substitute

for formal structuring since this code can be converted to a formal structure by inspection.

COBOL is deficient in the area of an inline WHILE-DO construct. This could be easily remedied by permitting NEXT-SENTENCE to replace the first paragraph name of a PERFORM para-1 THRU para-2. . . . sentence, and permitting control after the perform to flow to the next paragraph following the THRU paragraph. We also would like to be warned about any GOTO which branches upward in a manner similar to the warnings produced by the IBM compiler for GOTO's out of the range of a PERFORM.

Clearing up these minor deficiencies appears to us all that needs to be done.

DONALD J. NEWMAN  
Advisory Systems Representative  
Software International  
Andover, Massachusetts

## Don't license programmers!

Re: Kraft and Weinberg's Forum, "The Professionalization of Programming," (Oct., p. 169).

The legal and medical professions' licensing shows the beneficiaries to be lawyers and doctors—not consumers. Licensing will only serve to close the programming field to newcomers, and at a time when it is finally becoming

more accessible to women and minorities. Let's open the field, not close it.

Furthermore, as a programmer for over 15 years, I strongly object to the authors' charges of incompetence. To my way of thinking, poor programming is caused by a combination of poor training and poor management. The programs I've written that I'm least proud of were done in haste for customers who, through poor planning, needed them "yesterday."

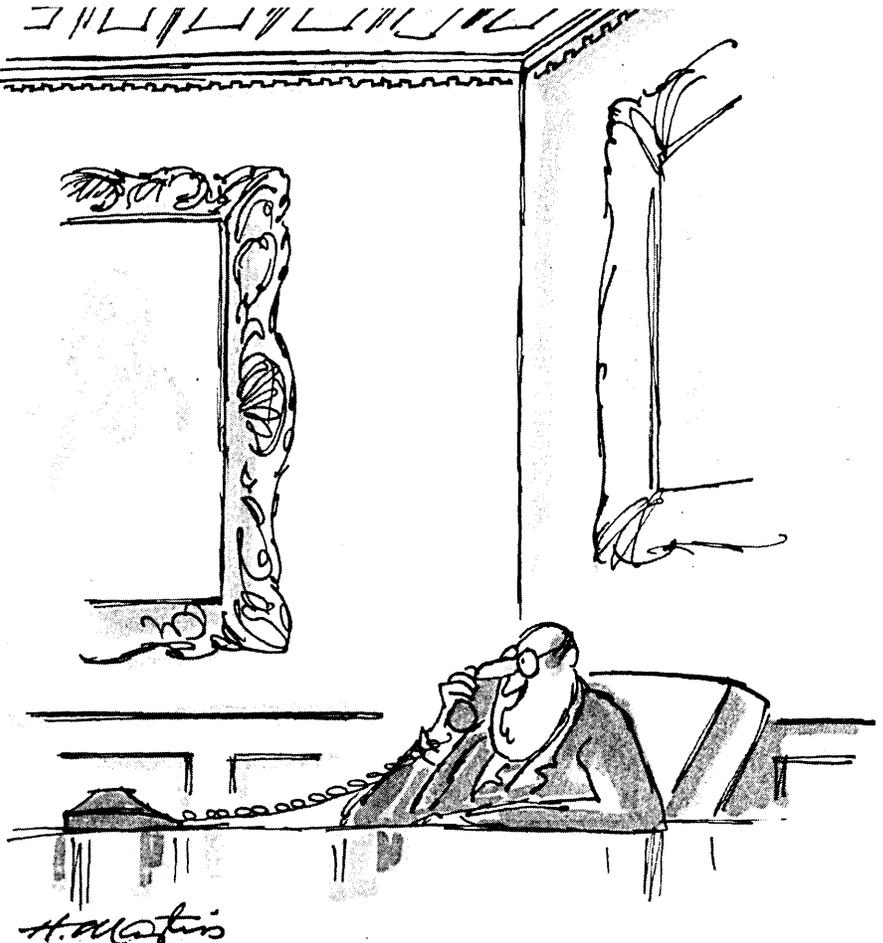
I put the blame squarely on teachers and managers for programming errors, not on working programmers who are trying their best in "speed up" environments.

HENRY NOBLE  
Seattle, Washington

## Real-time on his hands

In your October People section, there is a short article on Mr. John Cool (p. 11).

As an inmate of the Oregon State Penitentiary, I am highly indebted to Mr. Cool and his efforts on our behalf. I must point out an error in the article, however. The machine which Mr. Cool procured for us—we no longer have it, by the way—was an SDS model 910, not a Sigma 3. Although the 910 is now something of a vintage ma-



"Eddie, this is J.B. and I'm just calling up to wish you a very, merry bah humbug and all that!"

© DATAMATION ®

# letters

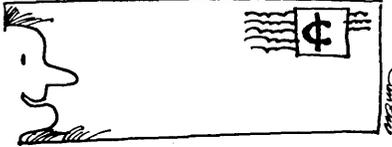
chine, I have learned much from it and have much to thank Mr. Cool for.

RAYMOND HADDON  
*Inmate Programming Student  
Oregon State Penitentiary  
Salem, Oregon*

## Nurdic activity spotted

Concerning S. A. White's "On Diginurds" (Oct., p. 72), some of the effects of these phenomena are reflected in a document given to me during my first week in data processing over 11 years ago, entitled "A Compendium of Certain Natural Laws Applicable to E.D.P." Here are the contents:

"1. If something can possibly go wrong, eventually it will. (This is Murphy's Law.)



2. When everything possible has gone wrong, things will probably get worse.

3. It is foolhardy to assume that jiggling X will not diddle Y, however unlikely.

4. All assumptions are false. This is especially true of obvious assumptions.

5. The question is always more important than the answer.

6. The necessity for providing an answer varies inversely with the amount of time the question can be evaded.

7. The minimum time needed to complete any project is exactly equal

## On First Looking Into White's Diginurd

Much have I travelled in the realms of Nurd,  
And many goodly Quirks and Murphys seen;  
Round many visiting vips have I been  
When Failure in fealty to Mammon purred.  
Of one wide expanse have oft I heard  
That clean-clipped Diginurd ruled as his demesne:  
Yet did I never breathe its pure serene  
Till I heard White speak out loud and absurd.

Then felt I like some watcher of the skies  
When a new planet swims into his ken;  
Or like lofty Von Neumann when with eagle eyes  
He stared at his automaton—and all his men  
Winked at each other with a wild surmise—  
"Zeitgeist," cognoscenti of Digi-Zen.

(Pardon the theft of Keats' demesne  
But mundane prose seemed too profane.)

J. P. RIGANATI  
*Yorba Linda, California*

to the maximum time available to work on it. (This is Parkinson's Law.)"

Of course, applications of these natural laws to other areas are common (e.g., the variant of Murphy's Law which states that in the production field, "A dropped tool will always land where it can do the most damage"—known as the Law of Selective Gravitation, and certainly a prime example of nurdic activity). I also recollect years ago reading an article dealing with "the perversity of inanimate objects," in which ordinary household appliances were discussed; this may now be seen more clearly as evidence of nurds at work.

In fact, I would bet that even a brief investigation into human history would reveal a great deal of interference by these unseen parasites; perhaps primeval nurds have evolved to match mankind's evolving technology. . . .

JOHN A. VELONIS  
*Delhi, New York*

. . . S. A. White's article caught my attention and so fascinated me that I wanted to learn more (or less) about the subject of nurds and related topics. However, I was unable to find any trace of the two references mentioned by Dr. White. . . . It occurred to me that perhaps these references are also governed by Nurd Theory; specifically, acting like the transmuted illogic function IF, these references exist only IF no one tries to find them.

I would appreciate your assistance in this matter, for IF you can locate the references, *MAYBE* I will be *ALWAYS/NEVER* in your debt for *WHAT* you have done.

TED C. BJORK  
*Dp Programming Officer  
Puget Sound National Bank  
Tacoma, Washington*

# NEW

## COMPUTER ARCHITECTURES AND NETWORKS:

Modelling and Evaluation

Proceedings of an international workshop organized by IRIA, Rocquencourt, August, 1974.

edited by E. GELENBE and R. MAHL.

1975 470 pages.  
US \$32.95 / Dfl. 85.00.

Papers presented at this workshop examine the main trends of research into, and applications of, the modelling and measurement of computer systems. They cover: modelling methodology, deterministic scheduling problems which arise in multiprocessing or real time systems, probabilistic models and performance measurements of novel or classical computer architectures, performance measurements and models of existing operating systems, computer network performance, and applications to system design.

## DATA BASE MANAGEMENT

Proceedings of the IFIP Working Conference on Data Base Management, Cargèse, Corsica, France, April 1974.

edited by J. W. KLIMBIE and K. L. KOFFEMAN.

1974 433 pages.  
US \$27.75 / Dfl. 72.00.

Papers presented at the meeting and summaries of the discussions are contained in this book. Particularly outstanding features are: a discussion on the equivalences of the DBTG and relational approach; several different views of the data modelling problem; several theoretical treatments of implementation problems (data equivalence, access path selection, data base editions, concurrency, integrity etc.); some articles on existing DBTG implementations.

## NORTH-HOLLAND PUBLISHING CO.

P.O. Box 211  
AMSTERDAM, The Netherlands

*Sole distributors for the U.S.A. and Canada*

American Elsevier Publ. Co.  
52 Vanderbilt Avenue  
NEW YORK, N.Y. 10017

CIRCLE 81 ON READER CARD

**DATAMATION**

# MOVE OVER 1403. THE 2550 IS HERE.

Make room for the Dataproducts 2550 horizontal-font printer.

Until recently, the IBM 1403 train printer has been the industry standard for quality printing at 1100 lines per minute (LPM).

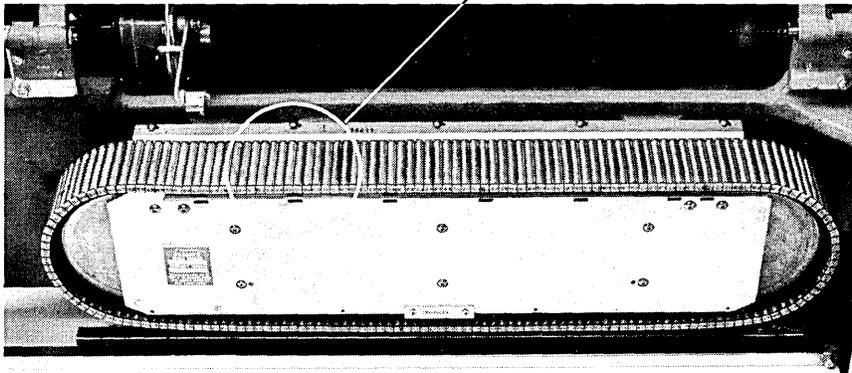
But now the 2550, with the Charaband® print drive, sets a new standard at 1500 LPM.

Or, 36% faster than the 1403.

## Horizontal Font Printing

The Charaband is a horizontal-font carrier that offers all the advantages of train printers, and eliminates the disadvantages of sliding friction.

The 2550, combining the Charaband with our patented Mark IV hammer, offers a highly reliable friction-free print mechanism.



In short, consistent, straight-line, high quality printing.

## Reliability Plus

The Charaband is driven on a roller bearing system to eliminate sliding friction and lubrication systems.

And, unlike train printers, very little wear occurs in the print mechanism.

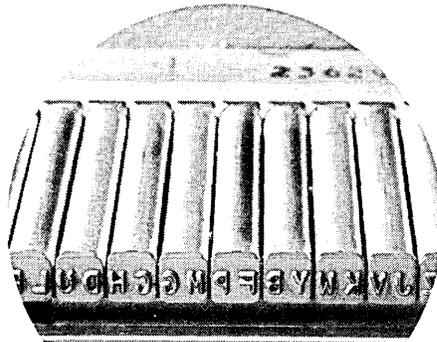
Reliable operation— equals much less down time.

## On-the-job Flexibility

The Charaband carries two complete fonts—one on each side.

The fonts are reversible.

The 2550 also offers replaceable character-type modules that don't require a cartridge readjustment.



A 90° swing-open gate for easy access to Charaband, ribbon and paper.

And simplified controls built into your own "quietized" cabinet.

## The 2550 Costs Less

It costs less than the 1403.

Yet, its exclusive Charaband design is a clear-cut improvement in line printer technology.

How do we do it?

Simply by specializing.

Dataproducts is the leading independent printer manufacturer in the world.

And by concentrating in one technology, we are able to make a better printer.

For less than the competition.

Our 2550 Charaband printer is 1500-LPM proof of that claim.

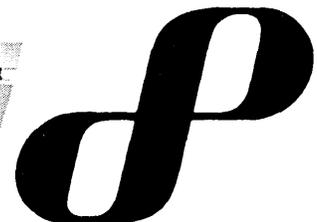
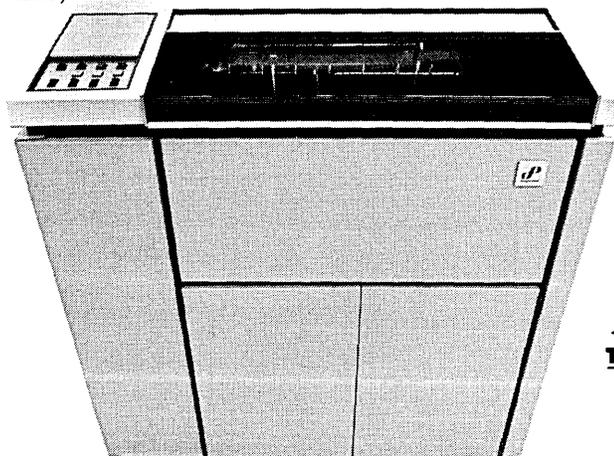
## Interface Compatible

The 2550 can be interfaced with almost every major computer system that requires high-speed performance.

So we invite you to call or write for full information and specs.

Remember, Charaband horizontal-font, 1500-LPM speed, less down time and less money.

Little wonder the former industry standard has to move over.

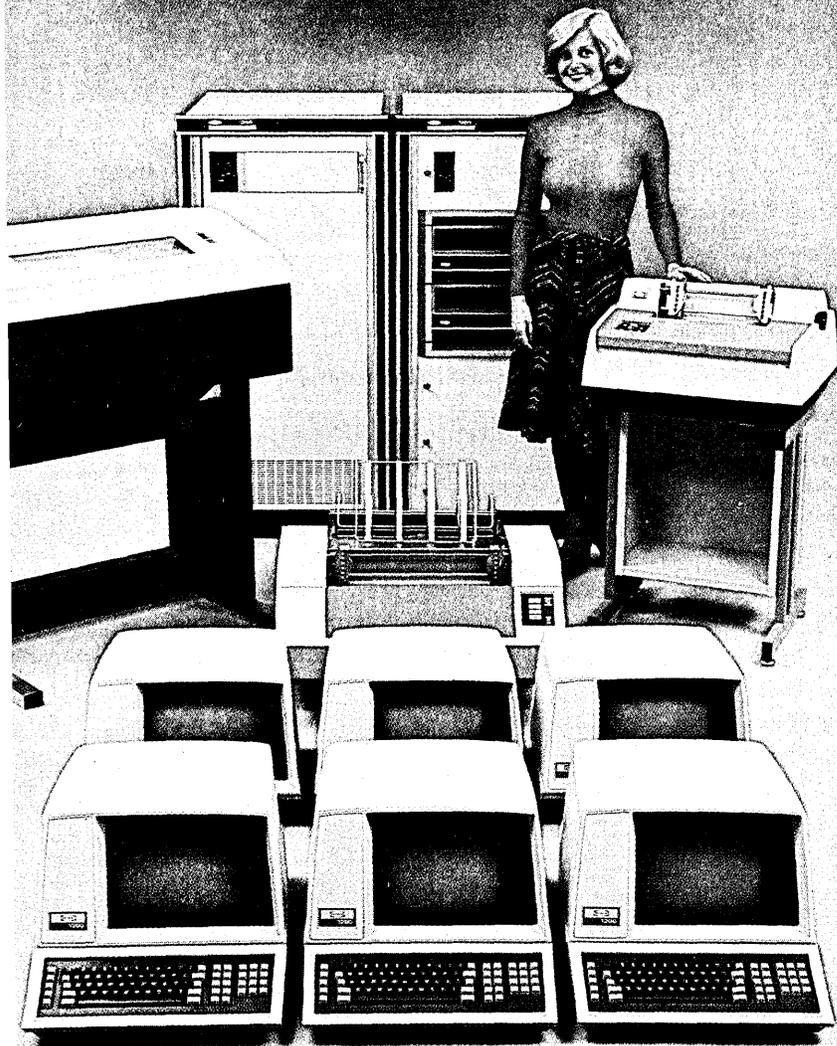


**Dataproducts**  
The Line Printer Company

6219 De Soto Avenue/Woodland Hills, Calif. 91364/Telephone (213) 887-8451/887-8147

# NEW PTS/1200 PROCESSING SYSTEM GRANTS "SIX FREEDOMS" TO REMOTE SITES. GET THE GOOD WORD.

## PTS/1200



Raytheon's new PTS/1200 distributed processing system gives companies with extensive branch operations new independence from centralized information handling.

The versatile, cost-effective PTS/1200 system allows remote sites to perform their own:

- source data entry and pre-processing, including editing and validating;
- file and record maintenance — creating, accessing and updating locally stored data;
- unattended two-way communications, either in point-to-point or multi-point networks;
- stand-alone batch processing — and disc storage up to 20 million bytes of capacity;
- fast, flexible report printing, in many formats;
- 3270 terminal emulation on-line with 360/370 computers.

Ready-to-use software gets your data up fast — and you can program your own applications easily. The system can utilize up to 24 terminals simultaneously. It reduces computer line costs and forms costs, expedites data retrieval and reports, improves productivity and requires minimal operator training.

A demonstration says it all.

To arrange that, write to Raytheon Data Systems, Marketing Department, 1415 Boston-Providence Turnpike, Norwood, MA 02062 — or telephone 800-225-9874 (toll-free). When you build better information processing systems... **the Word gets around.**

INTELLIGENT TERMINALS, MINICOMPUTERS AND TELECOMMUNICATIONS SYSTEMS

# RAYTHEON DATA SYSTEMS

RAYTHEON

CIRCLE 62 ON READER CARD

# people

## Personalizing Terminals



**JOHN W. FAIRCLOUGH**  
Lots of opportunity to influence new things.

Until 1972 IBM's terminal offerings were mostly general purpose. In recent years, though, the company has gone the other way. One of the men who influenced the change, John W. Fairclough, talked recently of the company's new directions shortly after he returned to England to head the company's U. K. Laboratories, Ltd. at Hursley after 11 years on assignment in the U.S.

Fairclough was a co-developer of what he calls the "industry systems" approach to terminal development while he headed IBM's research lab in Raleigh, N. C. The other developer was Earl Wheeler who was heading IBM's Kingston, N.Y., labs.

"Although there was a market (for general purpose terminals), Earl and I believed there was a growing market for the personalized, particularized terminal, for people with no knowledge of data processing. So eventually we were able to create an industry systems organization and a series of terminal-based industry systems."

"Missions" for specific industries grew up and began to be apportioned: Raleigh took primary responsibility for distribution applications. Kingston began working on

banking systems and the conversion of old equipment for health, printing/publishing and local government applications. Endicott studied manufacturing and process industries; Poughkeepsie, education and transportation; and Los Gatos, cash dispensers for banking systems. (That has now grown into a full scale mission for self-service devices across a broader range.)

Hursley, which had been working primarily on small to medium size mainframes, disc storage and PL/1, handed the mainframe mission on to IBM West Germany and PL/1 back to the U.S., and shifted its missions to industry systems for insurance and utilities, worldwide, with a desultory World Trade mission for local government.

Fairclough's concept involved pushing standardization down to a level of chips and components so that the company could have an assortment of "mix and match" elements with which to personalize terminals and at the same time presumably keeping the overall volume high enough to satisfy IBM's expectations for profit. Wheeler and Fairclough set the standards first by forming an industry-oriented organizational structure. Once it was started, the terminal development groups all over IBM fell into line, using the standard "little engines" or "building blocks" (Fairclough avoids using the term "microcomputer.") Thus all the industry systems so far announced, and those yet under wraps, are using the same basic elements.

Now back in England as managing director of the Hursley Labs, Fairclough resumes the same post he held there when projects such as

the SCAMP computer (once offered as an alternative to the 360 concept) were underway in the late '50s and early '60s. But he now has additional responsibilities as a senior member of the management team of IBM's new System Communications Div. headed by Bob O. Evans.

He works in what one IBMer calls "the nicest office in all of IBM," in a fine old Queen Anne building set in rustic countryside. The floor-to-ceiling windows in his large office frame the rolling hills of Hampshire. Winchester Cathedral is just out of sight over the hill.

In spite of the beauty of the surroundings and the convenience of a new home just across the road, it seemed too serenely remote for a man fresh from the excitement of IBM's upper regions. Why did he return to England? "I was an assignee in the U.S.," he answered. "I really had to decide where I lived." Though he enjoyed his work in the U.S., Fairclough notes that at Hursley, "there's lots of opportunity to influence new things." He's on a plane every six to eight weeks for the U.S. in his position with the System Communications Div. and SCD president Bob Evans comes to Hursley three or four times a year.

The wearing effect of travel is a challenge Fairclough says multinational organizations are going to have to face in the future: "How to use the brains and management skills they have effectively, where they are, without having to bring them together in one place." He sees satellite communications as one tool. "But it really comes back to human factors—getting people to work together." \*

## "Like The Picture of Dorian Gray"

Convinced during the mid 1960s that computer terminals could one day become almost as numerous as automobiles, Sam Irwin, president of Sycor Corp., began a search of industrial areas where such numbers of products could be inexpensively manufactured. Perhaps the choice of the Detroit area (specifically Ann Arbor) would surprise some people, but when Irwin explains it, it makes sense.

"There's very little difference between a brace in one of our terminals and a fender bracket, for example. Also, southeastern Michigan technology is second to none when it comes to practical problems such as matching the paint on plastic components with metal, or other

plastic parts. We use dies as large as a 4' x 4' cube—and you can't find those just anyplace. And our vendors are used to working with large orders and delivering on time. It takes a lot of load off the manufacturing operation to be able to count on this." Irwin claims the emphasis on manufacturing capability is responsible for the fact that less than 15% of Sycor's manufacturing cost is for labor. The company is currently building approximately 1,000 intelligent crt terminals a month.

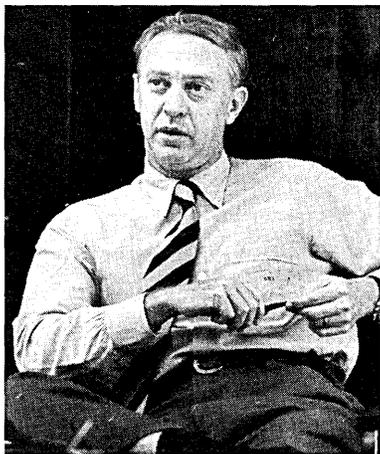
Irwin's application of automotive assembly line techniques in an electronics industry predates the 1967 formation of Sycor. In 1956 he joined the Holley Carburetor Co. in

(Continued on page 12)

# people

## DORIAN GRAY . . .

Detroit. Holley was interested in diversifying its business, and Irwin convinced them that building line printers was as close as anything to what Holley had been doing because of the high number of repeatable parts used. In 1960, he formed Inteledata Co. to concentrate on high-speed computer printing. The company became part of Telex Corp. in 1961. Much of it became Telex's Data Systems Div. in Minneapolis. Irwin worked with the division with a group in Detroit. This division was acquired in 1962 by Dataproducts Corp. (then Data Products). Irwin has an experimental version of the Dataproducts printer hammer in his office.



SAM IRWIN

Automotive techniques for computer terminals

Despite a schedule that includes getting up at three in the morning to head for Sycor's corporate offices, Irwin likes to claim he has nothing to do with anything that will affect the company for the next six months. "I like to think about what financial steps to take, what our plant layout should be, how the plant fits future products, and so on. I'm inverted, I guess. I'd rather know about what people are going to want next than what they want now. We have lots of capable people for handling now."

On the automated office concept, where terminals, filing systems, and communications are all integrated, Irwin says: "It's coming, certainly, but I expect it will be evolutionary, not revolutionary. IBM will undoubtedly have a very good system. We'll have another. They may have the optimum design for a 49 story Union Carbide building, and we may have the best set-up for a small battery distributor, for instance.

There will always be certain things we can do well—we'll make sure of it."

Asked if being the president of a \$40 million a year firm and seeing his product concepts proven, is *fun*, Irwin paused. "For me it's like a movie I once saw entitled "The Picture of Dorian Gray." The entire film was in black and white except for just a few color sequences. For me the color comes in accolades for

our products, or in situations such as getting off a plane in Europe and seeing our products coming off another plane.

For relaxation, Irwin engages in off-shore sailboat racing. "I've been charged by other board members that I sabotaged radio equipment aboard my yacht while on six day races on the Great Lakes. This is absolutely untrue and I will deny it," he said with a broad smile. \*

## Computers for Hospitality

Mary Ann Furniss is a Southerner who believes in the tradition of Southern hospitality.

She's also a mathematician and a computer scientist who has acquired in her working years an expertise in information storage and retrieval.

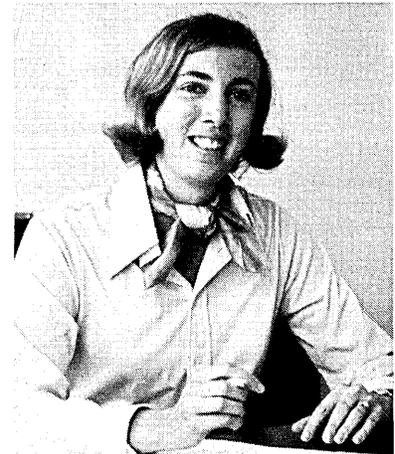
Now she's bringing the two together. She's the new director of the Center for Data Base Services for Holiday Inns, Inc. It's a new job with a new group and Furniss likes the challenge. "It's exciting and fun. I'm learning a lot about the food and lodging business."

In mid-October the group was still trying to establish its objectives but its major charter was in place: to provide a data base which would serve Holiday Inns' three major operating groups: Worldwide Systems, Food and Lodging, and Hospitality. The Center for Data Base Services is funded by all three groups but is under the direct supervision of Worldwide Systems.

Raymond Schultz, senior vice president for marketing of the Worldwide Systems Div., to whom Furniss reports, was, she says, one of the primary instigators of the new operation she heads. The center is the first group function to serve the three divisions. "It's a real experience trying to coordinate three divisions and get them working together. I think we're succeeding," she said.

Furniss' working background is a far cry from the hospitality industry but she says she's applying the same techniques with the same success. A native of Hamlet, N.C., she holds a B.S. degree in mathematics from Weshampton College of the Univ. of Richmond, Va., and has attended the Graduate School of Computer Science at the Univ. of North Carolina. Before joining Holiday Inns, she was supervisor of administrative computer systems at the Univ. of Tennessee Center for the Health Sciences in Memphis. She also is a

former director of data processing activities for the North Carolina Science and Technology Research Center—a regional information center for the National Aeronautics and Space Administration—and has served as aerospace technician with the Goddard Space Flight Center in Greenbelt, Md.

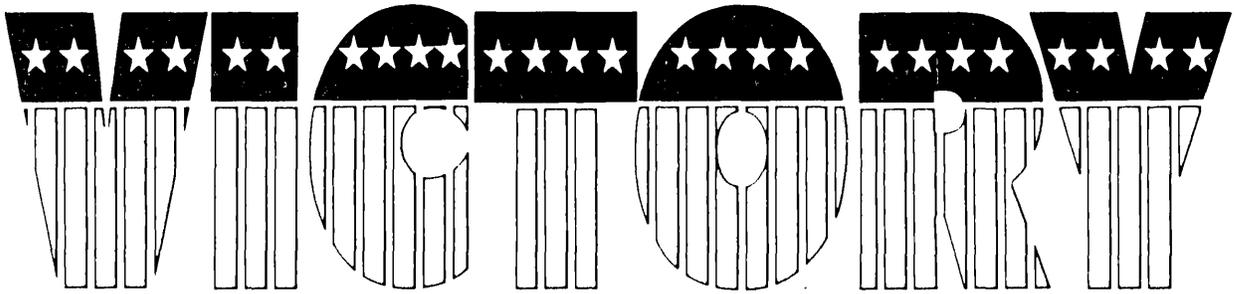


MARY ANN FURNISS

Learning food and lodging

Her first efforts in her new job have been aimed at the building up of a comprehensive data base. "We're gathering all the information we can on all the inns." Holiday has more than 1,700 inns internationally. Information being collected includes the physical characteristics of the inns, the structure of the buildings, who owns them if they are franchises, percent of ownership, whether they are roadside or downtown inns, and what kind of market each innkeeper thinks he serves. "Up till now," says Furniss, "we've had all those inns out there and not much information on them."

Currently Holiday Inns has three IBM 360/50s, one of which is dedicated to the Holidex reservation system. "Yes," says Furniss, "there are still a few 50s around." But they're looking at new equipment. . . . hopefully, hospitably. \*



# SyncSort wins all the gold medals in the "Great Sorting Olympics!"

(Better luck next Olympiad, IBM.)

## Call (201) 568-9700

Find out how to sort for less.

#### OVERSEAS REPRESENTATIVES —

London, Paris, Dusseldorf, Brussels — (Gemini Computer Systems), Rijswijk (ZH) — (PANDATA), Madrid — (Entel/Ibermatica), Vienna — (Ratio), Sao Paulo — (Deltacom Do Brasil), Melbourne — (The Shell Company of Australia, Limited),



**WHITLOW**  
**COMPUTER SYSTEMS Inc.** 560 Sylvan Avenue, Englewood Cliffs, New Jersey 07632

Which sort on the market today is really best? Which one uses the *least* amount of system resources to do a sorting job?

We found out by running a series of extensive—and expensive—tests we call the "Great Sorting Olympics."

In planning Sorting Olympiad I, we set two goals:

1. Unmask some of the misconceptions and myths that surround sorting.
2. Measure the exact amount of CPU Time, I/O Activity, and Elapsed Time that every sort on the market consumes.

First, we gathered the leading competitors from the Wide World of Sorts—our own SyncSort III-and-a-half, IBM's PEER/ICEMAN (SMI-5740), their older sort (SMI-5734), and a fourth contender from a minor sorting power.

Next, we asked three computer installations in the East, Midwest and West to provide the "tracks." They were to choose the files to be run and make the evaluation of the results. No hanky-panky. At one center, all four sorts were put through their paces under exactly the same conditions. At the other two places, SyncSort was matched against the IBM sorts.

Finally, we did something that's never been done before on the playing fields of sorting. We brought in a hardware monitor to judge the events.

SMF analysis wasn't good enough. It doesn't tell you what's really happening in a sort and it helps spawn those myths we referred to above.

By the time the dust settled, Whitlow's anthem had been played three times and SyncSort III-and-a-half had walked off with Gold Medals for:

- Least TRUE CPU TIME. SyncSort used 31.8% less than the average of the other three sorts.
- Least I/O Activity. SyncSort used 32.2% less than the average.
- Least Elapsed Time. SyncSort used 33% less than the average.

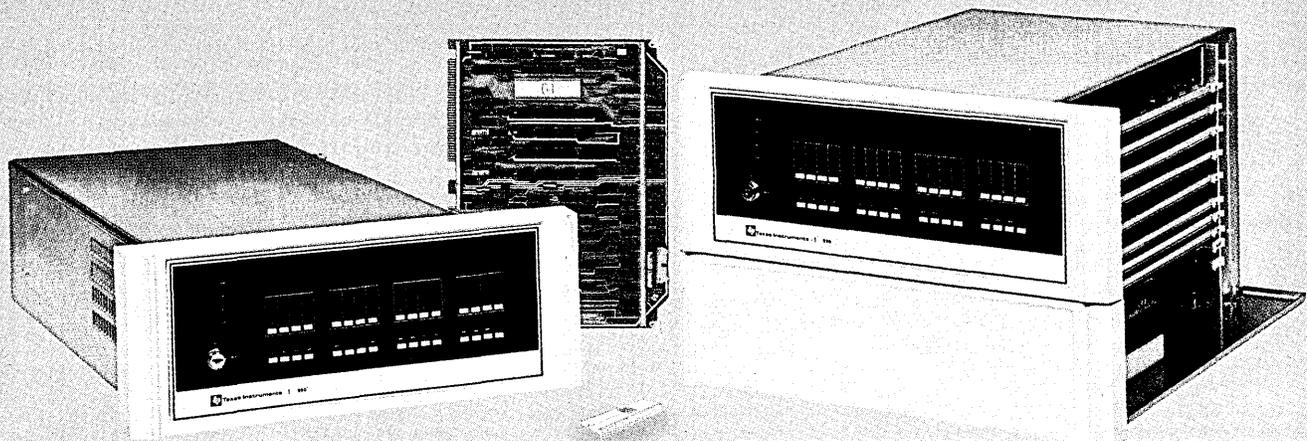
Proud? Sure. But not exactly surprised. We knew we had the best sort all along. But what did surprise us was how much new information we discovered about how other sorts really operate.

We discovered, for example, that other sorts use *twice* as much CPU time in the supervisor state as they do in the problem state. If one of our competitors tries to sell you a sort package, be sure to ask him if he's measured that aspect of his sort with a hardware monitor.

Or ask him if it's true that you can reduce channel time or device busy time by reducing EXCP's. He may not be aware that that's one of those sorting myths.

Why not call us today? We wouldn't want you to be misled because you didn't have the latest facts on sorting.

# Meet the new 990 Computer Family from Texas Instruments



**Introducing the 9900 Microprocessor  
and 990 Series Micro/Minicomputers**

# Upward Compatible Software and Downward Competitive Prices

At TI, we've started a new family tradition in micro/minicomputers with the 990 computer family . . . a new tradition based upon a heritage of semiconductor leadership.

The 990 computer family sets new price/performance standards because of an important milestone in MOS technology . . .

## *The TMS 9900 single-chip, 16-bit microprocessor.*

Powerful enough to be the heart of a full minicomputer, the TMS 9900 is also the best microprocessor going for terminals, machine monitoring and control, and a host of OEM applications.

## All in the Family

The same company . . . Texas Instruments . . . makes every member of the family, and makes every member software compatible, from the bottom up. The new Model 990/4 microcomputer and Model 990/10 minicomputer use the instruction set of the TMS 9900 microprocessor. This means that software developed for the low-end computers will be compatible with the higher performance models. And, users can expand their systems with a minimum of interface and software adaptation.

## The TMS 9900 Microprocessor

The TMS 9900 is a 16-bit, single-chip microprocessor using MOS N-channel silicon-gate technology. Its unique architecture permits data manipulation not easily achievable in earlier devices. With its repertoire of versatile instructions and high-speed interrupt capability, the TMS 9900 microprocessor provides computing power expected from a 16-bit TTL computer.

## The Model 990/4 Microcomputer

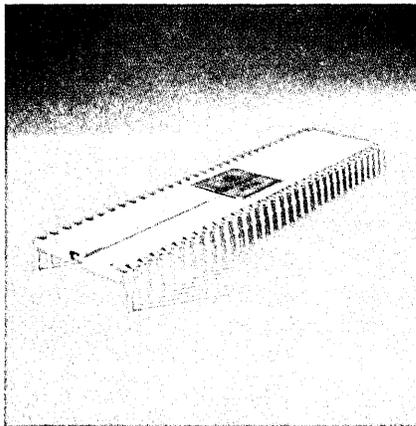
It's a complete computer on a single printed circuit board using the TMS 9900 as its central

processor. The 990/4 is ideally suited for terminal control, peripheral device interface control, and as a CPU for OEM customers.

In addition to the TMS 9900 microprocessor, the 990/4 microcomputer contains up to 8K bytes of dynamic RAM, up to 2K bytes of static RAM and/or PROM, eight vectored interrupts, front panel interface, real-time clock input, two I/O buses for low- and high-speed devices, and optional ROM utilities.

With the 990/4, you can select a low-cost OEM package, a 7-inch or 12¼-inch rack-mountable chassis, or a table-top enclosure . . . and memory expansion to 58K bytes.

*Price: The Model 990/4 microcomputer with 512 bytes of memory is only \$368\* without chassis and power supply. This same model with 8K bytes of memory is only \$512\*.*



State-of-the-art TMS 9900 microprocessor . . . 16-bit, single-chip CPU with minicomputer instruction power.

## The Model 990/10 Minicomputer

The most powerful member of the family is the Model 990/10 general-purpose minicomputer. The 990/10, a TTL implementation of the 990 architecture, provides the high-performance speeds demanded in many applications.

A memory mapping feature providing memory protection and privileged instructions supports memory expansion to two million bytes. And TILINE\*\*, an asynchronous high-speed I/O bus, supports both high-speed and low-speed devices. Chassis options are the same as those for the 990/4.

*Price: With 16K bytes of memory, chassis, power supply and programmer's panel, the Model 990/10 minicomputer is only \$1968\*.*

## Built Better Backed Better

In addition to the family of compatible hardware, Texas Instruments backs you with complete software and support. *Standard software packages include memory-resident and disc-based operating systems; FORTRAN, COBOL, and BASIC compilers; and program development packages with utilities.* And, for you to develop application programs for the 990/9900 family, we offer *cross support on timesharing networks* and standalone software development systems. One is a low-cost system using the 990/4 . . . the other is a disc-based system using the 990/10. And, a *prototyping system* is offered for TMS 9900 users to develop custom software and firmware modules.

TI supports you with training and applications assistance, plus an installed nationwide service network backed by TI-CARE†, our automated remote diagnostic, service dispatching, and real-time field service management information system.

Get to know our new family. Call your nearest TI office, or write Texas Instruments Incorporated, P. O. Box 1444, M/S 784, Houston, Texas 77001. Or, phone Computer Equipment Marketing at (512) 258-5121.



Arlington, Va. (703) 527-2800 • Atlanta, Ga. (404) 458-7791 • Boston, Ma. (617) 890-7400 • Chicago, Il. (312) 671-0300 • Clark, N.J. (201) 574-9800 • Cleveland, Oh. (216) 464-2990 • Costa Mesa, Ca. (714) 540-7311 • Dallas, Tx. (214) 238-5318 • Dayton, Oh. (513) 253-6128 • Denver, Co. (303) 751-1780 • Detroit, Mi. (313) 353-0830 • El Segundo, Ca. (213) 973-2571 • Hamden, Ct. (203) 281-0074 • Houston, Tx. (713) 494-5115 • Indianapolis, In. (317) 248-8555 • Milwaukee, Wi. (414) 475-1690 • Minneapolis, Mn. (612) 835-5711 • Philadelphia, Pa. (215) 643-6450 • Rochester, N.Y. (716) 461-1800 • San Francisco, Ca. (415) 392-0229 • Seattle, Wa. (206) 455-1711 • St. Louis, Mo. (314) 993-4546 • Sunnyvale, Ca. (408) 732-1840 • Winter Park, Fl. (305) 644-3535 • Amstelveen, Holland 020-456256 • Bedford, England 58701 • Beirut, Lebanon 452010 • Cheshire, England 061 442 8448 • Copenhagen, Denmark (01) 917400 • Croydon, England 01-686-0061 • Essen, Germany 01241/20916 • Frankfurt, Germany 0611/39 90 61 • Freising, Germany 08161/801 • Milan, Italy 02 688-8051 • Montreal, Canada (313) 353-0830 • Nice, France (93) 20-0101 • Paris, France (1) 630-2343 • Slough, England 33411 • Stockholm, Sweden 62 71 59/62 71 65 • Sydney, Australia 831-2555 • Tokyo, Japan (3) 402-6181 • Toronto, Canada (313) 353-0830

**TEXAS INSTRUMENTS**  
INCORPORATED

\*OEM quantity 50, U.S. domestic prices.

\*\* Trademark of Texas Instruments.  
† Service Mark of Texas Instruments.

# BASF has it. Why wait?



Now you can get the 3348, or "Winchester," Data Module, with all the quality and error-free performance that the name BASF implies . . . and at a competitive price.

The "Winchester" Data Module is a completely self-contained unit, incorporating heads, spindle, and recording surfaces in a protective factory-sealed pack. You've heard of the advantages of this new technology . . . complete security from environmental contamination, improved high-density storage, and incredibly fast access. Now you can enjoy this premium performance without paying a premium price.

Here are the facts, in brief:

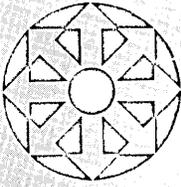
- Complete compatibility with 3340 drives
- BASF-guaranteed Zero-Error performance
- Now available in two configurations. . . . The 1335 Module, with 35 million-byte capacity, and the 1370 Module, with 70 million-byte capacity
- Our 1370F Module, with fixed head and quicker access, will be available later.

For complete details on the BASF "Winchester" Data Module, write: BASF Systems, Crosby Drive, Bedford, MA 01730, or call our nearest regional office . . . in **Los Angeles**, (213) 451-8781; in **Chicago**, (312) 343-6618; and **Clifton, NJ** (201) 473-8424.

**You're already paying for BASF quality..you might as well have it.**



CIRCLE 12 ON READER CARD



# LOOK AHEAD

## COMPETITION FOR THE IBM 5100

Digital Equipment Corp. is making great hay about opportunities in the education market for its new low-priced microprocessor-based time-sharing system, but privately the company is said to be counting on a huge end-user market to develop.

The DEC LSI/11-based system supports up to four terminals at a price of less than \$5K per terminal. DEC is hoping the equipment will serve as an alternative to IBM's 5100, which DEC thinks costs twice as much for half the performance. On the subject of the 5100, DEC got a chance to see the Big IBM Servicing Machine in action recently. The story is that DEC's 5100 went "down," its power supply failing. Not only did IBM servicemen respond quickly, but new parts were sent out from Wooster, Mass. by taxi on a half hour ride to the DEC plant. Presto: the 5100 was up and running again.

## SEL IS FARING WELL WITH 32 BIT MACHINE

The long hard struggle to turn Systems Engineering Laboratories of Ft. Lauderdale, Fla., around may be bearing some fruit. Not only has the company delivered some new systems, but we understand that there is an order backlog of more than \$5 million for the 32-bit SEL 32. Moreover, the machine is beginning to show up at sophisticated users' sites. Five machines for Mississippi Power and Light Co., for instance. Still, those lucrative big oem orders remain elusive, even though the firm's management believes the SEL 32 can compete in both price and performance with the popular 16-bit minis. Insiders say the SEL 32 is going out in larger average configurations than anticipated: \$100,000 rather than \$70,000.

## TRADE SECRETS JUDGMENT IMPACTS OTHERS

Customers using Digital Computer Control's D-116 minicomputer have been surprised that Data General hasn't been making much of a sales rush on them in the wake of DG's trade secrets victory over Digital Computer (p. 130). The best explanation is that Data General doesn't want to string out its delivery schedule.

Some users could be in a bind by the decision, which DCC says it will appeal. Entrex and Nixdorf Computer have been using the D-116 in their data entry systems and now not only is their source of supply for the machines in doubt, but the firms could be vulnerable because DCC licensed them to build equipment. A Delaware court ruled that DCC stole Data General plans and the court was preparing to issue an injunction halting DCC from making equipment designed from the Data General plans in question. Data General has also filed a patent violation case against DCC and, should Data General win that case also, then all users could be vulnerable. DCC has vigorously denied the Data General charges.

## GOVERNMENT LAWYER WAS AN IBM ENGINEER

One Justice Dept. attorney who doesn't have much trouble understanding all those IBM technical charts is Joseph H. Widmar, co-counsel for the government's antitrust case against IBM. Widmar worked for two years, from 1956 to 1958, as an engineer at IBM's Poughkeepsie, N.Y., plant. After resigning from IBM, Widmar went to law school and eventually ended up in the Justice Dept. Mention of Widmar's past employment with IBM was contained in transcripts of a session in the judge's chambers.

## AMDAHL A YEAR AWAY FROM BREAKING EVEN

At year-end a number of hardware vendors are bullish. A terminals company says business has been growing nicely since the National Computer Conference in May. Advanced computer designer Gene Amdahl, whose Amdahl Corp. will deliver six systems this year, now reveals plans for shipping an additional 25 to 30 of the powerful 470V/6 machines in calendar '76. Amdahl Corp., he adds, should reach the break-even point, in terms of total investment to date, early in 1977.

Helping the cause are lease financing arrangements the firm has with DPF,

# LOOK AHEAD

Inc. for commercial customers during '76, amounting to \$160 million, and a \$20 million commitment from First Municipal Leasing Corp., Denver, for state and local government and state university contracts. These lease contracts, says Dr. Amdahl, can be recorded by the firm as cash sales for virtually the full sales price.

## IT'S ALL IN HOW YOU TIME IT

"If we had started at any other time, we wouldn't have made it," Data 100 president Ed Orenstein frequently tells reporters of his company's remarkable success in the remote batch terminal field. The Minneapolis company was formed two years before the 1970 recession knocked the feet from under many firms that had started up as IBM competitors. And it was also at a time when the concept of communications-based data processing was catching on.

The company now may be timing perfectly the introduction of its newest product--the model 77 dual station key-to-diskette data preparation system that competes head-on with a communications-based model of the IBM 3741 floppy disc line--the 3741, mod 4. Data 100 claims an edge over IBM in its model 77's software, its 3780-like communications discipline and the fact that it comes with an impact printer. Added to that is IBM's current push to promote the concept of floppy disc-based data preparation. IBM has started to install diskette readers with the 3776 models of its batch terminals and also is selling 3540 diskette readers with large IBM systems. Although card readers come with all such equipment, the company obviously is pushing the floppy disc concept.

Data 100, which will begin shipping the equipment in the spring, already has some orders from among the 1,200 companies where its remote batch terminals are installed.

## HANGING IN THERE

Ripples in the magnetic tape storage market haven't rocked the boat of tiny Gulliver Technology Corp., Los Angeles, which last summer introduced a 6250 bpi tape drive (August, page 72). Dan O'Neill, president, said Gulliver is growing (up to 12 people) and is on target. They're testing the first unit and acquiring parts for the next four. Production will begin in April. And O'Neill isn't bothered by the fact that larger California Computer Products scrapped its development of a 6250 bpi drive last month or by hints that Storage Technology Corp., the only other independent offering 6250 bpi drives, is having troubles (p. 130). "Response to our product has been fantastic," said O'Neill. "The only frustrating thing is we have to move slowly and can't offer earlier delivery.

A spokesman for O'Neill's former employer, Ampex Corp. says his company decided two years ago to stay out of the IBM compatible market-place for tape drives and instead to concentrate on "high technology tape engineering," particularly in the instrumentation market for military, geophysical and telephone switching applications. It recently merged its tape engineering operation into the instrumentation engineering operation. However, it still will develop tape drives for the oem market such as the TMA and TMB products for minicomputer makers and systems houses.

## NEW COMPANY FOR TYMSHARE?

Speculation that Tymshare Inc., Cupertino, Calif., will form a separate value added company for communications services offered on its Tymnet network is answered by Tymshare president, Tom O'Rourke, "It's all up to the FCC." If the FCC decides to go along with a contention by Telenet Communications that Tymshare's purely communications "joint-user" service is illegal then Tymshare will form a new company but O'Rourke doesn't like the idea. "That's the easy way to go." He agreed with former Tymshare executive, Max Beere, now with TRW, who said formation by Tymshare of a separate value added company subject to FCC regulation would be "sad because regulation stifles."

(Continued to page 132)

# THE HP 2645A MINI DATA STATION. AT \$4400\* IT'S THE ONLY ONE.

**A NEW KIND OF TERMINAL.**  
Say goodbye to cumbersome, costly, complex approaches to increasing throughput at your work stations. The Mini Data Station combines powerful interactive editing capabilities with dual cartridge, integrated, local mass storage — all in one compact, economical, easy-to-use unit.

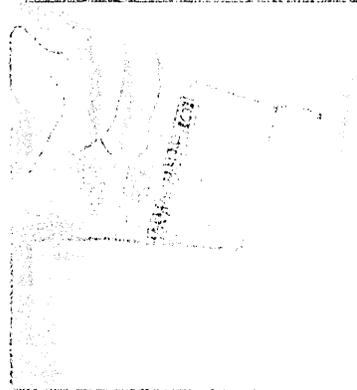
## EDIT AND ENTER DATA OFFLINE.

Direct, instant, emphasize, format. At the touch of a key, watch computer characters change color and watch the happy faces of your operators as they discover the unique editing capability of our unique, integrated characters that uses a 3 x 6 dot matrix cell for our registers display.

Small enough to slip into a slim pocket, yet assured interchangeability and extraordinary high reliability.

## ACCELERATE DATA ENTRY SIMPLIFIED.

Now operators can "grab right" before the computer. High resolution characters and a choice of horizontal, vertical, diagonal, and other edit directions make editing easier, even for "forms" and "tag" editing. Now, it's the computer that's "grabbing" data, not the operator.



ever you need them. Store your company's frequently used forms for instant display.

## "FALLSAFE" ON LINE OPERATION.

With the Mini Data Station, computer downtime no longer means work slowdowns.

## FOR, OUT, FOR, IN FEATURES.

Internal modules are easily accessible. Add options, replace cards without tools, without sending it back to the factory. A self-test key is standard.

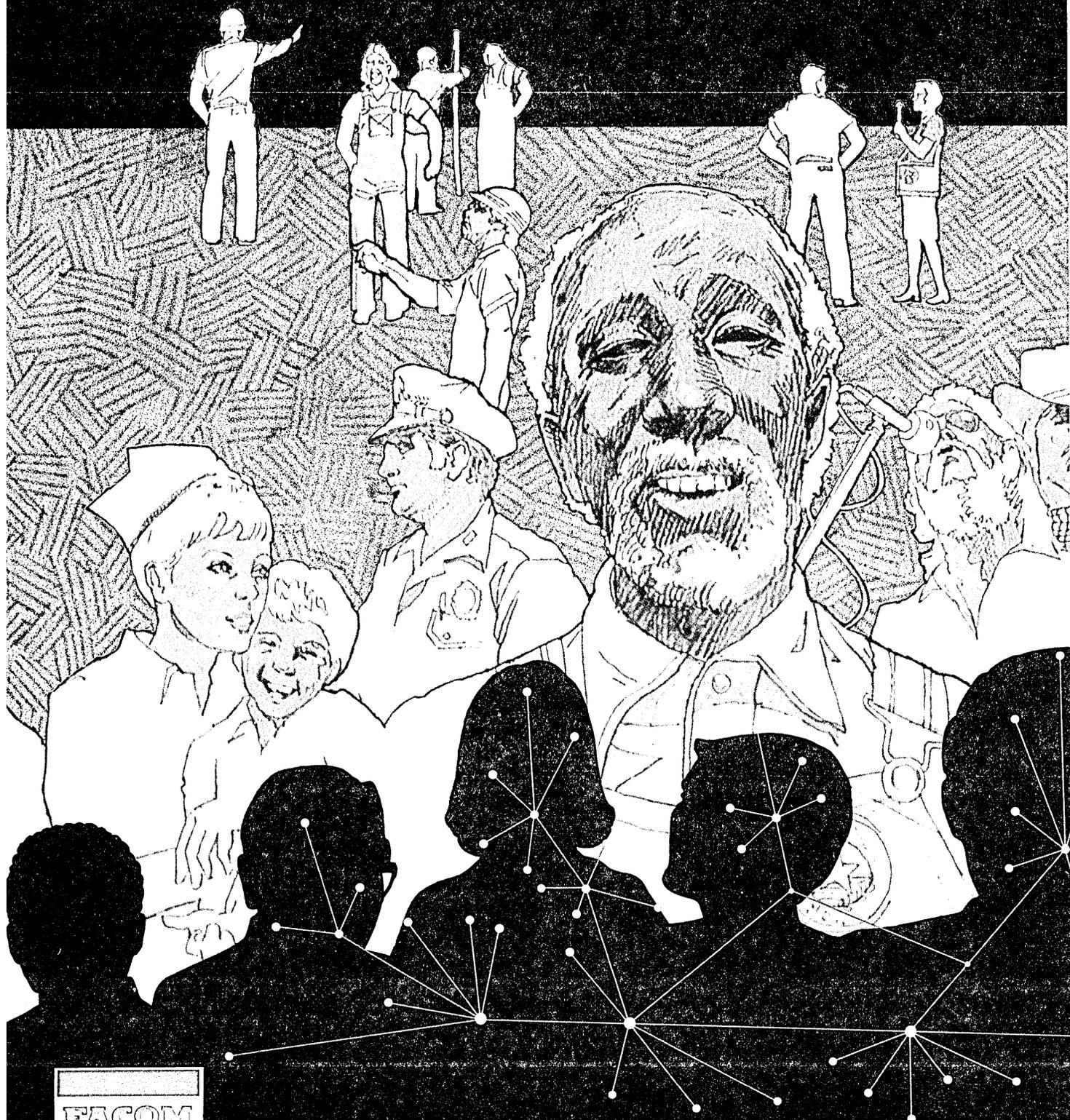
Small enough to slip into a slim pocket, yet assured interchangeability and extraordinary high reliability.

\*U.S. domestic price only quantities.

HEWLETT  PACKARD

Circle and compare from 174 offices in 26 countries  
and more countries. This one is different.  
© 1977 Hewlett-Packard Company

# Finding jobs for more and more people... Fujitsu is on-line.



MAIN PRODUCTS  Electronic, Computers & Peripheral Equipment (FACOM)  Telegraph & Data Communication Equipment  Remote Control &

Fujitsu is on-line finding jobs for more and more people. Fifteen years ago the Japanese government asked us to build a system which would make it easier for people to know when and where jobs open up. We responded by setting up an on-line network throughout the entire country.

Now, by simple punching a card, a man who is a thousand miles away in Okinawa can learn whether or not there's a position open for him in Tokyo.

We're the connection between employer and employee, too. Companies use our services to

recruit personnel from all over Japan.

### Why us?

Because Fujitsu has the muscle and skill to solve just about any data communications problem.

We're a leading main frame maker whose line spans everything from mini to very large scale computers.

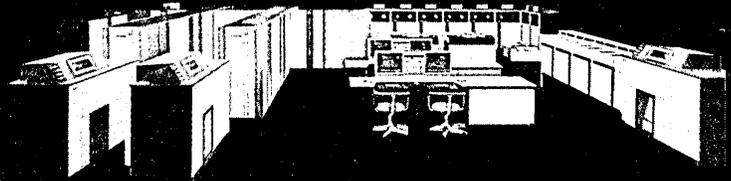
We're one of the world's biggest suppliers of tele-

communications equipment of all kinds. And we're uniquely experienced in meshing the two into tailor-made data communications systems.

So when you've got a communications problem, call on Fujitsu. We can bridge the gap.

## FUJITSU LIMITED

*Communications and Electronics*  
Marunouchi, Tokyo, Japan



CIRCLE 45 ON READER CARD

---

---

# calendar

---

---

## JANUARY

**3rd ACM Symposium on Principles of Programming Languages, Jan. 19-21, Atlanta.** Papers on automated debugging, automatic programming, compiler design and implementation, special applications, and software design are among those to be presented. The meeting is sponsored by SIGACT and SIGPLAN. Fees: \$37.50, members; add \$5 for nonmembers or post Jan. 5 registration. Contact: Prof. William Grosky, School of Inf. and Computer Science, Georgia Inst. of Technology, 225 North Ave., Atlanta, Ga. 30332.

**3rd Annual Symposium on Computer Architecture, Jan. 19-21, Clearwater, Fla.** A tutorial on microprogramming precedes the two-day conference sponsored by the IEEE Computer Society and the special interest group on computer architecture of the ACM in cooperation with the Univ. of South Florida. Sessions cover design evolution, hardware descriptive languages, multi/microprocessor, performance evaluation and modeling, and network design, among other topics. Fees (until Jan. 12): Jan. 19 tutorial, \$45, members; \$60, nonmembers; symposium, \$30, members; \$40, nonmembers; \$15, students. Contact: Oscar N. Garcia, College of Engrg., Univ. of So. Fla., Tampa, Fla. 33620, (813) 974-2948.

**"On-Line Systems, 1976-1986," Jan. 19-21, and "Data Base Systems," Jan. 21-23, Washington, D.C.** These conferences are sponsored by the American Institute of Industrial Engineers. "On-Line Systems," a technological update and forecast, will discuss the impact of miniaturization, and new data transmission networks, including satellites, among other topics. "Data Base Systems" focuses on problems in design and administration, the state of the art and future trends, and the impact of Codasyl. Fees single conference: \$295, teams \$195; combined fees for both conferences, \$445, teams \$330. Contact: Dept. OLIS, AIE Seminars, P.O. Box 25116, Los Angeles, Calif. 90025, (213) 826-7572.

## FEBRUARY

**4th Annual ACM Computer Science Conference, Feb. 10-12, Anaheim.** The conference will feature short reports on current research in computer science, as well as tutorials, book exhibits, an employment register, and special sessions before and after the main meeting. On Feb. 9 the L.A. chapter of the ACM and the National Bureau of Standards will sponsor the West Coast FORTRAN Forum; discussion will center on the proposed American National Standards X3.9-19XX FORTRAN revision. Contact: Donald Reifer, Aerospace Corp., P.O. Box 92957, Los Angeles, Calif. 90009. A joint technical symposium on Computer Science and Education is planned for Feb. 12 and 13. Contact: Ron Colman, Calif. State Univ., Fullerton, Calif. Employment register information: Orrin E. Taulbee, Dept. of Computer Science, Univ. of Pittsburgh, Pittsburgh, Pa. 15260. Conference fees: \$25, members; \$30, nonmembers; \$5, students. Contact: Julian Feldman, Dept. of Information and Computer Science, Univ. of California, Irvine, Calif. 92664.

**DATACOMM/76, Feb. 16-18, New Orleans.** Application, tutorial and general interest sessions on data communications are planned, with presentations directed to managers in dp, communications, datacomm, and business and financial areas. Exhibits will feature hardware, software and services. Fees: \$95, three days; \$50, one day; team discounts. Contact: DATACOMM/76, 60 Austin St., Newtonville, Mass. 02160, (800) 225-8960, toll-free.

**IEEE Int'l. Solid State Circuits Conference, Feb. 18-20, Philadelphia.** The emerging role of LSI and microprocessors will highlight keynote addresses during this meeting, which will feature 75 papers, 17 day sessions, and 10 evening sessions, covering design, performance, testing and application of solid state circuits and systems. More than 1,200 representatives from the U.S., Europe, and Asia are expected to attend. Fees: \$40, members; \$50, nonmembers; add \$10 for on-site registration. Contact: Lewis Winner, 152 W. 42nd St., New York, N.Y. 10036, (212) 279-3125.

**2nd Int'l. Conference, Software Engrg. for Telecommunication Switching Systems, Feb. 18-21, Salzburg.** Scope of this conference includes management of software design and production, problems of implementation and maintenance, multiprocessing systems, and support software. Contact: The Manager, Conference Dept., IEE, Savoy Place, London WC2R OBL.

**COMPCON 76 Spring, Feb. 24-26, San Francisco.** This 12th international conference sponsored by the IEEE Computer Society will focus on "The Next 5 Years: Evolution or Revolution." A one-day tutorial on Feb. 23 will be on "Unique Aspects of Microcomputer Applications." Fees: tutorial, \$50, members, \$65, nonmembers; conference, \$50, members; \$65, nonmembers; \$10, student members. Add \$10 after Feb. 13. Contact: Jon E. Petersen, COMPCON 76 Spring, IBM, R62/123, 5600 Cottle Rd., San Jose, Calif. 95193.

## MARCH

**INTERFACE '76, March 29-31, Miami Beach.** The program committee composed of data communications users, suppliers, and consultants from industry and academe has scheduled 100 speakers for this fourth presentation of the original data communications conference and exposition. Cosponsored by DATAMATION, the conference spotlights new approaches to fundamentals and advanced techniques, information on the latest data communications equipment and services, and workshops to deal with methods, systems, and procedures for planning, implementing, and managing a data communications network. Fees: \$95, three days; \$50, one day; team discounts. Discounts on hotel accommodations are available through the INTERFACE '76 office. Contact: INTERFACE '76, 160 Speen St., Framingham, Mass. 01701, toll-free (800) 225-4620; within Massachusetts, (617) 879-4502 (collect).

## ON THE AGENDA

**NRMA, Annual Convention, Business & Equipment Exposition, Jan. 11-14, New York; 3rd Int'l. Congress on Computers in Industry, Jan. 29-30, Paris; WINCON '76, 17th annual convention, Aerospace and Electronic Systems, Feb. 18-20, North Hollywood.** \*

---

Conferences are generally listed only once. Please check recent issues of DATAMATION for additional meetings scheduled during these months.

---

# HOW TO GET YOUR PACKAGE THERE AS FAST AS IF YOU CARRIED IT YOURSELF.

It's as easy as 1, 2, 3.

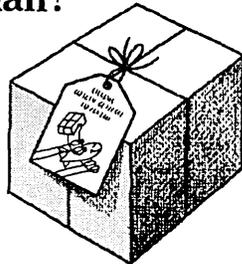
1. Bring your small package to United's passenger check-in counter 30 minutes before flight time. Pay the charges.

2. Phone your addressee. Give him the flight number, arrival time, and receipt number.

3. Thirty minutes after arrival, the package can be picked up at the baggage claim area.

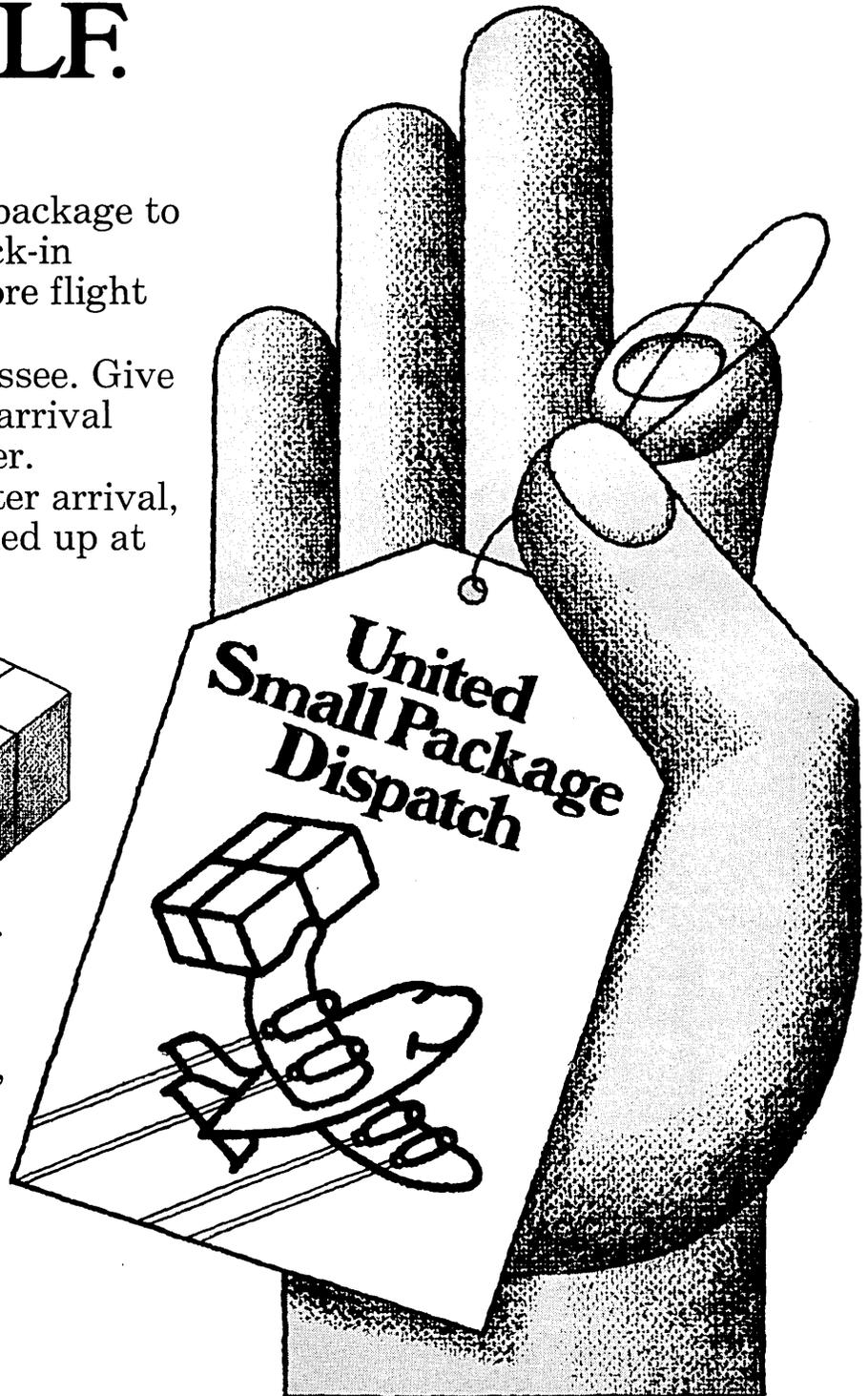
## How big is small?

Up to 50 pounds in weight, up to 90 inches in total dimensions (length, plus width, plus height).



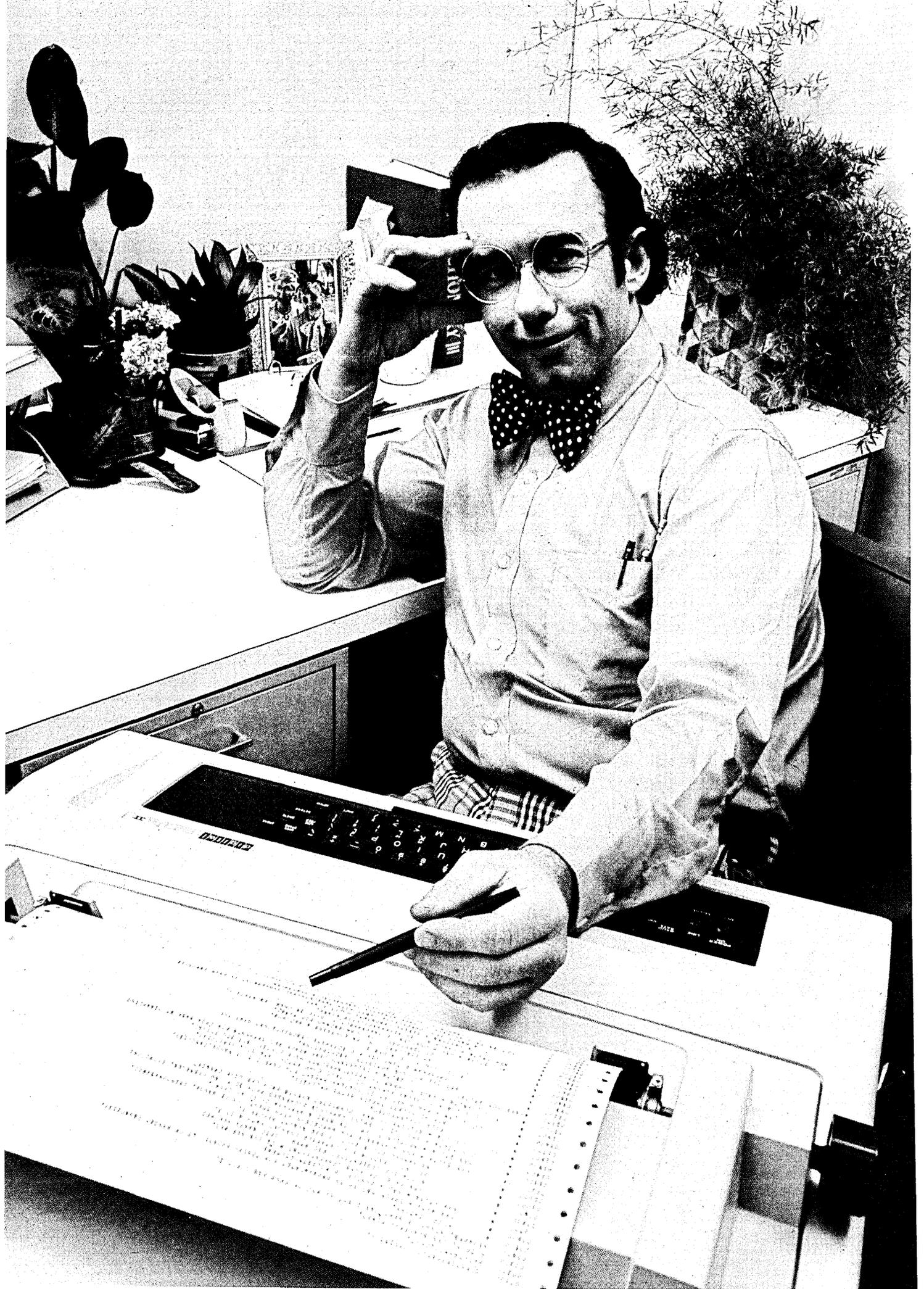
## What can you ship?

Things like film, computer tape, samples, medicine, advertising material, blueprints . . . or the briefcase you forgot to take on your business trip.



No.1 in the U.S. sky

 **UNITED AIRLINES CARGO**



# What to do about people who complain about your big computer:

## Give them one.

And the way to do that is to get yourself a DECsystem-10. The DECsystem-10 is a different kind of large-scale computer. It can accommodate up to 512 jobs — with each individual user having up to 1,280K characters of directly addressable memory — all at the same time. Which means that a lot of different people in a lot of different locations can use it.

But that's not all. The DECsystem-10 can do interactive, batch, remote batch, on-line EDP, real-time and transaction processing, and can be used for networks and hierarchical

systems too. Because the DECsystem-10 is a truly flexible big computer.

It can handle from 640K to 20 million characters of memory. It offers COBOL, FORTRAN, ALGOL, APL, BASIC, and MACRO, complete with de-bugging aids. (There's even a new low-cost APL terminal.) It offers you both virtual and cache memory and an advanced Business Instruction Set. It has complete systems software — MCS, DBMS, a file management system, and our famous TOPS-10 operating system — all supported by us, instead of you.

Best of all the DECsystem-10 costs about half what other big systems do. And it's backed by Digital's experience with over 50,000 computer installations worldwide.

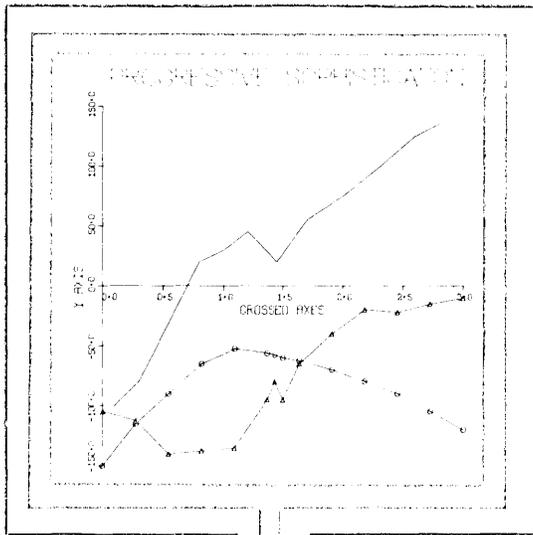
To find out how organizations like yours are using the DECsystem-10, simply call or write for our new "How I Got More Computer for Less Money" brochure.

You really can't afford not to.

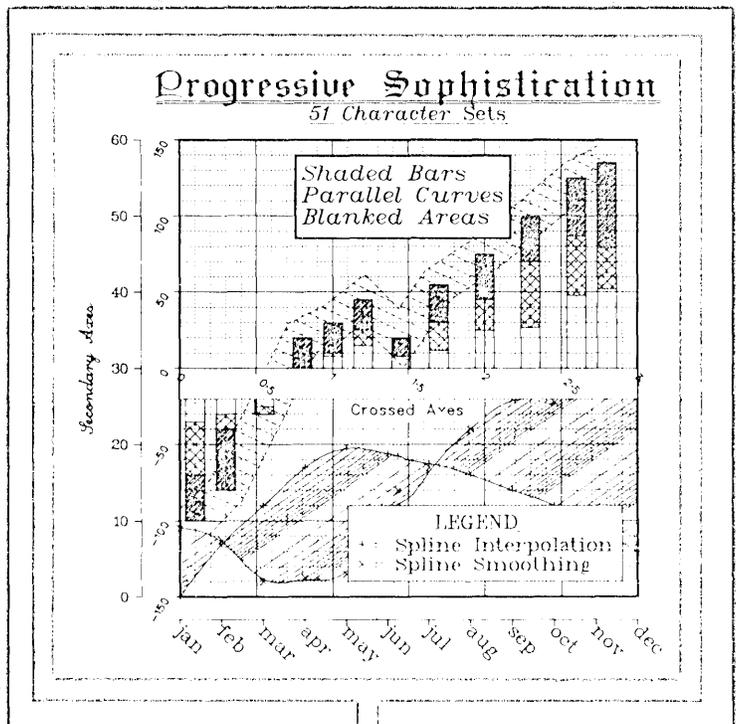
Digital Equipment Corporation, Marlborough, Mass. 01752, 617-481-9511, ext. 6885.

**digital**

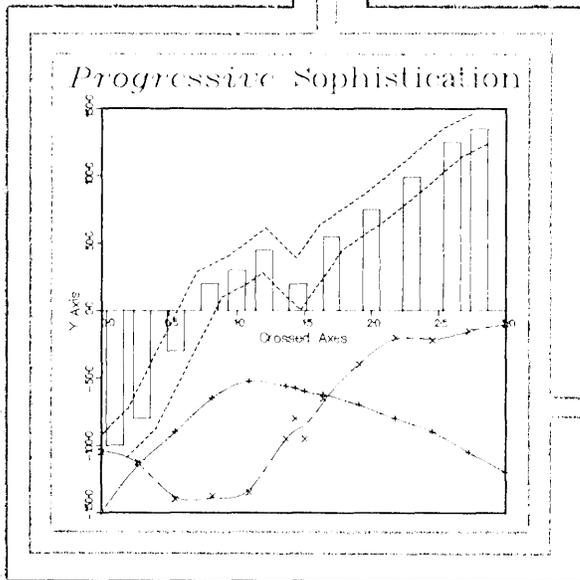
**DECsystem-10.**



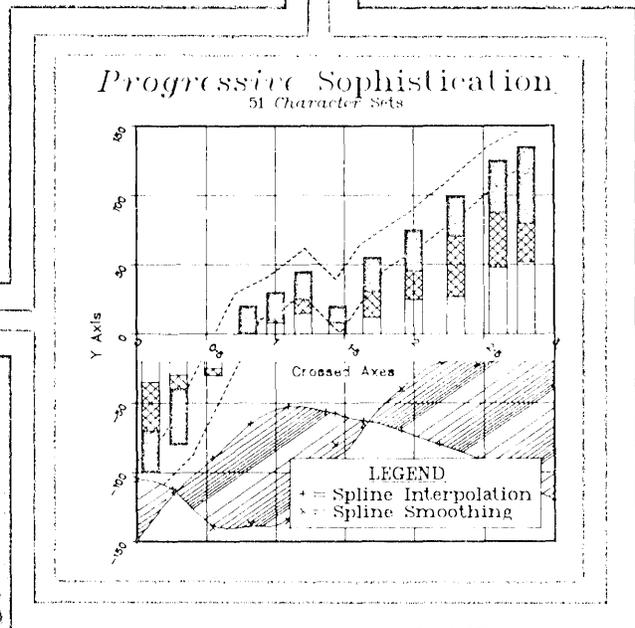
1



4



2



3

## DISPLA makes complex plotting simple.

Some of the best known computer centers in the world are our users. Many of them already had powerful graphics. So why choose DISPLA? Simple. It's **machine and device independent**. It offers unmatched features from publication quality fonts to 3-D hidden line surfaces and world maps. But, above all, it's easy to use.

Start with a simple plot of 3 curves. Scaling, centering and rounding are automatic unless specified otherwise.

Add a few "calls" to (1) for italics, bars, parallel curves, dashed lines and smoothed connection. The calls of (1) are essentially unchanged.

To (2) now **add** a grid, shading, legend, blanked areas and angled axis numbering. We **add to, not modify** previous instructions.

The plot becomes complex simply—with a dotted grid, more axes, month labeling, text and even Gothic lettering!

Draftsman quality plots are generated by the thousands every day on over fifty installations internationally. Ask our customers.

*DISPLA*

Display Integrated Software System and Plotting Language  
A proprietary software product of ISSCO

For more information call Sunny Harris (714) 452-0170 or (714) 565-8098.  
Or write

*ISSCO*

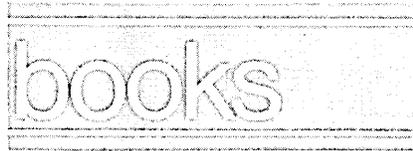
**Integrated Software Systems Corporation**

4186 Sorrento Valley Blvd., Suite N, San Diego, CA 92121

In Europe contact: Repko bv. van Blankenburgstraat 58  
The Hague, Holland  
Telephone 070-608425

# source data

SOURCE DATA provides information on books, courses, references, reports, periodicals, and vendor publications.



## On the Feasibility of Software Certification

by R. E. Keirstead  
(A report prepared for the National Science Foundation by Stanford Research Institute; #PB245213/AS.)  
National Technical Information Service, U.S. Dept. of Commerce, 5258 Port Royal Rd., Springfield, Va. 22151 (1975)  
133 pp. \$6.25 (\$2.25 microfiche)

The report has seven chapters (29 pages) followed by three appendices (39, 14, and 47 pages respectively). It is well-written—motherhood statements are commendably scarce—and is quite illuminating as a picture of both the present state of the art and the American political/industrial scene. (It is this mixture that makes the report somewhat unbalanced; while the technical problems of software certification are certainly international, the discussion of how a certification institute should get its revenue is more parochial.)

For the local political scene it contains a warning that should be repeated here: "Currently, there is some concern that formal or legal requirements for certified software may be imposed before the means for certification are available. Such requirements, without the technical means to accomplish certification, can only lead to disillusionment with certification, to the detriment of the entire software industry." Amen.

In stating our current inability to certify software, the report is healthily explicit. However, its analysis of the causes of this inability is too superficial to fully justify its specific recommendations. The last appendix mentions the as yet insurmountable difficulty in verifying sizable programs "written in conventional programming languages with rich sets of primitives." After such a remark, one must make up one's mind: is there any hope that realistic verification techniques will become available that can cope successfully with such "rich sets of primitives"? The remainder of the report—and I am far from amazed—gives very little support for that hope.

Having identified conventional pro-

gramming languages as one of the real culprits precluding verification, one could propose to exclude from the certification activity such programs that, on account of the way in which they have been written down, must be classified as "unverifiable," a suggestion that could take a much deserved swipe at the popularity of these programming languages. The report has not done so; its author seems more concerned with the certification institute being politically acceptable. In view of the political/industrial scene, this omission is not surprising. It is, nevertheless, depressing, because, as a result, much of the document deals with how to make the best of a bad job.

The report shows a misunderstanding of the proper role of high level programming languages, which may be at the root of many of our current problems. This is shown most clearly in: "The current state of formal proof . . . requires the proof to be developed at a representational level far removed from the pattern of bits that is the executable program in a real computer environment." (I have learned to become very suspicious when the word "real" is used in this sense.) Clearly the author sees the pattern of bits as the programmer's final target, and the high level language and its compiler as a software tool, as a means for generating that pattern of bits. But for a user, this is a very impractical interface. The semantics of his high level programming language should be so well-defined that he can totally disregard the compiler and the bit patterns it generates as irrelevant aspects of the implementation. Unless programmers learn to separate the definition of a programming language from its possible implementations, very few programs worth certifying will be written.

This hilarious suggestion is only quoted for the reader's amusement: "The solution appears to be to extend the sequence that begins with machine language, procedure-oriented language, problem-oriented language. Increasingly higher levels of expressive language are needed plus far more exotic compilers to go back down the levels."

Finally, because "every program of consequence is probably incorrect," the author suggests that we "consider other attributes of programs in determining certifiability." Is this courage or cowardice? Is this wisdom or folly? Will this be to the advantage or

to the detriment of "the entire software industry"? I think I would prefer readers to answer these questions for themselves, hopefully after they have read the report concerned and have an overview of the numerous and varied issues involved.

—Edsger W. Dijkstra

Prof. Dr. Dijkstra is professor of mathematics at Eindhoven Univ. of Technology in The Netherlands, and has been a Burroughs Research Fellow since 1963. His new book, "A Discipline of Programming," is scheduled for spring publication.

## BOOK BRIEFS . . .

**Human Choice and Computers**  
Enid Mumford and Harold Sackman, eds.  
American Elsevier Publ. Co., Inc., 52 Vanderbilt Ave., New York, N.Y. 10017 (1975)  
358 pp. \$35.50

A group of computer technologists, trade unionists, and social scientists met in Vienna in April 1974 for the Conference on Human Choice and Computers sponsored by the International Federation for Information Processing (IFIP). These proceedings open with the theme papers on Issues of Human Choice, which include "The Human Being and the Automation," "Design of Computer Systems," "Trade Unions and Computers," and "Computers and Social Options." Other papers support the conference belief that "deliberate human choice and continuing social accountability" should determine the role of computers in social affairs.

**Computers and the Learning Process in Higher Education**  
by John Fralick Rockhart and Michael S. Scott Morton  
McGraw-Hill, 1975  
356 pp. \$17.50

This report prepared for the Carnegie Commission on Higher Education is an assessment of what the computer can and cannot do in contributing to learning. Decreasing costs for the use of computers in instruction is having an effect on opposition, but faculty members and institutions continue to present formidable resistance to the concept. This book brings the reader up-to-date on what is happening in the field, with specific examples of schools that have experienced using computers for instruction.

**Benchmarking: Computer Evaluation and Measurement**  
Nicholas Benwell, ed.  
Halsted Press, 1975  
190 pp. \$20

This book is a compilation of papers and group discussions which took place in Cambridge during "Benchmarking '74," the first conference dedicated exclusively to this subject. Manufacturers, consultants, research-

# source data

ers, and users present a variety of opinions on this procedure for measuring computer power. Inclusion of conversations following each presentation illustrate some of the differing points of view.

**Computer Mathematics**  
by Clifford L. Conrad, Nancy J. Conrad, and Harry B. Higley  
Hayden Book Co., Inc., 50 Essex St.,  
Rochelle Park, N.J. 07662 (1975)  
224 pp. \$13.95

This programmer-oriented text tries a new approach by presenting traditional mathematics in formal and algorithmic terms for students of computer technology. Basic operations of arithmetic, logic, and array arithmetic are expressed in "simple formal languages" called Numeric Calculus, Logic Calculus, and Array Calculus. Other dp concepts such as flowcharting, algorithm construction, and logico-arithmetic characteristics of existing programming languages are also covered. This book requires only high school algebra as a prerequisite.



## IBM and the Industry

A number of reprints of our regular feature, "IBM and the Structure of the Industry," recording reader commentary on the topic over a seven month period, are still available—but the supply is limited. DATAMATION, Los Angeles, Calif.

FOR COPY CIRCLE 201 ON READER CARD

## System/32 Manufacturing

An evaluation of the IBM System/32 and the Manufacturing Management Accounting System (MMAS) Package are available in two separate reports. The reports suggest key questions for users to think about, including how to select packaged software for a small business computer. Price for both reports: \$10. MANAGEMENT INFORMATION CORP., 140 Barclay Center, Cherry Hill, N.J. 08034.

## History of Word Processing

A large two-color wall chart on the "History of Automatic Typing/Text Editing" shows the suppliers in the field, along with those who have dropped out of the market. Original dates of entry are listed. Automatic typewriters, mechanical text editing

machines, time-shared text editing, shared logic systems, and display systems are shown. The chart is published by Frost & Sullivan, Inc. Prepaid price: \$2. OFFICE MANAGEMENT SYSTEMS CORP., 37 E. 72nd St., New York, N.Y. 10024.

## Flight Information Display

What has been done in airport display of flight information, and what is yet possible? These questions are answered in the 24-page monograph, *A Guide to Flight Information Display Systems*,

TIME	FLIGHT	DESTINATION	VIA	GATE	DEPARTS
07:00	SV 874	BOHRAJ - KARACHI		04	ON TIME
07:15	SV 968	DAHASCUS - AMMAN		05	ON TIME
07:20	TW 411	NEW YORK - ROME		08	07:45
07:35	PA 002	TOKYO - TEHRAN		07	ON TIME
07:45	SV 741	CASABLANCA-TRIPOLI		06	ON TIME
08:00	LH 537	FRANKFURT - ATHENS			DELAYED
08:15	SV 839	KHARTOUM		04	ON TIME
08:35	BA 751	LONDON			CANCELLED
09:00	SV 810	MUSCAT - DHAHRAN		05	ON TIME
09:15	SV 750	DUBAI		07	ON TIME
09:25	ME 277	FREETOWN - ABIDJAN		03	10:10
09:30	ME 365	PARIS - BEYROUTH		01	ON TIME
10:10	SV 681	AMSTERDAM-FRANKFURT		08	ON TIME
10:15	SV 841	ASHARA - PORT SUDAN		02	ON TIME
10:20	AF 123	PARIS - CAIRO		06	11:50

WEDNESDAY 3:28:21

which is liberally illustrated and offered as a tool for general systems design. Director of Communications, CONRAC CORP., 330 Madison Ave., New York, N.Y. 10017.

## Directory of Software

The monthly updated, loose-leaf *Datapro Directory of Software* provides information on software products and vendors. The approximately 500 pages contain product profiles with users' software ratings, and the directory is indexed<sup>1</sup> by product name, vendor, hardware, and application. In addition to the monthly updates, subscribers also get a 4-page monthly newsletter, *Datapro Software News* which analyzes and interprets current developments in software; if subscribed to separately, this newsletter is \$42/year.

Still another benefit to directory subscribers is a telephone/mail consultation capability. Subscription: \$230/year (\$190 until Dec. 31 or for Datapro subscribers). There is also a 60 day trial subscription for \$10. DATAPRO RESEARCH CORP., 1805 Underwood Blvd., Delran, N.J. 08075.

## Data Base Management

A practical review, in non-technical format, of data base management systems and the problems of implementing, evaluating, and administering them, is the subject of the *Auerbach Guide to Data Base Management*. Included is an introduction to system components, their functions, and their interactions. The responsibilities of the administrator and evaluations of such systems as Total, IMS, IDMS, and System 2000 are covered. Price: \$24.95. AUERBACH PUBLISHERS INC., 6560 No. Park Drive, Pennsauken, N.J. 08109.

## Health Industry Dp

The market for health care-oriented computer systems and services was \$460 million in 1974. It will reach \$1 billion in 1978. A 150-page report analyzes this market, and includes a forecast of the nature, size, opportunities, and trouble areas through 1984.

The report notes a trend toward small in-house computers like the IBM System/32 in smaller 75 to 300 bed hospitals. Data collection and data entry are of prime concern, and hospitals are seeking low cost, easy-to-use terminals that can be placed throughout the hospital for immediate data capture.

Computerized hospital management systems is the most competitive segment, with more than 40 service bureaus, the major computer manufacturers, and medical system houses selling turnkey systems. Price: \$600. FROST & SULLIVAN, INC., 106 Fulton St., New York, N.Y. 10038.

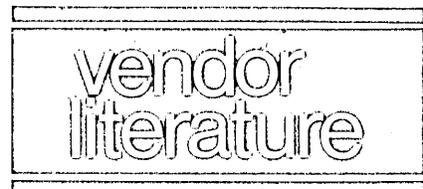
FOR DATA CIRCLE 203 ON READER CARD

## Executive Compensation

A 120-page executive compensation study presents this organization's sixth biennial survey of current practices and trends in compensating chief executive officers and financial and accounting management. Executive job descriptions are given, and classifications by major industry groupings, special industries, and geographical regions are made. Trends in salary and bonus levels are tracked, and many detailed tables are supplied. Price: \$30. FINANCIAL EXECUTIVES INSTITUTE, 633 Third Ave., New York, N.Y. 10017.

## Optical Readers

*All About Optical Readers*, a 36-page report, presents a user survey of the performance of these devices. More than 130 users rated 175 optical character, mark, and bar code readers; while they are well satisfied with overall performance and ease of operation of current products, they see need for improvement in reliability and maintenance service. Price: \$10. DATAPRO RESEARCH CORP., 1805 Underwood Blvd., Delran, N.J. 08075.



## Cybernet Software

A library of applications software available through this vendor's Cybernet data services network is described in a brochure. Brief descriptions of 29 programs are given for use in structural  
(Continued on page 37)

**HEWLETT-PACKARD****COMPUTER ADVANCES**

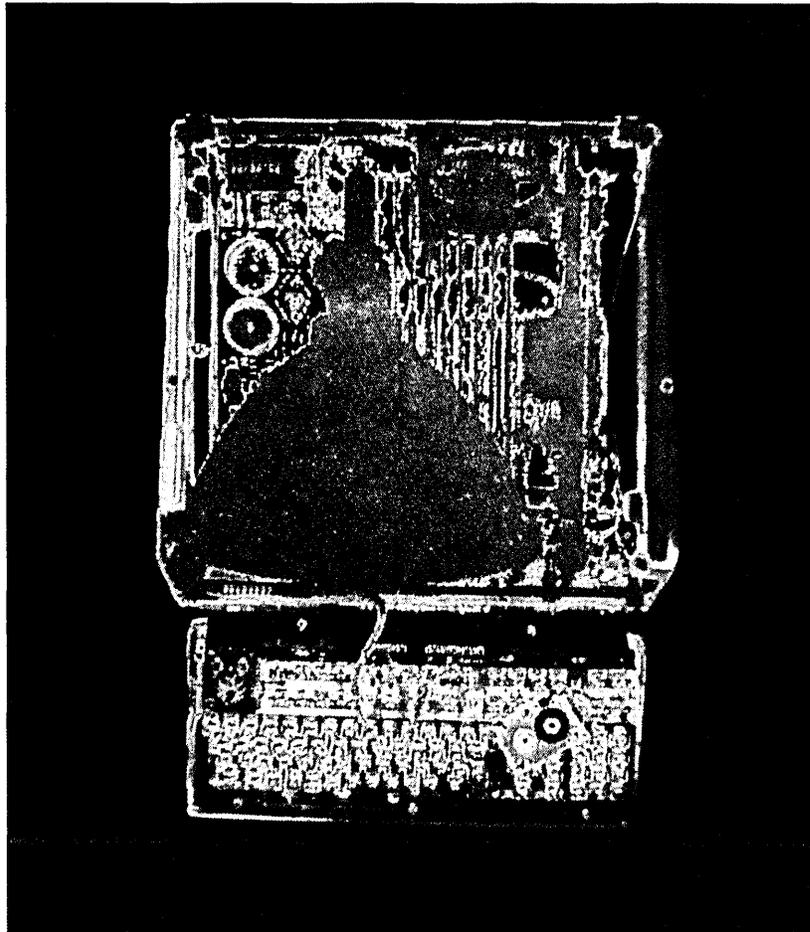
The HP 2644 Mini DataStation may well help change the character of data entry, programming, inventory, point-of-sale and other disciplines dependent on real-time editing, formatting and filing of data. This unique microprogrammed display terminal combines powerful interactive editing with dual cartridge, integrated local storage and peripheral capabilities—

**THIS ADVANCED TERMINAL  
MINIMIZES YOUR DEPENDENCE  
ON A COMPUTER**

all in one compact, economical, easy-to-use unit. No longer must you take up expensive computer time with routine editing and error correction.

Instead, at the end of the day, the fully formatted and corrected data can be dumped to the CPU from a magnetic cartridge, rather than at operator speeds. And, your ability to keep work flowing is protected by the Mini DataStation's ability to continue operation even when its host computer is down.

The Mini DataStation's own peripheral capability provides you further



Color derivation from X-Ray courtesy Stanford Technology Corp.

**Terminal  
Cont.**

independence from the computer. Up to five option slots are available with multiple data paths allowing data to be transferred between display, cartridges, keyboard, an optional printer, or RS-232C serial output interface. This is accomplished at rates up to 2400 baud for ASCII, or 9600 baud for binary data.

One of the breakthroughs that made the Mini DataStation's stand-alone capability possible is an unusually precise, shirt-pocket-size cartridge capable of storing up to 110,000 bytes. Engineered to strict specifications, these cartridges incorporate full-width data recording, to bring the bit loss rate down to a remarkable 1 in every  $10^9$  bits. This same precision also minimizes problems with cartridge interchangeability.

Each Mini DataStation can use two cartridges and can operate in either character or block mode. Data is stored in variable lengths at a density of 800 bpi formatted in either ASCII or binary.

You can conveniently insert and delete characters and keep track of data fields on the display with a built-in cursor sensing and positioning control. Programmable field protection helps the operator avoid misplaced data entries by allowing you to prohibit access to certain fields. And, you don't lose information the minute it goes off the screen. Off-screen character storage with scrolling or page select controls lets you bring the data back. Other keyboard controls can establish a positional memory lock to retain operator instructions or headings, while data is entered below, or display control codes for convenient error tracing. And, you can call up any form your company uses in seconds.

Users of the Mini DataStation will enjoy the high resolution screen. The clarity of the 9x7 dot matrix screen has to be seen to be appreciated. Not only is a sharp, readable Roman Alphabet displayed, but up to four 64-character sets of type and symbols are available, eliminating the need for awkward graphic approxima-

tions. Other useful features, such as inverse video (black on white), blinking, half-bright and underlining are available in any combination needed.

And the Mini DataStation is as easy to maintain as it is to use. Flip open two latches and inside you will see that we have chosen modular single-bus architecture. Maintenance is as fast as popping out the old module and plugging in the new, with hardly a pause in your operations. A built-in go/no-go test feature allows the operator to quickly verify the operating condition of the terminal.

We know that the Mini DataStation will meet many of your needs. Not simply because of its capabilities, but because these capabilities are available at a realistic, affordable price. If you would like to know more about how you can break free of the computer-dependent terminal, circle "A" on the attached reply card. 



HP's new 2644A terminal uses a pocket-size cartridge to provide stand-alone capability.

## INNOVATIONS IN DISC TECHNOLOGY

# A DISC FOR DEMANDING OEM'S

The fact that HP's compact 7905A disc drive has both the fastest access and the widest operating range of any interchangeable drive available is no coincidence. Both features are unique contributions to the need for quickly accessed, yet reliable data in the less than ideal operating environments OEMs encounter in scientific and industrial applications.

Consider the problems faced at field or remote sites. Typically in this situation, equipment is being driven by mobile motor-generators with power frequency tending to wan-

der and high RFI being generated. In such an environment, the 7905A will operate anywhere between 47Hz and 66Hz to compensate for power variances. At the same time, an electronically commutated DC motor eliminates all belts and pulleys, reducing parts failure and RFI. And cartridge interchangeability is guaranteed from 50° to 104°F at altitudes up to 10,000 feet.

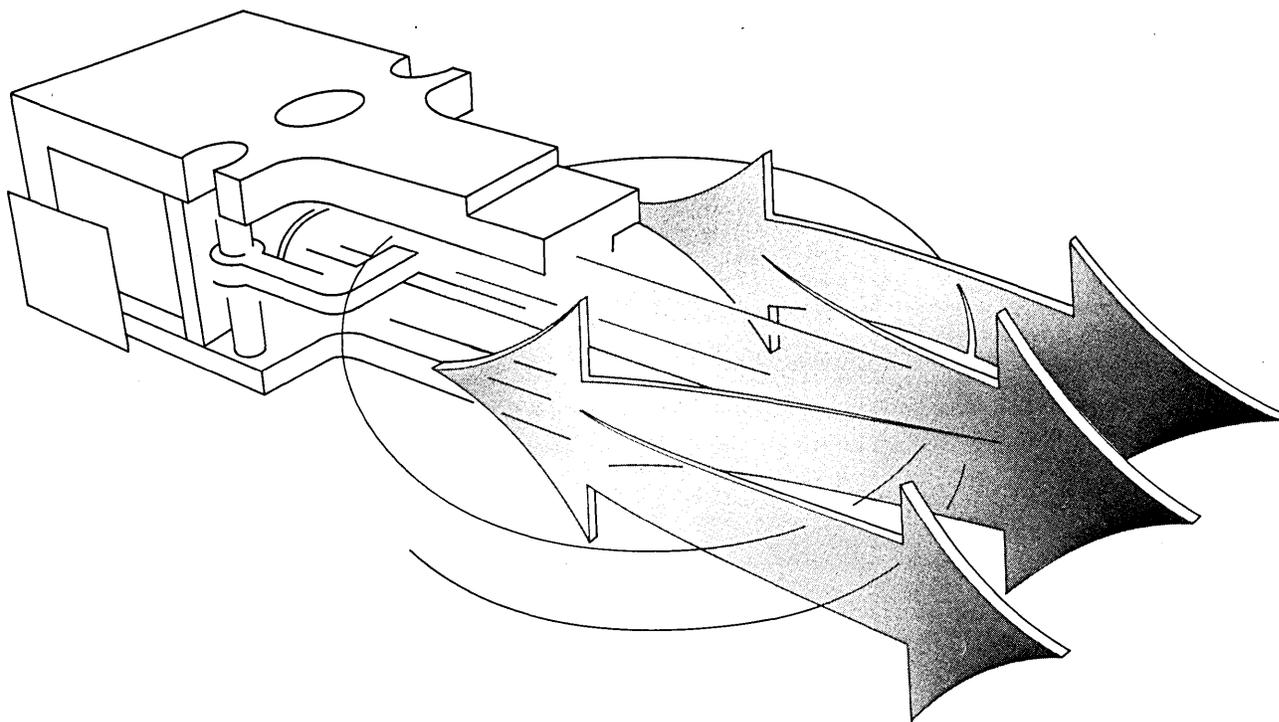
The 7905A can store 15 million bytes on each drive. Average access is a remarkable 25ms, and you can use up to eight drives per control unit, making it ideal for any system requiring fast access to large amounts of data.

In remote locations, or anyplace where accurate on-line data is critical, the 7905A incorporates Error Correction Code (ECC) hardware. This

feature allows the user to correct up to 32 contiguous bits of error per sector, or 48 times per track. Plus, automatic track and cylinder switching allows more throughput by cutting down interrupts to the CPU.

And, helpful to keeping servicing costs at a minimum, there is a plug-in Disc Service Unit which permits head alignment without an oscilloscope.

To find out how our disc can help you build more reliability and speed into your product, just circle "B" on the attached card. 



**The precise engineering of the 7905A's moving heads provides a remarkable 25 ms access time to 15 million bytes of data.**

# GETTING MORE WORK OUT OF REAL-TIME

More. More. More. Whether you're in production, research or new product development, the pressure is inevitably for "more." For many of you, getting more work out was the major reason for bringing in a computer in the first place.

Times change. If your computer is now the bottleneck, the problem could lie in an inadequate operating system. If you've been thinking that this is the price you have to pay for the economy of using a minicomputer, we have some good news for you.

## RTE-III.

RTE-III is HP's Real Time Executive III, the latest and most powerful addition to a large family of graded HP operating systems. You might call it the multi-solution operating system.

It's multi-programming. In a real-time environment, more of your

people can get more work done. Editing, compiling, testing and debugging can go on concurrently without interrupting the execution of real-time programs.

It's multi-terminal. More people can use the computer from more locations. Waiting in line is minimized, if not eliminated.

It's multi-batch. The ability to handle multi-stream batch lets you get full benefit out of your processor around the clock. You get not just output spooling, but input spooling as well, a boost to efficiency that's never been available for a minicomputer before.

It's multi-language. You can use the language you want to use—or use several languages at the same time; even call a program in one language with a program in another. Choose from FORTRAN IV, ALGOL, Assembly language and HP's unique Multi-user Real-Time BASIC, the interactive programming language that lets anyone write useful, powerful programs with only a few days training.

Obviously, RTE-III is more than just another foreground/background operating system. At its heart is a memory expandable to 256K words

that provides space for as many as 64 32K word partitions. This ability to house as many as 64 programs in active memory drastically reduces the need for swapping, making response as much as a hundred times faster.

It puts you in control. You assign programs to specific partitions during system generation. Or, if you prefer, you assign priorities matched to the relative urgencies of your programs and let RTE-III's Dynamic Memory Management allocate memory automatically.

In the end, it means faster throughput, more work accomplished, a cost-effective answer to the continuing demand for "more" from you and your staff.

We have some very comprehensive literature on RTE-III. It should be in your file. Circle "E" on the attached card for your copy. 

## HOW TO RUN LARGE SUBROUTINES AT MICROPROCESSOR SPEEDS

Microprogramming is the time short-cut that works. It can speed up execution of repetitive calculations by as much as 95 percent and allows you to customize your processor hardware to a specific application for the duration of the microprogram.

Now HP opens new horizons for microprogramming with a 1024 word Writeable Control Store (WCS), four times the user-microprogrammability previously offered. Now, even large subroutines can run at microprocessor speeds.

Since WCS is dynamically

alterable, it offers you the flexibility of storing microprograms on disc or in main memory and transferring them to the WCS card as needed.

Each WCS board contains 1024, 24-bit words of semiconductor RAM memory with a cycle time of 325 nanoseconds. WCS also provides access to 12 additional high-speed scratch registers for data manipulation and status to increase programming efficiency.

You can also burn frequently used routines into PROM chips which, in turn, are attached to an HP User

Control Store Board (UCS) installed in the microprocessor section of the computer as a permanent part of its processor instructions. Up to 2,056 words of RAM can be stored on a single UCS board.

Both WCS and UCS come documented with driver and I/O utility programs. Microprograms are callable from FORTRAN II, FORTRAN IV, HP Assembly language, ALGOL and HP extended BASIC.

If the idea of speeding up critical routines appeals to you, circle "C" on the reply card for more information. 



# ACCURATE SOURCE DATA ENTRY, THE EASY WAY

Getting data into a computer is easy enough these days. The problem and the expense is getting it right—the first time.

Hewlett-Packard has a novel solution. It's HP's new Source Data Entry package (SDE) which operates on HP's 2000 Access System, servicing 16 to 32 terminals. SDE significantly reduces the common sources of operator data entry error. It allows you to generate single- or multi-screen forms, check errors and edit without using complex programming languages.

The difficult and costly effort of writing programs to do these jobs has been done for you. SDE includes four built-in program modules for range checking and data type checking. There's even a feature that allows highly repetitive data to be directly supplied from tables with a single key-stroke, increasing both the speed and accuracy of data entry procedures.

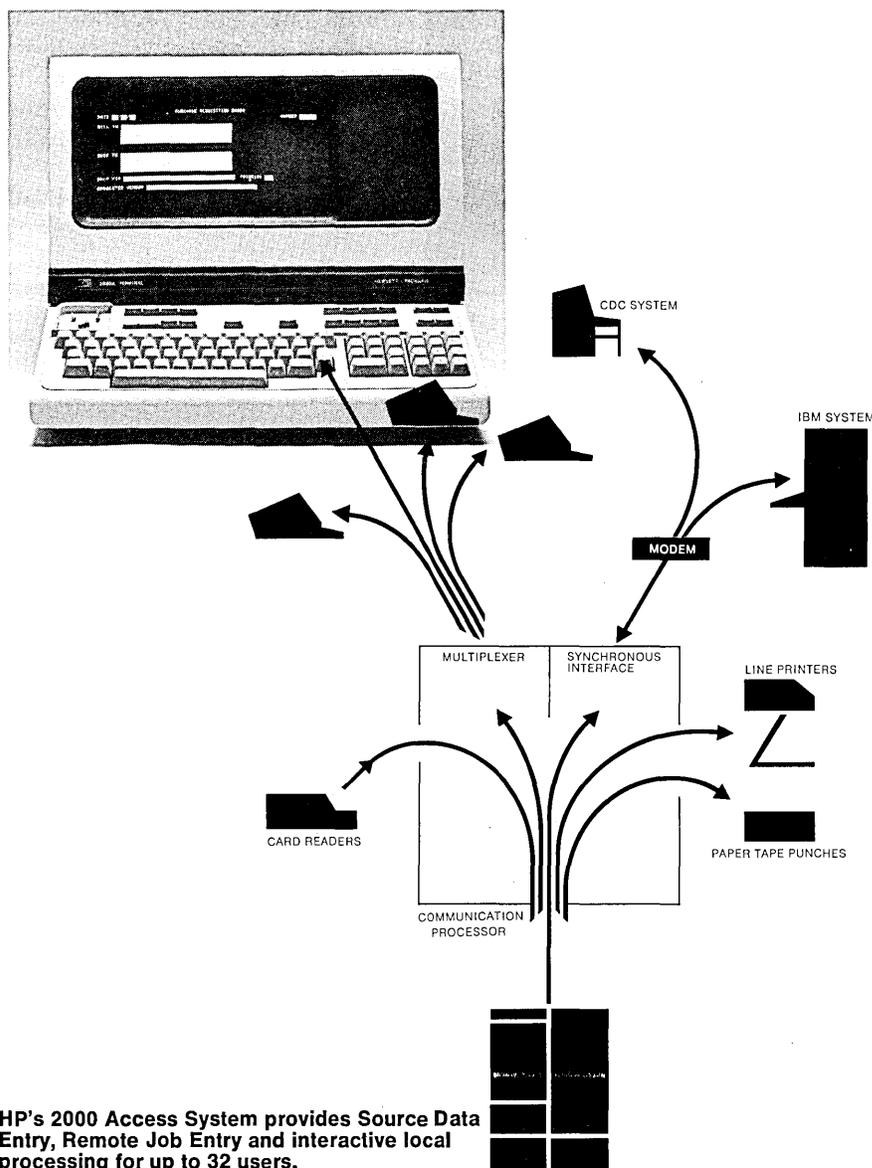
You design the forms. You establish the error-checking parameters. Simply. Quickly. For the more sophisticated user, SDE/2000 can be linked to user-written application programs to function as an efficient front-end module to reduce the cost and time for implementation of data entry applications.

Imagine the savings, the increased flexibility, the greater throughput that SDE might make possible in your application.

It saves money in another way, too. Each terminal can share an extensive family of local peripherals, thus avoiding the expense of redundant hardware.

SDE is the newest enhancement to the 2000 Access System. It operates concurrently with the system's "transparent" multi-terminal RJE capability, servicing IBM 360/370 or CDC computers. Or, it can use the 2000 Access System's 128k byte, dual-processor capacity as the basis for a stand alone interactive processing system serving up to 32 users.

To find out more about SDE and 2000 Access, take the easy way yourself and circle "D" on the reply card. 



**HP's 2000 Access System provides Source Data Entry, Remote Job Entry and interactive local processing for up to 32 users.**

# SOLVING THE PROBLEMS OF SUCCESS

Malkin and Pinton Industrial Supplies  
Accelerates Customer Orders

Malkin and Pinton are running a successful business in Vancouver, Canada. Their customers are getting good service and they are growing 20 percent a year. That is precisely the problem.

By the end of 1974, they had 6,000 customers for a complex line of fasteners, abrasives, power tools, shop and forestry products. They were managing an inventory of 25,000 items. Like many distributor environments, order clerks must check availability, price, discounts and updates to quantities on hand. Doing business called for five sets of customer files, kept in four separate departments. A single order involving one back order generated 21 separate pieces of paper—a river of 2.5 million copies in a year.

It was a manual system; a complex system; but a good system. The problem was they had simply outgrown it. Their analysis showed that it was extremely labor-intensive and involved considerable duplicate information—all necessary to maintain accuracy, but all operating to multiply the opportunity for error and impede fast customer service.

Success had brought them to capacity operation. A new solution was called for, one that would improve service without adding (or eliminating) people.

First they considered electronic accounting machines, but they could only do part of the job and would create queuing problems.

Some kind of computerization seemed the only viable alternative. Outside service bureaus and time-sharing approaches carried built-in delay factors and the certainty that as business grew, so would their expense.

In the end, an in-house computer system seemed to be the only practical solution. Batch? No. Its inherent time lag would actually make service worse and input errors would still be able to multiply before the system caught them.

A terminal-oriented data base management system seemed to be the



**When you have 6,000 customers and 25,000 products, good service is essential.**

only approach that would retain the best of their manual system, eliminate its problems and improve service.

Such a system would have to meet a number of objectives if it was to take over smoothly from their existing manual system. It would need: on-line multi-terminal capability for fast response, data base management to eliminate redundancy, multi-language capacity for efficient program-writing, the ability to operate in real-time to avoid processing delays, flexibility for short- and long-term changes in the company's requirements, a reasonable price and the availability of local service.

This was the list of qualifications met by the HP 3000CX they purchased. As Gary Nordman, their Systems Development Manager put it, "The (HP 3000's) combination of hardware and software and relatively low cost simply met all our requirements."

The HP 3000CX has been installed and is well into its first year of operation. The 11 terminals Malkin and Pinton purchased with the system are distributed throughout the company in operating departments such as sales, pricing and purchasing. Twenty-one more can be accommodated, some slated for their five branch offices. No changes will have to be made to the system to accommodate them.

HP's IMAGE 3000 data base management system has proven to be

an optimum solution to the problem of duplicate files. Unlike traditional file management, data is entered only once by the department responsible for it. For example, a clerk in the credit department enters credit data to a customer data base accessed by an order-entry clerk. Since only the responsible department can change its own information, errors are minimized and strict accountability is maintained.

Most programming is being done in HP's System Programming Language (SPL), the high level language in which the operating system is written, which makes custom-tailoring it to Malkin and Pinton's particular needs a relatively simple process. At the same time, the multiprogramming capability of the 3000CX allows other programs to be written in the most appropriate language for each problem whether it is SPL, COBOL, FORTRAN, BASIC or RPG.

As an on-line system, data is checked as it is entered. If errors show up, the individual who originated the information is still there to correct the data. Added to the single entry benefits of IMAGE and the restricted access that is possible through IMAGE's protected data items, maintaining correct records is dramatically simplified.

By choosing the HP 3000CX, a system whose flexibility, sophistication and features could readily be tailored to their needs, the goals of better service and increased work output from the same staff have been handily met.

But what about the future? There will be changes. New programs will be added. Management is just beginning to make use of the system's extensive capability to generate a wide variety of management reports for increased control and profitability.

Should you be considering the benefits of a terminal-oriented data base management system? Circle "F" on the attached card and we'll send you detailed literature on HP's powerful 3000CX series computers. 

HEWLETT  PACKARD

Sales and service from 172 offices in 65 countries.  
1501 Page Mill Road, Palo Alto, California 94304

## source data

analysis, electrical/electronic engineering, nuclear fuel management, graphics design, project control, data base management, and other fields. CONTROL DATA CORP., Minneapolis, Minn. FOR COPY CIRCLE 206 ON READER CARD

### Software for Students

"HP Math" is a brochure which describes this vendor's math software applications for schoolchildren. Basic arithmetic skills for students from elementary through higher grades are covered, as well as remedial work for adults. Student drills are part of the package. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR COPY CIRCLE 209 ON READER CARD

### Intelligent Crt Terminal

The HP 2644A Mini DataStation is described in a multicolored brochure. This intelligent crt terminal has up to 220 Kbytes of storage throughout two tape drives that use a pair of mini

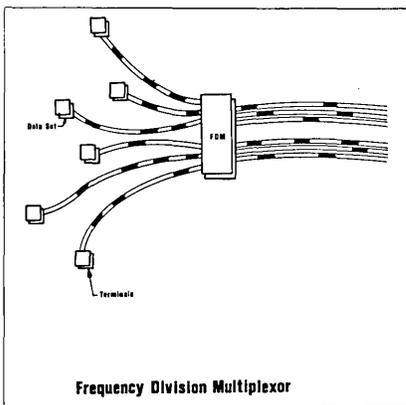


cartridges (one is shown in actual size). Special features include high resolution display, computer interfacing, plug-in modularity, and editing. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR COPY CIRCLE 204 ON READER CARD

### Telecommunications Tutorial

Notes from this distributor's seminar series, "Telecommunications from the Terminal User's Viewpoint," although admittedly salesy, provide a good tutorial on the subject. Liberally illustrated, these notes in brochure form explain basic terms like "modem" and proceed to explanation of interactive



Frequency Division Multiplexor

time-shared networks using multiplexors, concentrators, and front-end processors. Data sheets on a number of products are included, and comparison features and prices on modems from Bell and Vadic, for example, are detailed. MOXON ELECTRONICS, Irvine, Calif.

FOR COPY CIRCLE 207 ON READER CARD

### Printer Terminal Manual

A 40-page manual for this vendor's Carousel 300 printer terminal describes and explains the 30-character per second serial impact printer. The brochure is well illustrated with photographs and diagrams, and the features of the printer terminal are described in detail. INTERDATA, Oceanport, N.J.

FOR COPY CIRCLE 208 ON READER CARD

### Business Dp System

A 12-page illustrated brochure, *Data-share for Total Business Data Processing*, describes this vendor's field data entry, editing, preprocessing, and other equipment which comprise the "Data-share System." Central processing and peripheral units are listed, and the Datapoint 5500 processor which provides up to 16 remote work stations with a variety of dp capabilities is discussed. DATAPOINT CORP., San Antonio, Texas.

FOR COPY CIRCLE 205 ON READER CARD

## courses

### \$2 Dp Workshops

Perhaps the only cheap thing left in New York is a variety of two-hour workshops on 22 information technology categories. The price is a low \$3 for each session, and \$2 if registered in advance! These sessions are especially attractive for newcomers to the field. Among the topics are COM (Computer Output Microfilm) software, operations, and applications; index and filing technology; selling microfilm to top management; and more. This facility

also has a variety of equipment (micrographics, dp, filing, word processing, etc.) on display where the prospective user can browse without hearing a sales pitch. Hurry, while the New York we know and love is still there! METROPOLITAN INFORMATION TECHNOLOGY CENTER, 1 Park Ave., New York, N.Y. 10016.

### Management Home Study

Prime/Audio/III is the latest in a series of self-instruction courses dealing with management problems. Entitled *Planning and Organizing for Productive Work*, the course teaches planning and controlling, setting objectives, long and short range planning and scheduling, and improving productivity. The two prior courses in the series are *Constructive Discipline on the Job* and *Labor Relations and the Supervisor*. Complete instruction packages include cassettes, workbook exercises, and a final exam. A cassette tape recorder/player may also be purchased separately. Price: \$60 each (\$50 each for AMA members). AMACOM, Dept. PA3C, 135 W. 50th St., New York, N.Y. 10020.



### International Opportunities

A monthly newsletter, *International Electronic Trade Opportunities*, is an international clearing house of information divided into five sections: product lines wanted, product lines available, buyers sought/product tenders, manufacturing licenses offered, and manufacturing licenses sought. No names or addresses except for countries appear in the newsletter, but up to six contacts are free to the subscriber, with additional contacts at \$5 apiece. Subscription for 12 issues: \$65. ELMATEX INTERNATIONAL, 3640 Sepulveda Blvd., Los Angeles, Calif. 90034.

### Bottomline

A quarterly, *Bottomline*, published and edited by Larry Welke, has as its goal "to make you, the reading executive, confident in your managerial competence for the direction and use of your EDP installation." In handsome format the first issue features profiles of persons in the field and a "biography" of Paul Armer, a well known industry figure, as well as articles on privacy, software, and the status of the industry. Subscription: \$10/yr. INTERNATIONAL COMPUTER PROGRAMS, INC., 1119 Keystone Way, Carmel, Indiana 46032. \*

# We'll give them a run for the money!

## Inquire.<sup>®</sup>

Bigger is better? That sounds like a lot of IMS to us.

But if you believe that there is something truly ingenious about a low cost, single system DBMS with almost unlimited freedom of application and expansion, then you've come to Inquire<sup>®</sup>.

### **Advanced Concept**

With Inquire, data bases can stand by themselves. Or be linked dynamically. Data element relationships are made when a data base is used, rather than when it is built, giving data base designers and users unique flexibility.

Inquire DBMS is as comfortable with transaction-oriented applications as with analytic applications. Personnel and inventory control can be handled as easily as market research or text look-up.

### **Off and running**

Thanks to Inquire's Multi-File, there is no need to predetermine data base relationships. New applications can be rapidly installed, as they evolve. Data base security is intact; information remains recoverable and accountable.

Management reporting is then immediately available—right from

the instant of data base creation. Inquire offers a new perspective from the start.

### **We speak your language**

Inquire understands plain English.

Allows both programmers and non-programmers easy access. Now the user is free to deal with the content of the data base, without worrying about how to get there.

The Command Query Language assists the user with comprehensive diagnostics; a macro facility for pre-storing command strings; and interactive prompting!

### **Speaking of interfaces**

Inquire's Host Procedural Language Interface (PLI) allows COBOL, PL/1, FORTRAN, or assembler programs data base access via multiple keys. PLI is written as a set of re-entrant modules—permanently resident and shared by all users. Of course, Inquire's PLI is multi-thread; acts independently of data organization and storage techniques.

### **Speaking of structure**

Inquire employs a partially inverted hierarchical or network data structure. Any number of data elements can be quickly searched, following a path of least resistance.

And search time does not directly increase with data base size.

### **Double Whammy**

Besides giving you a super DBMS, Inquire possesses superior multi-key retrieval and report generation capabilities. Batch or on line with the same language. That's twice as much—twice as fast!

### **Single us out**

Now that you know us better, you can see just how ingenious we are. Inquire DBMS means business. And economy. And speed. All you want in a DBMS and more.

So, instead of talking turkey with our competition, come speak English with us. Give Bob Schreier, our VP of Information Management, a call at 703-578-3430. Or write Bob at: Inquire, Infodata Systems Inc. 5205 Leesburg Pike, Falls Church, Virginia 22041. He'll be happy to discuss the future with you.

## Inquire<sup>®</sup> at Infodata Systems

# The new package from the leader:

## Precision Graphics at an alphanumeric price.

**Not just graphing. Graphics from the graphics specialist.** The key is information capacity. Tektronix' new 4006-1 offers far and away the highest output density of any terminal in its price range: 1024 X by 780 Y viewable points; 2590 alphanumeric on screen characters.

It's all you'd expect from the company serving all your graphic needs . . . priced competitively with most alphanumerics.

Immediately compatible with most mainframes. Thanks to proven interfaces. Time-tested software. Great new usable software packages. And expert maintenance anywhere in the world.

And rely on Tektronix to do it right. The 4006-1 is our biggest breakthrough towards making the power of graphics affordable for everyone. Just \$2995

for openers. Lease price \$150 per month on a two year lease, includes maintenance. Plus peripheral options like our 4631 Hard Copy Unit for up to four 4006-1's, with 8½" x 11" copies, and 4923 Digital Cartridge Tape Recorder. And as fine a package of technical support as you'll find for any terminal anywhere.

Check it out: we're graphic leaders for some mighty good reasons. Your local Tektronix Sales Engineer can give you the whole story. Or write:

Tektronix, Inc.  
Information Display Group  
P.O. Box 500  
Beaverton, Oregon 97077



CIRCLE 61 ON READER CARD

\*U.S. Domestic Price Only

Graphics  
at  
an  
alphanumeric  
price.

# Your real time software is no place for INSECTUS-PROGRAMMA.

Insectus Programma, more commonly referred to as software bugs, can cost you money. These pests eat away at your profits and productivity by causing program development delays and costly system down-time. Not to mention the inconvenience.

The only known cure for Insectus Programma is time. Over a period of years, virtually all bugs can be removed from a software system; but how can you afford to wait that long?

When we designed the new SEL 32 minicomputers, we included the most extensive, reliable line of software available...software originally developed for the SYSTEMS 85/86 computers.

What does that mean to you? Plenty!

It means that you'll see big cost savings, through quicker application implementation and increased programmer efficiency. That's because our software

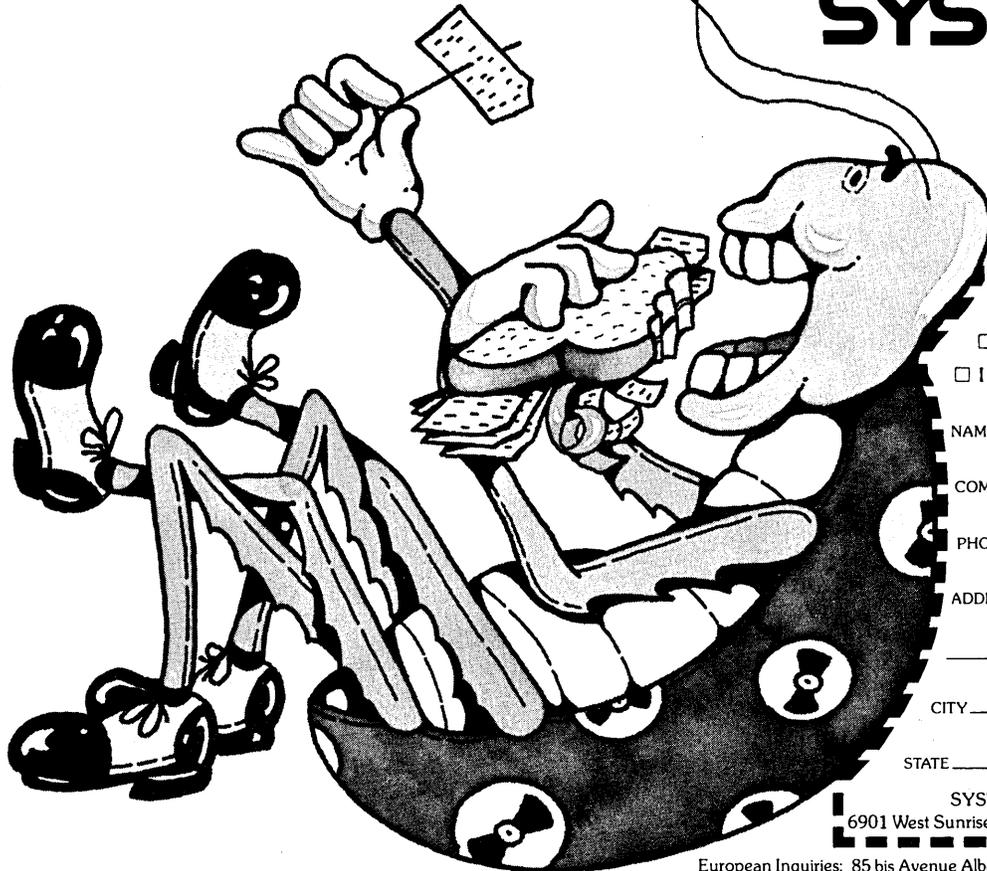
is virtually bug-free, completely documented, and fully supported. It got that way through five tough years in the field in hundreds of applications.

It means you don't have to worry about obsolescence. That's because SYSTEMS 32 software has a true 32 bit heritage, flexible enough to meet your future needs. The nucleus of our flexibility is provided by our powerful, disc-based Real-Time Monitor, a true multi-programming operating system.

Whatever your needs, we have the solution, like the extended FORTRAN IV Compiler, Process Control Executive...and a Terminal Support System that provides comprehensive services for multiple terminal users.

If Insectus Programma is bugging you, put it on the endangered species list...look into the SEL 32 Minis.

**SYSTEMS**  
ENGINEERING LABORATORIES



- CALL ME
- SEND ME MORE INFO
- I HAVE PRESENT NEED FOR SYSTEM

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

PHONE \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

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

SYSTEMS Engineering Laboratories  
6901 West Sunrise Boulevard Fort Lauderdale, Florida 33313

European Inquiries: 85 bis Avenue Albert ler 92 Rueil-Malmaison, France Tel 967-8317

83



## At last, a system that makes credit verification as simple as it should be.

Ideally, credit card and check verification should be a simple "yes" or "no" proposition.

Unfortunately, at a lot of banks, supermarkets and other retail outlets, it's a complicated, time consuming process.

To solve the problem, Bell has designed the fast and simple to operate Transaction\* telephone system.

The system includes the Transaction telephone terminal, the switched network, and 407 type data station interface. Plus, the data base computer.

The terminal itself is intended as the remote telephone in a digital inquiry-voice answer system. It has a single slot through which automatic dialing and bank or credit cards are passed. (If it's a check, the user keys in the account number.)

The Transaction telephone automatically

enters customer and user information by reading the magnetically encoded ABA Track II stripe found on the back of most major bank and credit cards. It also fully buffers all of the data input.

Sequential instruction lights guide the user through the simple data input procedure. While the data is being entered, the telephone dials the number of the data base needed for verification. All of the buffered information is then sped through the switched network and the 407 type data station. Customer information is withdrawn, and an audio or visual response is relayed to the user.

In addition, the terminal can be used as a regular telephone. And it's available in Touch-Tone® or rotary.

For the surprisingly low cost and complete details, contact your Bell Account Representative.

\*Trademark of AT&T Co. ® Registered trademark of AT&T Co.



### **The Transaction Telephone System.**

**Another part of the Bell System's end-to-end data commitment.**



## Here's a money-saving combination that you can bank on

Westinghouse software users include some of the largest, most demanding companies in the world. Like Colgate-Palmolive, General Motors, PPG Industries. They expect the most from their software. That's why they bank on Westinghouse:

### 1. DISK UTILITY SYSTEM

**DOS and DOS/VS program that increases your computer's productivity**

Runs up to five times faster than others  
Gives you 13 exclusive features  
Uses less storage space  
Self-relocating  
Verifies data copied/restored

### 2. WESTI

**DOS/VS teleprocessing interface that manages: terminals • user core areas • display format files • application programs • disk work space • user work areas**

Reduces core requirements  
Installs in as little as three hours  
Improves system efficiency  
Increases system flexibility

### 3. DOKUMNTR

**An automated approach to documenting: technical abstracts • course material • user manuals • maintenance handbooks**

Produces standard documentation  
Simplifies revisions and indexing  
Saves proofing time  
Saves time on main

### 4. JOB ACCOUNTING SYSTEM

**A system that helps you get more from existing resources**

Identifies program reruns

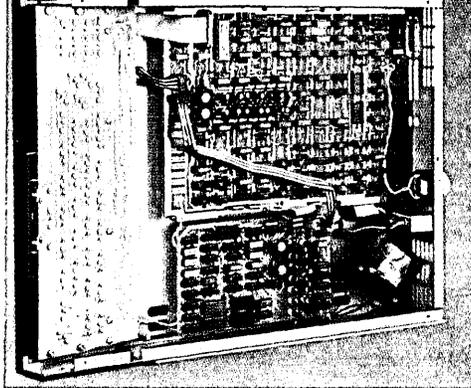
Identifies overload  
Examines operator/computer performance  
Reduces memory partition idle time

## Don't take our word for it

Prove these claims on your own hardware. Call us today at 412 256-5583 for more information. Or write Westinghouse Electric Corporation, OSP, 2040 Ardmore Blvd., Pittsburgh, Pa. 15221.



# Westinghouse helps make it happen



TELERAY APL... AND OTHERS  
 OF THE WORLD'S MOST  
 RELIABLE CRT TERMINALS  
 α [ ] \_ ▽ Δ + ' [ ( ) ] ~ ) < ≤ = > ] v ^  
 ⌈ T ⌋ [ ] ? w e f ~ ^ + ↓ 10 ± + + x  
 ◇ \$ ÷ + - ← + { } [ / 1 2 3 4 5 6 7 8 9 0  
 ▽ | φ [ ] ' [ ] H \_ H - / ^ T ⌈ I  
 TRUE OVERSTRIKE



## The "Fewer Belly Aches" CRT Goes APL

Here's the newest addition to the growing TELERAY family of "gutless wonders" . . . the Series 3900 . . . following in the same tradition that produced the Series 3300 TTY replacement and the full-ASCII Series 3700 with single-logic-board, plug-in-chip simplicity.

The 3900 is really three terminals in one—APL, full ASCII, and upper-case TTY. Its display clarity is unusually sharp—the result of several interacting features: a high resolution monitor, 15-inch CRT, and TELERAY's switchable wide-character format (over 1/4 inch high and wide).

The 3900 displays TRUE APL overstrike characters, with ASCII mode overstrike optional. It operates scroll-up, with bottom-line data entry and bot-

tom-line cursor controls. And, except for the bell tone, it gives you totally quiet operation—no fan.

Best of all, it is priced lower by far than any APL terminal in the world . . . like under \$2500—for one.

- Standard Features:**
- APL/ASCII Typewriter-Pairing Keyboard
  - APL and Full-ASCII Character Sets—Computer Switchable
  - True APL Overstrike and Underlining
  - 15-Inch, High-Resolution CRT
  - 1920 Characters (24 x 80)
  - Wide Character Format (24 x 40), Switchable
  - Asynchronous, Character-Oriented Transmission

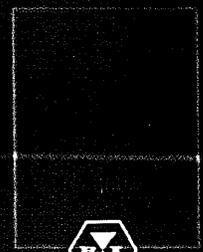
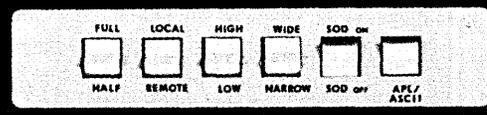
Dual Data Rates, to 9600 Baud  
 All Standard Interfaces—RS-232, Current Loop and TTL

- Optional Features:**
- Printer Output—RS-232 Serial and Parallel TTL and Current Loop
  - Composite Video Output
  - Numeric Keypad
  - Detachable Keyboard and Receive-Only Models
  - ASCII Mode Overstrike
  - 50 Hz Power Package

Call collect (612) 941-3300. That's the hot line to the "gutless wonders" 3300, 3700, and now APL 3900. We're called the *Uptime* terminal TELERAY!

CIRCLE 66 ON READER CARD

# TELERAY 3900



**RESEARCH INC**  
 BOX 24064 MINNEAPOLIS, MINNESOTA USA 55424

Granted, our new ADM-3 is basic. Especially if you compare it with all the smart video terminals around (our ADM-1 or -2, for example). But the \$995 unit price puts it into a different perspective.

As simple as it is, the ADM-3's one-card brain can help you move a lot of data. And it's compatible with most popular computers. That means, it fits all kinds of applications. Including yours.

Here's what you get for \$995. 12" diagonal screen. Full or half duplex operation at 11 selectable data rates. Bright, easy-to-read characters — 960 or 1920,\* displayed in 12 or 24 rows of 80 letters. 59 data entry keys arranged like on a typewriter which keeps operator training short and basic, too. What's more, our ADM-3 is alert. It says "beep" when you come to the end of a line. The rest of the time, it just keeps cool and quiet.

Our DUMB TERMINAL also offers you room for

\*1920 Characters is an option available at additional cost.

improvements. Its RS 232C interface extension port lets you hook up hard copy printer, magnetic tape recorder or additional (smarter) data terminals. And with a few options, you can make our ADM-3 answer back. Increase its vocabulary by adding upper and lower case. Transmit and receive independently selectable rates. Even enter just numbers on a numeric key pad.

After counting all its limited blessings, you have to admit one thing: you simply couldn't ask for more for \$995. At this low level, you can afford to order a dozen or more DUMB TERMINALS (and buy them at our even lower quantity discount price).



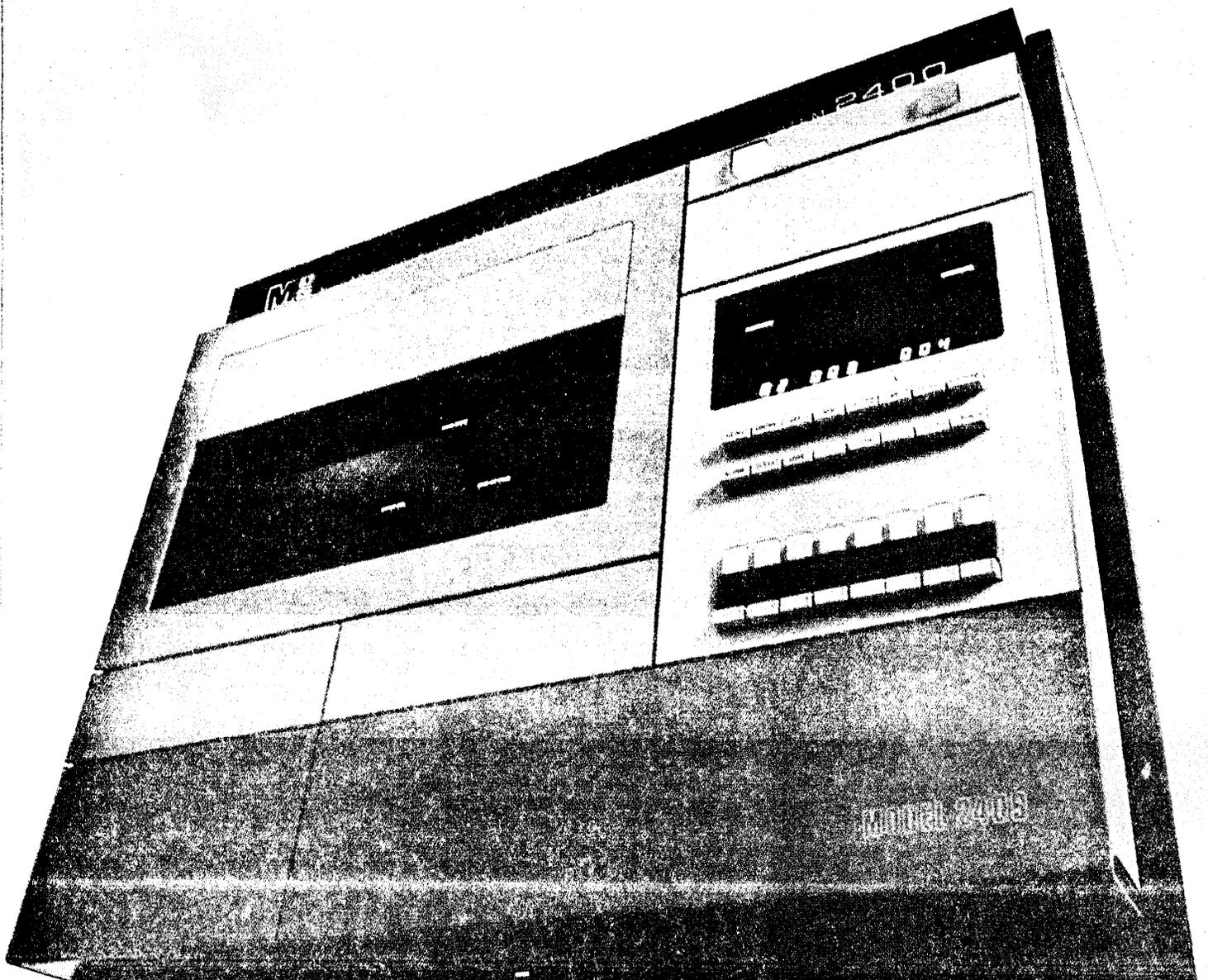
## **DUMB TERMINAL. SMART BUY.**

LEAR SIEGLER, INC.  
ELECTRONIC INSTRUMENTATION  
DIVISION DATA PRODUCTS



714 N. Brookhurst St.  
Anaheim, CA 92803  
Telephone:  
(714) 774-1010

# **INTRODUCING THE \$995 DUMB TERMINAL.**



# Give your main frame the power you're paying for.

MDS System 2400 lets your central computer perform. Mainframe systems are designed primarily for rapid internal processing. Their efficiency is seriously degraded by dependence on peripheral functions involving data preparation. It is now possible to execute most peripheral functions without mainframe involvement. With the power and flexibility of the MDS System 2400, backed by one of the most experienced support teams in the industry.

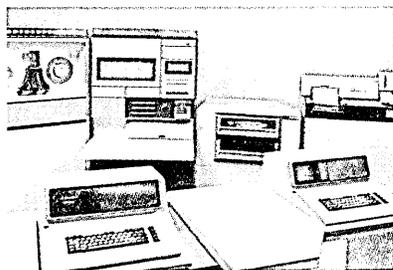
The 2400 is a mini-computer-based data handling system specializing in I/O service to large computer users. It performs functions off line which would normally consume up to 80% of costly mainframe time. And it can handle several operations

- concurrently: • Intelligent data entry • Off-line printing
- Media conversion • File maintenance • High-speed data communications • Network control

Let your main frame do what it was intended for. Find out

*how* from the people who pioneered peripheral processing. And *why* over 3500 companies (including 48% of the FORTUNE 500) have already selected Mohawk equipment to boost their total operational productivity.

Ask your local MDS representative how System 2400 can help maintain the bottom line with your existing computer. Call or write Mohawk Data Sciences Corporation, Executive Headquarters, 1599 Littleton Road, Parsippany, NJ 07054, phone (201) 540-9080



**Mohawk Data Sciences**

© Copyright 1975 by Mohawk Data Sciences Corporation



# Some artists work faster standing up.

We taught the computer to draw. And from the beginning, we've demanded ever-increasing accuracy—to the point where today, our plotters can draw things that the human would not even attempt.

But in the computer world, time is money. So our *artists* have to perform with remarkable speed.

Last year, we ran an ad where we said that our giant 748 Flatbed Plotter could draw faster than ink flows.

Now we're introducing the 960 Plotter.

It has the fastest *throughput* in the industry.

#### How fast is fast?

The 960 can draw at a rate up to 30 inches per second.

And from a dead start, it can accelerate to that speed after traveling only 3/10 of an inch.

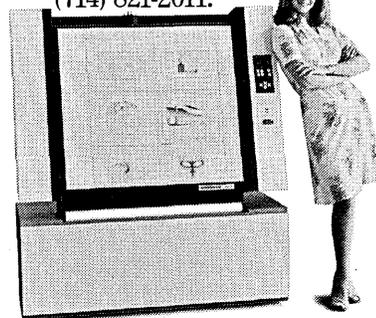
#### Less noise. Less space.

The new 960 is extraordinarily quiet. And because it's a vertical plotter, it takes up a lot less space.

Remember, CalComp taught the computer to draw, and our plotter marketing

facilities are unmatched throughout the world.

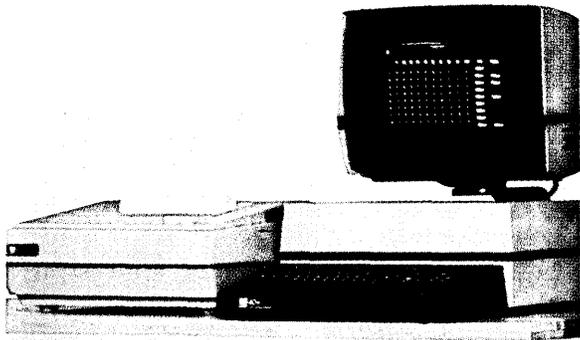
See our new artist at work. Call or write California Computer Products, Inc., DA-12-75, 2411 West La Palma Avenue, Anaheim, California 92801. Telephone (714) 821-2011.



**CALCOMP**

# In data communication systems, ICC helps you put it all together.

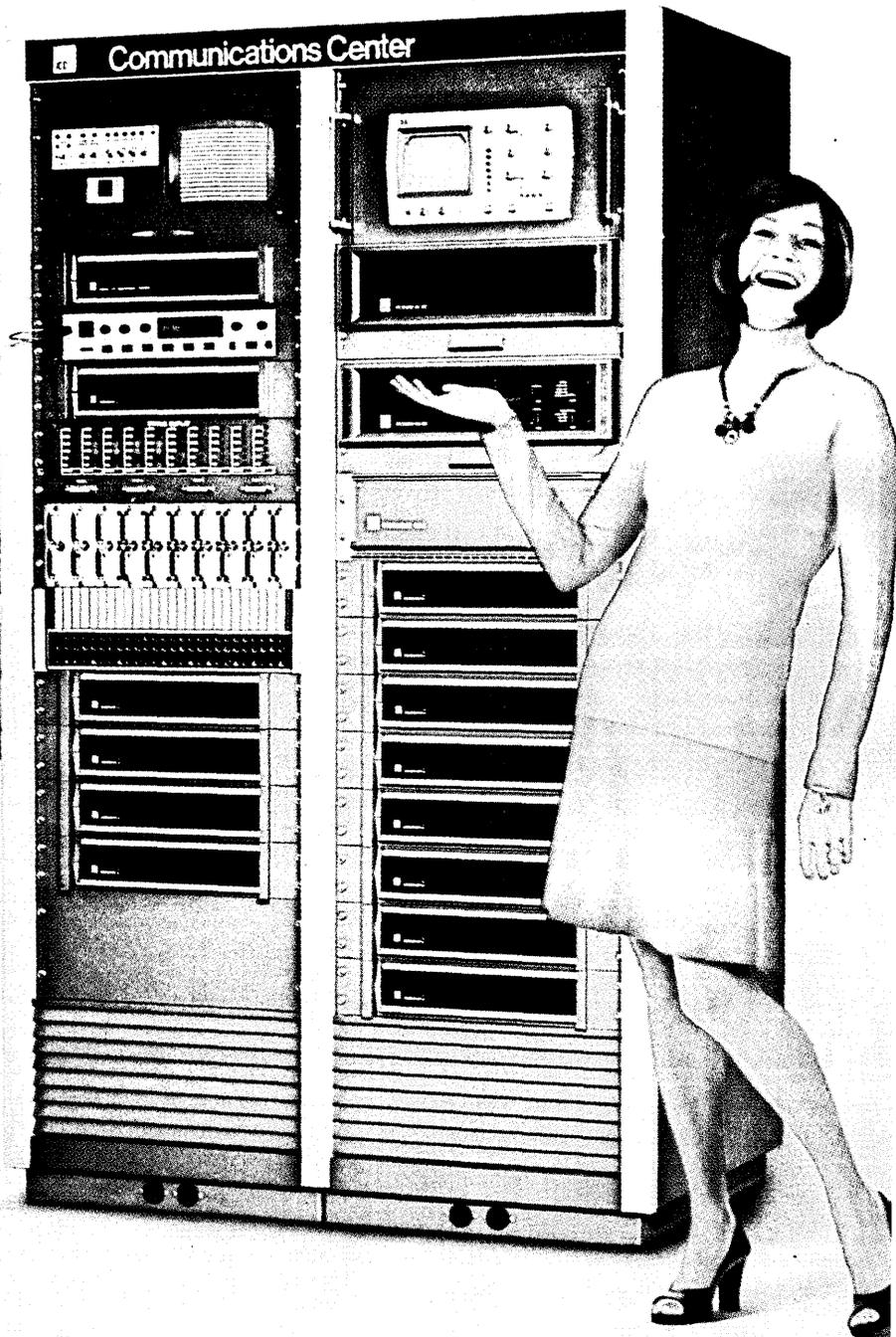
ICC believes that data communication systems have one main objective — to deliver your data when and where you want it, in the form that you want it . . . *economically*. That's why we build modems that offer you extra system flexibility. With features like self diagnostics, automatic line equalization, and remote test. And multiport design that lets you combine several data channels on one line.



ICC's tech-controls give you centralized network monitoring and control. And, the 40+ Data Display System rounds out your network with broad display capability at reasonable cost.

Even if your data communication network spreads across the country (or across the world) ICC's systems approach helps you put it all together.

Our new catalog explains how. Send for a copy.



## International Communications Corporation

8600 N.W. 41st Street, Miami, Florida 33166 Telephone (305) 592-7654

In Europe: RACAL-MILGO LIMITED Reading, Berks, England

© 1975



Regional Sales Offices: Eastern (212) 687-5040; Southeastern (404) 996-6327; D.C. (202) 296-4940; Central (312) 298-7150; Western (213) 641-3961

member of  
IDCMA

CIRCLE 29 ON READER CARD

# STARAN translates a satellite's winks into wheat forecasts.

Every time the Landsat satellite winks, it takes a picture. And by analyzing these pictures, crop forecasters will attempt to determine wheat acreage.

But the job of digesting the billions of bits of data in these images can give even powerful conventional computers indigestion. That's why NASA uses Goodyear's STARAN® associative parallel array processor.

Ordinary digital computers process only one or a few discrete

points of an image at a time. But the STARAN system combines content addressability with parallel array arithmetic to process hundreds, or even thousands, of image points at once.

And because this unique capability dramatically speeds operations, massive improvements in image throughput are possible. That's why the STARAN processing system is unmatched in its ability to solve problems requiring operations

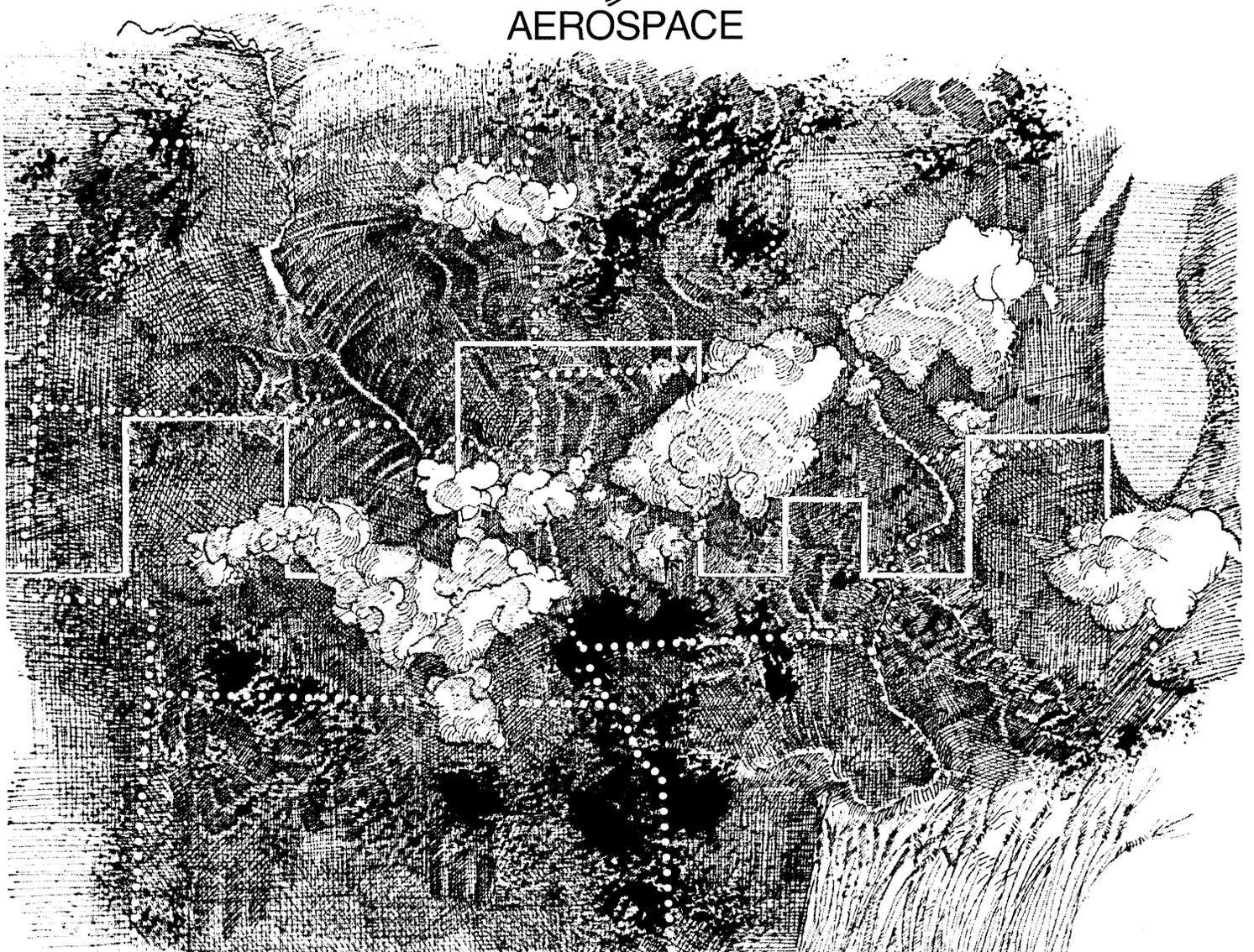
on many similar data streams or high-speed searches of many similar file records.

So before you invest a lot of money in an image processing system, invest a little time. Look into STARAN. The more severe your requirements, the more money it may save you.

For complete information, just write to Wayne Brubaker, Goodyear Aerospace Corporation, Akron, Ohio 44315. Or call him at (216) 794-3631.

CIRCLE 72 ON READER CARD

**GOODYEAR**  
AEROSPACE



# Editor's Readout

---

John L. Kirkley, Editor

## Too Little Too Late

After more than a year's delay, we finally have a National Commission on Electronic Fund Transfers.

President Ford's procrastination in appointing the non-statutory members has left the group with less than one year to do its work . . . and most commissions take a year just to work out a compatible meeting schedule and decide who gets the prune danish.

Membership on this potentially short-lived body is composed of bankers, retailers, financiers, state officials and the like. Although EFTS is a computer-dependent innovation, no one from the computer industry was appointed to the commission—and there were several highly-qualified hats in the ring.

And so we have an underqualified committee with not enough time to do its work.

It probably wouldn't matter much if this were just another run of the mill commission contemplating the usual piffle. But electronic funds transfer is going to radically alter the basic fabric of our society. As a recent Office of Telecommunications Policy study stated, these systems will affect the lives of all of us "as powerfully as the adoption of the automobile affected the lives of our grandparents." Much more is needed than the present ill-considered, half-hearted effort.

For openers, Congress should extend the commission's life. At the same time, a representative of the computer industry, wise in the ways of data processing technology and computer networking, should be appointed to the group.

Governmental myopia can sometimes be tolerated. This is not one of those times.

## Open Before Christmas

Although the holidays are still a few weeks away, this issue contains an editorial stocking-stuffer that we think you'll appreciate.

Wrapped up on pages 138-154 are approximately 4,000 user ratings of over 200 software packages. The ratings reflect the user's evaluation of each package's throughput efficiency, ease of use, and other important characteristics.

To our knowledge, this issue's ratings represent the largest such listing of actual user reactions ever attempted. And it also represents an acknowledgment of a software package industry that has moved out of its fledgling phase; an industry with an increasing number of helpful, reliable products being produced by companies that intend to be around for some time to come.

Data processing budgets for 1976 reflect the acceptance of these packaged solutions to the dp managers' problems. The average installation will spend 20% more for software during the new year.

If you're considering acquiring a software package, we think you'll find the ratings and the vendor index a handy reference package in its own right.

Unlike that handpainted tie from your Aunt Harriet in Chicago, this is one present that you may find some use for in 1976. \*

# Interactive Graphics Comes of Age

by Eric Teicholz

Continuing reductions in size, cost, and complexity are causing a population explosion in interactive graphics systems.

Imagine an architect first designing a building and then immediately being able to walk around and through it before the building is even built. He could walk up to windows and doors, examine them and make appropriate changes if they did not meet his design criteria.

This story is not a fantasy. Dr. Ivan Sutherland, first at Harvard and then at the Univ. of Utah, designed and built a head-mounted display consisting of two miniature crt's mounted in a pair of goggles and mechanically connected to a computer. As the architect turns his head, the computer knows precisely what is being looked at and will generate stereo views of the build-

ing as if the designer were actually inside it.

Today, designers have a unique tool that makes it possible to realistically simulate a three-dimensional environment and to make design changes in a faster and more accurate manner than has ever previously been the case—interactive computer graphic systems. Whereas computer graphics had its origin in line drawing (pen on paper) machines, companies representing the “cutting edge” of graphic technology, such as those started by Dr. Sutherland (Evans & Sutherland, Computer Corp.), now make it possible to design three-dimensional figures dynamically using gray tone or color displays.

## Some history

Interactive graphics has been with us since the early '60s when Ivan Sutherland developed “Sketchpad,” the first interactive system for computer aided design. Early developmental efforts, like GM's DAC-1 system, tended to be based on large, expensive, and specialized hardware. Many early experiments in computer aided design were actually of greater value for promotional rather than practical purposes. The systems and applications software usually demanded dedicated central processors, and incidentally were in many ways incompatible with the newly emerging time-sharing services that required low cost graphics

Vendor	Applicon	Auto-Trol	Bendix	Calma	Computervision	Digital Equipment (Redac System)
<b>1st delivery</b>	Model 700—1970 Model 800—1974	1973	1972	1971	1969—1970	1971
<b>Primary applications</b>	Integrated circuits Printed circuits	Drafting Printed circuits	Drafting, Printed circuits, and Mapping	Integrated circuits Printed circuits	Integrated circuits, Printed circuits, and Drafting	Integrated circuits, Printed circuits, Architecture and Garments
<b>Primary input &amp; edit devices</b>	<ul style="list-style-type: none"> <li>digitizer</li> <li>tablitzer with optional plotter</li> <li>crt with tablet and keyboard</li> <li>magnetic tape</li> </ul>	<ul style="list-style-type: none"> <li>digitizer with keyboard/display</li> <li>interactive crt with cursor</li> <li>Teletype ASR 33</li> <li>magnetic tape</li> </ul>	<ul style="list-style-type: none"> <li>digitizer</li> <li>crt with keyboard</li> <li>Teletype ASR 33</li> <li>magnetic tape</li> </ul>	<ul style="list-style-type: none"> <li>digitizer with keyboard/display</li> <li>crt with tablet and keyboard</li> <li>Teletype ASR 33</li> <li>magnetic tape</li> </ul>	<ul style="list-style-type: none"> <li>digitizer/plotter</li> <li>crt with tablet and keyboard</li> <li>Teletype ASR 33</li> <li>interface to larger computer</li> </ul>	<ul style="list-style-type: none"> <li>17-inch crt with light pen</li> <li>Teletype ASR 33 or Decwriter</li> <li>magnetic tape</li> </ul>
<b>Maximum input stations</b>	Model 700: 4 plus two other devices  Model 800: 5 plus three other devices	6 stations and two plotters	4 stations	6 stations with three plotters and one tape	4 stations	4 crt stations
<b>Processor</b>	Basic station: PDP-11/05 with 24K  Additional stations: PDP-11/05 with 8K	Varian 620L/200	Basic station: Nova 1200 with 24K  Additional stations: Nova 1210 with 24K	Nova 1220	Nova	PDP-15/76 dual processor with PDP-15 and PDP-11
<b>Typical system cost</b>	\$122,000	\$126,895 with flatbed plotter	\$91,290	\$131,000	\$110,000 ± 10% with digitizer/plotter but no drum	\$109,800 hardware \$ 50,000 software
<b>Expansion cost</b>	\$18,000—\$36,000 depending on size and display	<ul style="list-style-type: none"> <li>digitizer station \$12,500</li> <li>crt station with thumbwheel, x-y cursor &amp; keyboard \$11,500</li> </ul>	Station with digitizer, crt/keyboard, ASR 33 and Nova 1210 \$35,000	<ul style="list-style-type: none"> <li>station with crt and tablet \$24,000</li> <li>digitizer station \$34,000</li> </ul>	digitizer/plotter \$32,000—\$40,000	not applicable

\*Most of the market estimates and tabular data used in this article are from International Technology Marketing, Inc., Newton, Mass., with which the author is associated.

displays and low cpu overhead.

By the late '60s some changes took place in the computer graphics industry. Computer manufacturers began to realize the economic and technical potential of the interactive graphics market and more readily supported graphic requirements in their hardware design. As computer memory technology advanced, hardware costs came down, resulting in the emergence of still smaller and faster machines.

The greatest impetus of all for graphics came from the development of storage tube crt's that were both inexpensive (in the \$3-\$10,000 range) and could be used as terminals over telephone lines communicating with remote time-shared cpu's.

Storage crt's draw pictures on a display surface in a random fashion and the displays remain on the screen until they are erased. The storage tube, unlike its predecessor, the more conventional "refresh" crt, is not used with a display list or menu and can separate memory from display processing requirements—thereby freeing the graphics program from dependency on bandwidth, buffer size and phosphor decay rates. However, to be expected, the storage tube pays a price for these characteristics: because its pictures are not refreshed 30 to 60 times a second and are drawn in an unstructured (random) manner, storage crt's require high "driving" voltages to produce the required beam deflections,

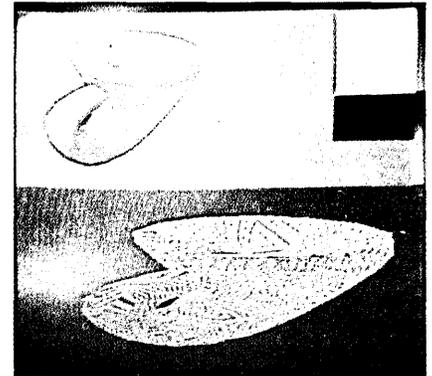
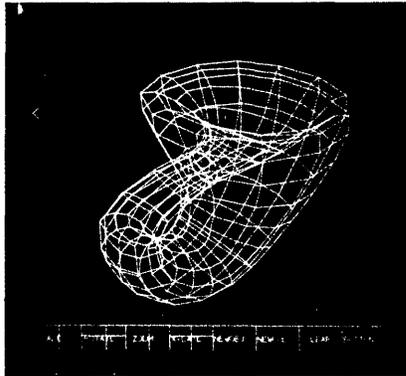
and therefore have relatively slow drawing speeds—especially if used over voice-grade telephone lines to a remote central processor. Finally, a large class of interactive graphic procedures that are available on the refresh crt (such as selective erasure) are omitted from the storage tube user's repertoire.

In the past five years, the computer industry has been changing at an ever-increasing pace. We have seen the development of intelligent terminals (often containing their own graphic processors); the development of integrated turnkey systems that combine hardware, software, and service from a single source; a rapidly expanding minicomputer market (which will be

about \$1.24 billion in 1975); a less mature microcomputer market; and larger and faster mass memories.

It is difficult to establish categories for interactive graphic modes of operation. Rather the modes can be represented by a continuum: At one end is the user who communicates with a remote computer using only a storage crt as a terminal. This user pays a little over \$200/month for the rental of the terminal and can perform only relatively simple graphic applications because of the data transmission limitations of telephone lines. A reasonably complex picture, for example, can take over 10 minutes to generate if sent over voice-grade telephone lines.

At the other end of the spectrum are



Evans & Sutherland's "Picture System" (from which these photos were taken) and others like it allow designers to work in gray tones or color or both. There are less than 200 such sophisticated (and relatively expensive) systems in use, primarily in basic research, aerospace modeling and simulation, and computer aided design.

Dimensional Systems	Gerber Scientific	GCA/Hampshire	Macrodata	M & S Computing	United Computing
1972	1973	1973	1970	1972	1974
Drafting and Mapping	Integrated circuits Printed circuits	Integrated circuits	Integrated circuits	Integrated circuits, Printed circuits, Drafting and Mapping	numerical control, mechanical design, drafting
<ul style="list-style-type: none"> <li>digitizer with menu and ASR 33</li> <li>crt with tablet and keyboard</li> <li>Teletype ASR 33</li> <li>magnetic tape</li> </ul>	<ul style="list-style-type: none"> <li>digitizer/plotter</li> <li>keyboard/display</li> <li>crt/stylus</li> <li>Teletype ASR 33</li> <li>magnetic tape</li> </ul>	<ul style="list-style-type: none"> <li>digitizer</li> <li>crt terminal</li> <li>crt with cursor and tablet</li> <li>Teletype ASR 33</li> <li>magnetic tape</li> </ul>	<ul style="list-style-type: none"> <li>digitizer</li> <li>crt, tablet, and keyboard</li> <li>Teletype ASR 33</li> <li>magnetic tape</li> <li>punched cards</li> </ul>	<ul style="list-style-type: none"> <li>storage crt</li> <li>stylus or cursor</li> <li>data tablet</li> <li>digitizer</li> <li>keyboard</li> </ul>	<ul style="list-style-type: none"> <li>storage crt</li> <li>cursor control</li> <li>keyboard</li> <li>magnetic tape</li> </ul>
4 stations	6 stations	8 stations	4 total: two crt and two digitizer	8 total	4 stations
Lockheed SUE	Basic station: H-P 2100A with 12K  Additional stations: H-P 2100A with 12K	PDP-11/40 with 24K	Interdata 70	PDP-11	General Automation SPEC 1665 with 32K
\$114,500	\$120,000 with crt/ stylus station	\$160,000	\$130,000	\$100,000	\$150,000
40x60 tablet and crt \$26,000—\$28,000	<ul style="list-style-type: none"> <li>digitizer/plotter \$50,000</li> <li>keyboard/display \$40,000</li> <li>crt/stylus station \$70,000</li> </ul>	<ul style="list-style-type: none"> <li>edit station \$30,000</li> <li>digitizer station \$40,000</li> </ul>	<ul style="list-style-type: none"> <li>digitizer station \$15,000</li> <li>crt, tablet, and keyboard \$25,000</li> </ul>	digitizer, two crts, keyboard, and data tablet \$25,000	\$16,000/terminal

## INTERACTIVE GRAPHICS

state of the art refresh-type systems consisting of sophisticated self-contained, standalone units, with two- and three-dimensional, and sometimes even color, graphic capabilities. These single-station systems contain large processors and are capable of continuous dynamic motion, zooming, perspective generation and other sophisticated functions. The costs of the display processors alone usually start in excess of \$125,000.

Finally, in the middle of the spectrum, are the family of graphic systems called intelligent terminals. These contain various degrees of self-contained computational capabilities and cost anywhere from \$8,000 to \$75,000.

The leading manufacturer of the storage crt is Tektronix, which has over 10,000 terminals in the field representing a little less than 90% of the total market. Uses encompass just about every application but can be approximated as 75% scientific and 25% business. Many of the business applications are provided by time-sharing companies such as Cyphernetics which not only support the storage crt but offer valuable econometric data bases as well.

The leading manufacturers of state of the art systems are Evans & Sutherland, Adage, and Vector General. Together, there are probably less than 200 such systems in use. Because of their unique capabilities (and because of their price), most are used for basic research (in universities and research centers), modeling and simulation (in the aerospace industry) and, to an increasing degree, for computer aided design applications.

The graphic community has not yet reached a consensus regarding the direction of future technological developments. Because of the developments mentioned above, in combination with emerging high speed digital telecommunications networks, however, raster scan or television compatible graphics (which structures data left-to-right and top-to-bottom) very likely will eventually predominate. Many research (MIT, Universities of Utah and North Carolina) and development efforts (Xerox, Datadisc, Evans & Sutherland) seem to point towards the primacy of tv-compatible graphics.

There are many factors that will facilitate movement in this direction: television sets provide a low cost terminal, and there are approximately 120 million television sets in the U.S. of which almost 50% are in color. Raster scan video memories are lowering in cost and have low power re-

quirements. Gray tones and color outputs are readily achieved on raster scan (tv) displays. Finally, raster scan technology has the potential of merging computer graphics with picture processing technology, thereby making possible the mixing and manipulating of photographic images with computer-generated displays.

### Mini-based turnkey systems

One of the more successful recent achievements in the computer graphics industry has been the emergence of minicomputer based integrated turnkey systems. The typical system will cost approximately \$125,000, and consists of a graphic input station (digitizer, tablet, function keys, joystick or keyboard), an output station (flatbed, drum, light beam, microfilm or electrostatic plotter), an interactive crt work station, a large secondary mass memory (disc, tape or drum) for storing large data bases, the mini and, in some cases, a communications interface to a remote processor.

Software for turnkey systems include both systems and applications capabilities for at least two-, and sometimes three-dimensional, graphic data bases. Table 1 compares some characteristics of turnkey systems as developed by their major producers. Although the hardware varies greatly

from system to system, they are all alike in that both hardware and software support is provided by the same company.

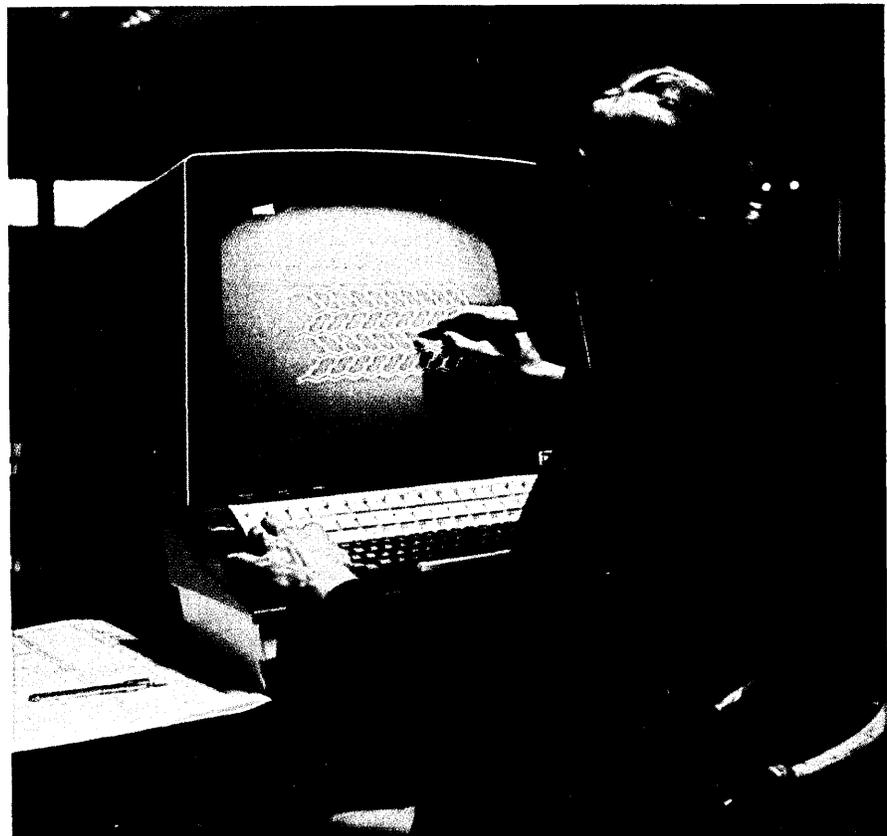
There are now about 500 systems in operation. Of these, almost half will have been sold in 1975. In five years the number of systems in use will have doubled.

The current size of the turnkey system market (1974 figures) as split up by the same vendors is as follows:

	\$ millions
Applicon	\$10.0
Auto-Trol	1.0
Bendix	2.0
Calma	4.5
Computervision	13.0
DEC/Redac	2.0
Dimensional Systems	0.3
Gerber	1.0
Hampshire	0.5
Macrodata	1.5
M&S	0.2
United Computing	0.5
<u>Total</u>	<u>\$36.5</u>

The figure is still relatively small, corresponding to only about one-third of the figure for non-interactive graphics products and services, but it is growing.

Also interesting in those figures is that only Digital Equipment, of all the major hardware manufacturers, makes



Firestone Tire and Rubber Co. uses a Sanders/900 system for applications like tire tread design. Larger systems like the 900 are usually found in companies with sales over \$50 million that can take advantage of multi-shift usage.

one of these systems, and that three vendors (Computervision, Applicon and Calma) share over 75% of the market. Computervision alone has over 200 systems in the field, reportedly.

### Today's applications

Most integrated systems are used for applications related to electronics (75%), drafting (15%), and cartography (5%), with architecture, engineering, plus university and government research making up the remaining 5%. The latest published and forecast figures for sales of turnkey systems by industry are:

	\$ millions	
	1975	1978
Electronics	\$58	\$150
Drafting	12.5	60
Mapping/cartography	7	20
Architecture/engr	2.5	3
Govt/univ research	3.5	7
<b>Totals</b>	<b>\$83.5</b>	<b>\$240</b>

Electronic applications encompass design and layout of wiring and cir-

as 3D drafting capabilities are required for manufacturers' applications in the ordnance, chemicals, refining, machinery and metal products industries. Unfortunately, such systems are extremely sophisticated and complicated to use. Consequently there are only about 25 3D systems in use today. Response thus far has been a "wait and see" attitude. Progress is being made but it will be another year (or two) before the required system flexibility, file response and access criteria are achieved.

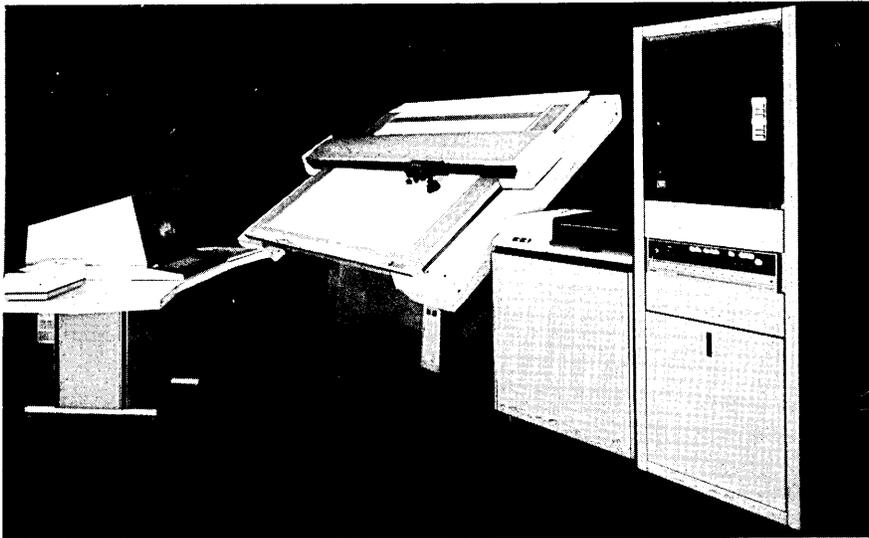
Computer mapping applications have enjoyed a rapid growth primarily because of the increased availability of geographic and statistical data bases such as census files. Furthermore, the forthcoming national conversion to the metric system will necessitate the re-drawing of millions of base maps which can best be achieved by computer. General purpose mapping software is also readily available and, except for topographic maps, extremely high accuracy output is usually not

by W. Barkley Fritz and Charles R. Lansberry which follows these pages, describes how interactive computer graphics is being used at the Sun Shipbuilding and Dry Dock Co.)

### Tomorrow

Integrated graphic systems of the future will become smaller (in terms of standalone capabilities) and less expensive than present systems. New systems will be designed for use with a host computer and will provide general local picture processing capabilities such as data base creation, graphic editing and interrogation, file formatting and the like. It will not only be easy to enter the geometry and topography of data base components, but attributes (such as cost, manufacturer, color, etc.) will be assigned to components as well. When this happens, and when such a system is available for under \$50,000, entire new classes of users and new application areas will open.

Turnkey systems have proven to be a viable and lasting force in the graphics market. Psychological barriers to their use that existed just a few years ago have largely been overcome. Skepticism has been replaced by respect and a sincere desire that machines will be able to assume an ever-increasing role in performing the drudgery of repetitive graphic bookkeeping chores. Only 10 years ago designers were primarily interested in automating the design process and in "pushbutton" engineering. Today, successful applications encompass a spectrum of activities from conceptualizing designs to production. Emphasis is on man-machine interaction rather than on man or machine action alone. It is this approach that has produced the most successful results to date and will continue to do so in the near future. \*



Computervision's "Designer System" includes a console, plotter/digitizer, disc, mag tape, and minicomputer. Approximately 200 of the turnkey systems have been put into the field, according to the manufacturer.

cuits for printed circuit, integrated circuit, and hybrid circuit production. The predominating application is the generation of artwork master and automated machine controls for the production of PC boards and for process masks used in IC production. A principal advantage of graphic systems here (as for all application areas) has been the ability to create and store graphic data bases which can be easily recalled and revised by computer (the 'big eraser' concept).

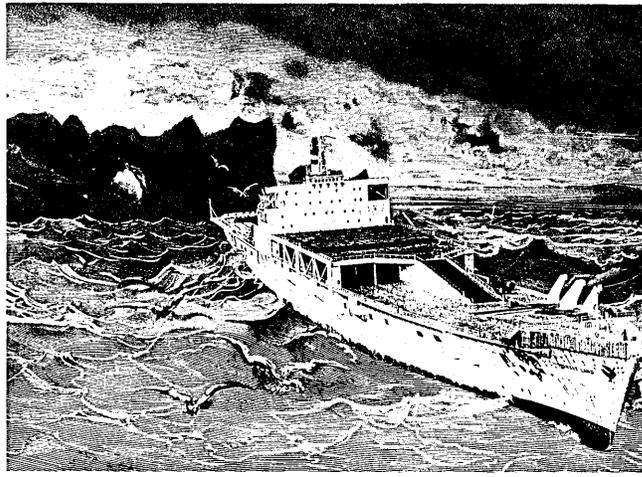
Two-dimensional general purpose drafting for electrical, mechanical and piping systems has been commercially viable for some time. Most developmental work in drafting for electrical, schematic and mechanical work relates to three-dimensional data base systems

required. At present, Applicon estimates that approximately 20% of its systems are used for mapping and engineering construction.

To date, most users of standalone interactive systems are large companies whose sales are over \$50 million. These are the companies who achieve the greatest cost benefits from multi-shift usage. Feedback from the user community indicates that benefits from integrated systems include shorter production times, design standardization, establishment of graphic data bases, improved accuracy and greater design flexibility, especially in terms of making design changes. Of all these, design standardization and data base establishment seem to be the most commonly noted. (As an example, the article



Prof. Teicholz is associate director of the Laboratory for Computer Graphics and Spatial Analysis at Harvard Univ., where he teaches in the Graduate School of Design. He was a member of the study team at International Technology Marketing, Inc., which produced the reports from which some of these findings were taken.



# Ship Modeling With Interactive Graphics

by W. Barkley Fritz and Charles R. Lansberry

---

The payoff comes from eliminating redundancy, error checking, post processing—and most of all, from saving time.

---

The Sun Shipbuilding and Dry Dock Company is a complete integrated manufacturing complex located on nearly 200 acres along the Delaware River in Chester, Pa. It currently employs over 4,100 people. The yard began operations in 1916 and has since launched and delivered more than 600 ships. Included in recent construction was the widely publicized "ocean mining" ship, the Hughes "Glomar Explorer," responsible for lifting a large portion of a Russian submarine from the bottom of the Pacific Ocean.

In June of this year, Sun Ship launched the world's largest and fastest Roll-on/Roll-off trailer cargo ship. In November 1975 it launched a new type double hull "ecological" tanker. This ship has been dubbed an ecological tanker because its unique double bottom and double side shell structure provides an effective solution to the problems of oil spills resulting from damage to the single hull structure of conventional tankers where the oil cargo and the water are separated by only a single sheet of steel. An interactive graphics illustration based on work

performed for the ecological tanker is discussed in the body of this article.

With the variety of these new hull forms, Sun Ship engineers have been faced with many unfamiliar problems. The use of the finite element analysis technique (a technique for determining the stresses and strains of material under load) enhanced by effective interactive graphics has provided Sun Ship with the tools to handle these new design problems in an efficient and relatively error free manner by eliminating or reducing redundancy, error checking, and post processing.

## Terminal support

To support the heavy industrial complex that Sun Shipbuilding is, extensive use is made of a large array of problem solving and computer processing facilities. These capabilities are made available via terminal access to a dozen computer networks providing use of IBM 370/168, CDC 6600, Honeywell 600/6000 series, and Univac 1108 computer systems. Among the vendors supplying this network com-

puter service are McDonnell Douglas Automation, Utility Network of America, Data Corp., Boeing Computer Services, Control Data, United Computing Systems, University Computing Company, Rapidata, Honeywell Information Systems, and Sun Services. Though the computer power is not in-house, the effective Sun Ship application software capability had been in the process of development and evolution for the past 20 years.

Major application programs support many program areas such as naval architecture (ship hull characteristics, speed/power, etc.), marine engineering (heat balance, pipe stress and flow, etc.), structural engineering, production planning and industrial engineering, and marketing. Like many of these other application programs, Sun Ship's varied use of interactive graphics are separate "ad hoc" efforts to resolve specific problems.

The total cost of the computer load being processed involves an expenditure in excess of \$30,000 per month. Over 100 individual requests for computer service are processed daily. Al-

though this load would seem to justify a moderate size in-house computer, Sun Ship had chosen the terminal route to service. The flexibility thus provided permits the selection of the most effective programs and those services which offer the best performance without the drawback of the fixed overhead, relatively high capital requirements, and fixed costs associated with an in-house computer facility. This approach also leaves open the option of introducing a dedicated mini-computer or microprocessor for a selected application whenever a clear financial advantage exists for such action.

Access to these computer networks is provided by a variety of computer terminals. The bulk of the computer load is processed by three remote job entry (RJE) terminals, currently a Data 100/78, an IBM 1130, and an IBM 3780. Each of these batch terminal systems contain card reading and line printing capabilities along with teleprocessing features which enable easy access via conventional dial-up telephone lines to the various remotely located large scale computers. Essentially any terminal can connect to any of the services. The IBM 1130 has standalone processing capability and also serves as the control device for the Gerber 522 4x5-ft. flatbed plotter. In addition to the batch terminals, a variety of slow speed interactive terminals including the Hazeltine 2000 and ASR 38 Teletypes are in use at several Sun Ship locations.

### The new method

The newest computing service at Sun Ship, first introduced in August 1974, is interactive computer graphics. The interactive graphics software presently used by Sun Ship is FASTDRAW II, a McDonnell Douglas Automation Co. (McAuto) proprietary time-sharing system which interfaces with the structural program STRUDL and several other application programs. Access to FASTDRAW II is by means of a normal time-sharing multiplexed local dial phone call.

The graphics terminal hardware used at Sun Ship includes a Tektronix 4014 storage tube terminal, a Tektronix 4953 digitizing tablet, and a Tektronix 4631 hardcopy unit. The current cost for the leasing of this equipment, including maintenance services, is approximately \$1,000 per month.

The digitizing tablet is particularly useful in the model generation process. The full complement of FASTDRAW II's model creation and display commands are listed on a clear plastic menu overlay that fits on the digitizing tablet. The commands are quickly and accurately

executed by simply touching the appropriate command box on the menu with the digitizing pen. The structural model to be analyzed can be completely generated on-line using the terminal, the digitizing tablet, and the data generation commands.

The hard copy unit is used to reduce the amount of conventional plotting required in an analysis, thus eliminating manual drafting or extensive use of the large Gerber plotter. The hardcopy unit produces an 8½x11 inch copy of any image displayed on the terminal in a matter of seconds. The quality of the reproductions is very good.

Fig. 1 is a finite element model of a typical structural bracket used in the construction of Sun ships. These brackets are used to reduce stress concentrations in areas where major structural members of the hull intersect at right angles. The original used for this illustration was produced by the hardcopy unit. The numbers in the figure refer to node numbers. It is important to note that while the Gerber flatbed plotting unit is seldom used to provide graphs from the same data, it can easily be made a part of the system by simply pressing the IPF command box on the digitizing tablet to create an Intermediate Plot File (IPF). The file thus created can then be transferred to the IBM 1130 and used to drive the Gerber. Because of the speed of the Tektronix hard copy device, however, this step is seldom necessary.

The state of the art in current use of interactive graphics at Sun Ship is such that these systems do not tie in directly to the numerical control machines and

the plasma arc plate burners. This is an obvious next step, however, and indeed represents one important consequence of the direction which is being taken toward more effective use of our integrated data bases.

At the present time, only a relatively small percentage of the overall design process takes advantage of interactive graphics.

### Our need for graphics

The challenge of designing new types of ships and analyzing new requirements for ship structural details presents structural problems to the naval architect and the marine engineer that, until recently, he has had little experience with. The structural engineer is also being called upon to help analyze these problems. Fortunately, the development during the past ten years of matrix methods of structural analysis, including the finite element technique, has provided the structural engineer with powerful analytical tools to solve these problems using computers.

For complex and highly redundant structures such as ships, the biggest drawback to efficient application of the finite element method is the effort required to generate and check input data, and the time to plan and provide for the presentation of the output in an easily interpretable format. The simultaneous development in recent years of interactive graphics software and relatively inexpensive graphics terminal hardware has given the engineer the means to eliminate these drawbacks.

Complex structural analyses, whether they be three-dimensional space frame models or two- or three-dimensional finite element models, require the input of large amounts of data to define the problem. The time required to generate and code information such as joint coordinates, member incidences, and element incidences can be substantial if done manually, particularly for the three-dimensional model. Not only is the manual approach time-consuming, but it is also prone to errors.

### Modeling time cut in half

The generation of a structural model using interactive graphics provides a means for the computer generation of detailed drawings, and the identification and coding of hundreds of node points as well as element and member incidences. Key punching several hundred (or even thousands of) cards, and the required verification of this data is eliminated when interactive graphics is effectively exploited.

With interactive graphics, the user can quickly identify and correct model errors via graphical model playback. Errors in input nodes and elements

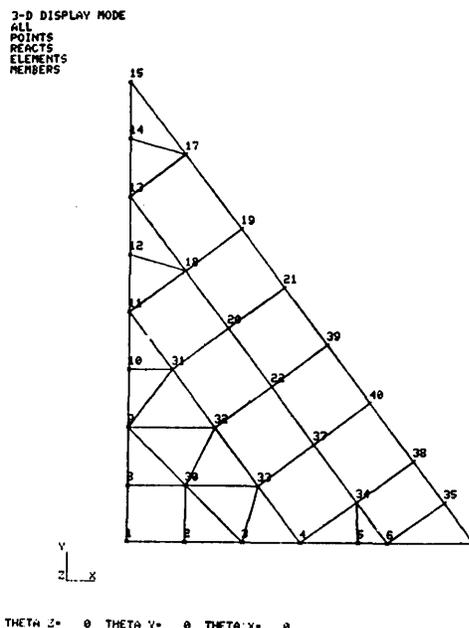


Fig. 1. Hardcopies of display images like this one of a typical structural bracket are adequate for most purposes. When required, a Gerber flatbed plotter drawing can be made without reentering the input.

# SHIP MODELING

stand out clearly on a plot of structure displayed on a graphics terminal, particularly when the graphics software allows the user to automatically rotate and view the model from a variety of positions. Such capability minimizes the chances of a faulty input model.

As a preprocessor, interactive graphics reduces elapsed time by allowing the user to quickly generate and thoroughly debug his model. Experience at Sun Ship has shown that about 60-70% of the manhours required for a typical finite element analysis are involved with the generation of bulk data (e.g., numbering and coding of nodes, members and elements, as well as creation and checking of geometric plots). Depending on the particular problem being solved, interactive graphics has reduced the manhours required for model generation and checking by 45-80%.

The output associated with a finite element analysis is also voluminous. Graphics provides a means for reduction of output data into a meaningful visual presentation. This presentation is also in a format suitable for the report required for evaluation and approval of new structures. Element and nodal numbering displays, deflected figures, and plots of principal stresses can save substantial amounts of time in the interpretation of results when properly displayed on a graphics terminal. A deflected picture of the structure superimposed over the undeflected figure condenses the printed deflection output into a single display.

### How it works

At Sun Ship, interactive graphics has been used primarily as a preprocessor for model generation and debugging. Graphics has also been used to some extent as a post-processor for effective display of output. The example given in what follows is typical of the applications where interactive graphics technology has been found useful. The finite element approach is used in the illustration and applied to static, ship-structural analysis.

Sun Ship is currently involved in the design of several new types of ships. One of these new ships, now launched, is the ecological tanker. The design of structural details for this tanker represents, perhaps, one of the most important aspects associated with the development of the overall hull girder strength and integrity. One such structural detail is shown in Fig. 2. The figure is a sketch of part of the cross section of the hull at the longitudinal centerline bulkhead showing the dou-

ble bottom transverse member (a beam running across the width of the ship at the bottom), the vertical bulkhead web (a vertical stiffener providing bending stiffness to the longitudinal bulkhead), deck transverse beam (a beam running across the width of the ship under the deck), four corner brackets, and miscellaneous stiffeners. The problem involved obtaining the performance of a plane stress finite element analysis of this detail to determine the effectiveness of the planned design.

A rough sketch of the finite element mesh to be used to model the detail was prepared by hand for use as a guide during the interactive graphics session. The details of the sketch are entered into the system using the digitizing tablet (Fig. 3) to generate the model shown in Fig. 4. The model contains 456 node points, 442 beam members, and 407 rectangular and triangular constant strain finite elements. (Fig. 4 is a photograph taken directly of the graphics terminal screen.)

Generation of the model began by creating the first element in the lower left-hand corner of the double bottom transverse member (Element 1). This element was then duplicated in the ver-

tical direction five times. The resulting column of six elements was then duplicated the required number of times in the horizontal direction to complete the bottom member. Similar procedures were used to generate the deck transverse beam, vertical bulkhead web, and miscellaneous stiffeners. The four corner brackets were generated by using the *define element* command of FASTDRAW II.

The *define element* command allows the user to build a complex model by piecing together substructures which have been previously generated. Since some structural details frequently re-occur in the design-analysis cycle, model generation time can be reduced by storing these details on-line as standard shapes. Corner brackets are common structural details in ship construction. The data file of standard shapes at Sun Ship includes the four corner brackets shown in Fig. 3. These brackets were added to the model by simply recalling them one at a time from storage, defining each as an element, and then attaching the element at the appropriate location on the model. Each standard structural shape is stored as a data file of relative node point coordinates, member and ele-

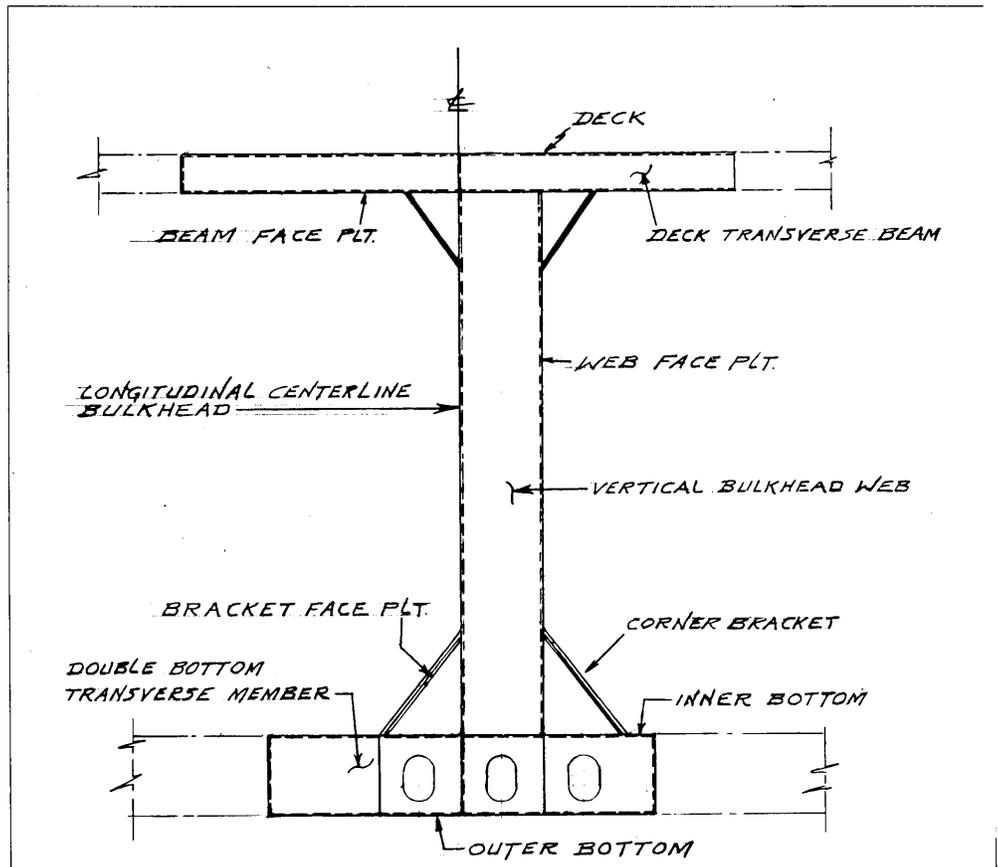


Fig. 2. The first step in the design process is to produce a sketch of the part being studied. Sketches can be much rougher than this one.

ment incidences, and member and element types.

The finite element model of the structural bracket given in Fig. 1 is actually the standard shape used to generate the corner bracket in the bottom right hand corner of Fig. 4. The ability of a good interactive graphics package to recall and modify a model file to conform to the particulars of a specific analysis makes the concept of storing standard shapes quite advantageous.

### The real saving is in time

The following time and cost figures include the effort required to generate, check, and correct the model shown in Fig. 4 (i.e., bulk data generation and checking). For the manhours included, a figure of \$25 per hour was used for engineering and \$10 per hour for keypunching:

*Time to generate computer model and check = 13 hours*

	<i>Cost</i>
Terminal usage	\$130
Computer usage	\$600
Structural engineer—13 hours	\$325
<b>TOTAL</b>	<b>\$1055</b>

*Time to generate manually and check = 38 hours*

The manual method has a slight edge in cost:

	<i>Cost</i>
Scaled Sketch of Model—6 hours	\$150
Numbering of nodes, members and elements—3 hours	\$ 75
Coding of nodes, incidences, etc.—20 hours	\$500
Keypunching & verification—5 hours	\$ 50
Generation of three plots of model on gerber	\$105
Checking by engineer—4 hours	\$100
<b>TOTAL</b>	<b>\$980</b>

The cost of using interactive graphics is still slightly more expensive than a straight manual approach using the assumption that no errors requiring rework are made in using either technique. The elapsed time, however, is reduced by 1/3 using the computer assisted technique, thereby significantly increasing the efficiency and productivity of the individual structural engineer as well as shortening the cycle time for investigating new structural approaches. Of further significance to

an economic justification of interactive graphics is the fact that the cost of manpower is continuing to increase significantly year by year while the cost of computer services is still continuing to decrease. Costs for network services are quite competitive and as interactive graphics software becomes more widely available, computer service costs are expected to be further reduced. (Ignored in this discussion is the actual computer processing for the STRUDEL, NASTRAN, or similar structural programs themselves.)

It is important to note that the motivation to go to interactive graphics was the requirement to increase the accuracy of the input in order to reduce the number of computer runs and to reduce the design cycle time. The near break-even cost picture for data preparation was an unexpected side benefit.

### Some problems encountered

There have been a few problems in our experience with interactive graphics which should be mentioned. Currently the communications rate as implemented is a relatively slow 30 characters per second. For some complex models, this slow line speed is responsible for causing a large percentage of

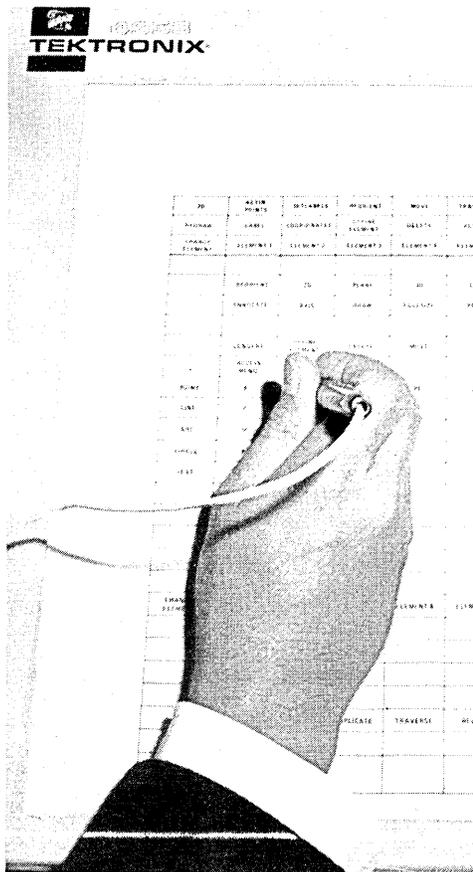


Fig. 3. Step two: The designer defines geometric elements and their positions by touching the digitizing pen to the appropriate command box on the menu.

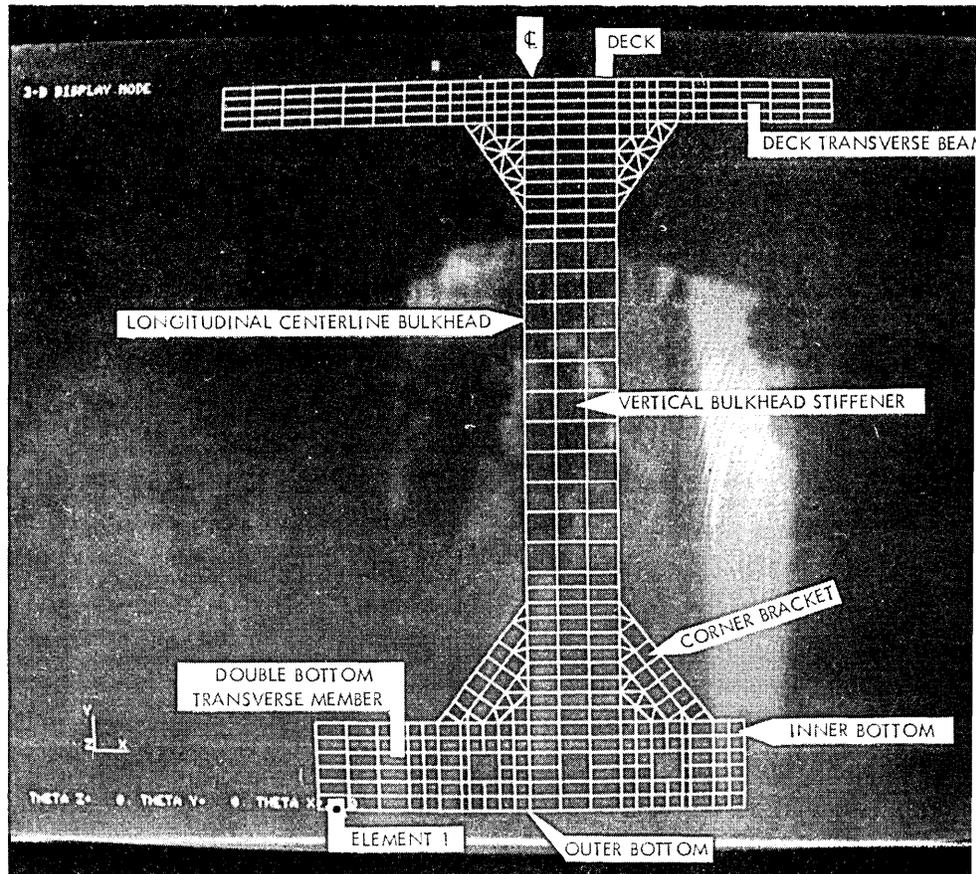


Fig. 4. After a single element is defined using the digitizing tablet, it can be easily regenerated in the image. Element 1 in the lower left-hand corner (a rectangular box) was duplicated in the vertical direction five times. The resulting six-element column was then duplicated in the horizontal direction to complete the bottom member.

## SHIP MODELING

the graphics costs, both for system connect charges and wasted manhours while the structural engineer waits for a redraw. For video graphic terminals in a time-sharing environment, faster response time is desirable. The alternatives of improved communications or possibly in-house systems are being considered.

Phone line problems have been thought to cause loss of files or portions of files, and sometimes even to result in incorrect input. In addition, inconveniences caused by the engineer's inability to connect to the remote computer because of phone problems can be disconcerting, especially when he has a "rush job." Should our demand for graphics service increase much beyond the current 25-30 hours per month, it will be possible to justify a dedicated line to the computer, thereby eliminating the phone problems and perhaps improving the response time.

Computer down times and/or "system full, try again later" messages can be just as disconcerting as phone problems. Experience at Sun Ship, however, has been that both phone and computer problems are within expected service levels and can be tolerated. Sun Ship operates on a construction schedule that is sometimes not more than a few days ahead of its design completion schedule. The ecological tanker, for example, was designed, built, and launched all within 1975. The keel was laid for the world's largest Roll-on/Roll-off trailer ship, the S. S. Great Land, in December 1974. The ship was in service by September 1975. Such schedules place emphasis on rapid turnaround on all aspects of our operations including computer service, and provide impetus to the overall justification of the interactive graphics approach. This mode of operations leads to a requirement for an expected service level or up-time of at least 95% during a normal 8 a.m. to 9 p.m. service day. During this period, the goal is to turnaround all batch jobs in under two hours, and interactive graphics sessions usually of 15-30 minutes require individual command response of 5-15 seconds depending on the specific operation requested.

The programs involved are major design programs involving, e.g., the processing of large systems of linear equations in STRUDL coordinated with interactive graphics software. Large computer networks having large core storage capability seem to be required although, of course, allocation of por-

tions of the system to front-end or back-end minicomputers is quite feasible. While requirements for such service continue to evolve, little attention is being spent on suboptimizing portions of the program or attempting to bring modules of the evolving system to in-house facilities.

Problems with the present in-house graphics terminal hardware have thus far been minimal. When a problem has occurred, the service to correct it has been very good.

### Conclusions

Although the finite element STRUDL-FASTDRAW II application is the example cited for description in the article, Sun Ship is also using the McAuto interactive graphics interface with other computer-aided analysis and design programs. Of particular value in some recent work has been the interactive graphics enhancement of TRIFLEX (a proprietary piping flexibility analysis program developed by AAA Technology and Specialties Co.) for an on-line visual portrayal of shipboard piping. Again, as in the STRUDL usage, the value of the display has been a shortening of the elapsed time required in the design cycle at a satisfactory cost.

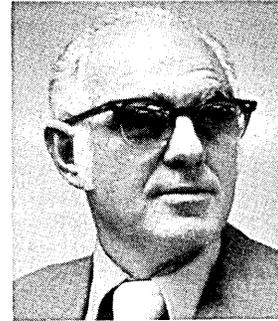
Interactive computer graphics has on the whole been an effective and efficient aid in the design and analysis cycle. Experience at Sun Ship has demonstrated the ability of interactive graphics to reduce significantly the time required for bulk data generation and checking. The use of interactive graphics and the finite element method has been instrumental in realizing the designs of new classes of ships such as the ecological tanker with its complex double bottom and double side shell structure.

The economics are currently satisfactory, and it is believed that the cost aspects associated with interactive graphics will continue to improve as increased competition is realized in the area of graphics in the computer network service industry. Of critical importance now, and incidentally ignored in the time and cost comparison section, is the fact that the use of interactive graphics eliminates most of the computer runs made using incorrect input data. By improving the quality of the input, the approach presented thus saves considerable computer costs.

In addition, as engineering manhour costs continue to rise, the use of graphics will become even more attractive as a means of data generation and model checking. The rapid developments taking place in the graphics hardware industry itself also seem to indicate a continued reduction in the cost of graphics equipment and a simultaneous increase in capabilities.

Graphics use involves a learning process both on the part of management and the engineer. Engineers at Sun Ship are enthusiastic in their response to the use of the system. A few hours of in-house training are required to initiate the inexperienced user to the current system, and this in-house training has often been augmented by one-day seminars conducted by the network service. Soon after his introduction to graphics, the engineer becomes aware of the power of this tool in the design-analysis cycle. Graphics increases the engineer's productivity by reducing the amount of time required to complete an analysis.

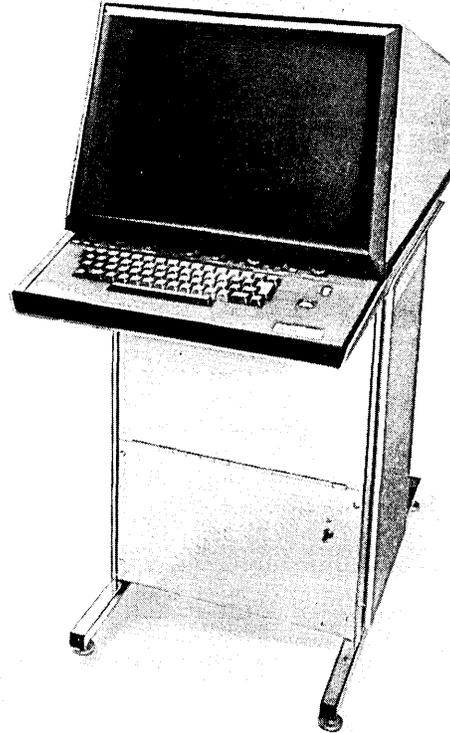
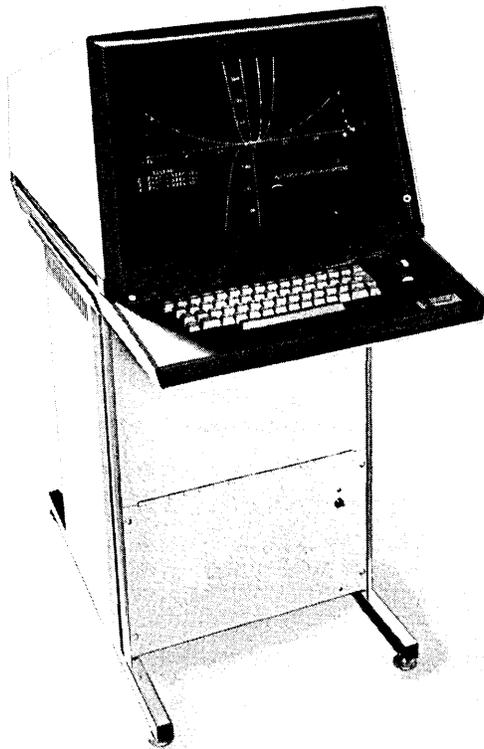
Finally, one of the side benefits of interactive graphics, and an important one from the engineer's standpoint, is its ability to make more interesting the task of data generation and checking. No longer is this a boring and time-consuming job; rather, it quickly becomes a challenge to the creativity of the engineer. For the future, the full potential of interactive graphics systems appears limited only by the imagination and ingenuity of the user. \*



Mr. Fritz is manager of the Engineering Computer Center at Sun Shipbuilding and Dry Dock Co. Previously with Westinghouse, his activities included computer programming and engineering analysis, direction of computer resources and data management systems, and management of business systems and services.



Dr. Lansberry is a structural engineer in the Hull Sciences Dept. at Sun Shipbuilding, and an adjunct professor of engineering at Widener College.



## Now you see it, Now you don't.

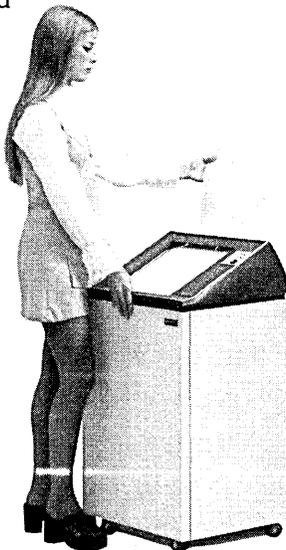
A CRT image is like puppy love. Nice while it lasts, but over before you can enjoy it.

Sooner or later, someone will want permanent copy from your CRT. Perhaps he needs a waveform record for his log. Or a copy of a computer-generated design. Or a graph with alphanumeric for a report.

Produce that ready-to-read copy in just twelve seconds. Produce it at low operating cost with a machine that has an MTBF in excess of 3,000 hours, and a paper that costs one-fifth as much as dry silver paper.

The machine, a standard Versatec printer/plotter with a computer and a CRT controller, does a lot. Serves up to four CRTs. **Doubles as an on-line computer printer/plotter** with printing speeds up to 1000 lines per minute. Plots up to 2.4 inches per second. And it does all these jobs without impact. Quietly. Reliably. Economically.

You get a better CRT copy. High contrast graphics, produced by dual array electrostatic writing, are actually enhanced. You don't lose detailed infor-



mation. And the copy is truly permanent. No fade or deterioration like silver paper.

If you have a Tektronix display terminal or other popular CRT, we can supply a complete output package designed for your system.

**VERSATEC**  
Making information visible

Versatec  
2805 Bowers Avenue  
Santa Clara, CA 95051  
(408) 988-2800

Send me complete information about the Versatec electrostatic printer/plotter that also makes hard copy from CRT displays.

My special interest:

- Permanent copy from CRT display
- Line printing
- Plotting
- Plotting software

My computer: \_\_\_\_\_ My CRT: \_\_\_\_\_

Name \_\_\_\_\_

Telephone \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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

# MARK IV IMPLEMENTS COMPUTER APPLICATIONS FOR 50% LESS TIME AND MONEY

Buckbee-Mears, Owens-Illinois, and Tulare County saved time to meet accelerated schedules and saved money by handling an increasing programming workload without corresponding staff increase.

The use of the MARK IV® System for implementation of their data processing applications produced these savings and other bonuses.

MARK IV Systems are used by some of the largest industrial firms – both domestic and international – yet most of the 900 MARK IV users in 39 countries have staffs of 50 persons or less, and they are at least twice as productive as staffs using Cobol or PL/1. Users say that no other system offers the power, flexibility, and simplicity of the MARK IV System. Let some of our users tell you about MARK IV.



**OWENS-ILLINOIS**

Financial Systems  
Manager John Kennedy,  
of Owens-Illinois, Inc. in  
Toledo, Ohio, reports that

“We needed to have a faster methodology.

The MARK IV System has cut in half our estimates for programming requirements – in both time and money. We have also added the MARK IV/Accounts Payable product to our operation. And MARK IV is every bit as economical as Cobol in execution.”

David Christenson,  
Data Processing Manager,  
Buckbee-Mears  
Company of St. Paul,  
Minnesota, says:



“MARK IV is our standard implementation language. We are in the process of rewriting 400 Cobol jobs in MARK IV, and, in the process, adding enhancements and a data base capability to the design.

“The MARK IV programs run more than 15 percent faster than the Cobol jobs they replace.” Christenson adds, “Our four MARK IV programmer/analysts can do the work of 8 to 10 Cobol programmers.”

MARK IV is a Registered U.S. Service mark



Tulare County in California ranks third as the most prosperous agricultural county in the United States. Marv Kelly, Assistant Director of Data Processing listed three ways in which MARK IV justified its purchase price. "MARK IV serves as a language which does not require hours of coding; it enables us to handle file maintenance, give quick response and to get multiple reports from one pass of a file; and provided the means for us to maintain our staff of 5 programmers for almost 3 years and still handle an increased workload."

Kelly reports that "Ninety-five percent of all new programming in the County is in MARK IV and programming times are 50 percent less (at least) than Assembler, our old language. The Tulare County data processing department handles all of the work for the tax collector, tax assessor, personnel, payroll, welfare, budgets and 65 school districts."

**informatics inc**  
MARK IV Systems Company



*North American Headquarters*

MARK IV Systems Company  
21050 Vanowen Street  
Canoga Park, California 91304

*Offices:*

- Atlanta (404) 434-7880
- Chicago (312) 648-0280
- Dallas (214) 233-6861
- Los Angeles (213) 822-3552
- New York (201) 488-2700
- Washington, D.C. (301) 770-5951
- Toronto, Canada (416) 493-9716

*International Offices*

Informatics S.A.  
267, route de Meyrin  
CH 1217 Meyrin 2 (Geneva)  
Switzerland  
Telephone: 022/41.76.50  
London • Copenhagen • Paris  
Stockholm • Frankfurt  
and

Computer Applications Co., Ltd.  
3-1 Hitotsubashi 2-chome  
Chiyoda-ku, Tokyo, 101 Japan  
Telephone: Tokyo (03) 263-7241

How to Get Started with MARK IV Savings

For immediate information, call our nearest office if you are concerned about solving your two biggest problems in data processing.



Just fill in the coupon if you would like to receive additional information on Informatics MARK IV Systems and how they can save your data processing organization at least 50 percent of your programming costs without any increase in machine time.

Informatics MARK IV Systems Company  
21050 Vanowen Street  
Canoga Park, California 91304

I am interested in saving money, please send me more information.

\_\_\_\_\_  
Name

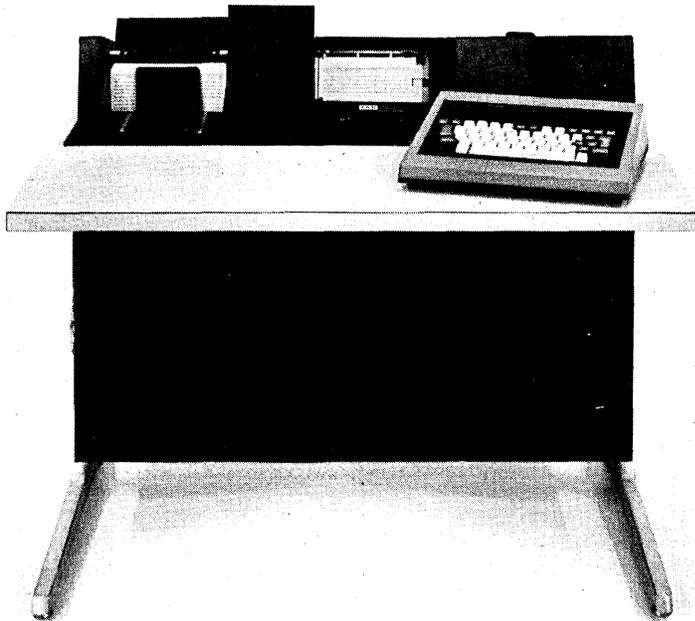
\_\_\_\_\_  
Title

\_\_\_\_\_  
Firm

\_\_\_\_\_  
Address

\_\_\_\_\_  
City State/Province Zip

# If you punch cards, read cards or do anything else with cards, we want to talk to you.



## We want to talk to you about the Tab 501 Data Entry Microprocessor.

About the unique versatility and operating capabilities resulting from its built-in microprocessor, RS-232C interface and unmatched performance characteristics:

- Minicomputer card input or output.
- Data transmission via modem or cable for terminal applications.
- Interfacing to virtually any type of data entry or processing system.
- On-line or off-line versatility.
- Reading, punching, printing, verifying and interpreting capabilities.
- Attractive purchase or lease plans.

## We want to tell you about our standard features.

- Constants from memory—up to 220 columns.
- Up to 28 program levels with automatic sequencing.
- Instant verification.
- Completely automatic error correction.
- High speed character duplication.
- Exceptionally quiet.
- Unparalleled operator acceptance of over 2,000 installed units.
- Easy to learn—easy to operate.

**Let's talk about "specials:"** We want your specials. Special applications. Special operating characteristics. Special interfaces. Special keyboard requirements. Because the Tab 501 Data Entry Microprocessor has this unique flexibility, we can give you what you want—easily and inexpensively. It's worth talking about.

Gentlemen: Let's talk.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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

Telephone \_\_\_\_\_

Let's talk:

Interfaces.

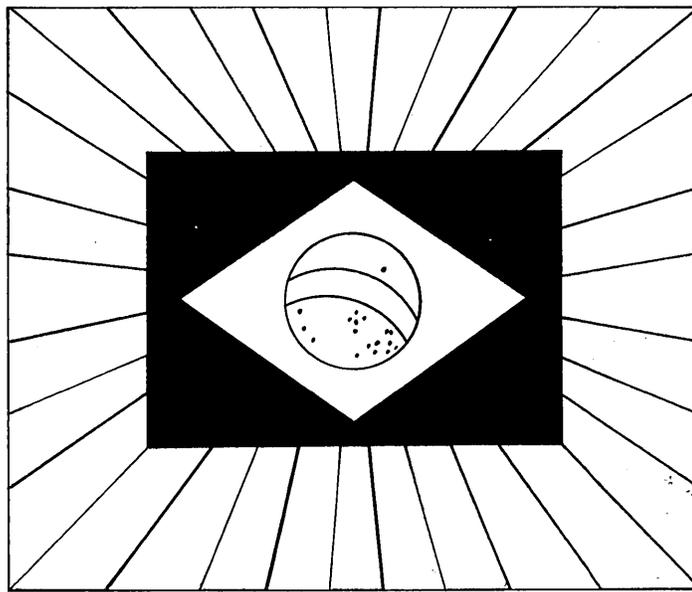
Terminal applications.

Special requirements.

Send more information.

**TAB**  
PRODUCTS CO

2690 Hanover Street  
Palo Alto, California 94304



# Brazil 1976—Another Japan?

by G. B. Levine

Import duties drive the prices of computers up by 50-90%, and still 30% more machines are installed each year. The situation is like Japan's was ten years ago.

The idea of comparing the data processing environment in Brazil to that of Japan may at first seem far-fetched. It is not.

There is in Brazil a growing and dynamic demand for data processing and data collection systems, for mini-computers, and for add-on peripherals. There is an urgent need for software, for engineers, for systems analysts. And there are U.S., European and Japanese companies here to assist their Brazilian counterparts to fill the needs.

How is this like Japan? A look at Table I shows that, in terms of population, Gross National Product, computer base and growth rates, the Brazil of today has a strong resemblance to the Japan of 10 years ago. There are also a number of qualitative similarities. First, Sao Paulo, the industrial capital of Brazil, is very much like Tokyo: 8-10 million people; dynamic, energetic, fast moving and hardworking population; smoggy, polluted; dense traffic and wild drivers.

Also, INPI (Instituto Nacional da Propriedade Industrial), in Rio, carefully regulates the flow of technology into Brazil, by controlling royalties and technical assistance fees. Try to get more than a 5% royalty for 5 years maximum, and you are likely to find INPI unyielding.

If that doesn't remind you of Japan's MITI (Ministry of International

Trade & Industry) in 1966 (5% and 5 years), then you weren't doing business with Japan at that time.

Another similarity is in importing. CACEX, the Banco do Brazil, controls the import licenses from abroad. Any computer firm which tried to get an import license in 1966 in Japan knows how applications were pigeonholed, or delayed for technicalities. And Brazilians report that CACEX has been known to reject documents where a period was inadvertently inserted instead of a comma.

Lest one carry the comparison too far, it should be noted that there are also some significant differences between Japan '66 and Brazil '76.

In the computer arena, Japan began with a large inventory of well educated and sophisticated engineers and technicians, built on a foundation of extensive education and near total literacy.

Brazil has yet to achieve this happy state.

Japan had, in '66, six national computer mainframe companies (since reduced to two consortiums: Hitachi-Fujitsu-Mitsubishi and NEC-Toshiba). Brazil in '76 still has no indigenous computer manufacturing, the closest approach being a minicomputer joint venture involving Ferranti of the U.K. and DIGIBRAS.

And in terms of government policy, Japan in '66 was welcoming foreign computer licenses to Japanese companies, though the terms were strictly controlled by MITI. Brazil's INPI also allows licenses but its tightening controls are tending to make such licenses very unattractive.

MITI, in '66, prohibited foreign majority control of Japanese enterprises in the computer field, and in fact made even minority positions difficult to

ANOTHER JAPAN?

	Brazil 1976	Japan 1966
Population	110 million	100 million
Gross National Product	\$80 billion	\$120 billion
10-year average annual real growth in GNP	~10%	~13%
Computers installed (over \$30K)	1,400	1,600
Annual growth in computers installed	30%	30%
Landed cost of an imported computer as % fob price	154%	135%

Table 1

# FULLY INTERFACED TAPE & DISC SYSTEMS for the PDP-11

## High capacity, low cost...from a SINGLE SOURCE!

WANGCO's new disc and tape controllers for the PDP-11 (following our successful NOVA systems), give you expanded capacities not presently available, and at significantly lower cost.

Up to four WANGCO disc drives can be daisy chained to a single WANGCO controller to achieve a maximum of 40 million bytes of storage.

WANGCO tape systems provide up to four times more tape flexibility than any other manufacturer. Systems include WANGCO's widely accepted, dependable magnetic drives, configured to meet your system requirements.

Expand your PDP-11's capability, with increased disc or tape capacity, at many times the operating flexibility presently available.

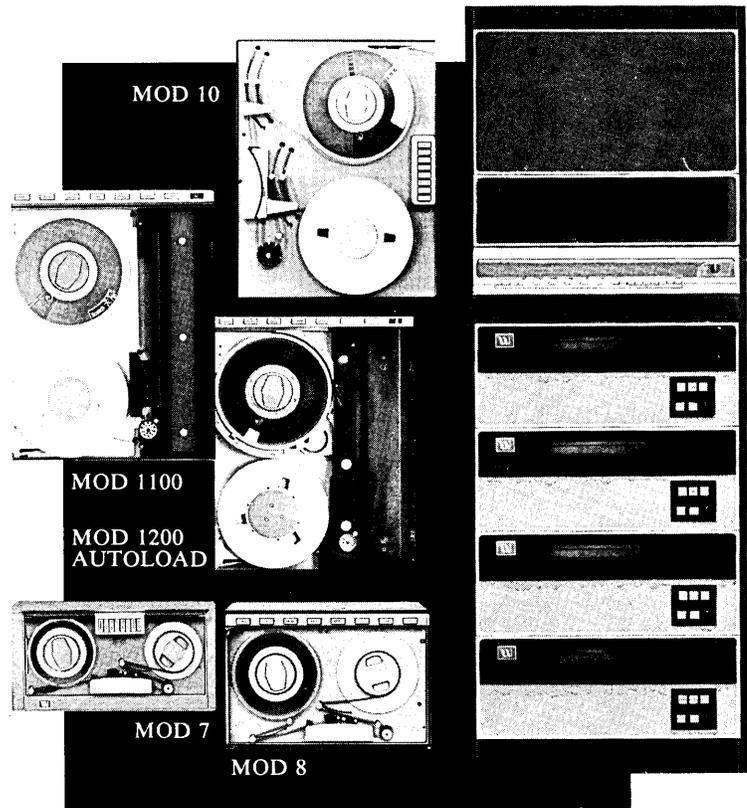
**WANGCO** INCORPORATED

SETTING THE PACE IN PERIPHERALS

5404 JANDY PLACE — LOS ANGELES, CALIFORNIA 90066 ■ (213) 390-8081, TWX-910/343-6246

Offices in principal U.S. cities.

In Europe: WANGCO Incorporated, The Lodge, 362 Cranford Lane, Harlington, Middlesex, England. Telephone 897-0202.  
Offices in France, Germany, Spain, Sweden, Norway, Finland, Switzerland, Australia, Canada, Israel, Japan, New Zealand and the Philippines.



Phone or write for your WANGCO  
SINGLE SOURCE DATA PACKAGE,  
for the PDP-11 and NOVA.

## BRAZIL 1976

achieve. Brazil's government, in contrast, encourages direct foreign investment in computer manufacture, and permits 100% foreign ownership, though there is an increasing swing toward the encouragement of local participation.

One must also admit that the GNP comparisons conceal the fact that Brazil's output includes heavy agricultural and mineral components, while Japan's was far more industrially oriented.

### The computer market

The number of computers installed places Brazil in the first 10 or 15 countries. And the number of new installations is growing faster than in most of the other leading nations, so one can expect the country's ranking in the computer sweepstakes to rise, possibly to 8th by 1980.

Table 2 shows the distribution of computers in Brazil by size. The annual growth rate has been running about 30%, though 1975 deliveries slowed somewhat.

Table 3 shows the market share by manufacturer. As in most parts of the world, IBM is the market share leader, accounting for some 70% of the units and 75% of the installed value. Although IBM makes part of the 370/145 in Brazil, and exports these to the rest of the world, most of that company's share of installed machines is covered by imports.

Table 3 also shows good market penetration by Burroughs. Industry authorities attribute this to the firm's excellent local management and to their early strategy of offering a very powerful software along with extensive software support, and an extensive and effective maintenance program.

One thing missing in Brazil is the systems house, dedicated to offering specialized solutions to classes of users such as hospitals, schools, paper mills, etc. Such companies, able to assemble hardware on an oem basis and combine it with specialized software, are sorely missed.

### Minicomputers

Minicomputer usage in Brazil is taking off. In one year, the number of units in place grew from 1,000 to almost 2,300. Almost all the demand has been satisfied by imports, so far, but this is sure to change in the very near future. Several of the leading U.S. firms are actively pursuing plans to manufacture minis in Brazil, some in the form of joint venture with Brazilian partners.

Similar plans, though perhaps a bit farther in the future, will involve mini-

peripheral and data entry companies. As in the case of larger computers, the limited availabilities of software, applications, and systems capabilities, are a drag on the rapid expansion of mini-computer usage. The very high cost, and rapid turnover, of engineers, technicians and dp managers is also a limiting factor.

The minicomputer market in Brazil is stimulated by the large number of small to medium size users, and has been dominated until recently by the Burroughs L Series, and the B 700. Together these machines accounted for some 65% of the minis sold through 1974, although the L Series can best be described as accounting machines. In any case, Burroughs has established a substantial production line in Sao Paulo for the "L."

The main push in minis today seems to be coming from DEC, Hewlett-Packard, and Datapoint.

### The user

What is it like to manage a data processing operation in Brazil? First of all, you can probably get any cpu you want, from a local sales office. Just as in the U.S., you can begin by calling your friendly IBM, NCR, Burroughs, Honeywell, or Fujitsu salesman.

But there the similarities may end. For example, the cost to the Brazilian user of dp equipment is not only high, but volatile. Until recently, the tariff was 10%. After payment of assorted taxes, freight, customs clearance, and insurance, the equipment probably

cost 151% of the U.S. price.

However, in September Brazil imposed the requirement that each application for an import license had to be accompanied by a six month deposit, bearing no interest, of the full value of the import. A number of computer companies then raised their price to Brazilian customers by some 11% to compensate for this extra cost. And in mid-October, the basic tariff on dp equipment jumped from 10% to 40%. Brazilians will now be paying about 192% of the U.S. fob price.

The preceding description of import costs is generally valid but there are some variations. For example, if the imported item is a fixed asset, and if the importer retains title for at least 12 months, some of the tariff is not assessed. On the other hand, some government agencies have been known to waive their right to exemption from the tariff and taxes in order to eliminate the waiting period for approval from CACEX.

Another difference between the U.S. manager and his counterpart is that the Brazilian expects more assistance and support from the dp supplier. The customer-supplier relationship tends to be deeper, and more enduring in Brazil, perhaps primarily because the user has few other alternatives for the assistance he needs.

One reason for the dependence on the manufacturer is that systems engineering, or software houses are practically unknown in Brazil, though the first ones are beginning to surface.

BRAZILIAN COMPUTER CENSUS

Size of computer	July 1975*	July 1976**
Very large (Over \$1,200,000)	61	80
Large (\$600,000 to \$1,200,000)	82	95
Medium (\$180,000 to \$600,000)	332	365
Small (\$30,000 to \$180,000)	1,053	1,250
	1,528	1,790

\*CAPRE estimates \*\*Mentor estimates

Table 2

MARKET SHARE BY MANUFACTURER\*

MANUFACTURER	SMALL	MEDIUM	LARGE	VERY LARGE
Burroughs	12%	23%	8%	14%
Mohawk Data Sciences	2	1	—	—
Hewlett Packard	6	—	—	—
Honeywell Bull	5	14	4	5
IBM	61	52	87	81
NCR	5	2	—	—
Siemens**	1	3	—	—
Singer	1	—	—	—
Univac	5	4	—	—
All Other	2	1	1	—
Total	100%	100%	100%	100%

\*Source: CAPRE, 1974

\*\*Since this data was published, Siemens has left the Brazilian market and Fujitsu has moved in strongly, but in the main the percentages remain similar.

Table 3

## BRAZIL 1976

Some earlier attempts to import specialized applications packages from the U.S. have not worked out well, even after modifications for the Brazilian environment. Brazilian observers feel that their business and industrial methods are different enough that a better approach would involve a team of U.S. and Brazilian specialists working together to create specific applications for Brazilian hospitals, Brazilian banks, Brazilian hotels, etc.

The users in Brazil have had very little experience with plug-compatible peripherals. This is partly due to the shortage of people familiar with the concept. But also, many of the major U.S. firms who sell such equipment do not yet have sales or service organizations in Brazil. The result again is a much greater dependence on the cpu supplier to provide the full system, and the subsequent support.

As a dp manager there, you would also find it difficult and expensive to recruit qualified personnel. Salaries are high, by Brazilian standards:

DP Manager, 370 Series	\$3,500 (U.S.)/month
DP Manager, System/3 Sr. Systems	\$1,400 to \$1,700

Engineer or Analyst	\$500 to \$2,000
Programmer, COBOL	\$350 to \$500
Programmer, RPG	\$300 to \$600
And fringe benefits add another 10% to these totals.	

As a user, two organizations would be important to you. One is CAPRE, the commission for coordination of dp activities. Associated with the Secretariat of Planning of the Presidency of Brazil, CAPRE's mission involves the coordination, development, and rationalization of dp usage, especially within government. Its activities include taking a periodic census of the computer industry publishing a quarterly information bulletin, and providing a technical training program.

The other important organization is SUCESU, the computer users association. SUCESU has been described as the main channel for information interchange among dp users and manufacturers. It holds monthly meetings in various cities, performs salary surveys, and is affiliated with IFIPS.

Some of its 6,000 users have expressed a wish for more deeply technical sessions than SUCESU provides, but others are content to have the opportunity to share problems with fellow users.

## The future

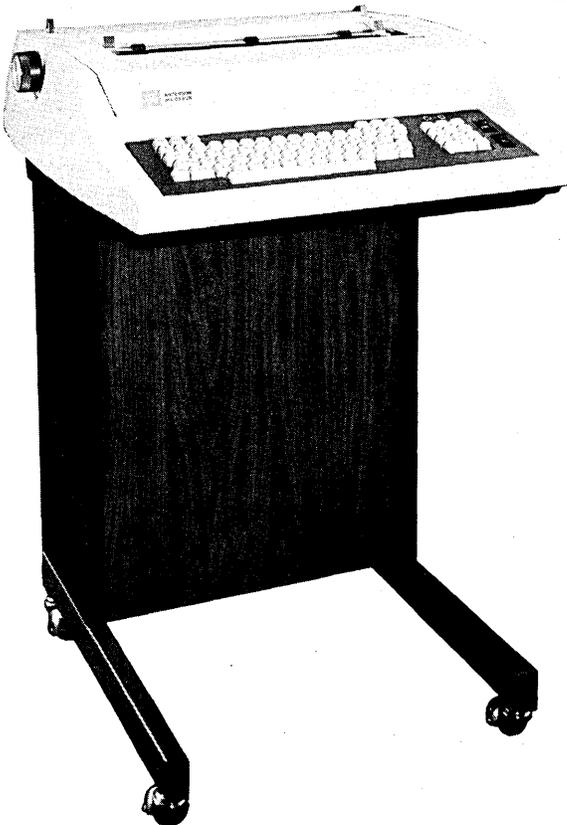
No one in Brazil doubts that the economy will continue to outperform the rest of the world. Forecasts of computer sales growth range from a relatively conservative 15% per year, to an optimistic hope that the 30% rate of recent years can be resumed.

One thing everybody agrees on—an increasing percentage of Brazil's dp requirements will be produced in Brazil. Foreign makers can choose between wholly-owned subsidiaries, joint ventures, or licenses but if they don't get "in" soon, they will find they are "out" of an important market. \*



Mr. Levine is president of Mentor International, an international market research firm he founded in 1963 to assist high technology companies in developing overseas sales and branches.

# The new 30 cps Terminal from AJ



Here's the *brand new* AJ 830, a 30 cps impact printer terminal that utilizes AJ's microprocessor control and the innovative "daisy" print wheel. The AJ 830 is ideal for interactive time sharing, information entry and retrieval, and point-to-point data exchange.

Some of the features of this great new terminal include:

- Throughput, high print quality, multiple copies
- Addressable horizontal and vertical tabs
- 10-key numeric pad
- USACII/EBCD/Correspondence codes
- Plotting and APL

You also can get options such as forms tractors, pin-feed platens, and fan-fold paper shelves. There's even a 45 cps printer available for greater throughput.

There's more, too. AJ's nationwide sales and service organization stands behind every Model 830. And, you get your choice—purchase or lease (month-to-month if you wish).

As you can guess, we're very excited about the AJ 830; you will be too once you get all the details. Just write or give us a call.



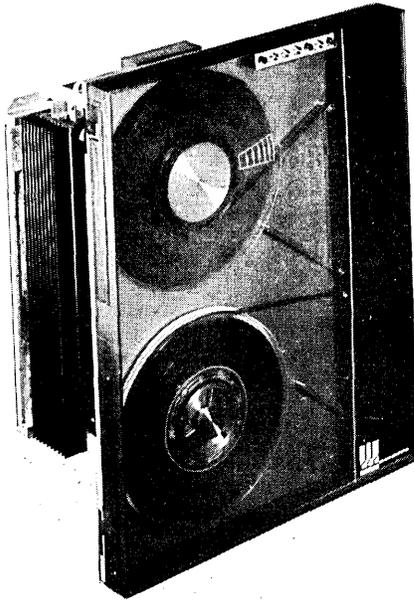
**ANDERSON  
JACOBSON**

1065 Morse Avenue • Sunnyvale, Calif. 94086 • (408) 734-4030

CIRCLE 104 ON READER CARD

# SIMPLICITY

(sim plis'í tē) n., the state of being simple, uncomplicated and straightforward.



**At Digi-Data**, simplicity is a magnetic tape transport built on a machined aluminum plate with direct drive motors, low inertia arms, superb maintenance accessibility, and no plastic cosmetics. This clean and straightforward design is the result of over a decade of concentration in tape-handling technology.

**To the End-user**, simplicity is a single supplier who manufactures mag tape transports, formatters, and software-compatible computer interfaces.

**For the OEM**, simplicity generates higher profit margins without a sacrifice in performance or reliability—margins that result from low acquisition costs and minimal maintenance.

Simplicity permits a lower cost to manufacture—a savings that is passed directly through to you.

Simplicity promotes high reliability with a low MTTR—eliminating the need for an excessive spares inventory and requiring fewer service calls for your CE's. Digi-Data protects your reputation for reliability and enhances your image among customers and prospects.

Quantity one price of  
a 45 ips NRZI transport is

**\$2,975.**

Complete minicomputer  
mag tape systems from

**\$4,750.**

Substantial OEM discounts available.



## DIGI-DATA CORPORATION

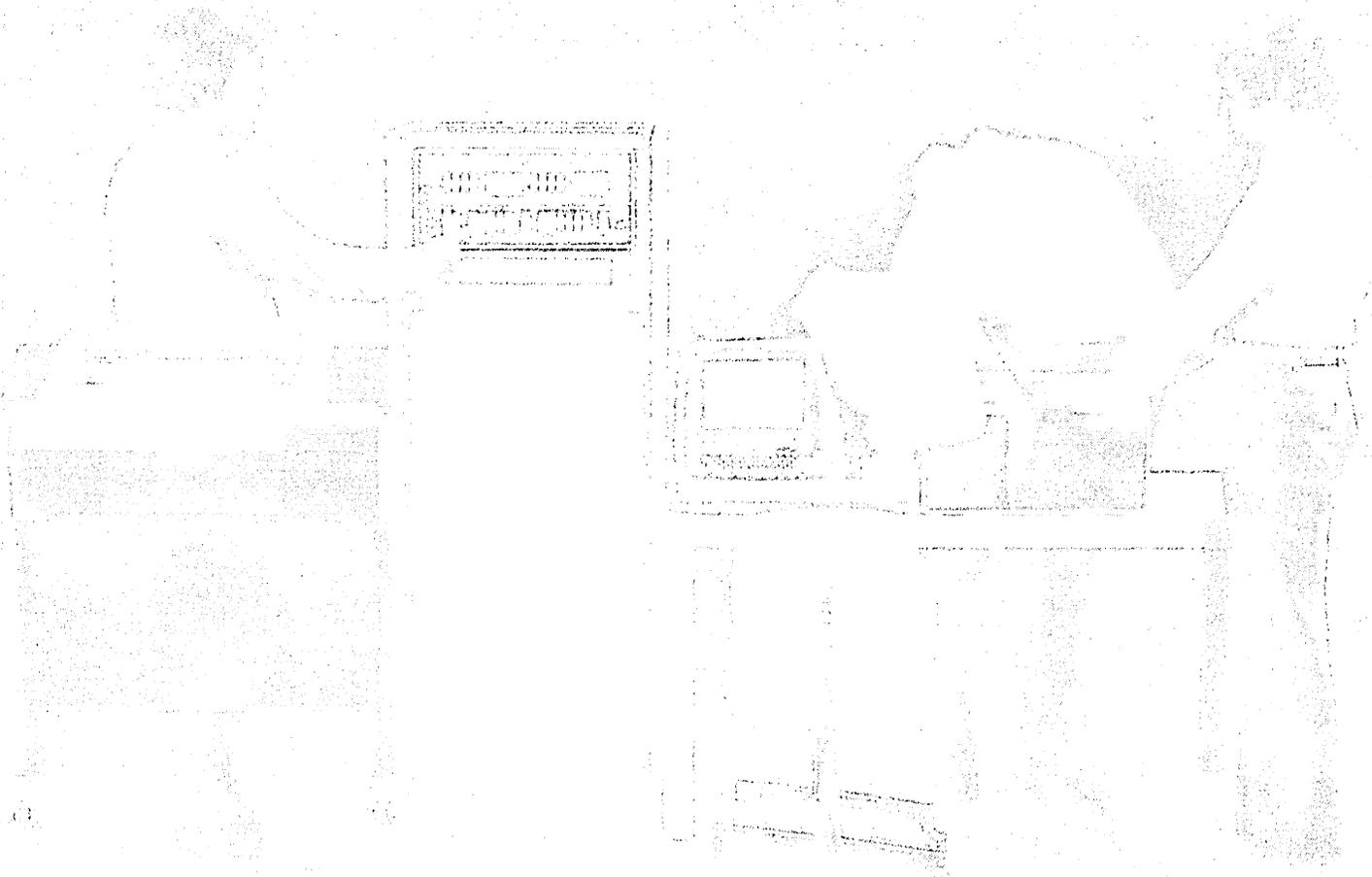
*Supplier of magnetic tape transports and systems.*

8580 Dorsey Run Road, Jessup, Maryland 20794 (301) 498-0200

**Digi-Data Europe**

Flüestrasse 632 5313 Klingnau, Switzerland Tel. 056 45 3610





## MODCOMP™ REMOTE TERMINAL SYSTEMS

MODCOMP™ Remote Terminal Systems are the only IBM compatible systems that let you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

MODCOMP™ RTS-1 (illustrated) lets you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

MODCOMP™ RTS-2 (illustrated) lets you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

MODCOMP™ RTS-3 (illustrated) lets you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

MODCOMP™ Remote Terminal Systems are the only IBM compatible systems that let you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

MODCOMP™ RTS-1 is an intelligent PC that lets you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

MODCOMP™ RTS-2 (illustrated) lets you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

MODCOMP™ RTS-3 (illustrated) lets you connect your IBM PC or compatible system to a central computer. This means you can use your IBM PC or compatible system to access the central computer's files and programs. And you can use your IBM PC or compatible system to control the central computer's operations.

For more information about Remote Terminal Systems, call your nearest MODCOMP sales office. Or write Modcomp Computer Systems, 100 West Walnut Street, Ft. Lauderdale, FL 33309. Phone (305) 977-1000.

Barbara Schroeder, 100 Walnut Road, Winston, Surrey, England. Phone (405) 200000.

**MODCOMP**  
IBM PC COMPATIBLE SYSTEMS

# The Communications Network Snarl

by Louis Pouzin

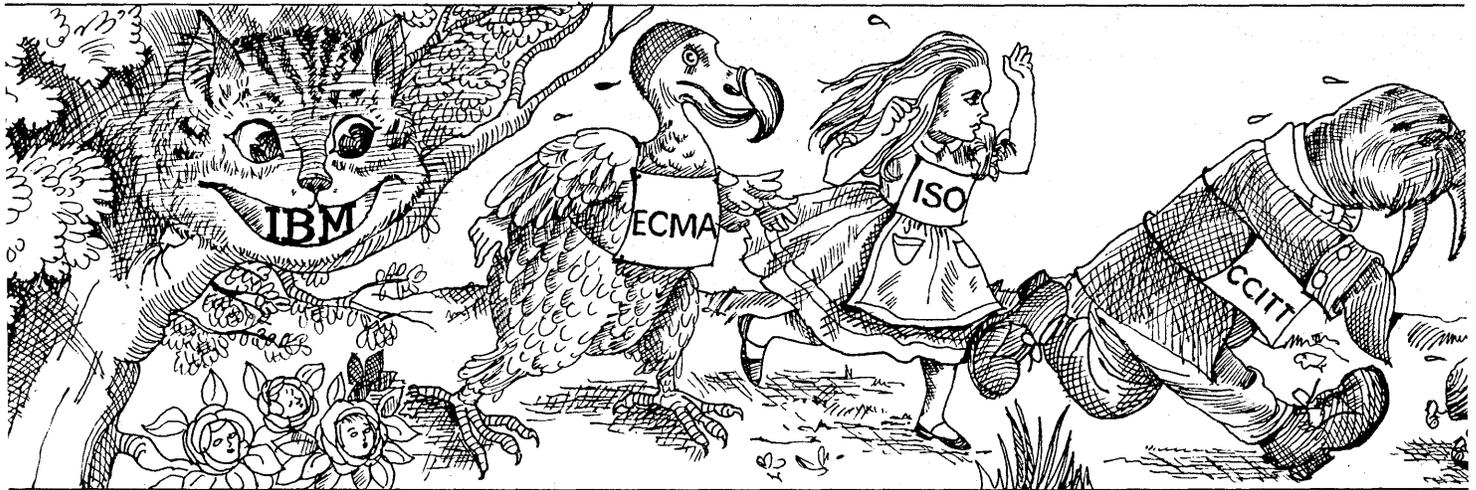
Like the flag and motherhood, no one will say "no" to communications standards—but no one says "yes" either.

It seems as though it happened way back when, but it was only in 1972 that the first network of heterogeneous resources became reasonably operational. Since then what's happened? Now, less than three years later, networks are political issues at corporate or government levels. In hush state-

fashion sizzling in the U.S., the old carriers feel it's better to play it safe and stick to the traditional business. Once the new specialized carriers have burned their fingers, the others will just pass by.

In Canada, data communications are provided by competitive monopo-

etc. At last, some experts identified wildcat networks as a serious disease, which called for prompt relief. Hurriedly they churned up antibodies out of sanitized homegrown nets, and made VANity a national sin. With new public facilities in the pipe and a bag of regulations, the situation should go



ments, communications and computer organizations leak their feelings that the other guys had better mind their own business. Since they are big, and more or less monopolies, each scrambles at shaping the world into specific designs before the others do it.

Lost in the turmoil is the user. He has no strategy, no power. He thinks the big brothers know what they're doing. No doubt, there are some who do.

Take for example our beloved friend IBM. They got hooked on the idea of getting into the communications field. And they really mean it. Are they going to market telephone services, or communications based dp services? How about both! Intelligent Bell Machines.

But what are the common carriers doing? It varies. With the antitrust

lies, say a duopoly. In Europe, national monopolies make the rules, and the difference. There are also international carriers, whose policies are mainly tied up with their mother countries'.

## Wildcat networks

Away from the bloody competition of the computer industry, the carriers enjoy a legally captive customer base. At least that's what they were used to. But this brave old world is no longer the same. Raised in a permissive society, folksy people got to making up wildcat value-added networks. The network cottage industry is booming. Ads read like this: put a computer in your VAN.

To some carriers it smacks of the flu. Keep warm, stay in bed, and watch the football game. Others treat it with a strong will: it shall not be permitted,

back to normal. Or should it?

More insidious are the EVAN's (elusive value added nets), which sell dp on Main Street, communications on the back streets, or any combination of both depending on who's asking. Skirting the regulations, they are out to make multinational carriers come alive, under no government eye.

To top it all, there comes the SNARING (referring to IBM's System Network Architecture). Phase 1: let the customers have it. Phase 2: take over network management. Phase 3: Wire up the whole thing worldwide, and sell the service.

Let's play "inside-IBM," just for fun. No way to get a larger share of the market, with those darn antitrust gnomes. Thanks to incompatibilities, new terminals sell new computers. But old ones turn up on the secondhand

market, and that's bad. Why don't we keep all that gear and take a swing in the service business? They couldn't sue us for awhile. If other computer makers wither out, it's their fault then, since we've left them alone. And once the EVAN's have squeezed the last cycle out of their hardware, what will they do? Well, think.

Forgetting about IBM's Jaws, one thing remains: networks expand so as to fill the territory available to them. This is indeed a recent extension of the famed Parkinson's Law. In recognition of this observed phenomenon, network strategists keep busy. Geographical borders being pretty much frozen, one might think there is nothing left for national monopolies to worry about. Not quite, some prods keep them on their toes.

Private nets? Oh yes, they are legal. And embarrassing, if only because they tend to grow large enough to become potential private carriers. Since they are on vantage ground in skimming traffic, the game is to juggle line tariffs so as to force them out, once public nets are operational.

International traffic is a money-maker. The next decade should send it

handful of them.

Wherever he turns, the customer is cornered by salesmen of brand X or Y. Reputedly, competition is for the benefit of the customer. There is just one hitch: network X is definitely not compatible with network Y. As soon as the contract is sealed, the customer is SNARED. For how long? Networks don't die.

As we know too well, common carriers are old hands at working out international agreements. One can call almost any phone in the world, and very often hear the other party. But for some reason TWX and TELEX are still on cool terms. American and European modems don't make it together. But given time and patience, it will certainly be fixed.

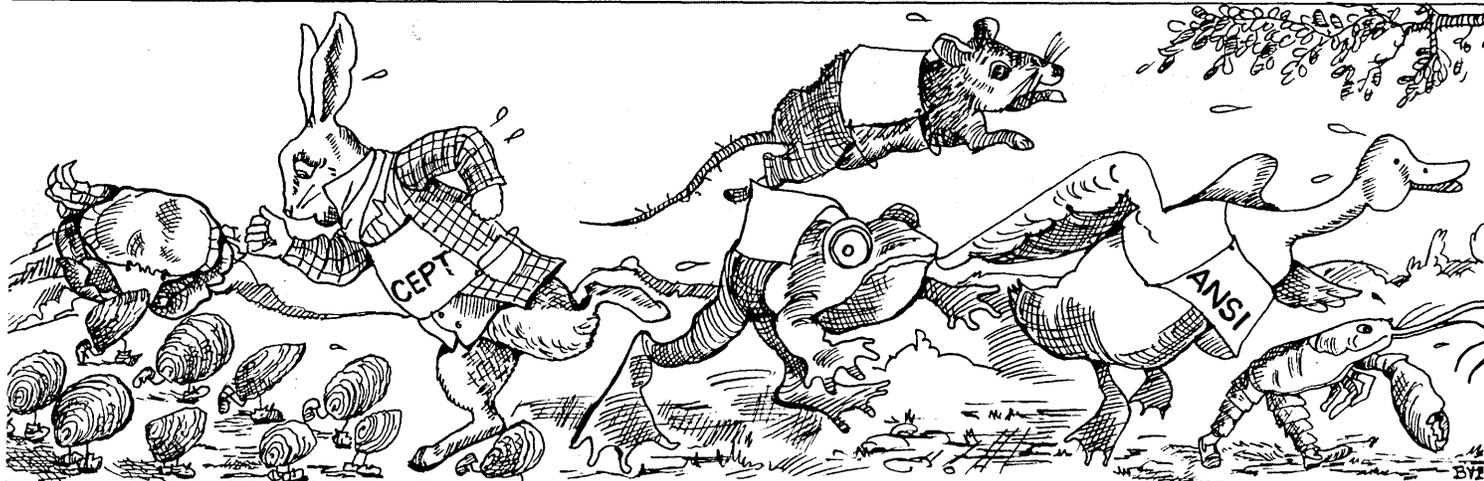
The computing world is a bit different. EVAN's or computer manufacturers are very careful to spare the customer any kind of interface problems he would face in going to a competitor. Obviously, the best way to protect the customer is to have incompatible systems, languages, protocols, terminals, etc. This means a stable customer base, planned obsolescence, and more predictable revenues.

ing gradually to a homogeneous set of hardware and software. Does that mean standards, or monopoly? It looks as if we have no other alternatives.

### Let's go make standards

Standards are like the flag and motherhood. We should have some, shouldn't we? Benefits are obvious: the customer would retain a permanent freedom to select products he feels more suitable to his needs, whether new or old, brand X or Y, as long as they come with standard interfaces. Small manufacturers would be able to sell components of heterogeneous networks. So let's go make standards.

The problem is there is no worldwide ministry of standards. Instead, a maze of organizations—representing professions, nations, continents—attempt with mixed success to gather a consensus for claiming a piece of the action. In the area of data communications, most large organizations have come to work out their private standards, usually derived from their specific applications, e.g. World Weather Organization (wwo), International Civil Aviation Organization (ICAO), International Airlines Transport Asso-



skyrocketing. Competition is going to rage between carriers to lure in packets flying over. Not much different from airlines. Are we going to see charter nets spruce up and carry data at rock bottom tariffs?

EVAN's are the real threat. Nowhere is there a clear border to fence them out. They don't challenge data carriers. They just dissolve the boundary between communication and processing. Isn't communication a limited form of processing, after all? Even though the carriers will probably protect their monopoly, end users will rely on EVAN's for all practical purposes. Then who will carry the day?

In case EVAN's don't really make it, we are left with a crowd of private nets, small and large, for dp applications. Where will customers get them from? Computer makers. Hardly a

As long as the market penetration is relatively insignificant, every species of network will probably succeed for a while, assuming an adequate capital supply. In this expansion period, customers will still be restricted to limited scale resources. Since they have always been captive of their communications service supplier, they probably will take it lightheartedly. A second period should follow, mainly geared to milking netted customers with new services, improved terminals, large scale interconnection. That's consolidation.

In our advertising-oriented society, getting more, farther, faster, is taken as desirable, therefore salable. Networks are already a communication tool for corporations. They are becoming an essential link with the customers. In the consolidation period, worldwide access and compatibility will sell, lead-

ciation (IATA). They had no other choice, as no suitable standards were available.

At the world level two organizations dominate the official standard scene: Comité Consultatif International Télégraphique et Téléphonique (ccITT) and the International Standard Organization (ISO). The former is the technical arm of the International Telecommunications Union (ITU). The latter is a federation of national standardization bodies, such as ANSI in the U.S., and AFNOR in France.

ccITT and ISO fix their common boundaries. As representing primarily common carriers and PTT's (Post, Telephone, and Telegraph organizations, the national institutions which supply both Post Office and telephone services in Europe), ccITT is responsible for matters pertaining to data

## NETWORKS SNARL

transport. Practically speaking, ISO is controlled by manufacturers who are concerned with interfaces between public data communication facilities and their own products. At times, subjects are so intertwined as to make boundary-setting an exercise in hair-splitting. As no single authority is in position to cast tie-breaking votes, these organizations have developed a good neighbor policy over the years. Members of CCITT are active in ISO, and vice versa.

In Europe, two other bodies are directly concerned with data communications. One is Commission Européenne des Postes et Télécommunications (CEPT), the other is European Computer Manufacturers Association (ECMA). CEPT is what it says: European PTT's. It is not known *officially* within CCITT circles, except that the same people are in both organizations. ECMA is also what it says, i.e. IBM, Honeywell, Univac, and Burroughs, as well as ICL, Siemens or Philips. Positions taken by ECMA reflect ANSI's or DPMA's.

National organizations like AFNOR are also stuffed with ECMA or CCITT people who make sure that ISO is receiving only sensible suggestions. To sum it up, a limited number of traveling commissioners heartily celebrate the anniversaries of the happy standard family. The only grey spot is that we have no standards.

Well, not quite true, thanks to another active group, often called De Facto. In other words, wait and see what IBM is doing. No wonder, what IBM is doing is good for IBM. It may be good for others too, like GE, RCA or Xerox.

### Where's the user?

A noticeable absentee from the standard scene is the user. Obviously, he is not needed, since his interests are the major concern of everyone else. He tends to think this is none of his business since experts upstairs know better than he does. There should only be happy users.

In case some users are not so happy, they may feel helpless in the face of the big-timers. Indeed in the standard Who's Who, what counts is power, not ideas. Nevertheless some historic accidents may be worth pondering. COBOL and CAMAC (standard interfaces) have shown how muscle and determination can bring manufacturers to compliance. Were the U.S. Navy set to define its own standards, say USNA, what would happen?

The arguments for not setting standards go something like this: Standards

are not mature. It's too early. And so on. Unquestionably, not all standards are mature. But enough experience has been accumulated for some standards. The best evidence is that IBM, Univac, Burroughs, DEC are busy making commercial products on their own standards which they are not going to give up. PTT's and common carriers are putting up national networks, but international communications require standards, don't they?

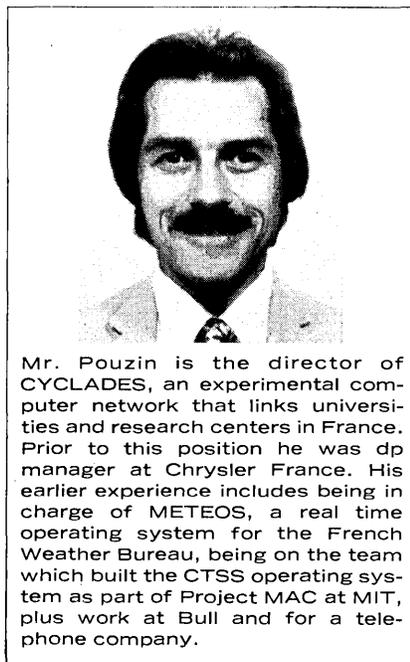
Complete compatibility between any kind of equipment, operating systems, and data carriers, is not likely to happen soon, or ever. But a few basic levels of commonality are desirable and feasible:

1. line procedure
2. packet format
3. end-to-end protocol
4. virtual terminal
5. file transfer

Various other standardizable services should follow: getting help, job status enquiry, data retrieval, etc.

Here is where we stand near the end of 1975: a line procedure, HDLC (High Level Data Link Control) is practically standardized by ISO as a syntax. Practical implementations are yet undefined. A working group (WG 6.1) of IFIP has proposed a packet format and an end-to-end protocol. But IFIP power is only intellectual. And a small group of carriers is attempting to force a "virtual circuit" protocol through CCITT. The remaining items are still at an early stage of discussions within informal groups.

Hardly a landslide. Not even impressive. Isn't it possible that networks are too vital for the economy to be left in the hands of standard officialdom? \*



Mr. Pouzin is the director of CYCLADES, an experimental computer network that links universities and research centers in France. Prior to this position he was dp manager at Chrysler France. His earlier experience includes being in charge of METEOS, a real time operating system for the French Weather Bureau, being on the team which built the CTSS operating system as part of Project MAC at MIT, plus work at Bull and for a telephone company.

## EMM COMPUTER PRODUCTS

### DIVISION SALES OFFICES

#### BOSTON

EMM Corporation—(617) 861-9650

#### CHICAGO

EMM Corporation—(312) 297-3110

#### CLEVELAND

EMM Corporation—(216) 884-1980

#### DALLAS

EMM Corporation—(214) 243-2374

#### DETROIT

EMM Corporation—(313) 352-1040

#### HACKENSACK

EMM Corporation—(201) 845-0450

#### HOUSTON

EMM Corporation—(713) 626-3592

#### INDIANAPOLIS

EMM Corporation—(317) 545-3154

#### LOS ANGELES

EMM Corporation—(213) 477-3911

#### MINNEAPOLIS

EMM Corporation—(612) 941-2404

#### NEW YORK

EMM Corporation—(212) 736-2471

#### ORANGE, CA

EMM Corporation—(714) 997-4132

#### PHILADELPHIA

EMM Corporation—(609) 428-9391

#### SAN FRANCISCO

EMM Corporation—(415) 692-4250

#### SEATTLE

EMM Corporation—(206) 284-5413

#### WASHINGTON, DC

EMM Corporation—(703) 941-2100

#### TORONTO, ONTARIO

EMM Corporation—(416) 447-0301

#### ST. NIKLAAS, BELGIUM

EMM S.A.—(031) 766975

#### ESCHBORN, GERMANY

EMM GMBH—(06196) 48017

#### LONDON, ENGLAND

ELECTRONIC MEMORIES, LTD.—  
(01-751) 1213

# EMM

# Protect your computer investment.

You've outgrown your computer and need more throughput and capacity.

By expanding your 370/155 with the EMM Micromemory 155 processor storage system and speed enhancement units, you protect your investment. Your 155 capacity and speed will be stretched close to those of the 158... but at a much lower cost. You'll get the reliability and performance benefits of our company's vertical integration—core and semiconductor memory components, subsystems, and systems all made by EMM. We make, sell and service our systems worldwide. And our lease plans fit your requirements.

Now look closely at our product. It's designed to add up to 4 million bytes of memory. With a processor speed enhancement (PSE) system that significantly increases your 370/155 throughput. With total IBM operating system compatibility, whether virtual or direct. Plus the ability to defer maintenance by reconfiguring your EMM and IBM memory segments.

The Micromemory 155 keeps both your initial and operating costs low. Gives you superior performance and reliability. Solid support. And all the features you'll need.

You won't find a better way to protect your investment. More users and computer manufacturers use EMM memory products than those of any other independent company.

Let your EMM salesman help you plan your 360/370 memory program.

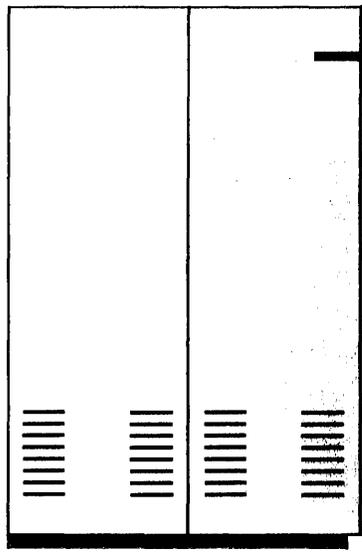


**COMPUTER PRODUCTS DIVISION**

**Electronic Memories & Magnetics Corporation**

12624 Daphne Avenue, Hawthorne, CA 90250

# 370/155

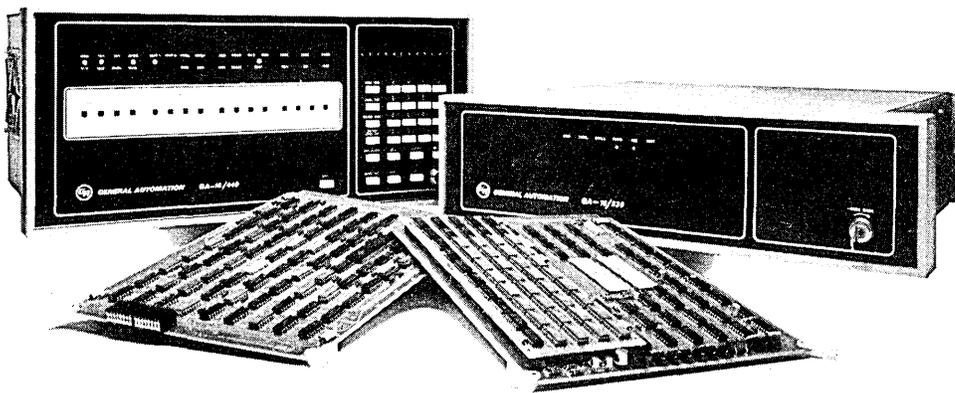


# memory

# GENERAL AUTOMATION

**Why our new line of  
part of the solution:**

# computers is only



General Automation is a systems oriented company. Problem solvers. Doing total designs where the solution is more than just hardware.

That is why our hardware is different. It is product with purpose. Developed specifically to support our system concepts where there can be no compromise with quality. Performance is the criterion.

## The New Solution Series. Four More in a Long Series of Solutions.

**GA-16/440:** Two million bytes of addressable memory. Combined with memory management hardware and software, provides large system capability for the most demanding applications.

**GA-16/330:** First true LSI minicomputer. Unique OEM packaging makes it the most economical core memory minicomputer available. With no sacrifice in performance.

**GA-16/220:** The only microcomputer with the performance and features of a minicomputer. Available with memory parity and write protection. Network hardware.

**GA-16/110:** Twice as fast as any other microcomputer. Complete compatibility with the GA-16/440 makes it the best supported microcomputer ever offered.

Write for the new **Solution Series** brochure:  
Mr. Sam Lane, General Automation, Inc.,  
1055 South East Street, Anaheim, California 92805; (714) 778-4800

# If 'productivity' is a buzzword rather than a fact in your dp operation, read about this new BCS product line.

You're a dp manager. A good one. With a highly capable staff and an efficient hardware configuration. But how can you make this investment more productive?

BCS can help.

Systematic Software Development and Maintenance (SSDM) is a new product line that helps you increase productivity in system design, coding and maintenance. How? By combining top-down design with structured programming. By formulating a set of well-defined procedures for developing systems.

Before you say you've heard such tales before, wait. After using SSDM techniques internally for over three years, we have found that SSDM helps produce more reliable software, which is easier to maintain, and at lower cost. It works.

## Where the trouble starts

Poor software quality is most often due to incomplete design of the system. The requirements of your end-user often go astray as they're translated into system specifications. The resulting programs contain many logic errors. This leads to cost and schedule overruns.

SSDM techniques place emphasis on requirements definition and design testing, documentation and reviews before any coding begins. Changes can be made at this point for a lot less cost. And maintenance can be done by anyone on the programming staff, not just the author.



## New training, new tools

Included in the SSDM product line is a four-day course on improved system design and programming procedures, plus three software packages that contribute reliability and efficiency. DECA (Design Expression and Confirmation Aid) to document and verify the system design; TRANSFOR (Translator for Structured FORTRAN) to provide structured programming capabilities for FORTRAN programmers; and SUR (Software Utility Routine) to provide configuration control of program libraries during the development and maintenance phases of the system. These tools make it easier and more convenient for your programmers to design, code, and maintain software.

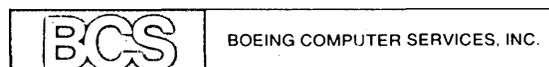
## What about hardware productivity?

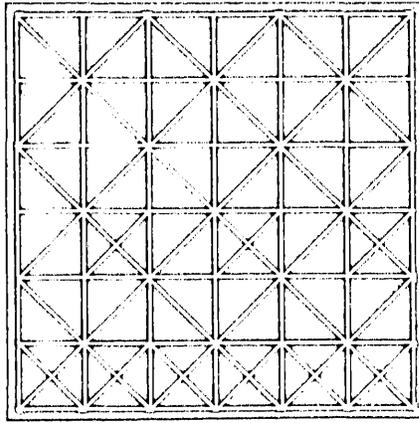
If you want to check on hardware performance, use SARA (Systems Analysis and Resource Accounting). SARA is a BCS capacity management system that allows you to define your configuration's performance standards, and then measure its productivity against those standards. It also gives you a way of simply displaying your computer loads and bottlenecks to all levels of your management.

SSDM (improved people productivity) and SARA (improved machine productivity) go hand in hand in furthering the efficiency of your operation. New techniques for managing your investment in people and hardware. Techniques that can help you achieve the productivity and software quality that you know your staff is capable of. Get the facts on them now. Call the BCS office nearest you, or mail the coupon.

Boeing Computer Services, Inc.  
P.O. Box 708, Dover, N. J. 07801  (201) 361-2121  
Please send full information on  SSDM  SARA  
My application is \_\_\_\_\_  
Name \_\_\_\_\_ Title \_\_\_\_\_  
Organization \_\_\_\_\_ Phone \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**We can help.**





# Languages for Reliable Software

by Jacob Palme

---

Features can be built into languages to enhance the reliability of the programs they produce.

---

Programming languages can aid in guarding against two factors of unreliability: (1.) faulty or unreliable software, and (2.) careless or malicious programmers.

One way of getting more reliable software is to check and test every item of the program thoroughly. But no software except very small programs can ever be completely checked and tested. We must therefore design software so that

1. it is easy to check and test, and
2. it checks itself when used so that errors both in input data and within the program are discovered before much damage is done.

The checking and testing of software is done by computer, by humans, and by humans and computer working together. Computer checking can be done either at compile time or at run time. Checking at compile time can be cheaper, especially for programs to be used in heavy production work, but run time checking is often necessary and worth its cost. Note that even with interpretive systems, much checking can be done before run time to avoid run time overhead.

A strong argument for compile time checking rather than run time checking is that the latter may come too late to avoid a catastrophe. One could draw an analogy between compile time checking and preventive aircraft maintenance, and between run time checking and flight recorders.

Computer hardware today is often

designed in a way which makes run time checking unnecessarily costly. Microprogramming and new hardware may therefore make run time checking more profitable in the future. (Suggestion: Introduce a "defined" bit associated with each word in the memory to avoid unintentional use of undefined words).

What kind of software is easy to test and check for both human and computer? To check a program, both human and computer must grasp the flow of control and of data in the program. This is much easier to do if the program and data are divided into modules with a small defined interface between them. A programming language can be designed so that the compiler helps to ensure this modularity. (This will be discussed later.)

## Language restrictions

If the compiler and run time system are to be able to detect programming errors, some restrictions on the programmer are necessary. A language system with good facilities for automatic error detection must have many restrictions. In fact, the ideal programming language for a given task would be one which allowed only those constructs necessary for the given task and nothing else!

A simple example: in many applications calculations are made with data which can only take certain values. Mass for example can never be nega-

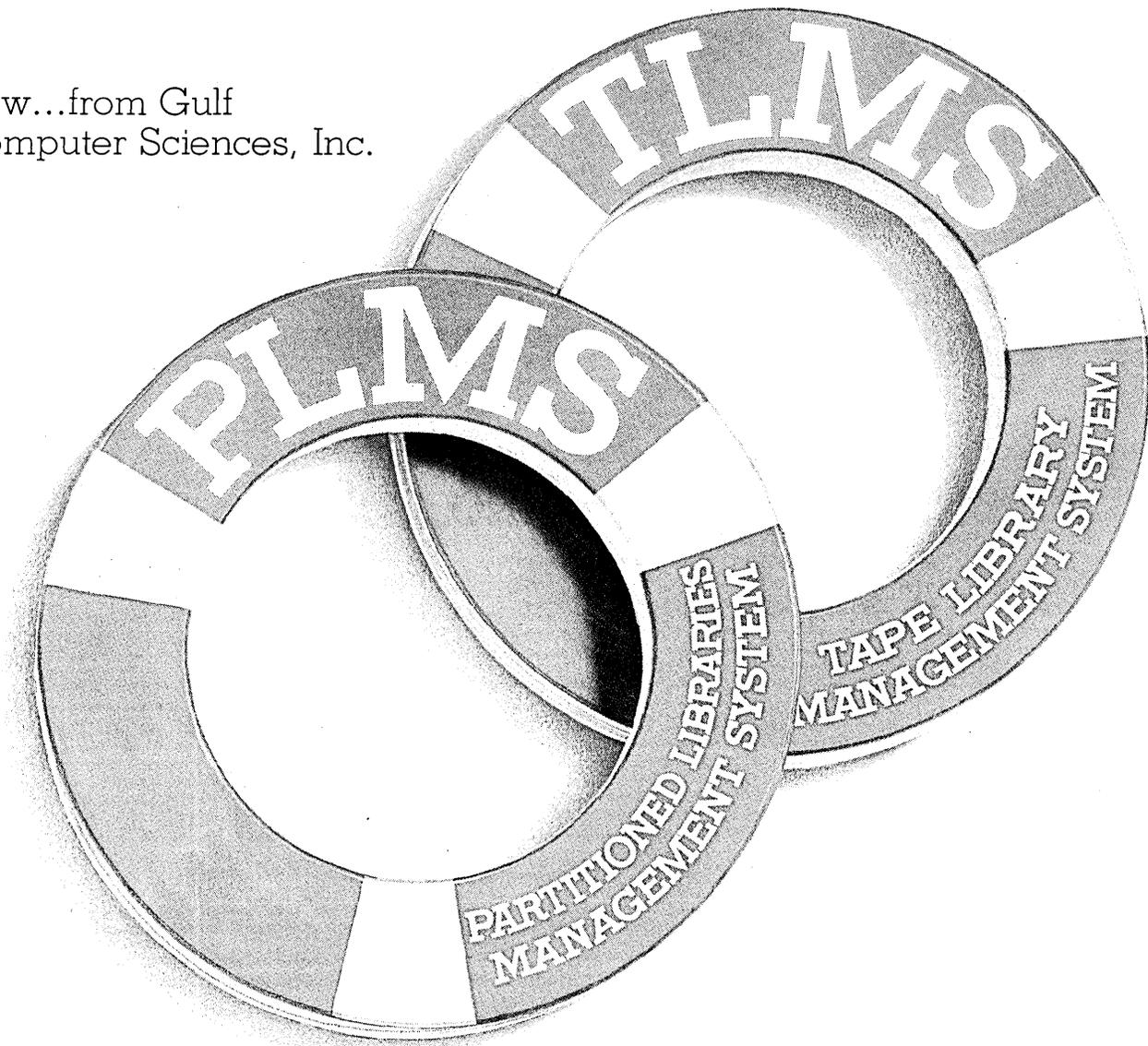
tive; the contents of a container must always be between certain lower and upper limits. In most existing programming languages, REAL variables are used to store such data. But REAL variables can be negative. However if only POSITIVE REAL variables were allowed, then the compiler and run time systems could detect many programming errors.

Allowable constructs would vary from application to application. Therefore there must be a way in which the language can be matched (i.e., restricted) to the application. In the earlier example this would be done by constructs in the language to create new data types like POSITIVE REAL, OR REAL BETWEEN 0 AND CONTAINER CAPACITY.

As another example, suppose we wish to introduce the new data types RECTANGLE and CIRCLE. A rectangle is defined as an object which has the properties *width*, *length*, and *area*. A circle has the properties *radius* and *area*. The programmer must then be protected from making the error of finding the *radius* of a rectangle. And this checking should be done at compile time.

On the other hand, there may be a need for a programmer to refer to an object which is sometimes a rectangle and sometimes a circle. In most languages (like ALGOL 68 or CS-4), this requires a run time check every time it is used to see if it is actually a circle or a rectangle since both have this proper-

Now...from Gulf  
Computer Sciences, Inc.



## A new product – Partitioned Libraries Management System (PLMS)– joins the highly rated TLMS Package.

Since 1968, TLMS (TAPE LIBRARY MANAGEMENT SYSTEM) has been providing universities, banks, insurance companies, state governments and customers in over 100 medium to very large installations with *complete control* over a data center's tape library.

TLMS is a data capture and reporting system, both online and offline. Online, it can update the master file, provide protection of data sets, provide inquiry and update, and optionally, it can gener-

ate external labels for tape output. Offline, it provides reports of library activity, which help to manage the library.

It has proved its ability to provide data security, inventory management, and cost reduction.

**Enter PLMS.** Now, Gulf Computer Sciences is out with something new . . . PLMS — a series of programs which provide for security control of all partitioned data sets. PLMS provides controlled updating, operational

backup and audit reporting of all partitioned data sets — including load module and procedure libraries.

Both packages are compatible with OS/360/370/MFT/MVT/VS1/VS2/multiple CPU's. You owe it to yourself to look into them further.



Write: Gulf Computer Sciences, Inc.  
P.O. Box 2100  
Houston, Texas 77001  
(713) 627-9320

**P.S.** Extra! "TLMS makes Honor Roll." Read about it in an editorial feature elsewhere in this issue!



A member of the Software Industry Association

# LANGUAGES

ty area defined.

In SIMULA 67, a construct is introduced whereby certain types (in SIMULA called classes) can be extensions of other objects in a way which avoids these unnecessary run time checks. In SIMULA, you first define the class *plane object*, and then define *rectangle* and *circle* as extensions of the class *plane object*. Rectangle can thereafter be further refined, for example into the extended concepts *floor* and *ceiling* of a room.

This method not only makes much more of the checking possible at compile time, but also is a very natural way to structure a program. A basic geometric package may define rectangles and circles, and a building extension of the package may define floors and ceilings. Different modules of the program may define the geometric concepts and their use in a particular application area.

Those checks which must be made at run time should if possible be explicit to the programmer. For example, trying to use an ordinary integer as index to a limited vector is actually a case of implicit type-conversion from an ordinary integer to an integer limited to the vector range. Such conversions would require explicit conversion statements in the program.

As another example, if there are several cases, with different actions legal in each case, then a statement like the INSPECT of SIMULA or CASE of PASCAL introduces an explicit run time check. In SIMULA, the compiler also checks that the code written into each case is actually legal for that case.

## Undefined constructs

In many programming languages, there are certain program constructs which can sometimes cause "undefined" results, and unpredictable things may happen at run time. A programming language giving high reliability should of course avoid such undefined constructs.

In many languages, the use of a variable which has been allocated but not initialized gives "undefined" effects. There are two ways to avoid this. One is to enforce initialization of all data at allocation time (this is done in SIMULA and CS-4), and another is to check at run time that every variable used has been given a value. The latter method is very costly on most existing computers.

Another undefined effect in many languages is misuse of a pointer (reference) variable, used as if it pointed to something, although it does not. Such errors often cause the whole program

to run wild and crash. PL/I and TACPOL have bad protection against such errors. But even ALGOL 68 and CS-4 can have such errors. In ALGOL 68, a pointer can be made to refer to a field which is deallocated when a block is left. Thereafter, this pointer refers to something undefined. In CS-4, the free statement can be used to deallocate something that other pointers still refer to. Only a very costly run time check can avoid such errors.

## Protecting program modules

Another aspect of reliability has to do with modularity. In a programming language to be used for large program packages, there is a need for a mechanism whereby the program package can be divided into modules with defined interfaces, and another mechanism to ensure that the communication between the modules conforms to this interface.

We regard it as natural that an operating system should check requests put on it from user programs, and that an interpreter should check commands to it. We are requiring more and more that application packages check how a program uses them. In large complex systems, the code to do all this checking, mostly at run time, is large and time-consuming. We would thus gain not only reliability, but also efficiency, by moving this checking into a pre-execution compiling stage.

Requirements on such a system might be:

1. The modules should only communicate through the defined interface.

2. All data transmitted between modules must conform to data definitions.

3. A module must be able to keep some of its parts hidden from the outside, so that other modules cannot access those parts directly.

4. The programmer's freedom should not be unduly restricted, thus a module need be not only a procedure, but also a data structure, or a data structure combined with a package of procedures. Not only single variables, but also data structures must be transferable across the module interfaces.

5. Several modules must be combinable to a higher order module which looks from the outside like a single protected module.

6. A module should be separately compilable.

7. As much of the security checking as possible should be done at compile time, since at run time it is inefficient and often cannot give such readable error diagnostics as at compile time.

Many existing language systems have very bad module protection. An example is most FORTRAN systems. A

module in FORTRAN can be either a static data block (the COMMON block) or a subroutine. The only parameters transferable to a subroutine are single variables, arrays, or subroutines. Most FORTRAN compilers do not check the consistency of COMMON blocks between modules, nor do they check the parameter types between calling and called module. This is a very common cause of difficult-to-find programming errors in FORTRAN.

Most ALGOL systems have better protection, but usually the only separately compiled module allowed is a procedure, and only variables and arrays can be transferred to it. The parameter type checking at calls to separately compiled procedures in ALGOL is usually done at run time, which is slow if much data is to be transferred to a short routine.

A basic requirement for security is the module protection between the high level language and the machine. If this protection does not work, then any programmer can intentionally or by mistake use the deficiencies to get around the protection.

A simple example: if a programmer is allowed to index an array outside the array bounds, he can in this way address parts of the computer memory which should not be available to him, or which should be available only through the protected interface gates between modules.

Most PL/I and FORTRAN systems have very bad protection for this. A programmer can very easily—intentionally or by mistake—address memory in illegal ways, not only by exceeding array limits, but in PL/I also by misusing list structure pointers, which is even more dangerous.

To test this I wrote a typical list structure application program and introduced five typical small programming errors. The IBM PL/I Optimizing system could only diagnose one of the five errors correctly. For the other four, the program ran wild. When it was finally stopped, it was trying to read or write in the operating system believing this to be part of the user program data area.

The four constructs which caused PL/I to run wild were:

1. Trying to deallocate data, and thereafter continue to use it;

2. Trying to look at a data structure as if it had been another, different data structure;

3. Making mistakes when trying to look at the similar parts of two partly similar data structures.

4. Trying to use an integer as a pointer.

When the same program was written in SIMULA 67, all errors were discovered immediately by the compiler. The

# ASGOL

**Can solve  
your complex  
Nova  
programming  
problems,  
fast, faster, fastest!**

ASGOL is a structured systems programming language for NOVA and Nova transparent computer users. ASGOL is a powerful high level computer language enabling systems programmers to develop complex software in a flexible and generalized expression organization similar to ALGOL or PL/I. ASGOL features

- Embedded Assembly Language.
- No complicated run-time libraries.
- Typeless variables with no artificial rules.
- String and byte manipulation.
- ALGOL and PL/I construction for loops, cases and variables.
- High code efficiency.

There isn't an easier way to get from a complex NOVA system program design to a fully debugged program than with ASGOL. Purchase or lease by month; immediate delivery.

**Coming soon: NOVA Sort**

## ASGOL / MDB SYSTEMS

981 N. Main St., Orange, CA 92667 (714) 639-7238

- I'm a swinging programmer, here's my \$10 for the complete 65 page Programmer's Manual. Credit with purchase or lease if I go ASGOL.
- OK, I spend 10¢, you spend 10¢; send me the brief description at no obligation. (No 20¢ credit if I go ASGOL).

We use \_\_\_\_\_ computer(s).

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

Co. Name/Dept. Mail Stop \_\_\_\_\_

Co. Address \_\_\_\_\_

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

(\_\_\_\_\_) \_\_\_\_\_  
Phone

## LANGUAGES

reason why SIMULA 67 gives good security is that the language is designed in such a way that a program containing illegal constructs is discovered immediately, usually at compile time. Each data structure element has to be defined in SIMULA, and the compiler checks that the element is used in the correct way. If a user tries to use an integer variable as if it had been a list structure pointer, then this is stopped at compile time in SIMULA while the error often cannot be found even at run time in PL/I except with special restricted checkout compilers.

This experiment shows that a programming language standard should not be a permissive one. A permissive standard only requires that the compiler treat correct programs in a correct way. In addition the standard must require that the programming language system reject all programs which are not legal. Basically, the computer should appear to the programmer as if it communicates only in the high level language. The programmer should never need to know that there are lower levels, and all errors should be discovered and diagnosed at the level of the high level language. SIMULA and a few other programming languages satisfy this requirement.

### Interrupts and parallel processing

Certain programming languages include ways to cope with hardware or software interrupts caused within the program or from the outside. These constructs may be necessary for certain applications, but they are not good from the reliability viewpoint. It is a well-known fact that wide-ranging GOTO-statements are dangerous because they leave the normal flow of control in a way which is difficult to check. Interrupts are even more dangerous, because they leave the normal flow without even any explicit GOTO statement. An interrupt may occur for example inside a sequence of statements updating some data which has been only partially updated. If the interrupt routine changes the data being updated, then when the updating is resumed, dangerous things can happen.

If interrupts are at all allowed within a programming language, their use should at least be as restricted as possible. Some languages, for example PL/I, TACPOL, CS-4, include the ON CONDITION construct which may encourage programmers to use interrupts where they are not necessary.

Certain languages contain facilities to allow several processes to run simultaneously, as if part of the program

was executed on several asynchronously running cpu's. This is very dangerous from a security viewpoint, if two of the processes simultaneously update the same data.

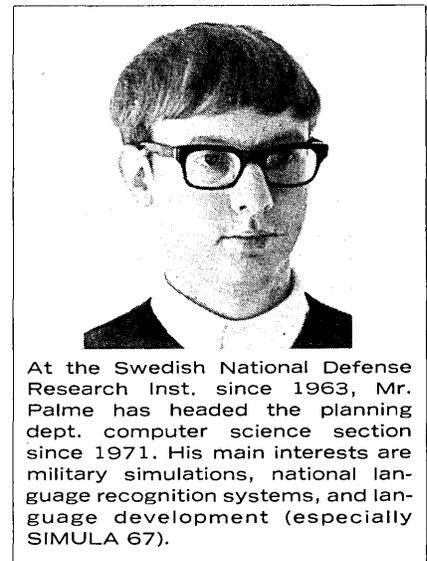
The idea of two asynchronously running processors is a typical example of something undefined. The order of execution of the statements in the processes are undefined. And as has been said, undefined constructs in a programming language are bad for security.

If a program is actually only going to be executed on one cpu, then there is no need for parallel processes in which the order of execution is undefined. One can as well use quasi-parallel processes, as is done in SIMULA, where the order of execution is defined in the language, and where control can pass from one process to another only at points in the program where this is explicitly stated.

If the program is to be executed on several cpu's, then the program should be organized so that as little data as possible is accessible to processes on both cpu's at the same time. This is possible if the data in the language can be divided into data modules in a way which makes it easy for the programmer to regulate which program modules have access to which data areas at which time.

### Conclusion

Reliability requires that the constructs of a programming language do not cause undefined effects, that the compiler is not allowed to make assumptions of what a programmer means, that a programmer is allowed to further restrict the constructs and the module interface, and that the compiler is made to do most of the checking, even of programmer-defined restrictions. \*



At the Swedish National Defense Research Inst. since 1963, Mr. Palme has headed the planning dept. computer science section since 1971. His main interests are military simulations, national language recognition systems, and language development (especially SIMULA 67).

# DATAcom

Data Base Management System

## The "Best kept secret in DB software" is getting out fast!

Here are 8 reasons why:

- 1 High speed sequential processing** / Savings and Loan processes a full 2314 pack of data sequentially on a 360-Mod 50 in just over seven minutes.
- 2 Data Compression** / Bank was able to save two spindles of a 2314 and an additional control unit.
- 3 Programming Ease** / FM company was able to convert an entire new application after a demonstration prior to formal installation training.
- 4 Processing Efficiency** / Insurance customer directly converted a three hour per day run to insure that DATAcom would not "degrade" performance. Without tuning, the update run was reduced to 40 minutes.
- 5 Data Access** / Savings and Loan is able to serve all its customers from any of 35+ branches on any account knowing any of the following— name, mortgage number, loan number, address or account number.
- 6 Response Time** / With DATAcom/DC an electronics distributor is able to get 1 second response time in an order entry application.
- 7 Memory Efficiency** / All users require only 25K plus buffers.
- 8 Ease of Use** / No full time data base administrator required.

DATAcom/DB is what the most sophisticated, impartial, cost-conscious professional judges of software performance are buying in data base management systems. They operate on a P & L basis and are directly dependent on user satisfaction. These *professionals*, the people who know software best, are *the fastest growing part of our customer list*. DATAcom/DB features are simply not available elsewhere and particularly not at this price level... and *professionals buy value!*

Consider these features: Simple programming. Great flexibility in data file design. Multiple logical keys. Concurrent multipartition operations. Faster high-speed batch sequential capability than any other D/B system. Wide variety of cost-saving features including data compression by file. Multiple levels of data security. Supports all IBM languages. Fully re-entrant and multi-tasking for high volume on-line systems.

If Datacom seems too good to be true, *make us prove it.*

The professionals do.

Call or write today and get the complete story in any benchmark situation you care to structure.

I'm a professional. Please prove DATAcom/DB to me.

Name \_\_\_\_\_

Title \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

Phone \_\_\_\_\_

**cim** an Insyte Company

D-12

**Computer Information Management Company**  
3707 Rawlins Street, Dallas, Texas 75219 214/526-4280

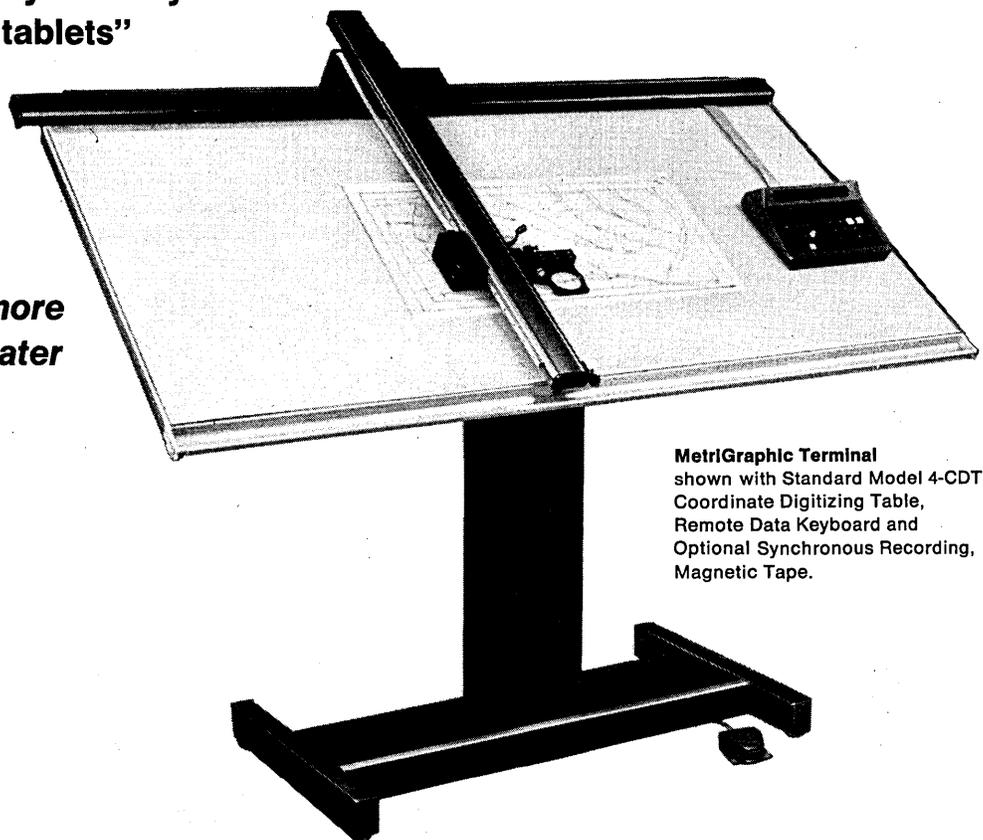
DATAcom Data Base Management System and Data Communications Monitor are the *only* DB/DC systems designed for each other... and you!



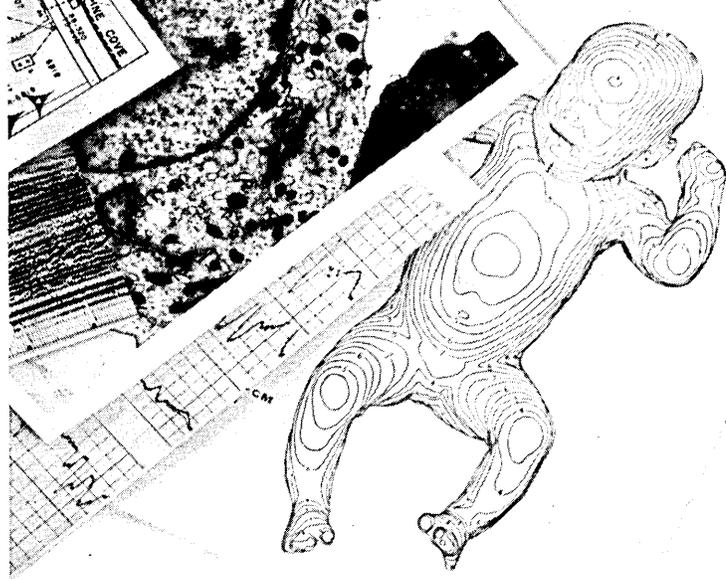
# FOSTER Re-introduces The Graphic Digitizer

to clear up some misconceptions  
you may have had.

When you compare (and you really shouldn't) "pens" and "tablets" to a Foster Digitizer, it's like comparing a slide rule to a 12-digit programmable calculator. They both do a job, but one does it *faster, more accurately and with greater flexibility.*



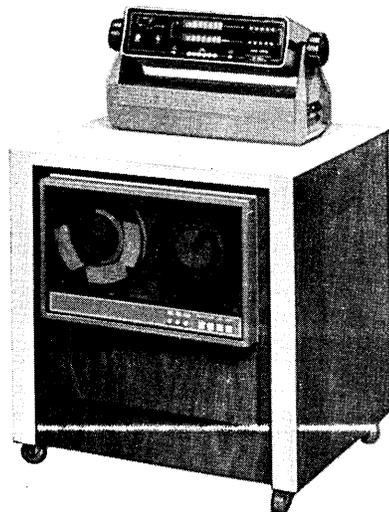
MetriGraphic Terminal shown with Standard Model 4-CDT Coordinate Digitizing Table, Remote Data Keyboard and Optional Synchronous Recording, Magnetic Tape.



Foster Digitizers are reliably generating digits in hundreds of companies with a broad range of applications.

Foster Digitizers allow you to convert *all types* of drawings, photographs and alphanumeric data into digital form for computer entry. They are used in conjunction with our or any other properly encoded x-y coordinating table. They also provide the basic input terminal for our Automatic Digital Drafting System and our fully Automated, *Interactive* Drafting System (AID System).

Two basic modular "stand alone" Digitizers are offered, including a variety of optional features for increased system versatility.



### Foster MetriGraphic Terminal

An economical precision computer graphic digitizer with precision and reliability for general applications.

- 2 or 3 axes with sign and 6 digits per axis.
- Inputs for all types of properly encoded coordinate positioning devices, including stereoplotters.
- Outputs for semi and automatic recording of points and associated identifiers to any standard type of remote recording device or directly to a computer. A full range of interchangeable options is available.
- All digitizing and computing performed in .001 inch increments, at cursor movement rate of up to 60 inches per second.
- Independent Axis Variable Electronic Scaling in Metric or English system.
- Two-axis Integrator (digital planimeter) for automatic area computation.
- *And more!*

### Foster Graphic Quantizer

A programmable, real-time, digitizing, computing and recording system offering up to 4 axes with sign and 16 digits per axis. Includes the basic MetriGraphic features *plus* a broad range of input and output options for greater flexibility, such as:

- 360° 2-axis rotation.
- Micro Keyboard for automatic entry of preprogrammed alphanumeric coding of input and output formats.
- *And much more!*

## Turns graphics into digits... with unlimited applications

**For Municipal Agencies, Utilities, Environmental Organizations and others** who wish to computerize geography-related data from existing maps, aerial photographs or other remote sensing systems for the production of specialized maps, property records, utility and pipeline layouts, land use and natural resources inventory.

**For Manufacturing Organizations in Electronics, Metal Fabrication and others** who wish to computerize numerous drawings and numerical control tapes for design/engineering, PCB and IC design and master art, dies and tooling, patterns, etc.

**For Organizations in Petroleum Exploration, Mining, Geophysical Research and others** who wish to computerize airborne and ground remote sensing systems data for the production of exploration maps, seismic diagrams, hydrological and geological studies, multispectral analysis, etc.

**For Organizations in Physical Research, Medicine and Pathology** who wish to computerize graphic, CRT, photographic, SCM, biostereometric and other recorded data for multispectral analysis, dynamic tests, stress and deformation analysis, etc.

## All Graphic Digitizers are not created equal!

For complete technical data, call or write: H. Dell Foster Co.  
P. O. Box 32581  
San Antonio, Texas 78216  
Phone: (512) 494-5511 or (800) 531-5355  
TELEX: 767-395



**H. DELL FOSTER CO.**

A Subsidiary of Keuffel & Esser Company

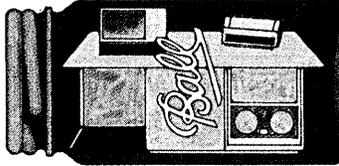
# Mini-DBMS+

Unique new minicomputer hardware/software combination provides tool for developing sophisticated data base management system—plus.

## Big in a small way.

Sometimes you can do amazing things with just a minicomputer.

If, that is, you know how to get the maximum out of every hardware and software component you have. And you're willing to make an extra effort at the conceptual stage of design.



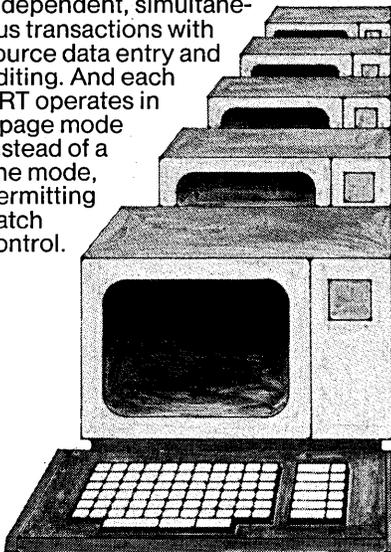
## Introducing DASL™

DASL (for Data Access System Language) is a good example. And the result is a breakthrough in the application of minis: a sophisticated (novices need not apply it) new tool for putting together an efficient minicomputer-based data base management system. Indeed, a flexible, highly capable, comprehensive business and accounting system that gives you Eclipse performance from a Nova-based (and priced) configuration.

## What it's all about.

DASL is unique for a lot of good reasons.

First, you enter all data at its source through a CRT, so it's simple, easy and fast (no more edit lists!). You can design your own forms right on the screen. Each (of up to 16) CRT allows independent, simultaneous transactions with source data entry and editing. And each CRT operates in a page mode instead of a line mode, permitting batch control.

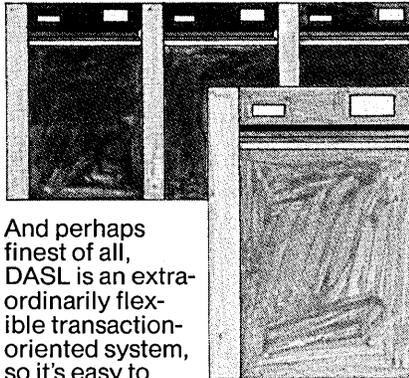


Second, DASL does everything on line—data is entered in real-time, and files are updated in real-time. Third, all input data is thoroughly checked before being entered into the system. Fourth, every valid entry is written on mag tape for a complete audit trail. Finally, it's a stand-alone operation—the entire system is dedicated to your application, so there's never any need for data links to a larger CPU.

## The finer points.

DASL is new, but it's built around field-proven operating systems. It uses Ball Computer Products' Disk Operating System, for example (now 4 years old and in release 1.6) and takes full advantage of its error-checking and speed features.

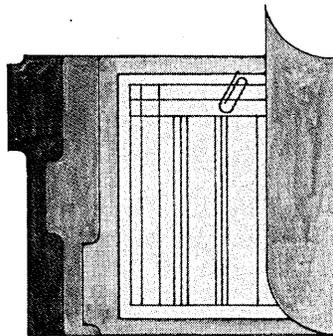
DASL has over 250 commands, supports up to 400 MB of on-line storage and utilizes an efficient and powerful ISAM file access technique.



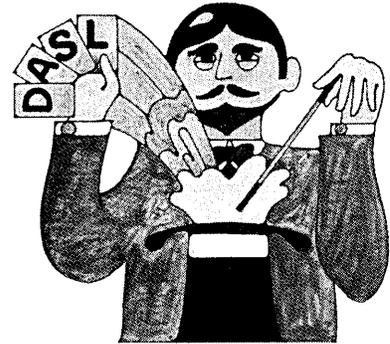
And perhaps finest of all, DASL is an extraordinarily flexible transaction-oriented system, so it's easy to implement all your business and accounting functions.

## No fancy footwork.

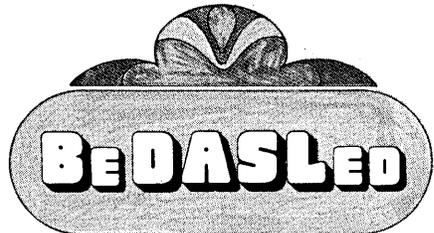
We've built our reputation on exceptional systems design, strong technical support and unmatched service



backed by a company more than \$300 million strong. So when you think about it, it shouldn't surprise you at all that a breakthrough like DASL should come from a company like Ball.



After all, we've been doing amazing things with minicomputers for years.



Gentlemen:  
Send me more information on DASL, the new minicomputer tool I can use to build my own business system.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State/Zip \_\_\_\_\_  
Phone \_\_\_\_\_



**Ball Computer Products, Inc.**

SUBSIDIARY OF BALL CORPORATION

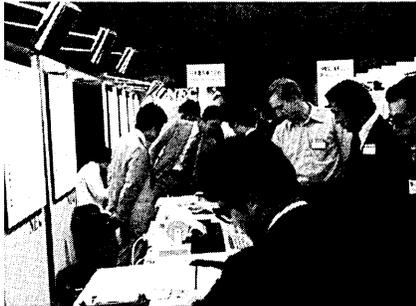
5601 College Avenue  
Oakland, California 94618 (415) 654-8626  
New York • Atlanta • Chicago •  
Los Angeles • San Francisco • Boston

## 2nd U.S.A.-Japan Computer Conference

Microprocessors reared their pointy little heads at exhibits, while more esoteric computer science subjects dominated the technical program of the Second U.S.A.-Japan Computer Conference, in Tokyo, on August 26-28, 1975.

A commuter ticket issuing system by Oki Electric Industry Co., Ltd. stole the show at the exhibition. A person keyed in his name (for identification) and birth date (for fare computation). Then, pressing a key for the point of origin caused a bank of displays to cycle around to the fares for all destinations. Selecting a destination then caused a ticket to be printed, which before it saw the light of day had been laminated in plastic. Always a line of souvenir seekers.

Panafacom attracted interest with its 16-bit microprocessor. Nitsuko showed a service station POS system. Other companies displayed wares such as printers, minicomputers, a liquid crystal display, LSI components, etc. Intel Japan was prominent, but for slick marketing IBM Japan took the



prize, with bilingual promotion of time-sharing services and 37XX devices. In all, there were about 30 exhibitors.

The technical program featured recent work in computer science and innovative computer applications. Most of it was real-world, but Stanford Univ. was represented by James Moorer who is researching transcription of musical sound by computer and by Ed Feigenbaum who taught how to find Koala bears in eucalyptus trees. The theme for the technical program (and generally for the conference) was the bi-national exchange of information on disciplines of common interest.

The technical sessions were well attended, partly because the continuous bilingual translation (via portable receivers) worked very well. The conference also featured a people-to-people program, a social program, pre-conference symposia, and post-conference technical tours. The NHK (public) Broadcasting Center tour, for instance,

included coffee (or tea) and petits fours, and a close-up look at the videotaping of Japan's most popular soap opera, in addition to the technical stuff.

The conference was attended by about 150 from the U.S. and by almost 900 from Japan, the total of over 1,000 being about the same as for the First U.S.A.-Japan Conference two years ago.

The conference headquarters was the Tokyo Prince Hotel, also the site of the exhibits and sessions, and home base for part of the American contingent. Tourist class travelers stayed at the Imperial Hotel, also a first class western style hotel, which probably has the better shopping arcade and is within walking distance of the restaurants and stores of the Ginza district.

While the conference itself ran August 26-28, the travel arrangements from the U.S. covered August 18-30, so much vacationing was accomplished. Those who left Tokyo early for the hinterlands fared well. Particularly if they tried a Japanese Inn. However, several people attended pre-conference symposia August 20-22 and left for Kyoto Saturday the 23rd, only to spend the day in the Nagoya train station when the Bullet Train service was stopped by a typhoon.

The language barrier occasionally is a problem, but English is the second language in Japan and the people are very helpful, sometimes giving you directions when all you want to do is stand and look. In any case, you'll never starve, as you can always go into a restaurant, drag a waiter out to the display case, and point at what you want.

Japanese drive on the left side of the road, so forget about renting a car. Taxis work fine. Half of the Tokyo car population is taxis. The subway/train system is good but not trivial for foreigners. Honda and Kawasaki must export all of their big bikes, as the only big machine seen was a Harley ridden by a Ginza traffic cop.

Eventually, you may tire of shrines and temples, but not of the pleasure of being able to walk any street of the world's largest city, at any hour of the day, and not worry about getting mugged.

—F. John Postas

Now an independent consultant working on a message switching system related to electronic funds transfer, Mr. Postas' previous experience includes several years in design and programming for Compata, Inc.

**PROFESSIONAL  
DISCOUNT  
PRICES  
AVAILABLE ON**

 **Texas  
Instruments  
Engineering  
Calculators**

**PHONE TOLL FREE  
800-638-8906**  
FOR THE CURRENT LOW DISCOUNT  
PRICE OF THE LATEST MODEL  
TEXAS INSTRUMENTS CALCULATOR  
OF YOUR CHOICE

**TEXAS INSTRUMENTS  
SR-50A**



Performs all classical slide rule functions—simple arithmetic, reciprocals, factorials, exponentiation, roots, trigonometric and logarithmic functions, all in free floating decimal point or in scientific notation. Rechargeable batteries, AC Adapter/Charger and case included.

**TEXAS INSTRUMENTS  
SR-51A**



Performs logarithms, trigonometrics, hyperbolics, powers, roots, reciprocals, factorials, linear regression, mean, variance and standard deviation. Three memories. Scientific notation. 20 preprogrammed engineering conversions. Rechargeable batteries, AC Adapter/Charger and case included.

**ALL THE FAMOUS  
TEXAS INSTRUMENTS  
ELECTRONIC CALCULATORS  
ARE AVAILABLE AT DISCOUNT PRICES**

Mail and phone orders accepted. Master Charge and BankAmericard accepted. Add \$2.50 per unit for shipping and handling. Maryland residents add 4% sales tax.

Use our toll free phone: 800-638-8906 (Maryland residents phone: (301) 340-7200) to order or for current discount quotations on the leading brands of electronic calculators: Texas Instruments, Hewlett-Packard, Rockwell, Ricoh, Kingspoint, Corvus, Novus, and many more.

### THE GUARANTEE

10 day money back trial. If you are not completely satisfied you may return the Texas Instruments calculator you order within 10 days for a cash refund or charge cancellation. In addition Texas Instruments Inc. and Capital Calculator Co. Inc. warrant each calculator for a period of one year against defective parts and workmanship.

**Capital Calculator Company**



Maryland residents phone:  
(301) 340-7200

**701 East Gude Drive  
Rockville, Maryland 20850**

CIRCLE 101 ON READER CARD

# The Varian System It Speeds Relief for Throughput

When you suffer from headaches caused by software during critical run-times, then you need the fast, effective relief of the Varian System with Writable Control Store (WCS).

With WCS, your critical routines will run at an incredible 190 nano-second micro-cycle time (up to 20 times faster than software), executing up to twenty-five separate functions simultaneously.

Our commercial firmware package customizes the Varian computer into a commercial machine running COBOL and TOTAL data base management. Our scientific firmware package transforms the Varian computer into a scientific FORTRAN machine. You have the choice to optimize the Varian System for either commercial or scientific applications, or both.

You can also design your own accelerator package to answer your own needs (repetitious routines, special algorithms, and others).

The Varian System offers you the oppor-

tunity to design specific solutions to specific problems with our broad open-ended selection of computer hardware, firmware and software that gives you the speed, performance and flexibility to get your information processing job done.

A network of field service engineers, analysts and a full staff of factory experts are committed to serving you with system configuration, hardware and software specials, installation operator training and systems management.

If you're interested in the best medicine for the greatest throughput for your dollar, contact any of our offices throughout the world, or Varian Data Machines, 2722 Michelson Drive, P.O. Box C-19504a, Irvine, California 92713, (714) 833-2400. In Europe, contact Varian Associates Ltd., Molesey Road, Walton-on-Thames, Surrey, England, Telephone 28971.

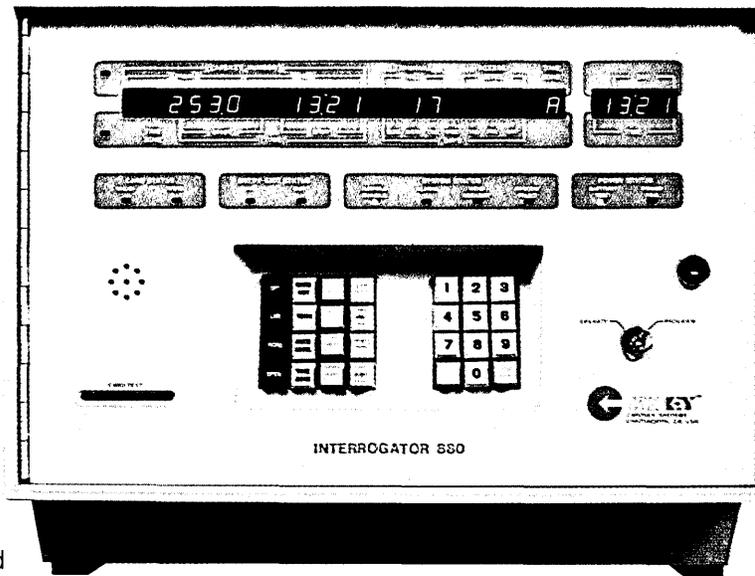
**Helping a Fast  
World Move  
Faster**



 **varian**

CIRCLE 10 ON READER CARD

Introducing the revolutionary  
new Interrogator 880™  
Security System that controls,  
monitors, and documents  
the movement of people  
and vehicles through  
specific points from  
one central location...  
to anywhere in the world.



**There is no other security system currently being produced with the performance capabilities of the Interrogator 880.**

The Interrogator 880 is a dedicated mini-computer, programmed to control, monitor and command from a central location to and from as many central points on or off the premises as needed. You may retrieve, through hard copy reports, magnetic tapes, or route data through interfacing equipment direct to a main frame computer. The system may begin with a simple installation and thereafter be field-expanded to meet your growing requirements.

Once a Cardkey Securiti-Card™ is issued, it need never be retrieved. All commands and controls are programmed through the 880, which issues any changes in levels of security. The Interrogator 880 completely controls and

monitors entry/exit at all card reader terminal locations by permitting or denying access. It will record both valid and invalid entry attempts and even report reasons for denying access. It can also control elevators, doors,

**CARDKEY**

**CARDKEY SYSTEMS**

A DIVISION OF GREER HYDRAULICS, INC.

20339 NORDHOFF STREET  
CHATSWORTH, CALIFORNIA 91311  
(213) 882-8111/TELEX 651-375

**European Manufacturing and Sales Office:**  
43/45 Millford Road, Reading, Berks RG1 8LG, England  
Telephone: 0734 582804 TELEX: 847733

parking gates, as well as monitor alarms and any environmental conditions such as fire, flood, temperature, pressure and noise levels.

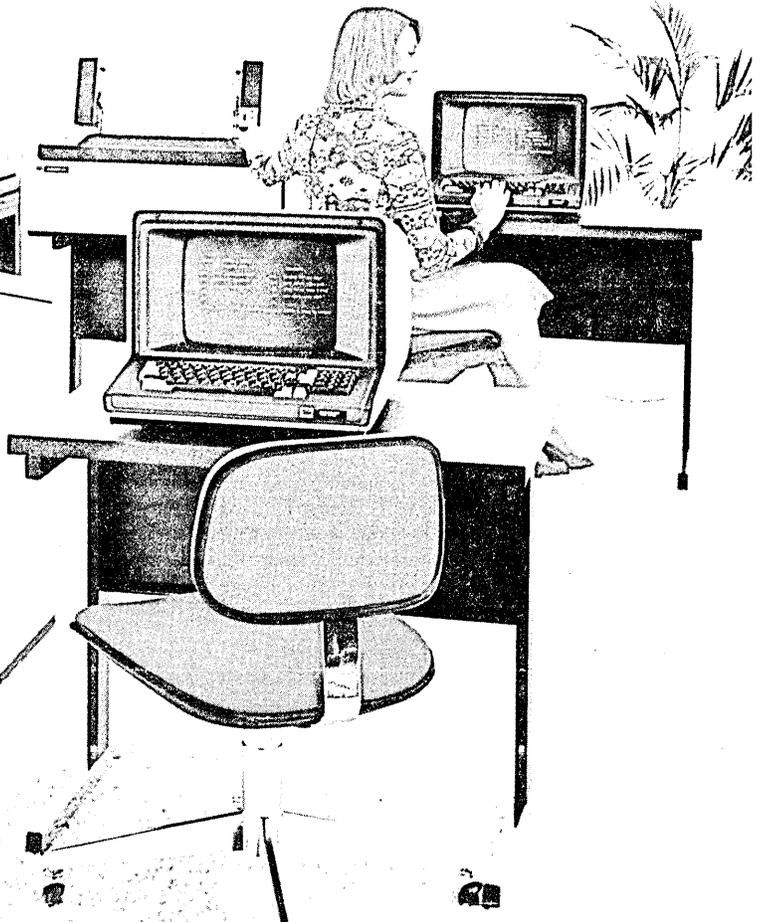
Since its recent introduction, the Interrogator 880 already has been field-proven by utility

companies, government agencies, institutions, high rise buildings, data-processing centers, financial organizations, the petroleum industry and many manufacturing firms.

Because the Interrogator 880's applications are so diverse, we've only mentioned a few. Its application capabilities are limited only by your own imagination. No matter what your own perplexing problems — in the area of security — the 880 can handle them.

**Call or write for a free security analysis. Or simply ask for additional technical information.**

It's 340 in Poughkeepsie,  
350 in Des Moines  
and 440 in Los Angeles.



# Now there's a family of distributed data entry and processing systems that you can tailor to the requirements of your remote sites.

If you've considered the advantages of distributed data entry and processing, you've probably discovered a sad truth:

A system that's fine for Poughkeepsie might be a washout in Des Moines.

Different sites have different needs. From remote data entry, to communications, to remote inquiry and response, to on-site report and forms generation.

And to overwhelm a small branch with high-powered equipment is just as bad as under-equipping a large one.

To match each of your branches with exactly the right equipment, in both hardware and software, there's only one terminal manufacturer to turn to. Us.

## We're as flexible as you are.

Using our Sycor Models 340, 350 and 440, and their wide range of peripheral equipment, you can pinpoint capability to site requirements and price.

Our Model 350, for instance, might be just the ticket for your two-man operation in Des Moines. While a larger branch in Los Angeles might require the concurrent background processing capabilities of the Sycor 440.

And, while each of the three terminal systems has its own unique capabilities, they all work together in a remote processing network.

Each, for example, can be programmed with our high-level, easy-to-use TAL language. And,

they not only talk to your CPU, but to each other.

And that means flexibility.

Should the requirements of one location change, our systems can change with them. You can switch terminal models without changing programs, or even retraining operators.

## The Model 340.

For smaller office situations that call for data entry, you'll find our Model 340 the low-cost intelligent answer.

No matter which of its hundreds of applications you use it for—like order entry, payroll and accounts payable—you're assured of virtually error-free data every time. Because operator errors are pointed out immediately for on-the-spot correction.

And, its 8k bytes of programmable memory and capabilities like customized field validation, conditional data entry and arithmetic operations, mean the Model 340 goes even further in providing for needs you might not even have anticipated when you first got it.

## The Model 350.

If you need the advantages of random accessibility, look into the Model 350. The 500,000 "fill-in-the-blanks" characters on its exclusive dual flexible disks let you store customer, product/price and salesman files right at the source.

And, with its 16k bytes of programmable memory, the Model 350 not only retrieves data, but maintains and updates files—and even

generates reports.

Just key in a customer number and you get all the pertinent data: name, address and billing information. That means reduced key-strokes, improved accuracy and big savings.

## The Sycor 440 System.

When you need more than just data entry, look into our new Sycor 440. With a disk storage capacity of up to 10 million characters and the use of up to eight separate terminals, you can do data entry and inquiry/response concurrent with background processing.

Our 440 system lets you store and access files locally, reducing communication line costs and investments in central CPU resources.

Each display is controlled by the on-site processor and is capable of performing independently. At the same time that you're performing data entry you can make use of our special programs to produce a wide variety of management reports like sales analysis, inventory and billing.

It's a system as flexible as your needs.

## Give us a call.

We invite you to take a closer look at our family of distributed data entry and processing systems—the lowest cost answer to your branch office needs.

Call your Sycor representative for details.

# SYCOR

... applying intelligence to remote processing.

CORPORATE OFFICES: Ann Arbor, Michigan 48104 (313) 971-0900. DISTRICT SALES OFFICES: Atlanta (404) 455-3070 • Boston (617) 890-7290 • Chicago (312) 297-5200 • Cleveland (216) 741-4840 • Columbus (614) 888-8657 • Dallas (214) 521-6710 • Denver (303) 458-0794 • Detroit (313) 355-5770 • Greensboro, N.C. (919) 274-2964 • Hartford (203) 529-1100 • Houston (713) 785-2953 • Indianapolis (317) 788-1577 • Kansas City, Mo. (816) 842-7799 • Los Angeles (213) 640-0120 • Miami (305) 592-1533 • Milwaukee (414) 257-3780 • Minneapolis (612) 854-2309 • Newark (201) 773-7400 • New York (212) 371-9050 • Philadelphia (609) 665-1170 • Pittsburgh (412) 922-3350 • Portland, Ore. (503) 227-5672 • San Francisco (415) 349-6626 • St. Louis (314) 878-0900 • Washington (703) 527-0200. CANADA: Sycor International Ltd.; Ontario and Quebec.

INV NO	INV DATE	TYPE	PAID	CNTL	DISCOUNT	NET	CURRENT
115325	5/30/75	PRO		21439		105.00	105.00
115326	5/30/75	PRO		21440		45.00	45.00
115327	5/30/75	PRO		21441		3,990.81	3,990.81
115328	5/30/75	PRO		21442		2,491.71	2,491.71
115329	5/30/75	PRO		21443		88.52	88.52
115330	5/30/75	PRO		21444		2,627.48	2,627.48
115331	5/30/75	PRO		21445		530.37	530.37
115332	5/30/75	PRO		21446		7.60	7.60
115333	5/30/75	PRO		21447		120.00	120.00
115334	5/30/75	PRO		21448		102.04	102.04
115335	5/30/75	PRO		21449		1,502.98	1,502.98
115336	5/30/75	PRO		21450		116.11	116.11
115337	5/30/75	PRO		21451		286.95	286.95
115338	5/30/75	PRO		21452		1,648.98	1,648.98
115339	5/30/75	PRO		21453		341.94	341.94
115340	5/30/75	PRO		21454		1,943.03	1,943.03
115341	5/30/75	PRO		21455		142.90	142.90
						8.99	8.99
						858.57	858.57
						24,070.41	24,070.41
						110,306.49	110,306.49

## Could you be put out of business before you could put out a fire?

At the very least, a computer fire means you'd probably have to hire temporary accounting help, just to keep the books and payroll current.

And it could be even worse if a computer is what makes your company go. No computer, no income.

### Computer downtime is expensive.

Consider what a fire would cost in terms of lost business while repairs were being made. How much business do you do in a week? How many orders go through your operation in a week? And what if repairs took two weeks? Or even three?

It adds up to a lot of lost business (not to mention lost goodwill from customers). It probably adds up to a lot more than the cost of a fire protection system, too.

### America's computers are under-protected.

With the future of your company largely dependent on your computers, we hope you have a good fire protection system already installed.

If you do, then you're an exception. Because we know that only a small percentage of existing computer facilities in this country have adequate fire protection systems. We are also aware of the tremendous losses that EDP facilities suffer each year due to fires.

### How many kinds of computer fire protection systems are there?

There are only two that are practical, CO<sub>2</sub> and HALON 1301. Chemetron has them both.

### Get a free fire protection survey.

We'll conduct a thorough survey

and analysis of your computer installations and put together a detailed recommendation on the fire protection system that's right for you. No cost or obligation, of course. Write today for our brochure, "HALON 1301, Folio 9-2," to Don Roberts, Chemetron Fire Systems, 111 E. Wacker Drive, Chicago, Illinois 60601. Or call (312) 565-5000.

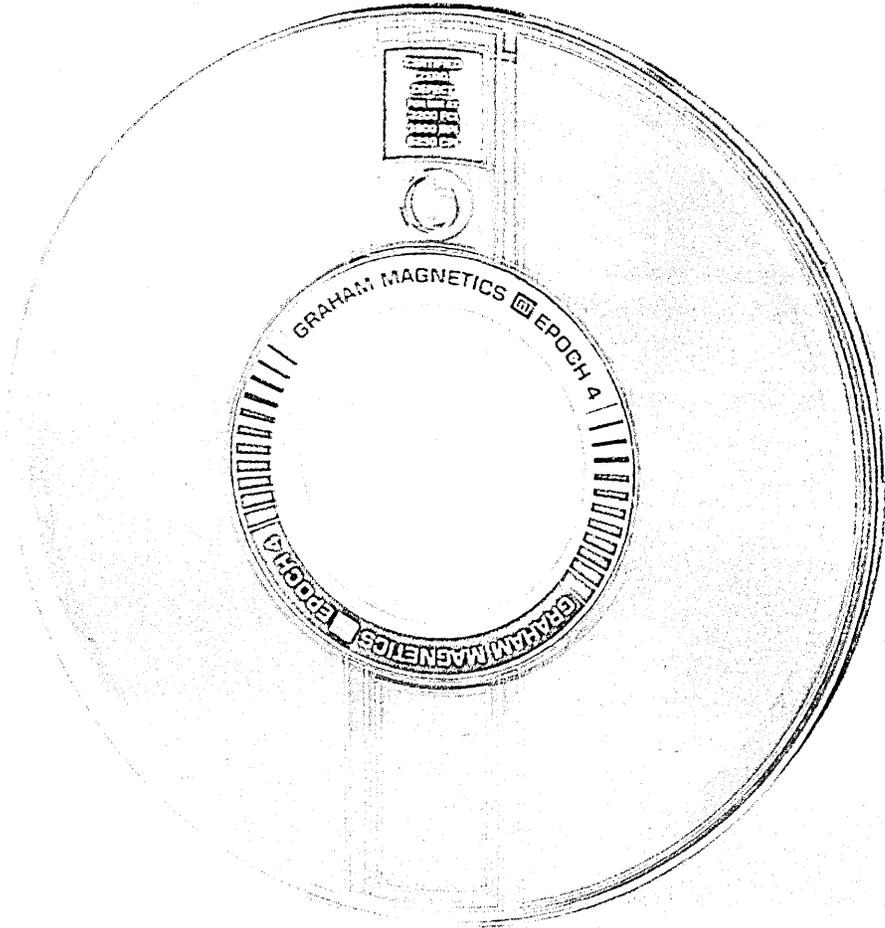
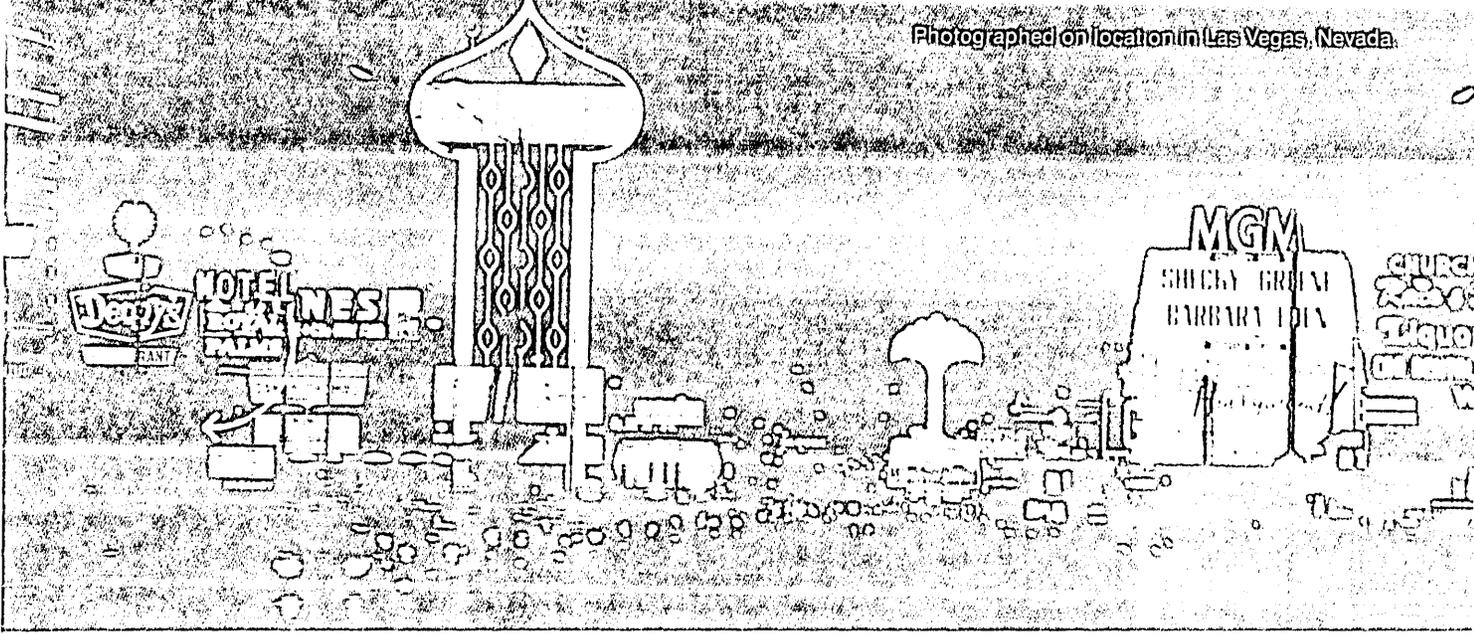
We hope you'll do it now. Because our business is to help keep you in business.

# CHEMETRON™

## Fire Systems

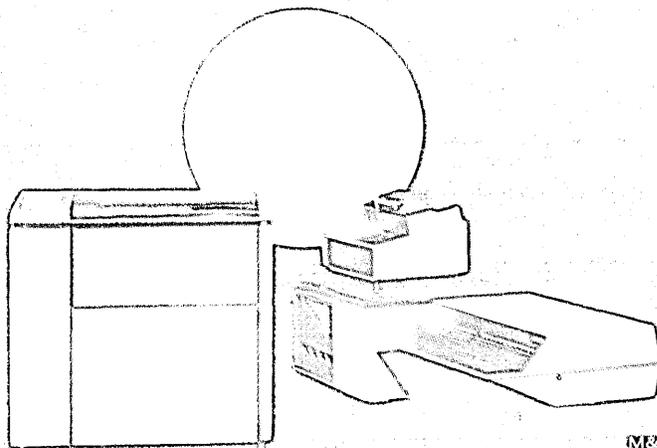
Chemetron Corporation

Photographed on location in Las Vegas, Nevada.



We can make all the difference in your world. We're Singer-M&M Computer Industries. The high-speed Intelligent Remote Batch Terminal people with the solid systems that are a proven success. **A WORLD OF DIFFERENCE IN PRICE** Singer-M&M means a money-saving difference. With the lowest priced High-Speed Intelligent Remote Batch Terminal System in the market. It's the one system that delivers more for less. **A WORLD OF DIFFERENCE IN SERVICE** We're also the service people. There are more than 1500 Singer-M&M service representatives within the U.S. And, even more throughout the entire free world. We're there. When you need us. Where you need us. **A WORLD OF DIFFERENCE IN CAPABILITY** Singer-M&M delivers more dependability, superb software support and field reliability. That's been proven. The Singer-M&M systems emulate IBM, CDC, UNIVAC, BURROUGHS and HONEYWELL high-speed terminals with communication speeds up to 50 KBPS—Line Printer speeds from 200 to 1800 LPM—and, card reader speeds from 300 to 1200 CPM. **A WORLD OF DIFFERENCE IN STABILITY** The world-wide Singer organization is the solid base for M&M Computer Industries operations. That means M&M management and financial stability is unequalled in the market. Singer-M&M Computer Industries. A difference that you can depend on.

## A World of Difference



CIRCLE 95 ON READER CARD

**SINGER**  
M&M COMPUTER INDUSTRIES, INC.  
2201 N. Glassell St.  
Orange, California 92665  
(714) 998-1551 Telex 655464

# The 1970s: A Period of Pause and Appraisal

by Edward K. Yasaki  
Senior Associate Editor

---

We are on our way to technological goals which we aren't certain we want to reach.

---

The decade of the '50s saw an ascendance of such physical technologies as space exploration, nuclear power, computers, and communications systems. The '60s brought to the fore social technologies and the mistaken belief that social problems could be solved by the application of earlier technologies. "All we needed were more and better analysts, more modeling, more programming," says Roy Amara, president of the Institute for the Future, Menlo Park, Calif.

Amara says maybe the '70s will be

seen as a period of pause and appraisal.

Reasons for such a pause and for concern on the part of scientists and technologists alike were advanced by speakers at the recent International Conference on Cybernetics and Society in San Francisco (Sept. 23-25), sponsored by the IEEE Systems, Man and Cybernetics Society.

In a session titled "Technology and Goals: 1975-2000," chaired by Louis Fein, Willis W. Harman of Stanford Research Inst. observed a growing challenge internationally to the legitimacy

of science, technology, commerce, and even to many aspects of government. He cited Third World demands for a new international economic order, saying, "It's pretty clear what that means . . . a suspicion has developed that somehow the system has divided us into the screwers and the screwees. And it's getting to a conflagration point."

Leadoff speaker Amara said the '70s will not be characterized by pessimism, but neither will we be as naive as in the last two decades, thinking that technology can be used to solve social ills.

## A SWEEPER CART, SOME SPARE PARTS, AND A MICROPROCESSOR

Two experimental computer-controlled mobile robots, under development at the Universities of Wisconsin-Milwaukee and at California-Berkeley, were described at the conference on cybernetics and society. Both are in the form of carts, rolling around on wheels, and both are being fitted with an arm and a camera eye, as well as a communications transmitter/receiver.

The Wisconsin robot, named Ralph, has been operational and, by this month, should possess a six-degrees-of-freedom arm. It receives commands from a human operator through a 48K Modcomp 225 minicomputer that, in turn, communicates with an onboard Motorola 6800 microcomputer. The latter, in addition to serving as a communications interface between the robot and the operator, can also override human commands when those instructions overlook the presence of some physical barrier that could result in damage to the machine. There are onboard sensors

that detect these things, transmitting this information to the operator.

Ralph, made from scraps and donated parts, stands but three feet tall, a mere 18 inches in diameter. The latest arm, a second attempt, cost only \$125 for the parts. For visual sensing, there's a diode matrix camera that's to be fitted with a digital memory so that scenes can be stored and transmitted to the mini at low bandwidth rates.

The authors of the paper on Ralph, Neil Leverance and Richard Northouse, say that robots with "a sufficient level of autonomy" do not exist. They add: "A general purpose, completely independent, sophisticated robot does not appear to be immediately realizable."

Jason, the UC-Berkeley robot, is a few months shy of completion, if any university robot can ever be described as completed. Here again low-cost, donated parts are being used, but they include a donated solar panel for experimental use

outdoors. More recently they also obtained an electrical sweeper, the chassis of which might be used for a Jason-like robot that operates in a factory warehouse environment.

With both Ralph and Jason, one of the ideas is to study the possibility of a robot operating remotely from its operator, even though the two may be separated by some type of hazardous environment. Jason has a microcomputer that handles this telemetry, and has been designed to interface to almost any remote computer. To date, the friendly fellow has been connected to an HP-3000, CDC 6400, a PDP-10, and to the ARPA network.

But plans are to fit Jason with a multi-cpu microcomputer with interleaved memory, 32K bytes of memory, plus a tape cassette. It would handle simple control problems as in navigating and avoiding obstacles, as well as some speech recognition. There also is to be an onboard CCD camera. \*

# If your computer's talking gibberish, take two aspirin and call us in the morning.

Chances are, your computer's being harassed by its environment. High or low humidity, wide temperature swings and insufficient air circulation all cause gibberish. And worse, they *can* cause a complete system failure.

More often than not, the trouble begins with an environmental system that has been designed to keep people comfortable but that can't keep either the people or the computer comfortable.

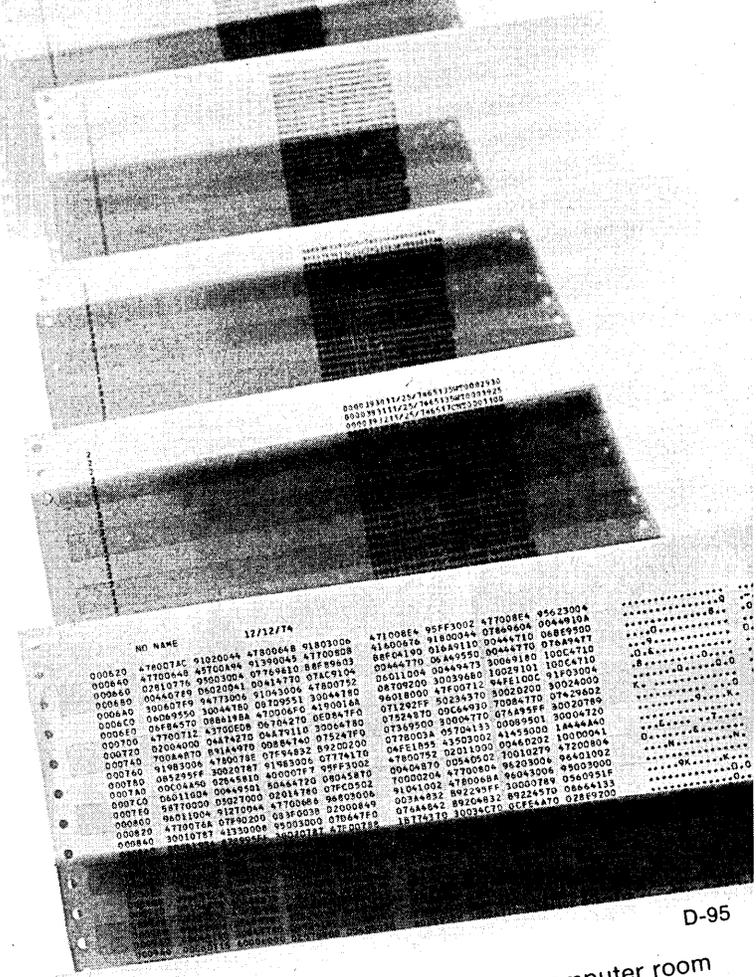
The problem can easily be prevented by creating and maintaining a precise, controlled environment for optimum computer operation.

Without costly and complex modifications, comfort air conditioning cannot maintain this precise environment.

Process cooling can.

Specifically, EDPAC Process Cooling Systems.

To learn more about remedying your own computer room climate control problems, fill out the coupon. We'll rush you a copy of "Process Cooling for the Data Center Environment." And the name of your EDPAC specialist.



NO NAME 12/12/74

000230	47607AC	91020044	47800648	01803000	471008E4	95FF3002	477008E4	95623004
000840	47700648	47700644	91390045	41700808	41800816	91800344	07840654	0044410A
000840	02191078	95003004	07160810	84F89803	88F0A190	016A9110	00444110	088F9900
000840	00440789	95003004	00414770	07AC9104	00444770	06449550	00444770	0784947E
000840	30040789	95003004	01043006	47800752	02611104	00449473	30069180	10DC4710
000840	00069550	30044780	00709551	30044780	08700200	30039680	10029101	10DC4710
000840	04F8A570	08A8188A	470006FC	417001AA	96018000	47F00712	94FE100C	93F03004
000840	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000700	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000720	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000740	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000760	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000780	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000800	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000820	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000
000840	47700112	43700E08	06704270	0E8647F0	07124270	00234370	30020200	30024000

D-95

Please rush me your prescription for computer room climate ills. And the name of my nearest EDPAC specialist.

Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Company \_\_\_\_\_  
 Address \_\_\_\_\_  
 Phone \_\_\_\_\_

Your computer. We're good for what ails it.

**EDPAC**  
 Old Cuthbert Rd. at Deer Rd.  
 Cherry Hill, New Jersey 08034

EDPAC is a product of AC Manufacturing Company

# The Private Eye.

It solves the mystery of data communications networks.

The new Codex 6000 Series Intelligent Network Processor.

The Codex 6000 has a unique, multiple-micro-processor system architecture that combines the best features of time division multiplexers and computer-based concentrators.

The Codex 6000 slips into your network without a dime it's completely transparent to network protocol, terminal type, system configuration or existing control facilities. Yet no customized programming is necessary.

Line costs are reduced

because the Codex

6000 combines

statistical hand-

with allow-

tion and data compression - outperforms traditional TDD systems by factors as high as four to one, with less node-to-node delay. Error-free data is assured by a full-duplex, internal ARQ protocol.

The 6000 checks out all the facts. From a central-site communications and control console it surveys your network, collects such statistics

as data as terminal error rates, frame and node performance, data compression efficiency, line utilization. Then compares and reports the information.

Assign preset performance thresholds to the Codex 6000 Series Intelligent Network Processor, and it lets you know when they're exceeded.

It's the Private Eye from Codex, sophisticated.

A great case to work on for better network planning, growth and management.

**codex**  
Well beyond the front.

member of  
**IDCMA**

Codex Corporation, 15 Riverdale Avenue, Newton, Massachusetts 02195, (617) 969-0600, Telex: 92-2443

Codex Europe S.A., Bte 7/Av. de Tervuren 412, B-1150 Brussels, Belgium, Tel: 762.23.51/762.24.21, Telex: 26542

CIRCLE 107 ON READER CARD

## THE 1970s

But he said dozens of critical issues have arisen. He chose to talk about four of them.

### Technology and social ills

In developed countries, he said, technology has contributed to a great deal of alienation by opening up a variety of choices for values and goals while also creating uncertainty about those same values and goals. We are also confronted with a fast rate of change in society, he added. The question raised is whether we can continue to develop and use technology while also minimizing these effects.

Continuing, Amara said technology often acts to diminish person-to-person contact. The automobile, tv, and the telephone were cited as examples. With these physical artifacts, he said, a sense of community is not built up or is not there to begin with.

Speaking of relations among nations, he said technology often produces a concentration of wealth. It does this by changing considerations in economies of scale, divisions of labor, and the existence of cartels. These things existed before technology,

Amara explained, but technology developed them into "more grotesque forms," resulting in a wider gap between developed and developing countries. "We face wars for the redistribution of wealth," he asserted.

Finally, he said technology results in large concentrations of power, primarily the power of government at the national level. This accumulation of power becomes necessary because of the mobility of people and the resultant difficulty of governing them except at the national level. And it grows at the expense of local power, of citizen participation, and of democratic government. Amara said it thus produces big government at a time when that complexity demands more local control.

He suggested three components of a strategy to cope with these problems. He urged first that we use the term technology monitoring, not assessment. We need indicators—of alienation, of concentrations of power and wealth, and the diminution of person-to-person contact, he added. Second, he urged greater public participation "because technology is too important to be left to technologists." We need to make the issues understandable to the public so that they can participate in the setting of goals. And third, Amara said, we need to continue to explore and experiment, but do so with much

more humility than in the past.

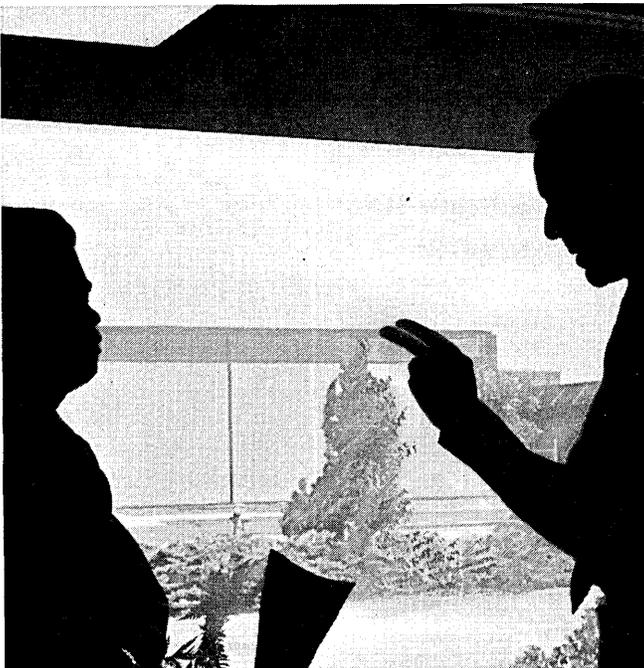
### Challenging existing institutions

In a similar vein, SRI's Harman spoke of challenges to the legitimacy of existing institutions and mores. He cited the call for a more frugal society, the obverse of which is a society more conserving of natural resources, and for a more equitable distribution of those resources. He mentioned also challenges to the past role of the U.S. in the world, as well as labor's demands for meaningful work, for a share in management, and for higher wages.

Harman, who is director of the Center for the Study of Social Policy at SRI, said there's good reason to think there's a pattern in all this. And in the past when this pattern was present there had also been lead indicators that it was coming. Some lead indicators today, he observed, include alienation, a feeling of purposelessness and loss of community, rise in the rate of violent crimes, use of police force to put down social disorders, rise in the rate of mental illness, rise in public acceptance of hedonistic behavior (particularly sexual), the acceptance of lax morality in public affairs, interest in noninstitutionalized religious cults and practices, and decreased trust in institutions.

In the past, he added, these patterns led for example to the fall of Rome, the

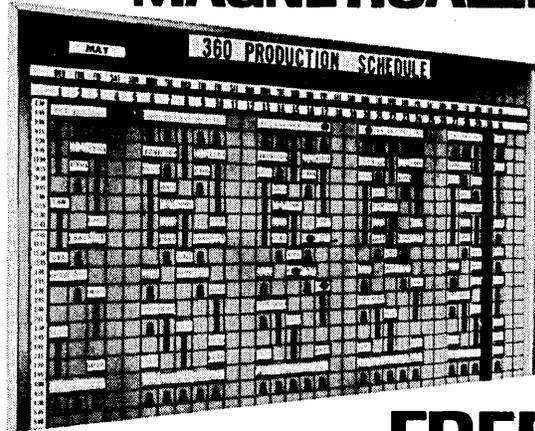
When I think networking products and systems, I think Tran.



**Tran**® computer transmission corporation  
2352 Utah Avenue, El Segundo, California 90245 (213) 973-2222

CIRCLE 83 ON READER CARD

## Computer Scheduled MAGNETICALLY



Write for 16 Page Illustrated Catalog **FREE**

- Keep your computer running—not idle.
- Schedule in 6, 10, 15 & 30 min. cycles, for daily, weekly or monthly periods.
- Know in advance when slack periods or heavy work loads are coming.
- Make changes & additions immediately.
- Every hour saved saves you \$20-\$40-\$60.

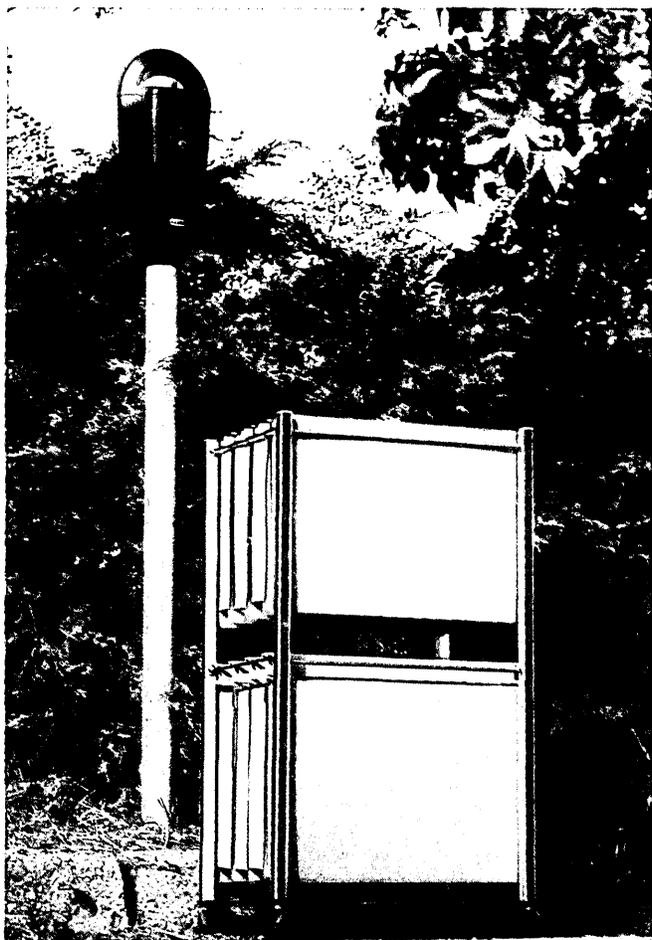
Representation throughout most of the United States  
TELEPHONE 201-938-6000

## METHODS RESEARCH

70 Asbury Avenue, Farmingdale, N.J. 07727

CIRCLE 99 ON READER CARD

# Our compact, economy model.



**Special introductory offer on National Compak-Rack™ mobile storage unit.**

Introducing the best little mobile storage rack to come down the pike in years.

Compak-Rack,™ by National.

We call it Compak-Rack because that's exactly what it is. Compact. Only 16½" x 12⅝" x 30½."

And Compak-Rack is economical, too. A paltry \$49.95.

Yet it can give you 2-level

capacity.\* With modular, add-on racks for even more capacity. Plus a convenient bottom storage shelf, and optional work surface top.

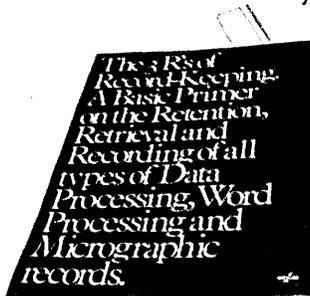
It's a simple, functional mobile storage unit. Handsomely designed in wood grain trim. So it'll go with any office decor.

We're pretty excited about our Compak-Rack. And we think every office should have at least one. So here's what we're proposing.

**Free for the asking!**

For each Compak-Rack you order — which comes complete with 4 Easy-Hanger™ Data Binders — we'll include 5 Easy-Slider™ binders (a \$12.00 value) free! Order through your National dealer. Or circle our number on the Reader Service Card for information. We'll also send you a free Printout Reference Ruler (regular

\$2.50 value), that makes reading printout sheets a snap, plus a free copy of our new catalog.



**National Blank Book Company, Inc.,** Marketing Department D, A Subsidiary of Dennison Manufacturing Company, Holyoke, MA 01040.



\*For second level storage, order National Slide-A-Ref hanging devices.

## THE 1970s

industrialized revolution, the Protestant reformation, the Western democratic revolution, and the Russian communist revolution.

He explained that legitimacy of an institution rests on three foundations. One, is it duly constituted, was it put together in some legitimate way? (In this context, people are questioning whether multinational corporations with their concentration of economic power are duly constituted and representative of the people they impact. Then, too, there are challenges to the concentration of intellectual power in the hands of manipulative technologists.)

Second, does an institution have adequate guiding moral principles? And third, is it effective in achieving the goals it claims to be attempting to achieve? (Here, people ask whether it makes sense to go endlessly in the direction of replacing humans by machines when, in fact, one of the most serious problems of society is that we're running out of meaningful social roles for citizens—in which they feel they're playing a valuable and contributing part. That's more than economic unemployment, Harman observed, but involves also psychological

nonparticipation. "Does it make sense to go further and further in industrializing everything—food production, dating, aesthetics, health care?" he asked.

So, people are beginning to question "whether we have in the past and can in the future manage and control technology as it impacts society."

No less comforting was Ruth Davis of the National Bureau of Standards, who provided yet another view of the dilemma. She said science and technology, in parallel, have produced the greatest change in our lives.

"And since the effects of science and technology cannot be measured in terms of incremental changes in our lives, the best we can do is to try to set the pace at which we allow science and technology to change our lives or its products to come into existence."

### The impact on the individual

She observed that the sciences and technologies we're trying to control today interact with people far more than the old ones, such as astronomy, high-energy physics, and biochemistry. "They (the old ones) didn't look like they were going to replace us, do better than we, change us individually, do something that we don't understand," she explained.

Davis said she finds today "a na-

tional monumental hangup" on what the new roles should be of these interactive sciences and technologies relative to the never-understood role of man as an individual.

"We have a national concern . . . whether computers are just a primitive first step in a line of succession, leading to improved intellectual specialization, or whether they're just the end product of computer science," she said. And there's concern, too, whether we need improved intellectual specialization. "By that I mean any kind of specialization that allows us to do tasks better than we've done before or tasks that we couldn't do before that require some sort of intelligence," she continued. "Maybe we couldn't do them before because it would be hazardous to people . . . or because they required the kind of memory retentivity that people didn't have." She said this applies to such fields as microbiology, genetics, mathematics, and cybernetics.

Davis also conjectured that things like robots and specialized banks of superior genes "are the next steps in this line of succession to a goal that we don't know yet whether we want to achieve." She said we are not prepared, emotionally or intellectually, to make this decision. And yet we're funding research and developments in those fields. \*



### A Standard of Time-Sharing Excellence

#### The solution to your time-sharing requirements is available.

- A powerful, easy-to-use, non-modal command language
- Full OS/MVT and VS2 compatibility
- JCL-less job processing, including batch, remote-batch and interactive program execution
- Rapid terminal response, even with a large number (50+) of concurrent users
- Five years of proven reliability

#### On COMNET's nationwide ALPHA Time-Sharing service

- A local phone call away in 55 cities from coast to coast
- Compatible HASP/RJE service available
- Professional client support services

More information on COMNET's comprehensive remote computing capabilities are available from Lawrence Lawson, Director of Marketing

#### On your IBM 360/370 computer system

- Negligible impact on host system performance
- Functional replacement for IBM's TSO at a fraction of the cost

Detailed information on ALPHA's capabilities, internal structure, host system requirements and installation qualifications is available from Ward Clark, Manager of ALPHA Licensing

\*available mid 1976

**COMNET**  
COMPUTER NETWORK CORPORATION

5185 MacArthur Boulevard, Washington, D. C. 20016 (202) 244-1900

# The Datapoint Diskette 1100—Lets You Enter the Profit Making World of Dispersed Data Processing



Now you can enter the profit making world of dispersed data processing with Datapoint's Diskette 1100 System, a combination of computing power and data storage designed to meet critical requirements for business data entry and data processing applications.

The Diskette 1100 combines a powerful business-oriented computer with 16,000 characters of fast memory and a rapid yet inexpensive flexible diskette data and program storage facility. And, since it's a Datapoint, it has the same operator-oriented styling and features including a wide, clear video display and typewriter and numeric keyboards that have made Datapoint dispersed processors "workhorse" data entry and processing stations in thousands of organizations.

The System's integrated Diskette unit offers on-line storage for over one million characters through the use of up to four diskette drives. Each diskette can hold up to 256,000 characters of data or programs with an average access time of approximately 80 milliseconds.

This capability puts bottom-line performance where it counts — at the disposal of the people who really need computer power. Here are some of its operational advantages:

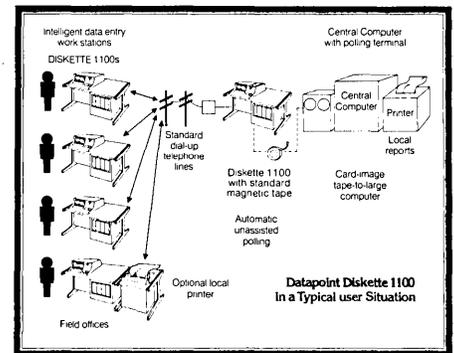
**1. FAST FORMS RETRIEVAL** — Almost instantaneous form display for data entry tasks — through form retrieval off a

Diskette and then a high-speed display on the screen. You simply select your form, hit a button and zap — it's there. Result: Higher operator productivity, less waste.

**2. FLEXIBLE LOCAL FILE CAPABILITY** — Now a local office can create, access and maintain files on locally entered data plus other useful files such as duplicate home office master files. All files can be sorted, edited and locally printed out. Result: Local personnel stay in closer touch with relevant business situations.

**3. LOCAL DATA PROCESSING** — The computer's power permits data to be processed by use of a number of high-level languages; DATABUS, RPG II or BASIC, saving home office computer time and providing timely local reports. Remember that data files on the diskette are compatible with all Datapoint programming languages — no need for complex conversions.

**4. EASY COMMUNICATIONS** — No need for expensive communication programming development. Our DATAPOLL package offers simple to use yet powerful communications between a Diskette 1100 and home office Datapoint system. Dialing and answering are automatic over standard telephone lines. If communications with a large computer are needed then a suitable emulator can be selected from among those available for most standard main frames.



**5. A TRUE DISK OPERATING SYSTEM** — Many processor-based terminals offer only the minimal programming tools and file support software. Not so here. All programs run under a true Disk Operating System that provides easy operation and sophisticated file support. It can also be upgraded to larger systems such as DATASHARE with modification.

For more information on the Datapoint Diskette 1100 contact the sales office nearest you or Datapoint Corporation, Attention: Marketing Communications, 9725 Datapoint Drive, San Antonio, Texas, 78284, (512) 690-7151.

**DATAPPOINT CORPORATION**



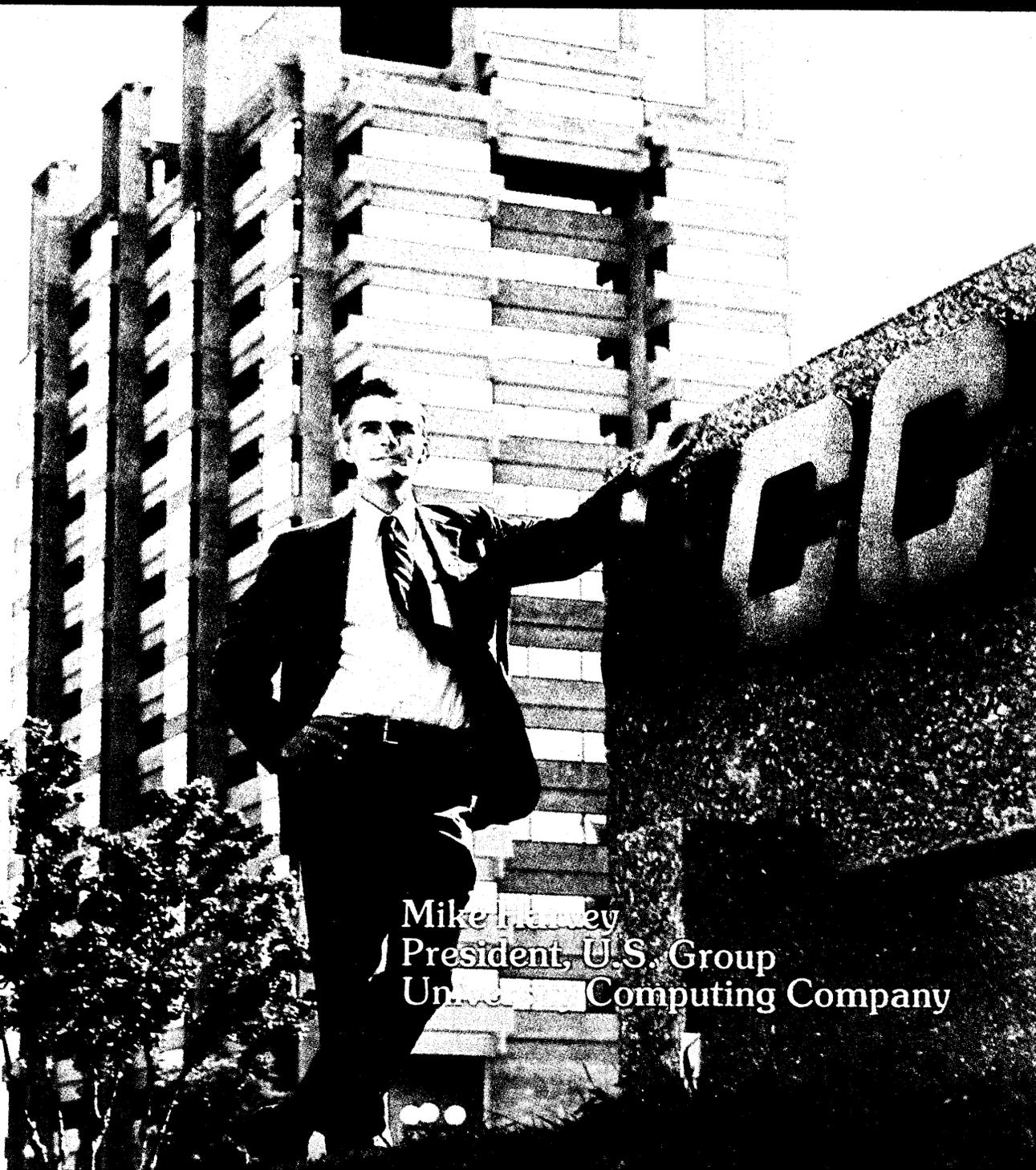
The leader in dispersed data processing

**Home Office:** 9725 Datapoint Drive, San Antonio, Texas 78284 (512) 690-7151 • **Sales Offices:** Atlanta/(404) 458-6423 • Boston/(617) 890-0440 • Chicago/(312) 298-1240 • Cincinnati/(513) 481-2600 • Cleveland/(216) 831-0550 • Dallas/(214) 661-5536 • Denver/(303) 770-3921 • Des Moines/(515) 225-9070 • Detroit/(313) 478-6070 • Greensboro/(919) 299-8401 • Hartford/(203) 677-4551 • Houston/(713) 688-5791 • Kansas City/(913) 321-5802 • Los Angeles/(213) 645-5400 • Milwaukee/(414) 453-1425 • Minneapolis/(612) 854-4054 • New Orleans/(504) 522-5457 • New York/(212) 736-3710 • Orlando/(305) 896-1940 • Philadelphia/(215) 667-9477 • Phoenix/(602) 265-3909 • Pittsburgh/(412) 931-3663 • Portland/(503) 233-2411 • San Diego/(714) 460-2020 • San Francisco/(415) 968-7020 • Seattle/(206) 455-2044 • Stamford/(203) 359-4175 • St. Louis/(314) 878-6595 • Tulsa/(918) 664-2295 • Union, N.J./(201) 964-8761 • Washington, D.C./(703) 790-0555

**International:** TRW/Datacom—International/Los Angeles, California, TELEX 691286 (213) 475-6777 • Sydney, Australia/(2) 922-3100 • Vienna, Austria/0222/36 21 41 • Brussels/3762030 • Rio de Janeiro, Brazil/222-4611 • Toronto/(416) 438-9800 • Copenhagen/(02) 96-53-66 • Guayaquil, Ecuador/394844 • London/(1) 903-6261 • Helsinki/90-661 991 • Paris/(1) 657-13-31 • Hannover, Germany/(0511) 634-011 • Rotterdam/(10) 216244 • Hong Kong/(5) 243-121 • Tel Aviv, Israel/(03) 410565 • Milan/316 333 • Tokyo/264 6131 • Beirut/(348) 340/1/2 • Oslo/153490 • Makati Rizal, The Philippines/877294 • Singapore/911788 • Tehran, Iran/8538857 • Johannesburg/724 9301 • Las Arenas, Spain/63 64 00 • Stockholm/(8) 188295 • Lyss Berne, Switzerland/(32) 844240 • Taipei, Taiwan/768-1114

# “We’re going of software

---



Mike Hanley  
President, U.S. Group  
University Computing Company

# to be the IBM companies.”

Already, we offer a broader and more comprehensive line of both systems and applications software than any other independent software vendor.

We now list over 800 software customers . . . worldwide. To serve them, we have software sales and support forces operating from offices in 30 principal cities in the U. S. and a dozen European countries.

Every year, we invest millions in research, development and customer support of software products.

Can you name *one* other software company that is making this kind of commitment to the industry . . . and its customers?

Today, with our line of operating software products, we have five ways to make computers

work harder. Tape management software. DUO 360/370 (DOS under OS) to ease conversion to OS. Data Dictionary/Manager software to control IMS. PDS Space Management and Restart Management software.

We have the most advanced and complete General Ledger/Financial Control System in the business with over 150 successful installations to prove it.

We're also the leader in banking software. And no other company is as prepared for the EFT revolution and on-line banking as UCC.

So, when it comes to software, talk to us first. Odds are, we've got what you need today. And the long-term support and commitment you'll want tomorrow. After all, we're going to be the IBM of software companies. Very soon.

## **UCC**

**UNIVERSITY COMPUTING COMPANY**

Dallas • Zurich • London

A Wyly Company

## Communications

# The Long Wait Could be Longer

FCC will allow direct attachments to telephone company networks—maybe.

It's been a seven year wait.

Finally in the late fall, the Federal Communications Commission ordered the American Telephone and Telegraph Corp. and the nation's other telephone common carriers to let independently-made modems be connected directly to their dial-up network. The order permits users of such equipment to do away with the protective connecting arrangements which they now must lease at extra cost from the carriers. It also gives the non-Bell suppliers a much bigger share of the market for modems—devices used in the transmission and reception of digital data over voice grade transmission lines.

But in mid-November, it appeared that the FCC decision would be taken to court. This could delay establishment of the new program considerably. Otherwise, users would be able to connect directly to the dial-up network beginning next April 1.

### A little longer

The possibility of further delay doesn't bother one supplier, who said, "we've waited seven years for this decision, so I guess we can wait a little longer if necessary. The important thing is that deButts (John deButts, AT&T's board chairman) has been backed into a corner and there's no way he can wriggle out of it."

(The "seven-year wait" is a reference to the commission's 1968 Carterfone Decision, which abolished AT&T's previous total ban on the connection—direct or indirect—of customer-provided modems and voice terminals. That policy was replaced with the present one, requiring the use of telephone company-supplied connecting arrangements for "foreign attachments.")

Specifically, the commission's decision, adopted in late October, establishes a plan for certifying and directly connecting all terminals except private branch exchanges (PBXs), main station telephones, key telephone sets, and coin telephones.

Alternatively, the plan provides for connecting non-certified terminals, exclusive of the above types, through pro-

TECTIVE built-in circuitry, or separate protective connecting arrangements. The order includes a detailed set of technical specifications which the terminals, protective circuits, and connecting arrangements must comply with in order to be certified. They must also be "registered." They must be given an I.D. number signifying that they have passed the certification test.

Certification will be required on a "type-acceptance" basis—meaning that only one unit of a particular device model, rather than all units, has to be tested. The supplier will be able to perform the test or have an outside lab or consulting engineer do the work—provided the test documentation is submitted to the FCC and approved before the device is attached to the dial-up network. The commission said it retains the right to test the actual device if it isn't satisfied with the documentation.

### Pay later

Telephone company-provided modems, along with those made by independents, will have to be certified and registered before being connected directly to the network. But already-installed modems supplied by the telephone company are excluded from this requirement. The FCC will charge suppliers for certifying and registering their equipment, but the amount hasn't been set. It will be the subject of a later ruling.

One result of the order, says an FCC source, will be to force abandonment of certification programs already established in California and in the territory serviced by the Rochester, N.Y., Telephone Co. The New York Public Utilities Commission will have to modify a similar scheme which it proposed recently for use throughout the state.

### Problem of appeal

There is a chance the FCC's new order will be nullified by a case now pending before the U.S. Circuit Court of Appeals in Richmond, Va. In 1973, the North Carolina Utilities Commission (NCUC) proposed a regulation that, in effect, would bar the direct or indirect

attachment of customer-provided terminal equipment to the North Carolina intrastate dial-up network. Telerent Leasing Co. was one of the suppliers directly impacted. Nebraska later issued a basically-identical ruling.

The North American Telephone Association (NATA), a trade association of independent telephone equipment makers, then asked the FCC to cancel these two state regulations.

NATA claimed they violated the Carterfone Decision. The FCC obliged early last year. In a ruling generally referred to as the "Telerent Decision," the commission concluded that, "There is no interstate message toll telephone service either offered or practically possible except over exchange plant used for both intrastate and interstate . . . service . . . It appears . . . evident . . . that in those instances where the rendition of interstate . . . service is dependent upon plant facilities . . . also used for . . . intrastate services, the federal role must be controlling."

The North Carolina commission together with NARUC—the National Association of State Regulatory Utility Commissioners—plus AT&T and carriers then took the Telerent decision to the appeals court in Richmond, Va. That's where the case is now. One close to the case says it's possible, but not probable that the FCC decision will be overturned. If it isn't, the commission's preemptive right to control interconnection of terminal equipment to the dial-up network probably will be firmly established.

But a small army of lawyers is involved in this battle, and some of them almost certainly will find other grounds for challenging the commission's new policy. One logical challenger is NATA, because the FCC order bars independent telephone equipment makers from connecting their equipment directly to the dial-up network. The FCC's commissioners tried to soften this blow by stating that they aren't opposed to direct connection of such equipment, only that they want to wait for further comment on the question.

But FCC Chairman Richard Wiley, in a speech to NARUC shortly after the in-

terconnect order was announced, indicated clearly that the commissioners meant they don't see any valid *technical* reasons for barring direct connection of telephones and PBXs. The question of *economic* harm is the subject of a separate proceeding, he pointed out. Although Wiley deprecated the idea that direct connection of independently-made telephone equipment will seriously harm the carriers—he referred to claims of such a relationship as “unsubstantiated allegations”—it seems clear that the commission's final decision on whether to allow direct connection of telephone equipment is several months away. All of which may impel NATA to hurry things along by asking a court to block implementation of last month's order.

IBM may also try to block the new policy. The company told the commission a few months ago that a certification program run by either the states or the federal regulators is technically unnecessary and too hard to administer. Wiley, in his NARUC speech, was apparently thinking of this when he said the new policy “permits the FCC to focus only on that very limited portion of the terminal containing the protective circuitry, and consequently reduces the time and expense of the ministerial burdens accompanying registration. Moreover, it avoids the necessity of reviewing complete terminal blueprints where proprietary information may be involved (this was another fear expressed by IBM), since only the protective circuit diagrams need be submitted.”

### No decision on appeal

The likeliest foes of the FCC's direct connection order are NARUC and AT&T. Asked whether Bell would request reconsideration of the order, and/or take it to court, an AT&T spokesman said, “we haven't decided.” This comment came shortly after the company issued a statement sharply criticizing the commission's decision. The statement seemed to be laying the foundation for an appeal.

The commission's plan is “replete with technical and administrative shortcomings,” said AT&T. It's “deficient in numerous aspects of network protection . . . that the National Academy of Sciences deemed essential in its report submitted five years ago at the commission's request.” Bell's “protective module” (APCM) plan, by comparison, complies “fully with all essential elements of protection prescribed by NAS and permits “the direct connection of customer-provided ancillary and data equipment,” so “we are at a loss to understand why this proposal was not adopted (by the FCC) in full.” That approach, besides being “a more effective technical solution . . . would be more economical and simpler to administer.”

AT&T added that “there is no logic

whatsoever” in the decision to register carrier-provided equipment. The carriers “traditionally have accepted end-to-end responsibility for the integrity of the network and have maintained the highest quality standards in the world.”

Regarding the direct connection of PBXs and telephones, Bell said “it seems apparent . . . the commission has prejudged the matter, even though (direct connection of this equipment) will raise problems even more serious than those posed by ancillary . . . equipment.”

The statement also criticized the FCC for issuing the new policy before completing its investigation of the economic impact of competition on the telephone carriers (Docket 20003). “Finally, we are increasingly concerned that regulatory decisions to inject competition into a closely-regulated industry are being made in a piecemeal fashion.”

Paul Rodgers, NARUC's general counsel and administrative director, said his organization probably won't protest the



**TOM CARTER:** As the president of Carterfone Communications, Inc., he spent seven years petitioning the FCC to loosen AT&T's ban on foreign attachments. The FCC agreed in 1968 by issuing its Carterfone decision. Carter, who sold his interests in the company shortly after the FCC decision, most recently formed a communications services partnership with former MCI president Jack Goeken called Carter-Goeken, Inc. (April, p. 109).

FCC order unless strong sentiment develops within the membership.

[A source within the California PUC reported such sentiment already exists. This individual helped persuade NARUC, at its recent meeting in Boston, to seek legal review of an FCC order upholding Southern Pacific Communications in a fight with the California and Oklahoma commissions. The basic question there was whether the FCC can countermand state regulations which are imposed on an intrastate circuit that is connected through a CCSA switch to an interstate message path. The FCC decided the answer was “yes.”

[NARUC insists, however, that the commission overreached itself. The resolution adopted at Boston will attempt to “vindicate the statutory responsibility of state regulatory commissions to regulate intrastate communications within their respective states.”]

The same basic jurisdictional issue is posed by the FCC's certification/registration decision, said our source. The commission's order is “a direct invasion of states' rights and violates section 221 (b) of the Communications Act, which reserves to the states regulatory authority over local exchange telephone service.”

—Phil Hirsch

## Everybody Wants to Communicate

AT&T is going after the data communications market.

New? No. But the way Ma Bell is doing it is new for Ma. Its new (one year old) marketing organization is organizing on an industry by industry basis.

Roger Moody, vice-president, industry marketing for AT&T told the recent National Retail Merchants Assn.'s dp conference that “we're going to understand your business.” He told retailers that the Bell system had four studies going on in general merchandise retailing.

Moody has a background in retail systems. Before Bell (he joined in May '74) he was with Litton Sweda; before that with Nuclear Data's retail point-of-sale effort which eventually was purchased by Bunker-Ramo, and before that, with IBM's early retail efforts. So, if he says Bell is going industry by industry, and he tells retailers, he probably means it.

### Bell is listening

He's part of a really new marketing organization which Bell has been putting together for more than a year. “One of its charters was that more than half the staff come from outside the Bell system.” But Moody's very much in the system now. His overall message to retailers last month was, “Bell is listening . . . and is ready to meet your total communications needs.”

He said a big part of data communications, “a litany which is communications processing,” was rejected by the Bell system way back when the means changed from electro-mechanical to electronics. “We've changed that decision,” said Moody. “We're in the communications processing piece of data communications.”

Moody offered retailers everything they might need in data communications. He wasn't the only one.

Bob O. Evans, president of IBM's System Communication Division, touted his company's SNA (systems network architecture) as the be-all, end-all and



## “Sure, my Bully’s a competitive terminal. But where’s the competition?”

Being the Bully’s manager is no picnic, lemme tell ya.

Look. I got a terrific TTY terminal here, ready to take on everybody and his brother and all of a sudden, it’s Philly-on-Saturday-night.

Sure, I’ve seen a lot of tough-talking terminal ads. A couple even put up a good front. But show me one terminal that’ll even climb in the ring with my boy these days.

Can’t blame ’em though. A blow-by-blow of the Bully’s last fight’d be enough to turn any terminal chicken.

The bell sounded.

We opened with a left hook (tabbing, line and character insert/delete).

A hard right to the jaw (black

characters on white background, upper and lower case character display).

A quick left jab (protected formatting, graphics, and function keys).

Then, the old uppercut (2 peripheral ports, current loop as well as EIA interface).

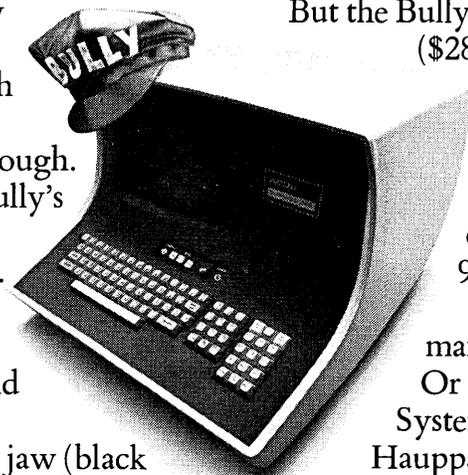
The ref wanted to stop the fight. But the Bully landed a roundhouse punch (\$2800 price tag with OEM discounts of over 30%) that made the decision unnecessary.

The winnah and still champeen, ADDS Consul 980, the Bully!

Call me, the Bully’s manager, at (516) 231-5400.

Or write Applied Digital Data Systems, 100 Marcus Blvd., Hauppauge, N.Y.

# ADDS



# news in perspective

cure-all. He said today's needs call for a terminal architecture that is consistent and can support distributed intelligence. "SNA is such an architecture."

Max Beere of TRW wasn't so sure about that. "We don't want to do something that will lock us out of being able to utilize the technologies of the future," he told the retailers' conference. He pointed out that the Canadian government has prohibited "any protocol that will tie in or tie out any vendor's terminals."

And then there is Sam Harvey of Singer Corp. to whom none of the above makes any difference. Harvey is looking forward to a "whole new level of communications people on this planet." His level would have IBM, AT&T and the Postal Service joining forces. \*

## Security

### Computer Criminals Beware!

The law enforcement community is taking a closer, harder look at computer crime and maybe a more hard nosed look as well.

When Phillip Wynn, a deputy district attorney in the Los Angeles County District Attorney's Major Fraud Section was quoted in the *Los Angeles Times* as saying his section was putting staff members through a "crash course" in computer technology, he received calls from "law enforcement jurisdictions all over the country" wanting to know how this was being done. "They were interested in doing something similar."

Actually Wynn says "crash course" is not the proper term for what is being done in the Major Fraud Section. "It's an on-going thing with seven or eight of us giving it as much time as we can." They are working with volunteers from the computer industry and with members of the county's data processing department to "gain a general familiarity with computers and how they work from the time a programmer takes over an assignment. We want to gain familiarity with the terminology and the technology."

#### Training at the FBI

A similar concern for computer training has been evidenced by the Federal Bureau of Investigation which has begun conducting special training sessions in computer technology for its special agents and its accountants.

John T. Hall, an FBI Special Agent in the Bank Robbery and Fraud Department for the Los Angeles Office, says

there's "a problem of attitude" when law enforcement is confronted with computer crime. "We've got to generate a new attitude."

"The law enforcement community views computer related crime quite differently than it does violent crime. They



tend to see it as a civil matter." This kind of attitude, he said, even pervades in the courts where a judge finds it hard to view as a criminal a defendant who might have a background similar to his own. "But that's what he is and he's accountable."

The impetus for the educational efforts of Deputy District Attorney's Wynn's office was an investigation into an alleged computer time theft by a Los Angeles man. Wynn believes it's a first

in that it's an alleged theft of "pure time, nothing else, and there are no laws that clearly cover this."

Special Agent Hall would agree. He said law enforcement faces serious problems when it gets into the area of tangible versus intangible theft.

In the Los Angeles case in which Wynn is involved, Marvin Henry Maki, 42, is charged with grand theft and forgery in the tapping of a computer belonging to a former employer. Helping the Fraud section with technical aspects of its investigation are Tymshare Inc. and Manufacturers Data Systems (MDSI) of Ann Arbor, Mich., both alleged victims.

MDSI is a service bureau operation which uses Tymshare's Tymnet network. Each MDSI customer has a code word to get him into the service bureau's computer.

Maki left a job as an engineer for MDSI last June when he took an executive job with the W and R Tool Co. in North Hollywood, Calif. After that time MDSI representatives in England and France began to notice that they were being billed for computer time they weren't using.

An investigator in Wynn's office said it was determined that codes assigned to these representatives had been used in calls placed to the computer through Los Angeles telephones from June through October. A search warrant was

# "We've scratched the master file!"

That's probably the last thing you want to hear. Ever. And, with UCC ONE, you won't ever hear it.

That's because UCC ONE Tape Management Software manages your tapes and protects valuable data from loss or destruction.

UCC ONE provides real-time tape status and eliminates costly, time-consuming hand-written records. And the expensive mistakes they breed.

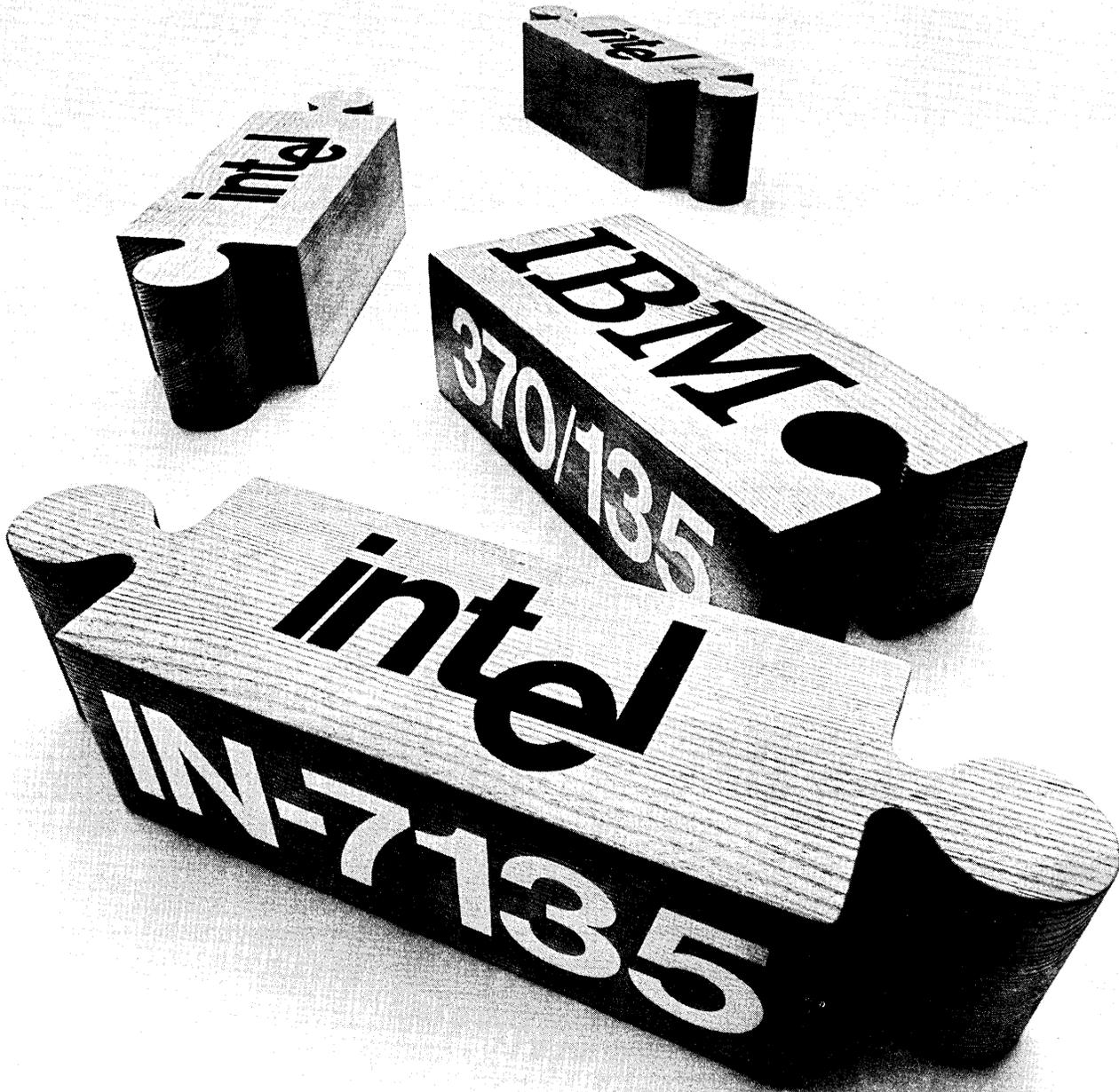
In short, UCC ONE means better control and greater efficiency. And it means you've heard "We've scratched it" for the last time.

## UCC

### UNIVERSITY COMPUTING COMPANY

7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75247

CIRCLE 85 ON READER CARD



## One good name deserves another.

DIRECT FROM INTEL. Nothing succeeds like success. IBM in computers. Intel in semiconductor memories.

It all started back in 1968 when we began to build a business on semiconductor memory technology. It's worked out pretty well. We're now an international company with revenues well over 100 million dollars, and the recognized leader in semiconductor memories.

Until recently all of the plug compatible, add-on memory systems we have manufactured for the IBM 370/135, 370/145 and 370/158 central processor systems have been marketed by third parties. Now we are selling direct so you can buy or lease from the same company that manufactures and services your add-on memory. You'll continue to get Intel performance and quality with further cost savings.

**S 370/135 MAIN MEMORY.** The Intel IN-7135 add-on memory system for the 370/135 offers performance you can't get anywhere else. Like expansion to one megabyte in the same small, compact, swingout frame. That's twice the capacity available from IBM. The unique swinging door packaging approach means you can add that one megabyte of CPU main memory without taking up any additional space, beyond the required IBM service area. You can also reconfigure blocks of memory and replace failing portions of IBM memory. And all our IBM 370/135, 370/145, 370/158 add-on memory systems are fully field upgradable.

For more information call any of our sales offices listed below or write: Intel Memory Systems, 1302 North Mathilda Avenue, Sunnyvale, California 94086, (408) 734-8102.

**intel memory systems**  
A DIVISION OF INTEL CORPORATION

Domestic Sales Offices: California 408-734-8102 • 213-640-0584 • Florida 305-971-2500 • Illinois 312-640-0050 • Massachusetts 617-861-1136 • Michigan 313-642-7018  
Minnesota 612-474-5939 • New York 201-985-9100 • Ohio 513-690-5350 • Pennsylvania 609-428-8825 • Texas 713-771-5781 • Virginia 703-790-1191

# news in perspective

obtained for Maki's home in Canoga Park and his office in North Hollywood where evidence was obtained which led to the grand theft and forgery charges.

Maki is charged with using the MDST computer to produce a numerically punched tape that was used to run W and R's tool manufacturing machines. Maki is estimated to have used the computer for 143 unauthorized hours for which the charge would have been \$15,000. A preliminary hearing was scheduled for Dec. 9.

The FBI's Hall would like to see more cases brought before the court. "There's a conspiracy of silence," he said.

A panel of computer crime experts at an ADAPSO conference in October agreed that the majority of computer related crimes "never surface" largely because the victims are embarrassed so the perpetrators are told to go away.

Special Agent Hall deplored the fact that a young man (Jerry Schneider, Feb. 1973, p. 121) who ripped off the telephone company for \$1 million would get 40 days in jail while an ordinary thief, stealing to pay hospital bills, could spend five years or more in jail for theft of a lot less.

With the ordinary thief, Hall said, it's usually a "have to" situation. With the computer criminal it's generally "want to." He said the motivation can be "nothing more than a challenge to beat the system."

Hall said even organized crime is getting into the act. "We have some cases pending involving organized crime. Early stages of investigation indicate that certain types of systems information is being sold on the street." He emphasized that organized crime's involvement is "not at the level of the actual fraud but at the level of exchange."

Both Hall and Wynn feel the best way to beat computer crime is to prevent it. "But that's the job of industry," said Wynn, "and we can't police private industry."

Hall feels the important thing is that "technicians and systems should be controlled by management and not the reverse. He feels computer technicians tend to consider themselves computer professionals and "too often their loyalty is to their profession rather than to their employer."

Wynn expects the attention to computer crime in his Major Fraud Section will grow because "the potential for computer crime is so tremendous."

He said there is a section within his section called medical/legal with two full time staffers and a full medical library. "Why not computer/legal?"

—Edith Myers

## Banking

### Too Many Cooks or Maybe One

It's "in" to talk about "banking-of-the-future" these days but the only agreement seems to be that it will be a lot different than it is today.

Also clear is that the cast of characters will change. Not so clear is whether it will be larger or smaller. Possibly the newly named National Commission on Electronic Fund Transfers (Nov., p. 135) will get a handle on this.

One thing the commission undoubtedly will look at is the "too many cooks" problem: that of the vast numbers of state and federal regulatory bodies that have jurisdiction over the various sectors of the financial industry. And most of the cooks have representatives on the commission.

### The Postal Service

A government agency which doesn't but which has a definite stake in EFT development is the U.S. Postal Service. The service's Research and Development arm has been studying EFT for

more than two years, concerned over the potential revenue loss from all that "clean first-class mail" involved with billing and bill paying. Envelopes used for billing and bill paying are generally scanable and therefore easy and inexpensive to handle. They are said to account for some 60% of USPS revenues.

USPS has issued a Request for Proposals (RFP) for a "system definition" of an Electronic Message Service system (EMS) which would enable it to continue participating in some way in funds transfer exchanges.

Also not represented on the EFT Commission and desirous of a "piece of the action" is the Association of Data Processing Service Organizations, (ADAPSO) Inc. In fact, "A Piece of the Action" was the title of an EFT briefing at ADAPSO's 43rd Management Conference in October in San Diego.

Session moderator, Bernard Goldstein, vice president of corporate development of Tymshare, Inc., deplored the fact that no one from the computer industry was named to the commission (Nov., p. 148). ADAPSO had written to President Ford requesting such an appointment.

"President Ford said no to ADAPSO," said Goldstein. He suggested this could be because "he envisions the commission as a battleground for financial institutions."

# Looking for a G/L System?

Look no further. The UCC General Ledger/Financial Control System has everything you... and Accounting... want.

UCC FCS is the most advanced and complete system of its type. Full general ledger accounting. Budgeting. Cost allocation and profit center reporting. Optionally, it generates over 100 standard reports.

And, get this. It can be implemented quickly and efficiently. Plus an easy-to-use report writer that the Accounting Department can use — with a minimum of EDP assistance.

The General Ledger System you've been looking for is here. UCC FCS.

## UCC

UNIVERSITY COMPUTING COMPANY

7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75247

CIRCLE 86 ON READER CARD

# Covered with mud, dropped off a desk, and working like a champ.

Our 300 is a 30 CPS, portable terminal that operates over regular telephone lines. It's lightweight, compact, and a joy to work with.

It's also the most reliable terminal of its kind (ever built). By anyone.

Ask a salesman who's tested a 300 from us about a week ago. He dropped his unit off a desk during transmission, creating a streak that was probably

harder on our friend than our machine. The 300 lost two characters, then continued operating as before.

Seemingly determined to destroy our unit, this same fellow then put this same unit into the trunk of his car. An unconnected rain storm filled his trunk with muddy water, giving our machine a thorough bath. Not to mention a perfectly good excuse for never working again.

The 300 came through with shining, if somewhat muddy, colors. Plugged in, it operated beautifully.

If you'd like to know more about a terminal that can stand up to this tough world, get in touch with Charles Kaplan or Shirley Newman at (201) 261-3300.

Computer Transceiver Systems Inc.  
East 66 Midland Ave.  
Paramus, N.J. 07652



Execuport 300 portable terminal.  
Not just reliable. Practically unstoppable.



# news in perspective

Goldstein said small banks wanting to participate in EFT have three ways to go: correspondent banks, bank co-ops, and third party services. "I believe a competitive disadvantage awaits them which restricts us (service organizations) as well."

## A large pie

Roger Hotte, vice president, Datasab Systems, told the ADAPSO session he expects EFT transactions will be taking place at two million locations in the U.S. by 1980. "It's a large pie. Plan now. Don't wait."

One service organization that is planning now is Midwest Advanced Computer Services. Bill Fletcher, its president, told the ADAPSO group: "We gross less than \$2 million a year and we've already spent \$1 million getting ready (for EFT)."

The kinds of things Midwest is doing include: providing interfaces for many foreign terminals; developing a vehicle for tracking sources of transactions; working on a central information file; and studying the types of unmanned teller terminals available.

"It's up to us," Fletcher warned. He described what he called "one large New York bank's strategy." It's a ten point program with the first five already accomplished:

1. Implement a central information file.
2. Introduce a combined or universal statement.
3. Introduce an automatic overdraft.
4. Issue plastic cards containing customer information file numbers.
5. Install 5,000 on-line terminals in branches and retail outlets.
6. Develop a point-of-sale program for retailers by way of selling computer services and leasing terminals.
7. Attract direct deposits of payrolls.
8. Expand services state wide by lobbying and by acquiring small bank retail programs.
9. Obtain branching authority in other states by lobbying for reciprocal branch banking.
10. become involved in the acquisitions of insurance companies, mortgage companies and the like.

## Better cooperate

"This bank already has spent \$50 million in launching this program," said Fletcher, "and retailers have similar strategies. Montgomery Ward has said if you don't cooperate we'll do something on our own."

Los Angeles area Savings & Loans are doing something on their own. The Federal Home Loan Bank of San Francisco had planned to set up a switching system to link EFT systems put in place by California Federal Savings, Glendale Federal Savings, and Gibraltar Savings.

The San Francisco Home Loan bank oversees s&Ls in California, Arizona, and Nevada. In September it said it would seek Federal Home Loan Bank Board approval for a pilot system linking the three Southern California institutions. It never sought the approval and now it won't.

In the interim the Justice Dept. wrote to the FHLBB in Washington urging it not to sponsor computer networks, but to leave such developments to private industry. The FHLBB issued a statement of agreement.

But the California s&Ls are going ahead through Savings Association Central Corp., a jointly owned corporation now working on plans for a state-wide system. Systems Development Corp. was to have received a \$500,000 contract from the San Francisco Federal Home Loan Bank. It was considered a likely candidate for a similar award from Central Corp.

So perhaps only the names will have been changed.

A scenario which would drastically reduce the names involved in the game of banking has been developed by the Federal Reserve Bank of Cleveland. Called "Scenario for a Federal Reserve

System in the year 2000," it details reasons for single agency control of all financial organizations—banks, savings & loans, credit unions, and others. The report defines "bank" as "any corporation or other organization engaged in the business of accepting deposits of money and making loans or investments."

Undoubtedly it would be a super agency with super powers should it come to be. Maybe a super cook?

—E.M.

## Standards

### Voting Begins On Card Standard

Voting on a proposed third track standard for credit cards began in November among members of an International Standards Organization (ISO) subcommittee (SC1). The ballots are supposed to be counted in January. If there are no negative votes, which appears likely, the proposal will be referred to the subcommittee's parent group, Technical Committee 68 (TC68) for a final vote. That one takes six months.

Meanwhile, the American Bankers Association is preparing a proposed U.S. third track standard containing

# Get your IMS under control.

With the UCC TEN IMS Data Dictionary/Manager.

You can't get the benefits you expected from an IMS system without it.

UCC TEN IMS is an automated, centralized source of all the data... about the data. Now, you can put your finger on the information you need. Quickly and precisely. Without paperwork and the errors that come with it.

UCC TEN enables you to manage the data base environment. Because it controls data definitions, provides powerful cross reference features, automatically generates IMS control statements and facilitates new systems designs.

UCC TEN. It'll make your IMS everything you wanted it to be.

## UCC

UNIVERSITY COMPUTING COMPANY

7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75247

CIRCLE 87 ON READER CARD

# DOUBLE YOUR PDP 11/45 PERFORMANCE!

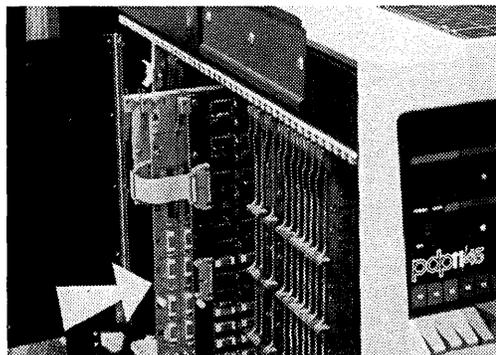
## All it takes is a little Cache.

### THE ONE AND ONLY

Introducing the Fabri-Tek Model 4511 Cache Buffer. Plug it into your PDP 11/45 . . . and see what happens to your effective processing speed. The Model 4511 operates in conjunction with the entire PDP 11/45 main core memory. It gets more out of your computer than you ever got before—without the high cost of MOS memory and 32K word address limitation. Nobody else has anything like it—not even DEC. For a fraction of your overall computer system investment, the Model 4511 isn't just a bargain—it's a necessity!

### PLUG-IN EASY

The Model 4511 Cache Buffer uses bipolar technology contained on just three printed circuit assemblies. The whole thing installs in min-



utes on the 11/45 Fast Bus: A +5.0 VDC Power Supply is also included to operate the system. Unlike semi-conductor memory, the Model 4511 guarantees protection of data against unexpected AC power failure and power turn on/off. There's also a switch within the Cache Buffer for ease of on/off line operation.

### GIVE IT A TRY

If hard facts are what you need, how about a demonstration? We'll plug our Model 4511 Cache Buffer into your PDP 11/45, then stand back while you run a few benchmarks. We'll guarantee a dramatic improvement. And we'll guarantee off-the-shelf delivery for one of your own. If you want to make a little Cache go a long way, there's only one place to look.

Call or write today.



**FABRI-TEK INC.**  
**COMPUTER SYSTEMS**

5901 South County Road 18 • Minneapolis, MN 55436 • (612) 935-8811  
Leader in Memory Technology for Over a Decade

#### SALES OFFICES IN:

Boston  
(617)969-5077

Dallas  
(214)661-3155

Los Angeles  
(213)973-0484

San Jose  
(408)246-8391

Hong Kong  
K-331383

Fairfield, OH  
(513)874-4280

Chicago  
(312)437-4116

Denver  
(303)753-0631

New Jersey  
(201)222-6250

Minneapolis  
(612)935-8811

United Kingdom  
Maidenhead 37321-4

## news in perspective

language identical to the ISO document. The ABA proposal is likely to reach the American National Standards Institute in January.

Final approval of both documents will end a protracted struggle between commercial banks and savings and loan associations over the bit density of the third track, and whether it should be dependent on the already-standardized second track. The proposed ISO standard provides that the third track should normally be dependent, but adds that "independent use of track 3 is an alternative mode of operation, permitting both on-line and off-line interchange based on mutual agreement between interested parties."

The ISO proposal specifies that the third track must conform to a proposed specification now percolating up through one of the organization's other technical committees (TC95); it's known officially as Addendum 1 to ISO Standard 3554 and describes the physical characteristics of a standardized third track. A 210 bpi bit density is among the characteristics covered by Addendum 1. This proposal probably will be sent to the members of TC95 for their final vote in January. It will be at least six months more until the results of the ballot are known.

The French reportedly will oppose Addendum 1 because the magnetic stripes on their credit cards have a different width; thus, to comply with the proposed standard, the French would have to modify their credit card reading and encoding equipment. But an ISO source says he expects the French objections to be overruled, and the addendum to be adopted as a standard, before the end of next year. \*

### Time-sharing

## An Industry in Transition

If time-sharing users aren't immediately ordering IBM's 5100 portable computer, they certainly are thinking of it as a partial alternative to time-shared computers.

The computer giant announced last fall it was aiming the machine at "problem solvers in business, engineering and scientific disciplines" (November, p. 71). Shortly afterwards, a time-sharing users association whose members primarily are in that "problem solver" class, said it would begin looking at problem solving applications using products such as the 5100.

The 900-member Assn. of Time-Sharing Users (ATSU) said, "Our thrust



HILLEL SEGAL  
President, Association of  
Time-Sharing Users

is increasingly oriented toward applications and problems that we might be able to best solve in an interactive manner with a computer, and less toward the fact that they must be solved strictly on a time-shared computer."

And one of the association's members, Time Sharing Resources, a Great Neck, N. Y., APL time-sharing firm, in mid-November began offering leases for the purchase-only 5100. The

company said it had arranged for a New York bank to pick up the paper on payout leases of three, four and five years. TSR president Joseph F. Hughes said his company's only financial return would be in the investment tax credit on its purchases of 5100s for lease. But Hughes said the possibility of expanding its time-sharing service for 5100 users was the chief purpose of the leasing offer.

Hughes said he hoped to have signed up a few prospects by mid-December, even though only two of the 60 customers TSR serves in the New York region had expressed any interest in using the 5100 in conjunction with TSR's 360/75-based time-sharing service. Though not ruling out an eventual "marriage" of 5100-type products and time-sharing, Hughes finds that prospects instead seemed to consider the IBM offering as a pretty good data entry device.

"It has an excellent tape transport mechanism and full editing can be done on the crt screen," Hughes said. So, he says, it could find a place in small business applications as a sort of remote job entry station.

### How it's selling

Some industry sources think IBM has fallen short of its 5100 sales goals. Internally, the company hoped to have placed some 1,500 machines before

# Converting to OS?

There are two ways to convert from DOS to OS. One is drastic and disruptive. The other is UCC TWO (DUO 360/370-DOS under OS).

With UCC TWO, you continue to use your DOS programs — without reprogramming — while you make the conversion. And still get all the facilities and features of OS.

You can plan the conversion to fit your work schedule, instead of the other way around. You can even spread the job — and the cost — over months.

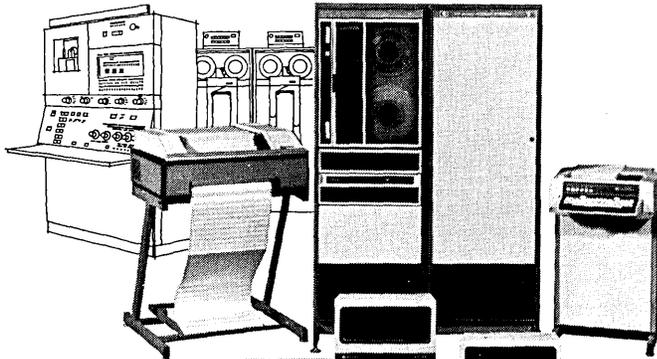
Get to OS — faster, easier and at less cost. Make the conversion with UCC TWO.

## UCC

UNIVERSITY COMPUTING COMPANY

7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75247

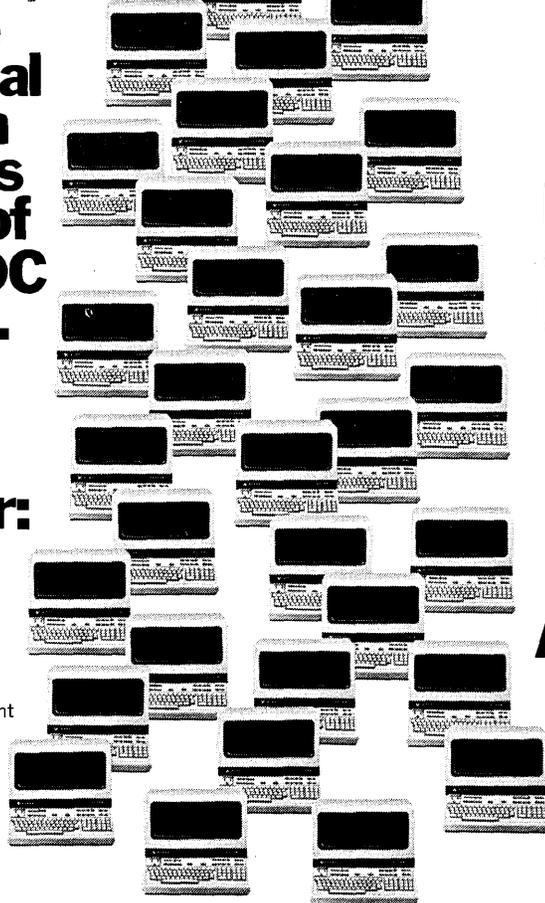
# Introducing the Hewlett-Packard 2000 ACCESS.



**The unique  
multi-terminal  
RJE system  
that increases  
the capability of  
IBM and CDC  
computers.**

**32 on-line  
terminals for:**

- HASP multileaving
- RJE to IBM
- UT200 RJE to CDC
- Data entry
- Data base update
- Information retrieval
- Concurrent program development
- Local processing



**Plus multiple  
on-line  
peripherals.**

- Up to 7 line printers (200-1250 LPM)
- Up to 7 card readers (300-600 CPM)
- IBM and CDC-compatible magnetic tape drives
- 5 to 120 Megabytes of on-line disc storage.

**Available now:**

Hewlett-Packard's 2000 Access System is the low-cost way to enhance the capabilities of your IBM 360/370 or CDC computer. For complete information call your nearby HP field engineer. Or write.

**HP minicomputers.  
They work for a living.**



Sales and service from 172 offices in 65 countries.  
1501 Page Mill Road, Palo Alto, California 94304

# news in perspective

year-end through its 120-man dedicated sales force. Based on present order volumes, it isn't expected to sell more than half of that number. IBM declines to comment on this speculation, although some IBM salesmen have admitted informally they're not certain exactly where their prospects lie.

Despite that somewhat disappointing reception (which easily could be corrected by additional versions of the 5100 or a more concentrated sales effort), time-sharing users have come to realize that all their applications don't necessarily have to go on a time-shared computer.

Hillel Segal, a founder and now president of the time-sharing users group, ATSU, says he's found that users seem more interested in finding applications for solving problems than in the kind of computer or service to be used in the solution. When it was formed 15 months ago, the association indicated it wanted to keep its vendors honest by conducting surveys that would provide its members with such caveats as "processing costs, frequency of downtime and liability under service contracts." (November '74, p. 12).

## Work with vendors

"We've mellowed since then in the viewpoint of what we want to accomplish," says Segal, who is a financial analyst with the Hertz Corp.'s Rent a Car division in New York. "We won't be activists concerning our vendors. We'll work with them."

That might be a reasonable approach in these times. The number of companies offering time-sharing services has been pared drastically to a more manageable number since the glamorous early '70s when there were 200 time-sharing companies. Segal said a recent survey by his association could turn up only "35 or 40" firms offering conversational time-sharing.

A recent study by the business magazine *Forbes* identified "50-odd companies" of which it said 20% were losing money and 10% were barely breaking even.

## Business is growing

Yet, according to many studies, the use of time-sharing is increasing. Quantum Science Corp., the New York firm which annually surveys the services industry, says revenues of firms offering conversational time-sharing will reach \$518 million this year, compared with \$447 million a year ago. But a considerable portion, says Quantum's Charles Vargo, will be going to the large service companies with big networks and hosts of applications.

Says ATSU's Segal: "More and more

people coming out of college after having been exposed to time-sharing are becoming more and more vocal in asking their employers to try out these techniques of time-sharing. Work that has been done manually or on in-house computers is going to the time-shared services."

However, Segal continues, this doesn't always help the smaller firms. "Small time-sharing companies may get a client for one application. When the client wants another application and the small firm can't offer it, he'll go to the big ones and the big ones may get both jobs."

## Signing up

It is understandable, then, that users and vendors are anxious to communicate with each other. Since it was formed a year ago last September, ATSU has recruited 900 members who pay \$45 a year to participate in activities of chapters that have been formed in 13 U. S. cities and to receive a monthly newsletter and two directories the association will begin distributing in February.

One is a directory of time-sharing companies and the other is a listing of

time-sharing applications available from the suppliers. The directories will be issued in loose-leaf form and will be updated throughout the year.

Of its 900 members, 700 represent users in some 600 companies. (Segal estimates that there are "several thousand" companies in the U. S. that use time-sharing extensively). The other 200 members are associate members who represent about 100 vendors of terminals, software and time-sharing services, this last group representing the 35 to 40 companies ATSU has identified as time-sharing houses.

Its headquarters are at 210 Fifth Ave., New York 10010.

—Tom McCusker

## Training

### It's Not Your Usual Programming Class

A teletype clacked slowly as a student pressed one key at a time. In an adjoining room there was a buzzing sound produced by an electrically driven wheelchair. Students there, too, were intently completing their classroom assignments. But it was not your usual programming class.

This group of seven—completing the

# Are you ready for EFT?

UCC is. With a complete, integrated package of proven, on-line banking software.

First, there's the UCC Central Information File. UCC CIF provides a complete record of all your bank's customers and a cross-reference of all relationships. You shouldn't try to get started without it.

Then, there's our Asset Card Management System which can control issuance and provide support of multiple card classes. And our Consumer Transaction System that provides support for on-line, unmanned teller devices.

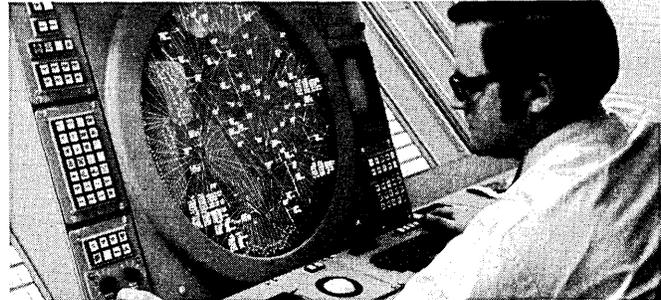
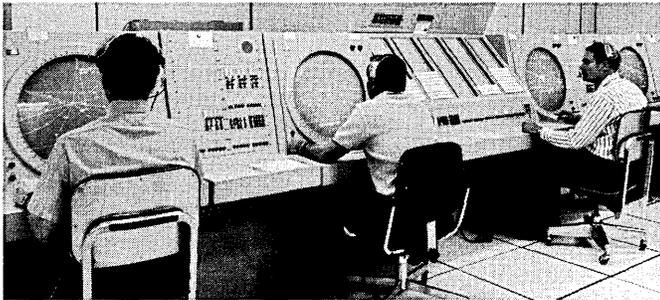
If you aren't ready for EFT, ask UCC about CIF, ACM and CTS.

## UCC

**UNIVERSITY COMPUTING COMPANY**

7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75247

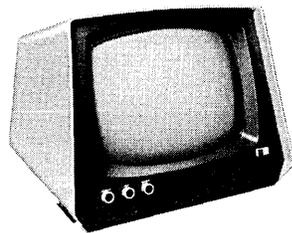
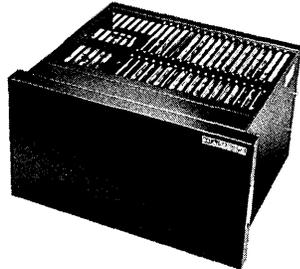
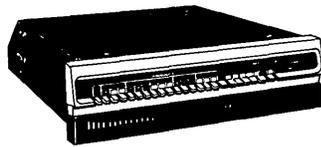
CIRCLE 89 ON READER CARD



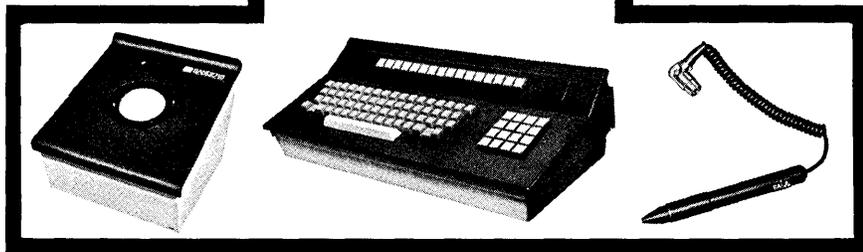
AIR TRAFFIC CONTROL



COMPUTER AIDED DESIGN



SIMULATION & TRAINING



# Sanders Computer Graphic Display System

There's a time-proven Sanders Computer Graphic Display System to meet your particular needs. Typical applications are shown here. With our modular building block design capability, we can provide you with virtually any system you require.

For more information, contact the Marketing Manager, Sanders Associates, Graphic Systems Marketing, NHQ 1-379, Daniel Webster Highway—South, Nashua, N.H. 03060. Or call (603) 885-5280. International inquiries should be directed to ATTENTION:

International Marketing. Or, you may use TWX 710-228-1894 and Telex 094-3430.



**MDS  
Division**

# news in perspective

9-month course, preparing for graduation ceremonies last Oct. 30, and looking forward to their first jobs in data processing—consisted of paraplegics, quadriplegics, and the legally blind. They are the first crop of entry-level program-



**SCOTT LUEBKING**  
Interrupted Ph.D. work to train severely physically handicapped

mers to blossom from a California Dept. of Rehabilitation program for the severely physically disabled. Of the seven, four already had been tested by a review committee set up by people in the local business community to pass upon their technical competence. Even before the course was completed, the four had passed.

The students, not all of them confined to wheelchairs, range in age from 25 to 45. Some have never had a job, and two have master's degrees—one in physics and one in history—but couldn't find jobs.

Steve Marigan, a 27-year-old quadriplegic (all four of his limbs are affected to some degree by paralysis), was the first to receive a job offer, one he was still considering a full two weeks before graduation day. Marigan is completing, as well, his final semester of work on a B.A. in business management at San Francisco State Univ. And, at the same time, he and a partner have a vending machine business. Referring to the 9-month course, he says, "I didn't do as much homework as I should have."

Marigan is one of an estimated 3 million severely disabled and blind individuals in the U.S. A resident of San Francisco, he has been commuting across San Francisco Bay to Berkeley, where classes have been held at the Center for Independent Living. This nonprofit organization, serving the blind and severely disabled, estimates a target

population of 30,000 just in the five adjoining communities it has been working with.

The Rehabilitation Act of 1973 (Public Law 93-112) reaches out to provide the handicapped with the same rights previously extended to minorities and to women. Under the law, companies receiving more than \$2,500 under contract from the federal government must make a reasonable, good faith effort to recruit the qualified handicapped. They also must not discriminate against them in promotions. And, of course, they must assure that their facilities can accommodate, for example, employees confined to wheelchairs. The companies, it's understood, eventually will have to have plans, goals, and timetables for such a program. At the time the law was passed, it was said that there were some 12 million handicapped, employable people between the ages of 16 and 64—this according to the 1970 census.

IBM's Steven L. Jamison points out that a number of states are taking parallel action, adding the physically handicapped to a growing list of people who cannot be discriminated against in the various aspects of employment. Jamison is vice chairman of the Assn. for Com-

puting Machinery's Special Interest Group on Computers and the Physically Handicapped. SIGCAPH earlier this year held a conference on computing careers for deaf people. It even provides interpreters for the deaf at ACM national conferences, and urges dp managers to send their deaf professionals.

## The instructor knows

The instructor of the 9-month class in Berkeley, Scott Luebking, graduated Phi Beta Kappa in math from Knox College in Illinois, and interrupted his work toward a doctorate to take on this teaching assignment. Injured in a diving accident five years ago, the 24-year-old Luebking is now a quadriplegic. His co-instructor, 22-year-old Neil Jacobson, has had cerebral palsy from birth, and yet he, too, is a Phi Beta Kappa, having received his B.S. in computer science from Hofstra Univ. in New York City. The Brooklyn-reared Jacobson is working on his thesis for the Ph.D. program at the Univ. of California in Berkeley.

Their course dealt with the fundamentals of flowcharts and computer programs, machine organization and business dp concepts, including files, table handling, editing, updating, and reporting. Students initially were exposed to BASIC, which is on the system at the Lawrence Hall of Science on the U.C.-Berkeley campus.

# Restarting all over... is all over.

Restarting in a matter of seconds is now a matter of fact. With UCC FIFTEEN.

With the UCC FIFTEEN Restart Management System, you don't have to restart at the beginning. Instead, you restart at the proper job step. The OS catalog is corrected. Unnecessary direct access data sets are automatically deleted. GDG biases are properly altered for the rerun. And manual errors in restarting are eliminated.

Why should you take hours to restart, when UCC FIFTEEN can do it in seconds?

## UCC

### UNIVERSITY COMPUTING COMPANY

7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75247

Bell & Howell's Optical Mark Readers. The beauty of the system is in the simplicity behind its data entry concept. Our OMR reads a pencil mark from a source document directly into computer-ready information. It requires no special skills, no manual keying, no duplicate transcribing and no cumbersome manual edit procedures. And the bottom-line savings are dramatic.

A simple case underlines the point. A telephone company in California installed a Bell & Howell Intelligent Mark Reader terminal to process trouble reports and dispatch repair crews. As information is received on the phone, a tab-card trouble report is marked by pencil, placed in the IMR terminal, and automatically checked for errors. The information is then reformatted and transmitted to a central computer where

Let's see how simple it is to start saving time and money. Please send me your brochure.

I'd like a representative to call.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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

Phone \_\_\_\_\_



**BELL & HOWELL**

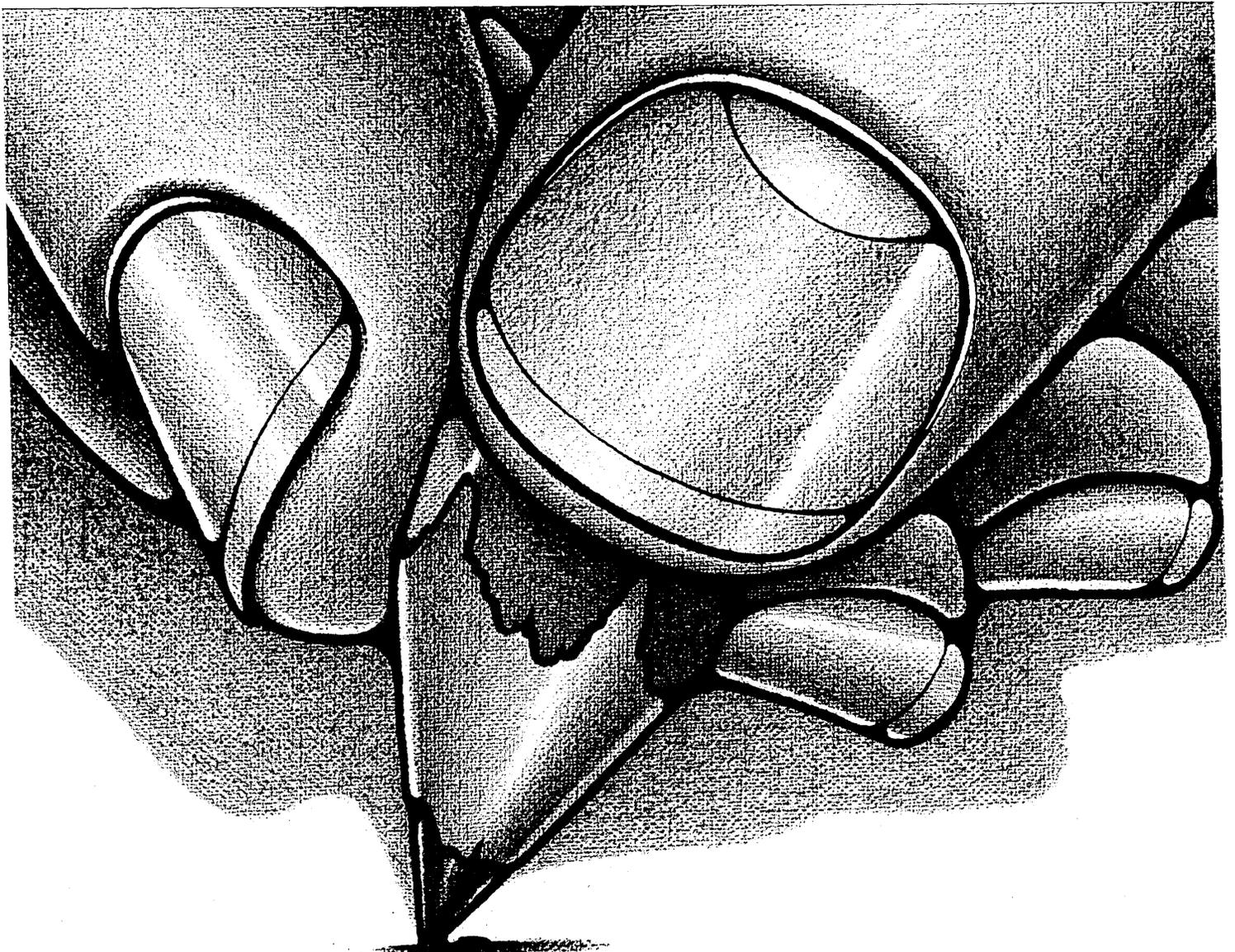
Business Data Products Division, 360 Sierra  
Madre Villa, Pasadena, CA 91109. 213-796-9381.

the data is routed to the appropriate service center. The IMR terminal takes 3 hours to provide 100% error-free data entry. The same job originally required 40 hours manual keying, with an unknown error factor. The per-installation salary savings are about \$1000 a month. Valuable connect-time requirements dropped from 15 hours monthly to one hour—a savings of around \$170 a month per installation. Think of these savings for every one of 28 installations!

Our Optical Mark Readers are up, running and saving in thousands of installations all over the country—doing jobs such as inventory control, order entry and trouble reporting. Our OMR can save you a lot of time and money, too. It's as simple as that.

For a brochure describing our OMR products, fill out the coupon and mail.

## Here's how simple data entry is with OMR.



# news in perspective

"BASIC's a good educational language," says Luebking. "I've done histograms on it and stuff that people swear I did in FORTRAN." They then went to COBOL, covering also 360 assembler language and JCL. Through terminals, they also were able to get to the Control Data 6400 at the campus computer center, and had periodic access to the IBM system at Del Monte Corp.

## Business helped

In all instances, the instructors say, the local business community was very cooperative. Luebking spent a week at Fireman's Fund, the insurance firm, and Jacobson a similar time at Del Monte to better understand working conditions. For weekend instruction on JCL, they were able to use the videotapes of Crocker Bank. Says Luebking, "Neil's and my background have been in scientific programming. And local business people have been good about sort of looking over our shoulders to see that we don't teach things that aren't going to be useful to the students." Jacobson adds, "That's probably one of the strongest points of the program. We have a lot of the businesses working with us to make sure that what we teach is what the students will use when they get out there."

Indeed, the 9-month course went over so well that a second-year continuation grant has been awarded by the state Dept. of Rehabilitation. Classes open in January, and applicants are being accepted from throughout the state. From Southern California, too, members for a business advisory committee are being sought.

The Bay Area program can be traced back to an earlier project in Virginia where, since June 1973, IBM has been working with that state's Dept. of Vocational Rehabilitation and the Woodrow Wilson Rehabilitation Center in Fishersville. A model system for training and placing the homebound handicapped in dp was established, but entering students were required to have job commitments before beginning training.

## Some doubts

In the spring of 1974, IBM representatives came West and talked with a California Dept. of Rehabilitation district administrator in San Francisco. "For a considerable time, we in this particular area were somewhat skeptical because we did not see that the wage rates were going to be comparable to what would be needed in order to make it practical for a quadriplegic to go to work," says John Velton, assistant district administrator in Oakland, Calif.



NEIL JACOBSON  
Fewer hangups than the  
non-handicapped

In the fall of '74, it was decided that if five students could be located for this training program, they would go ahead with it. The Dept. of Rehabilitation got two people on loan from IBM to help set up the program, lined up vocational psychologists to test each interested stu-

dent, and began a search for a local contractor to take on the teaching job.

Wisely, the assistance of local business people, mostly from computer using organizations, was solicited. "We decided that this would be an essential factor if we were going to have a successful project," explains Velton. At two breakfast meetings, in Oakland and across the bay in San Francisco, they met and formed a business advisory committee. This was divided into three subcommittees: business, technical, and placement.

The business committee supplied classroom speakers and arranged tours of local computer facilities. The technical committee advised on the curriculum and provided speakers, while the placement committee supplied speakers on the employment interview process, preparation of resumes, and how best to present themselves for the interview, as well as arranging interviews with prospective employers.

People in the disabled community tend to think that business people don't care for them, Velton says. "But in this situation they found that the businessmen are deeply committed to helping anyone who's making a strong effort to help himself."

## Go right to work

At the Woodrow Wilson center in Virginia, students live in the facility. But

# Say goodbye to PDS compression.

Say "hello" to UCC SIX. A software package that eliminates PDS compression, because it automatically inventories and controls PDS disc space.

UCC SIX (PDS Space Management) means the virtual end of ABENDS and "dump and restore" operations caused by exhausted PDS disc space. You even save money on your disc investment, since UCC SIX utilizes PDS disc space more efficiently.

Say "so long" to an old nuisance. Greet a new friend. UCC SIX.

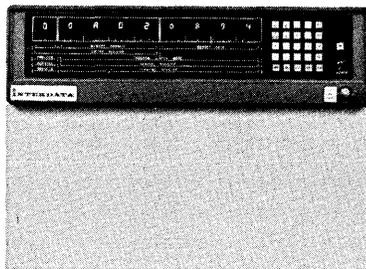
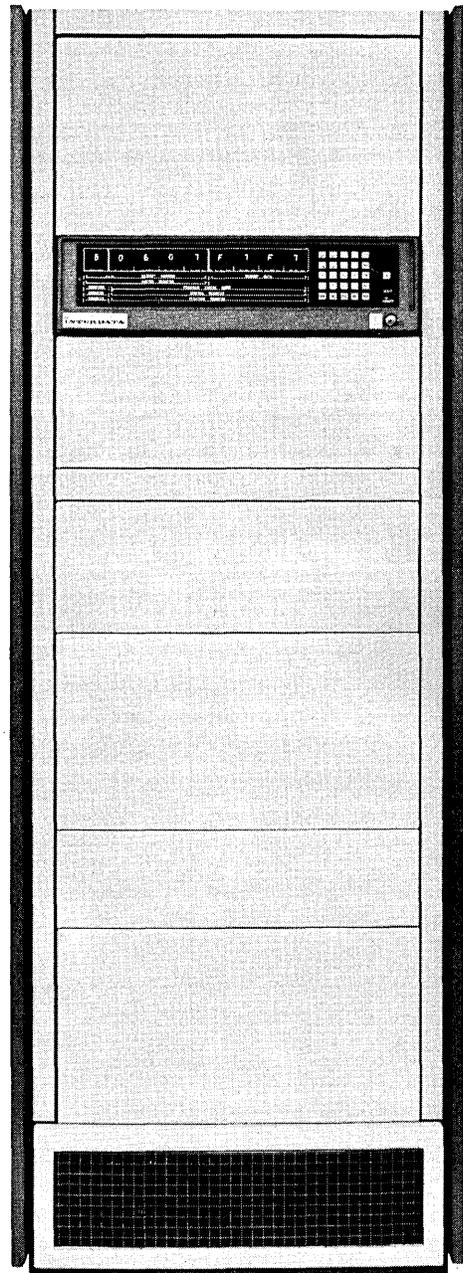
## UCC

UNIVERSITY COMPUTING COMPANY

7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75247

# Interdata announces minicomputer EASYWARE.

Interdata and Megamini are trademarks of Interdata, Inc.



**Interdata's 7/16 minicomputer** is a 16-bit machine that combines high-performance with low cost. Its architecture, packaging and programmability make it a proven, cost-effective solution for the OEM buyer.

**Interdata's 7/32 minicomputer** is an economical 32-bit machine with a main memory expandable up to a directly-addressable million bytes of 750 ns core.

**Interdata's 8/32 Megamini** is the industry's most powerful 32-bit minicomputer. It is an unequalled combination of power, flexibility and reliability compactly packaged.

# A family of hardware and software that's easy to work with.

Interdata offers a family of 16- and 32-bit hardware and software designed to be compatible throughout—from the low to the high end of the product line. Our Common Assembly Language enables you to go up or down in performance ranges always knowing your Interdata software will work.

## **Hardware.**

From the beginning, Interdata built its minicomputers with a microprogrammed architecture, using the same architectural principles as the companies who build large-scale machines. As a result, our big machine architecture offers you 360/370-like instruction sets. Multiple registers. And the ability to scale-up from our 16-bit minicomputer to our one-megabyte, 32-bit Megamini.

With Interdata comes component compatibility which minimizes your inventory and guarantees interchangeability. Whether you use a 7/16, 7/32 or 8/32, you get the same front panel, power supply, memory, and same family of peripherals. Also, when you choose Interdata hardware, you can be sure anything you buy from us today is compatible with what you bought from us yesterday—or will buy from us tomorrow.

## **Plus software.**

Interdata makes operating systems for the systems builder. Not only do they take advantage of the hardware, but they optimize the use of systems software and the human user. In addition, both the 16-bit OS and the 32-bit OS are completely compatible at all user interfaces—namely, file structure, supervisor calls, operator commands, etc.

To help the user build his system, Interdata offers a variety of higher level languages. These include: FORTRAN V—a very well-known version of FORTRAN extended for system construction. MACRO CAL (Common Assembly Language)—a macro-assembler which guarantees application program compatibility across the family. And BASIC—a simple, easy-to-use language.

## **Equals EASYWARE.**

Interdata's philosophy has always been to make the hardware—the least expensive part of a minicomputer system—work the hardest. Our software then provides the tools which make it easier for you, and your people, to use our systems to solve your automation problems.

That's why we call it EASYWARE.

  
**INTERDATA®**

Subsidiary of PERKIN-ELMER

Oceanport, N.J. 07757. (201) 229-4040

6486 Viscount Road, Mississauga, Ontario, Canada L4V 1H3. (416) 677-8990 • Arundel Road, Uxbridge, Middlesex, England. Uxbridge 52441.  
8000 Munchen 71, Forstenrieder Allee 122, West Germany. 089-75-30-81. • 92 Chandos Street, St. Leonards, Sydney, Australia 2065. 439-8400

## news in perspective

in Berkeley's Center for Independent Living, they must commute to their classroom. CIL, a self-help agency for the disabled, believes in developing an ability among the disabled to live independently, that it is wrong to "ghettoize" them, and that it is better for them to get out into the community. "We've tried to maximize their independence so that, hopefully, the day they graduate from the course they would be able to go to work without any additional adjustments or changes," says Velton.

In search of students for the first class, they contacted about 60 individuals, tested 30 to 40 of those who showed interest, and picked 13 for the class. The few who have withdrawn from the program learned that they lacked the capability to continue or found that their interests lay elsewhere, not in programming.

The Center for Independent Living, in Berkeley, was selected to undertake the instruction under a \$50,000 contract. It had disabled personnel who could both teach and serve as role models for the students, and it had the expertise in providing counseling, housing assistance, transportation service, and

other support services for the blind and severely disabled in Berkeley and adjoining communities.

"One of the things we're hoping to teach these people is how to deal with their own transportation and their own care," says Luebking. "We're gradually getting people involved with arranging their own transportation." People confined to wheelchairs ideally need a van and sometimes a driver, too. Employers of the graduates of this course, it is pointed out, will not have to concern themselves with their transportation to and from work. Luebking worries that some of the students might have difficulty, at the beginning, putting in a full 8-hour day. But Jacobson doesn't feel that way, saying they now put in five and a half hours daily in class and have homework assignments to complete in the evening.

The instructors, both confined to wheelchairs, also feel that they serve an important function in their relations with prospective employers. The two have been meeting constantly with members of the various committees. In their initial contacts, it seems, some of the business people backed away

from the pair, not certain how they should behave toward them and careful about what questions could properly be broached. But that concern and reticence soon vanished when it became apparent that Luebking and Jacobson have fewer hangups than many non-handicapped people. The pair also raised and answered questions about the personal aspects of life in a wheelchair. "We're teaching the prospective employers about disabled people," says Luebking. "So it's like we're breaking the way for our students."

—Edward K. Yasaki

### International

## Market in Mexico: El Dorado For Some

For U.S. computer manufacturers, who sometimes like to think in extremes, Mexico City is either El Dorado or the Treasure of Sierra Madre.

To minicomputer manufacturers, it looks like the city of gold of El Dorado while to dp mainframe manufacturers, Mexico City and, indeed, the entire country of Mexico must conjure up memories of the unhappy loss of the Treasure of Sierra Madre.

# up your productivity with **ADABAS** the Adaptable DAta BAse System

ADABAS has all the functions and features needed in a generalized data base management system and provides . . .

**FLEXIBILITY  
EFFICIENCY  
EASE OF USE**

ADABAS is the lowest total cost ANSWER to your organization's need for data base technology

**software ag**  
OF NORTH AMERICA, INC.

(703) 620-9577

COMPUTERWORLD Survey  
of DBMS Users—September  
24, 1975

ADABAS from software ag  
came up with the highest  
weighted averages.

DATAPRO 70 User Ratings  
of Proprietary Software—  
November, 1975

No DBMS, rated by 6 or more  
users, scored higher than  
ADABAS in user overall  
satisfaction.

"Buy your hardware from the biggest and your software from the best."

In a sense, all this is a reflection of the situation in the U.S.—dp mainframe shipments are in a period of temporary stagnation and the mini business is booming—but the whole scene is exaggerated in Mexico.

“Not only is the whole mini and controls business taking off,” says Fernando Rodriguez-Montero, “but, for many people in Mexico, the minicomputer is the right machine now for dp, too.” Rodriguez-Montero, a former president of IBM de Mexico, is currently president of Informatica Nacional S.A., a Mexican firm that represents eight U.S. companies in Mexico including minicomputer manufacturer, Interdata.

“We think we’ve been successful in offering an alternative to the major mainframe companies,” adds Rodriguez-Montero, who noted that his firm had just marketed two Interdata systems valued at \$200,000 each. The Interdata 732s interface with IBM and Control Data equipment, he said.

#### Complex and dynamic

The Mexican computer market is a complex one. It is whipsawed by currency considerations, a high level of governmental involvement, a rapidly growing economy, and a recession. But, most important of all, the Mexican computer market is growing and dynamic.

The slowdown in mainframe shipments from the U.S. may be temporary, since the Mexican government has quietly put a lid on government dp purchases because it is said to feel that the government had “overcomputerized.”



There have been no official decrees or statements on the matter, but dp business has dried up since July when the government was said to have tightened up on new acquisitions of dp mainframe equipment.

“Things are slow right now,” says Robert D. Clark of the U.S. Trade Center in Mexico City. “But we’re hoping they will open up after January 1.”

Clark, whose Commerce Dept. unit

works to encourage U.S. trade in Mexico, monitors Mexican trade regulations and practices with the idea of stimulating shipments of U.S. gear into Mexico.

#### Manufacturing plans

To date, Mexico has little in the way of computer manufacturing, but the country definitely has big plans for the future. Mexico’s general hope is to encourage large U.S. computer companies to manufacture in Mexico. The government, however, requires that the manufacturing operations be at least 51% owned by Mexicans.

One big enticement for foreign computer manufacturers is that once a plant is built in Mexico, the government closes its borders to competition, giving the new manufacturer what is in effect a monopoly—unless and until another manufacturer decides to establish manufacturing facilities in Mexico. The most sophisticated large scale manufacturing in Mexico is being carried out by—who else?—IBM, which makes electric typewriters near Mexico City.

Another type of manufacturing is the so-called “maquillaje operation,” in which U.S. computer and electronics firms manufacture labor-intensive products along the U.S. border in Mexico and then ship the finished product back

# The brightest COM image in the business. Period.

**The new, advanced Vantage COM II.**  
A revolutionary new optics system improves screen brightness by 100%.

The Vantage COM II is loaded with award-winning engineering features that make it the most well-designed, rugged reader on the market.

- Full-size 11x14 COM image from a cabinet that takes up less than a square foot of desk space.
- Vari-Optic zoom control gives you up to 25% more picture from any lens.
- High resolution optics deliver a clear, sharp, glare-free image even in a brightly-lit office.
- Optics module drawer simplifies maintenance. No need to tip the reader on its back or unplug the cord when changing lamps.
- New “easy shift” dual lens unit provides instantaneous changes between two magnifications.
- Exclusive same-way scan. The carrier travels in the same direction as the image. No more right-from-left confusion.

**Call today, collect at 414-251-8100 for a free demonstration! Ask for sales manager Jim Keck.**

Vantage® COM II

**THE MOST VERSATILE, ADVANCED COM READER LINE YOU CAN GET.**



**REALIST, INC. MICROFORM PRODUCTS DIVISION**  
Menomonee Falls, Wi. 53051  
Realist International S.A. / 4 Rue Bernard Palissy  
92800 Puteaux-France

# news in perspective

to the U.S. Many firms, such as Cambridge Memories and Burroughs, take advantage of the border operations, but they have little impact on the actual Mexican computer market.

The future of the "maquillaje operation," moreover, is in doubt because Mexican labor wages have been rising at a rapid rate of 20 to 22% a year and manufacturers are beginning to look elsewhere in Latin America for inexpensive labor.

## Users are sophisticated

In many ways, Mexican computer users are surprisingly sophisticated, particularly in Mexico City, where most governmental operations are centralized, and in industrialized Monterrey where the per capita concentration of computers is the highest in the country.

The data communications market is also regarded as a booming market and the Mexican telephone system is a good one and is generally regarded as better than most European systems. For example, the Mexican phone system, Telefonos de Mexico, has two microwave networks—one serving the East Coast; the other serving the West Coast.

While the minicomputer market is impeded by the stringent and complex import restrictions that hamstring the dp firms, the mini market, nevertheless, looks bright in Mexico. The Digital Equipment Corp., the leading U.S. mini manufacturer, finds the Mexican market attractive.

"The Mexican market is typical of the



whole South American market," says a DEC spokesman. "We're getting a lot of education applications and a lot of small business applications."

When DEC was contacted, the firm had just sold mini-based systems to a petroleum distributor, a fish processing operation, and to the 2,500-student Tijuana Institute of Technology. A PDP-11 went to the Tijuana location where it will be used for a wide variety of applications including program development, student instruction in COBOL and BASIC and for general administrative

applications

Informatica Nacional's Rodriguez-Montero believes the data communications and minicomputer segments will continue to enjoy the fastest rates of growth in Mexico. He points out that the government is beginning to disperse some important operations—like taxation and social security agencies—in different regions in the country with the result that there will be more opportunities in distributed processing and data communications.

"We're optimistic about the future," says Rodriguez-Montero. "Mexico has a steadily growing economy, a developing middle class, and the government seems to have begun to have brought inflation under control during the last six months."

Besides representing a cluster of U.S. computer and electronics firms, Informatica Nacional has begun to manufacture equipment designed by U.S. firms in an old IBM plant that Informatica Nacional has leased. The first products to be manufactured are Milgo modems. Ronald F. Morrison, vice president of Informatica and a former director of marketing for IBM's Caribbean Area, says Informatica has plans to manufacture other products designed by U.S. firms.

—W. David Gardner

## THE MMS GENERAL LEDGER...

### A feast of flexible financial reporting



Satisfy your company's increasing appetite for accurate, on-time financial reports with the famous MMS GENERAL LEDGER.

MMS GENERAL LEDGER has been the prime choice of more than 400 discriminating corporations around the world. They wanted the flexibility of catering to each and every report user. So they served the financial reporting software system with the most powerful report writer in the industry — MMS GENERAL LEDGER.

MMS GENERAL LEDGER will please any palate — it operates under DOS, O/S, IMS, DL/1, IDMS, even TOTAL. IBM S/360-370, System/3, Honeywell, and other systems find the MMS GENERAL LEDGER the perfect complement.

For the manufacturer, our new NET CHANGE MATERIAL REQUIREMENTS PLANNING System is everything from soup to nuts.

The MMS GENERAL LEDGER is more than a software package. It's a banquet of financial reporting systems. To get a taste of the MMS GENERAL LEDGER and other fine systems from Software International, write for our menu . . . and nourish your company's growth.

**Bon Appétit**

**SOFTWARE  
INTERNATIONAL**

Elm Square, Andover, Mass. 01810 (617) 475-5040

New York (914) 332-0040 Chicago (312) 729-7410  
San Francisco (408) 371-0331 Los Angeles (213) 795-4256 Toronto (416) 862-0521  
Philadelphia (302) 995-7101 Dallas (214) 233-5856

# REQUIRED LISTENING

Where did the GOTO go to? That's the subject of Yourdon's first State-of-the-Art Conference. Hear Jerry Weinberg, Larry Constantine, Bill Plauger, Tom Plum and Ed Yourdon speak on the first 10 years of structured programming. Enroll now.

## THE CONFERENCE

Now there's a forum that can ground you thoroughly in the basic issues of structured programming. It's Yourdon's State-of-the-Art Conference. Three one-day conferences (New York City, Jan. 19; Boston, Jan. 20; and Chicago, Jan. 21) that will open a dialogue between you and five of the leading experts on structured programming.

Is structured programming right for your organization? Is it difficult to implement the technique? What are the real benefits for an organization like yours? All of these questions will be answered at the State-of-the-Art Conference. Special emphasis will be given to the problems associated with starting up a structured programming project. This State-of-the-Art Conference is designed to help you through the throes of getting rid of the GOTO.

## THE TEACHERS

The five State-of-the-Art Conference speakers are:

**Jerry Weinberg**—author of *The Psychology of Computer Programming*, *An Introduction to General Systems Thinking* and co-author of *Structured Programming in PL/C*. Jerry will speak on programming teams, structured walkthroughs and other related topics.

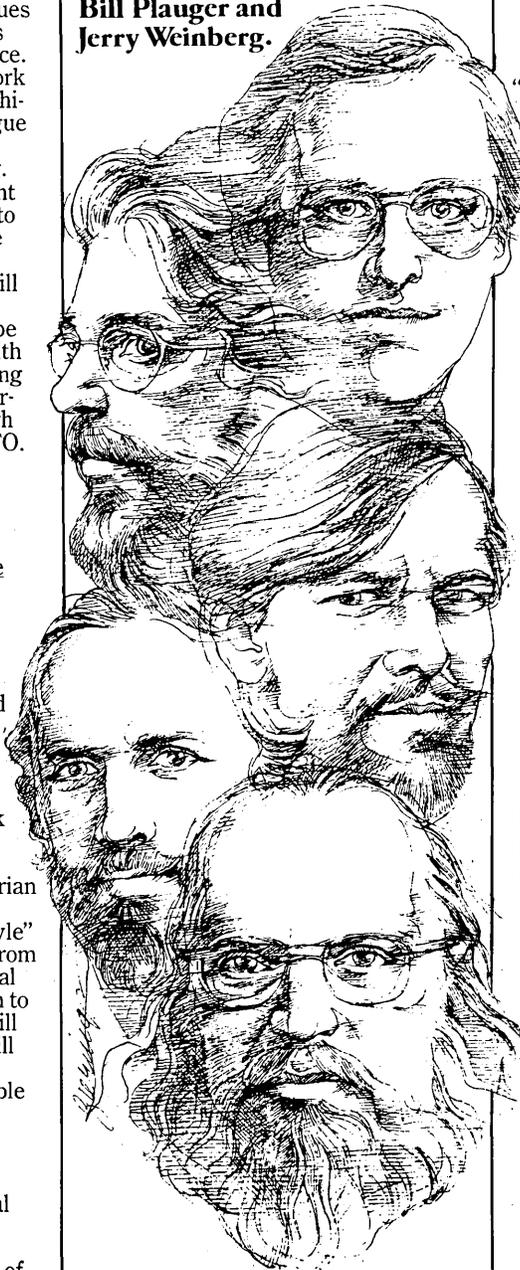
**Larry Constantine**—co-author of "Structured Design" in the *IBM Systems Journal* and co-author of *Structured Design*. Larry will speak on structured design and its impact on structured programming.

**Bill Plauger**—co-author with Brian Kernighan of *The Elements of Programming Style*, "Programming Style" "Examples and Counter-Examples" from the *ACM Computing Surveys* special issue on programming, and the soon to be published *Software Tools*. Bill will speak on programming style and will emphasize that eliminating GOTO statements does not ensure a readable program.

**Tom Plum**—co-author of "IF-THEN-ELSE Considered Harmful," "Teaching Structured Programming...by Example," and "Remedial Programming." Tom will serve primarily as moderator.

**Ed Yourdon**—author of *Design of*

**Ed Yourdon, Tom Plum,  
Larry Constantine,  
Bill Plauger and  
Jerry Weinberg.**



*On-Line Computer Systems, Techniques of Program Structure and Design*, and co-author of *Structured Design*. Ed will discuss the practical problems of implementing structured programming and the associated "programmer productivity techniques" in the typical EDP organization.

## THE SPONSOR

Yourdon inc. is sponsoring the State-of-the-Art Conference. We feel this conference is consistent with our philosophy of presenting only the finest lecturers, seminars, conferences and workshops. Weinberg, Constantine, Plauger, Plum and Yourdon are five of the finest minds in the computer industry today. We're confident you'll find participation in this conference both profitable and educational.

## THE PARTICULARS

The State-of-the-Art Conference will be held in three different cities. This one-day conference will take place in New York City on Jan. 19 at the New York Hilton. In Boston on Jan. 20 at Howard Johnson's 57 Hotel and in Chicago on Jan. 21 at the Hyatt Regency Chicago.

The Conference is only \$95.

For more information call Ms. Rikki Moss at Yourdon inc. 212-730-2670 or send the coupon below to:

Yourdon inc.  
1133 Ave. of the Americas  
N.Y., N.Y. 10036.

Please enroll me in the State-of-the-Art Conference scheduled

for \_\_\_\_\_ in \_\_\_\_\_.

My check for \$95 is enclosed.

Please send me more information.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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

Phone \_\_\_\_\_

**We're the people  
who train the people  
who train the people.  
Yourdon inc.**

## news in perspective

### Who Will Market the Unidata Machines?

Apparent dissolution of Europe's three-company computer partnership, Unidata, has sent the partners and their governments scrambling to chart their now disparate futures in the computer industry.

The decision last May 12 of one partner, Compagnie Internationale pour l'Informatique, to merge with Compagnie Honeywell Bull prompted the first defection late last summer when N. V. Philips of the Netherlands said it was pulling out of the general purpose computer business (October, p. 130).

West Germany's Siemens, the third partner, continued to reaffirm its intentions to remain with the full line designed for the Unidata effort to compete with giant IBM in the European computer market. (Sperry Rand Corp.'s Univac division was rumored to have visited Siemens to discuss a possible joint venture. And in Paris this fall, sources close to CII indicated that the CII-Honeywell Bull combine, at least in France, would continue to market three of the Unidata computers, the models 7.720, 7.730 and 7.740.)



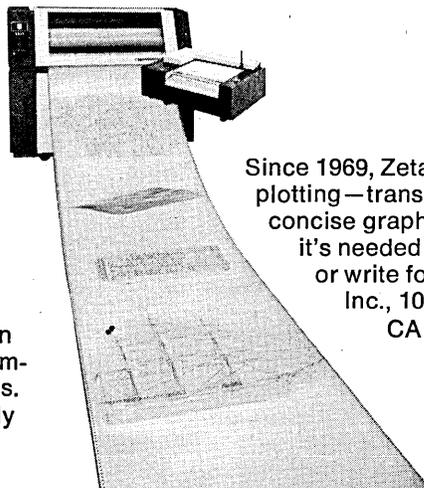
**NO SALE:** Demonstrators at a recent computer show in Paris waved placards denouncing the merger of France's CII with Honeywell Bull. One read: "We don't want to be sold to the Americans."

#### Not feasible to EEC

In Brussels the European Economic Community, despite all its protestations, was accepting the grim reality that a truly "European" competitor against IBM's dominant position was not feasible. Its dreams had been defeated by overwhelming nationalism and under-

whelming funding. In an early summer bulletin the EEC said "Europe is now faced with either massive funding to maintain even a certain market share or with maintaining a minimum competence in the mainframe market, while seeking out new but related growth markets in the computer field." The lat-

# There's a Name for Leadership in Remote Plotting. Zeta.



By any criteria . . .

**Speed** — Up to 11.3 inches per second over normal 300 baud phone lines.

**Versatility** — 12 and 36 inch models using standard 10, 14.8, 15 and 30 cps terminals.

**Accuracy** — 2.5 to 10 mil increment sizes.

**Software** — Standard plotting subroutines on every major timeshare computer. Over 40 commercial services. Over 50 in-house systems.

**Cost** — Our pricing has always been "toughly competitive." It still is.

Since 1969, Zeta has led the way in remote plotting — translating computer data into fast, concise graphic output — when and where it's needed — at the user's terminal. Call or write for literature: Zeta Research, Inc., 1043 Stuart Street, Lafayette, CA 94549, 415-284-5200.

 **Zeta Research**

ter was the EEC choice. Generally, those markets include everything but the larger mainframe—"terminal, peripheral, and minicomputer manufacturers, the semiconductor industry and various service companies such as bureau and systems, software and consultancy houses."

It will be many months or years before all the effects of the CII-CHB merger (due to be finalized last month and consequent abortion of Unidata will be seen. Siemens' vice-president of finance, Klaus Muller-Zimmerman promised the financial publication *Barron's* that Siemens will stay in "computers and in every other promising field associated with electricity, no matter how many other companies quit." The \$7.2 billion Munich-based company has continued to suffer huge losses in the computer business. It grossed \$400 million in dp sales last year and lost \$73 million. It expects to lose another \$40 million in 1975 and may remain in the red in 1976.

In fact Philips disclosed in a memorandum on its withdrawal from two-year-old Unidata that in 1974 the partners forecast that "very high uncovered costs would have to be taken into account in the first four years (up to and including 1978) and thereafter, irrespective of government subsidies in Germany and France." They realized that they would have to integrate their facilities and their management. The disintegration of Unidata would not seem to help Siemens improve that picture, since presumably it must reassume all the development, marketing, software, and other responsibilities that its partners had.

#### Profitable, or else

Gerhard Sorg, a commercial analyst for the computer operation's marketing division, says that despite Muller-Zimmerman's optimism in the *Barrons* article, he knows that the computer operations have been told to become profitable, or else. Sorg, who was on a trend-seeking tour of the U.S. computer industry this fall, is vague over the meaning of "or else," saying simply "we will be profitable, or at least breaking even." Siemens computer operations, he suggests, actually do better than indicated, since they provide computers within Siemens at cost and give technical services to the various divisions at no charge. Hence the parent company saves considerably by having an in-house manufacturer.

Sorg said Siemens' plan for profitability in the computer business is simple: don't spread the operations too thinly. It will drastically cut back peripherals development, going outside to Storage Technology and Control Data for tape and disc drive printers. It will not offer new operating systems, but instead will

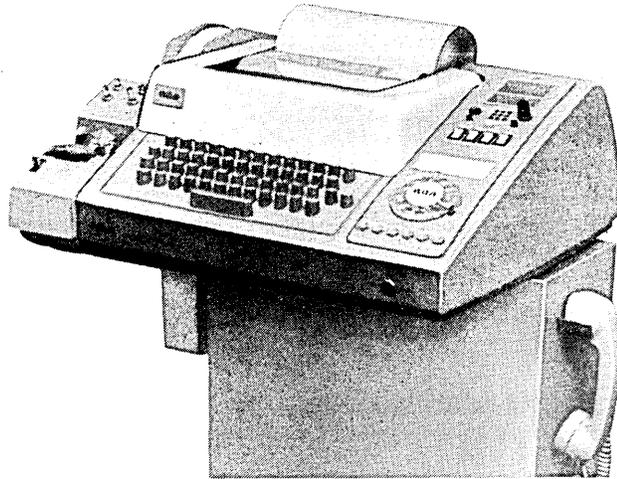
develop enhancements to the two systems it now offers: the BS 1000 and BS 2000. Siemens will stick to the present line of mainframes, but concentrate on software applications that are more directly tailored to the needs of prospective customers (as opposed to the more generalized offerings of IBM).

#### Keep Unidata line

Related to all of this are its plans to pursue the Unidata line, which Sorg describes as offerings of the three partners to which are added "modes" of each other's computers. For instance, Siemens' model 230 medium scale computer has a CII and Philips mode that

makes its instruction set compatible with CII and Philips' offerings, and therefore is called the Unidata 7.730 (similar to the IBM 370/125). The Philips Unidata 7.720 machine has a compatible instruction set with the Siemens-made model 220.

Sorg said Siemens can make the entire Unidata line. It probably will introduce a more powerful version of the low end 7.720 (of which he said 100 are installed). The 7.740 is developed and manufactured by CII, but CII had some production snags and Siemens filled the first orders with a stripped-down version of the Siemens-developed 7.750, so it can be assumed Siemens can continue



## TWX, Data-Phone ... you name it. From RCA. Everything you're looking for and more.

If you want a TWX® terminal, the RCA Model 33ASR interfaces with Western Union's TAA line. It gives you built-in dial capability — and all the services available to TWX subscribers. In fact, the 33ASR makes available all you may want — TWX, alternate Data-Phone\* and voice communications interfaced with telephone company's DAA. And, if you wish — through the TWX network — access to Telex capability.

Whether it's one terminal or 100, RCA can lease you the equipment you need. And we'll give you fast delivery and installation. Regularly scheduled maintenance and prompt service.

And all for less than you might expect. Let us tell you about it. Call us at (609) 779-4129.

RCA Service Company, A Division of RCA, Technical Services, Building 204-2, Camden, N.J. 08101

WE GIVE YOU MORE OF WHAT YOU'RE LOOKING FOR.

\* Trademark of Western Union Telegraph Co.  
\* Registered service mark of AT&T Co.

# RCA

CIRCLE 73 ON READER CARD

# It's happening here...

If you know a lot about telecommunications, you should know a little more about GTE Sylvania's Eastern Division.

We're a world leader in data and voice communications, information processing, communication switching and radio communications. And, right now, we're offering talented professionals an opportunity to work on a variety of complex systems designed to make yesterday's technological solutions seem almost prehistoric.

# and it's happening now.

Engineers at the Eastern Division are currently involved in state-of-the-art assignments of literally unprecedented magnitude. Projects running into many millions of dollars. Programs at the very furthest edge of the man/machine interface.

They're working independently and cooperatively.

In small groups and autonomously.

Whichever way they work best.

They're assuming the kinds of responsibilities that most professionals only dream about. And they are doing it now.

If you're career-oriented, and you'd like to be part of an organization that's tripled in size over the past 5 years, get in touch with us.

The following positions represent only a sampling of the many outstanding career opportunities presently available:

## REAL-TIME SOFTWARE ENGINEERS

Openings exist for both Communications and Telephone Systems experienced individuals. Real-time communications involve assembly language software design and development for advanced ELF communication systems. Real-time Telephone Systems Engineers will be responsible for the design and development of operating system software to a variety of special purpose customer specifications providing both foreign and domestic commercial telephone switching systems.

## DIAGNOSTIC PROGRAMMERS

Will participate in the development of maintenance software for large scale computer controlled electronic switching systems. Experience should include familiarity with fault detection and fault isolation programs relating to voice and data switching in both on-line and off-line operating environments.

## SENIOR SYSTEM ANALYSTS

Will be responsible for acquisition of new business opportunities, support proposals and contribute on definition of initial system concepts and design. Heavy experience required with large real-time systems, hardware/software tradeoffs for military or commercial systems including data communications, signal processing, circuit and message switching and real-time applications.

## MESSAGE SWITCHING/CIRCUIT SWITCHING SOFTWARE ENGINEERS

Will specify, develop and test computer programs for a large scale computer controlled communications message and circuit switching system. Must be familiar with development of software system requirements and preparation of military specifications.

BS/MS in Computer Science, EE, or Math with at least 3 years related experience is required for all positions described.

Please forward your resume outlining SALARY HISTORY to Fred D. Brown, GTE Sylvania, Eastern Division, 77 "A" Street, Needham, MA. 02194

**GTE SYLVANIA**  
INCORPORATED

An Equal Opportunity Employer M/F

# news in perspective

to supply the 7.740. New offerings in the first quarter of 1976 will be the 7.760 (370/155 range) and 7.770 (IBM 370/165). Beyond that will be a new line, which Sorg insists will be compatible with future IBM offerings.

Being twice burned—as an RCA licensee and Unidata partner—Siemens is reported by other sources to be leery of other entangling alliances. Univac, most often mentioned, is reported to be willing to discuss minority interest in a computer partnership within Europe. There is room in the Univac line for some of the Siemens/Unidata equipment, especially in the 7.740 and 7.750 range, and Univac could initially solve Siemens' need for big computers with which to upgrade its customers.

## Plans in France

As the CII-Honeywell Bull merger approached finalization late last month, a source close to CII said the merged companies would continue to market the Unidata models 7.720, 7.730 and 7.740 in France as well as the full Honeywell line. Honeywell's small business systems, level 61 and 62, will be marketed side by side with the 7.720. Although Philips, which developed and manufactured the 7.720, has said it will no longer manufacture this equipment after existing orders are filled, this source claims that CII-HB will "keep this product in the line and who will make it has been solved."

The level 64, a Honeywell Bull development for Honeywell Information Systems, "will be dedicated to upgrading HB users," the source said. "The new customer prospects will be pitched to buy the 7.730, 7.740 and IRIS 50." Presumably the source was referring to the IBM customer as the predominant new prospect, since the 7000 line is IBM-compatible. The source had no information on how CII-HB would obtain the 7.730, since that was a Siemens development.

## The 66 an upgrade

The Honeywell level 66 system would be "dedicated to go to new accounts within the private sector," as well as being provided as an upgrade to existing Honeywell system users. The IRIS 55 and 80 will be offered to the government and government-controlled companies.

This source claims that this market plan is more logical than would be thought by those who feel the Honeywell line should supplant all CII products. He claims that the CII operating system IRIS-8 is used by more firms in France than HIS's GCOS. He noted that 125 of the CII IRIS 80s are installed or on order in France, about equal to the 126 Honeywell level 66s and 6000s in

or on order there. He claimed that the library of application software for the CII line is "more European-oriented" than Honeywell's. ("To get a change made to their software, you must call Wellesley.") Then he reemphasized that the IBM-compatibility of the 7000 line gives the new combine a great chance to crack the IBM market. In France, "Honeywell is living on old accounts."

HB could not verify this plan before the merger was finalized, but its existence indicated some important questions and problems faced by this new

combine. The first is the anti-American bias. Despite the majority French ownership of the new combine, the French feel that the strings will be pulled from the U.S. "We don't want to be sold to the Americans," said a sign at the Communist party demonstration at the recent SICOB business exhibition in Paris. As has been their tradition, they were calling for nationalization of HB and now, CII-HB. It is also evident that the CII and HB employees are not yet unified in spirit, especially since many at CII came from Honeywell.

The economic reality is that somehow the two firms will have to eliminate redundant facilities and people. Honeywell itself has already suffered from that

## Like a key, Ruscard opens doors. That's where the similarity ends.

**Security access control starts in the parking lot.**

The RUSCARD "key" activates parking gates, elevators, doors and entrances of all types. It controls who goes where and when from the moment the employee enters the parking lot. Park-O-Matic is another division of Rusco, manufacturing a complete line of automated parking gates, controls and equipment.

**Ruscard doubles as a photo ID badge.**

The same size and shape as a standard plastic credit card, the cryptically-encoded RUSCARD "key" can be printed and embossed on both sides. It is compatible with Polaroid<sup>TM</sup> and other ID systems.

**It controls access for 1 to 20,000 cardholders, 1 to 100 entrances and elevators, as well!**

Keys can easily be duplicated by anyone. The RUSCARD "key" defies duplication. A lost key compromises your entire security system. Then you have to change locks and reissue keys. With the RUSCARD "key" you "rule out" the lost card instantly and it will never open anything again. The RUSCARD system permits positive elevator control, restricting use by authorized personnel as to floor, day and hour of access.

**Ruscard systems provide data collection capabilities.**

In addition to recording personnel movement the RUSCARD system provides multi-purpose information for use in attendance recording, time-keeping, automated payroll, job cost accounting and more.

**You won't blow a fuse when you hear the price.**

Cost is low, just pennies a day! The RUSCO specialist in your area will provide a no-obligation survey of your security needs along with a free RUSCARD Security Guide.

Write Mr. B. Martin, Rusco Electronic Systems, P.O. Box 5005, Glendale, Ca. 91201. Or call toll free: (800) 423-2557. In California call direct or collect: (213) 240-2540. Telex: 696318. Sales and service worldwide.

**RUSCO ELECTRONIC SYSTEMS**

Division of Rusco Industries, Inc., a listed company on the American Stock Exchange

CIRCLE 76 ON READER CARD

# news in perspective

problem for years, despite the fact that it purchased GE computer operations outright. Considering the high emotion surrounding the CII-HB merger, the problem will be compounded. The Communist demonstration at SICOV was quite amicable, but the threat of nationalization can be real if the blending isn't handled right. One of the demonstrators, asked how CII-HB can be profitable or even survive if it must carry duplicate facilities or personnel, replied, "We are talking about people, not machines. If people are out of work, who cares?"

—Angeline Pantages

## Privacy

### Law Would Cover "Secondary" Users

A new privacy protection bill, covering police department and similar data banks, has been drafted by a House Judiciary subcommittee. In late November it was expected the bill would be voted up to the full committee. One novel feature is a section devoted to "secondary use." It directly restrains what can be done by organizations and individuals

with dossier data they obtain from law enforcement agencies.

Private as well as public secondary users are covered. Previous bills, by comparison, attempted to control secondary use only indirectly—for example, by limiting access to data bank files.

The House bill also imposes a number of new record keeping requirements on suppliers and users of dossier data. It gives the states extensive control over the operation of criminal justice information systems, and restricts the federal role.

One provision says the Justice Dept. cannot require the states to support such systems on dedicated computer or telecommunication facilities. This language responds to a tidal wave of criticism from the states which has engulfed even the White House. The states contend that shared facilities can provide adequate security at far less cost.

(The Justice Dept. already is backing away from its insistence on dedicated systems. Under a regulation issued last summer, each state was supposed to submit a privacy protection plan by the end of this year covering its criminal justice records. The plan had to include a dedicated computer to massage the

dossiers. This month, the Justice Dept. held the first of a series of hearings on a proposed revision of last summer's pronouncement, which would allow use of shared computers. The revision establishes a new deadline—next spring—for submission of the plans, and allows each state to determine, largely on its own, how to keep the records secure.)

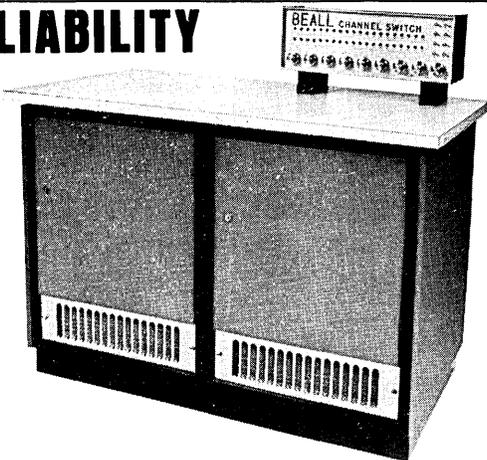
### Additional records

The other key provisions of the new House bill (which had not yet been given a number):

—A criminal justice agency obtaining arrest record information from another such agency would have to keep track of who asked for it, what data was obtained, why it was requested, and how the information was used. These "request records" would have to be kept for three years. A similar audit trail would have to be maintained on dossier data "accessed by patrol units (from) automated systems."

—Criminal justice agencies using automated systems to exchange any kind of sensitive information on individuals accused or convicted of breaking the law would have to sign detailed, written exchange agreements. The type of information traded, and the individuals having direct access to the files, are among the items that would have to be spelled out. A non-governmental agency granted access to criminal justice information

## RELIABILITY



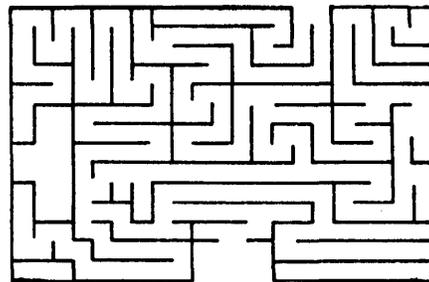
A switching system is the Aorta of your data processing facility. It must be inherently reliable and quickly repairable. Our 4 x 8 channel switch contains only eleven circuit boards.. A leading competitor uses several hundred boards to achieve the 4 x 8 function.

**The most reliable component is the component which isn't there.**

**JOHN BEALL & CO., INC.**  
447 Gorge Road  
Cliffside Park, N.J. 07010  
201 945-1188

GET 40% MORE WORK  
FROM YOUR COMPUTER NOW

WITH OUR  
JOB MIX OPTIMIZER  
AND  
DYNAMIC PARTITION BALANCER



LABYRINTH SYSTEMS LTD  
2 PENN PLAZA  
NEW YORK NY 10001  
(212) 594-7791

would have to sign a similar pact.

—With a few exceptions, dossier data could not be disseminated automatically for “noncriminal justice purposes.” A state or federal statute or executive order would have to be adopted first. And in each case, the authorized “requestor . . . has the obligation to put individuals who may be the subjects of such records on notice that such information may be requested.” This is one of the direct controls imposed by the bill on secondary users. The other is a section prohibiting such users from disseminating criminal justice information—directly or through intermediaries—or employing it illegally in any other way.

### Putting justice in its place

—The bill says the Justice Dept. cannot “own, operate, manage, or control the telecommunications services and facilities necessary” for exchange of law enforcement information between the feds and the states. This is a reference to a protracted battle between the FBI and the states over control of the National Law Enforcement Telecommunications system (NLETS), a low-speed data network operated by the states. The FBI wants to take over the system and upgrade it. The states, fearing federal domination, oppose the takeover. The dispute was recently referred to President Ford for a decision. Presumably, the language in the House bill is aimed even more at him than at the Justice Dept. There is a similar restriction in S2008, a related privacy protection bill now pending in the Senate.

### CCH downgraded

—Another provision in the House bill reduces federal control over state/local criminal justice information systems by allowing the FBI to keep detailed records in its Computerized Criminal History (CCH) file only on persons charged with federal crimes. Now, CCH encompasses records on single-state offenders as well. (It also includes an index to the criminal history records held by some states. The House bill would allow the index to be retained.)

—Notable by its absence from the House bill is any mention of a federal commission to regulate state and local law enforcement data banks. This commission is a major feature of the Senate bill.

—The House legislation imposes a one-year prison term, a \$10,000 fine, or both on any “present or former officer or employee of an agency subject to this act” who violates it. But these penalties are imposed only on an officer or employee who “knowingly” makes an illegal disclosure of information. Establishing such intent is generally pretty difficult.

There are also civil penalties, which include fines and award of a plaintiff’s

court and legal fees. But “good faith reliance on the provisions of this act . . . shall constitute a complete defense” against most of these penalties.

—P.H.

## Mainframers

### Soft Lights and Music

What must certainly be one of the most sophisticated benchmarking facilities anywhere in the world was dedicated last fall by Sperry Univac at its Eagan (St. Paul, Minn.) facility. No other manufacturer is known to have a



system as comprehensive as the Sperry Univac BMD-1100 system, which uses hundreds of miniaturized electronic probes (potentiometers) mounted in assortment of Univac mainframes and peripherals to monitor system activity. In addition to the system’s obvious importance to current Univac users considering expanding or upgrading their systems, more than 100 specialists familiar with the workings of IBM, Burroughs, Honeywell, and other systems can modify job streams taken from these systems for comparison runs on Univac equipment.

At the heart of the benchmark facility, built entirely in-house by Univac after looking at what was available from other vendors, is a Univac 1616 mini from its federal systems division. Users can ask the console operator for specific graphs of system activity, which are shown on a seven-color crt display, and then change requests dynamically (as the run is in progress) to get answers to such questions as “what is the percentage of cpu activity; how busy are the channels when the cpu is busy; etc.” Within minutes, system configurations can be modified to show the effects of more (or less) memory, an additional channel, or whether a second processor would benefit a system more than addi-

tional memory or channel. Runs are recorded for “instant replay” and subsequent analysis. Collected data can be displayed over time periods ranging from two minutes to more than two hours. Perhaps not of as much use (but sexy and impressive all the same) are lights hidden in the system diagram boxes on the display screen shown at the front of the room. Every time a device is accessed, the lights reflect this activity, giving impressive evidence of system activity.

Univac intends to use the new benchmarking facility to woo potential customers for its 1100 systems from the ranks of IBM, Burroughs, and Honeywell small- and medium- scale users. The benchmarking system is “free” for prospects who would consider converting to a Univac system if it could be shown that the price/performance gains to be realized would be worth it in the customers’ eyes. Univac, while noting that “it hasn’t won every benchmark,” claims reception to the service has been excellent, and that at any given time, anywhere from 10 to 30 benchmark projects were being handled, many from non-Univac sites. Univac declines to divulge how much was spent on developing the benchmarking equipment, or how much it spends to operate it.

—Michael W. Cashman

**Think of what just one company can do to stop pollution. We have.**



**People start pollution. People can stop it.**

-----  
Please send me a free copy of your guide.

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_



**Keep America Beautiful**  
99 Park Avenue New York 10016

-----

## News in Perspective **BENCHMARKS . . .**

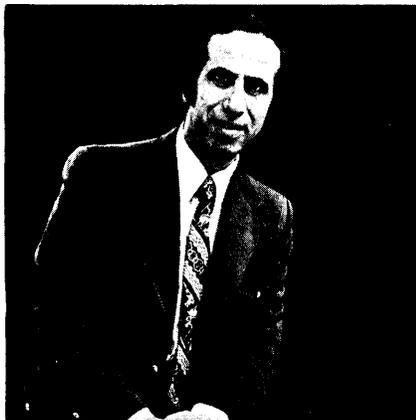
**Room at the Top:** Joseph Flavin has departed Xerox Corp. to become top man at Singer Co. replacing Donald P. Kircher, 60, who has been on a leave of absence since mid-September and who, the company said, is resigning for health reasons. Flavin was the third ranking executive at Xerox as executive vice president and president of international operations. He gave as one of his reasons for taking the Singer job: "Very few opportunities ever come to run your very own show." He told a press conference his mandate from the Singer board was "we'll support you in anything reasonable you want to do." He said he hasn't made any decisions on the fate of the business machines division, said to be for sale, but said he feels Singer's basic business, which he defined as sewing machines, is "a very sound business." Flavin said "I've spent my life with two top companies, Xerox and IBM . . . Singer's the same kind of place." Now he's at the top of one of the top.

**"Call to the Colors":** Walter Bauer, president of Informatics, Inc., characterized his keynote speech to the 43rd Management Conference of the Association of Data Processing Service Organizations (ADAPSO) as a "call to the colors." He was calling for relief from "the IBM threat." He warned the group of service bureau and software company representatives that the agreement between IBM and Control Data Corp. which keeps IBM out of the services field for six years, will be over by January 1978 and "We need IBM in data services like Custer needed Indians." He cautioned against looking for too much help outside of the computer industry, noting that "8.9% of the trust portfolio of Chase Manhattan Bank is in IBM stock." Bauer feels the Computer Industry Assn. (CIA) "may be the only effective force operating today to achieve competition in the data processing industry." He doesn't want IBM broken up "into parts" and believes IBM is going to suggest this and probably has a plan for it." And, he said, "we don't need a CAB (Civil Aeronautics Board) for data processing. What we need is a carefully considered, long term consent decree which probably would be good for 10 years. The 1956 decree really did help."

**Narrowing the Lines:** Capital-limited California Computer Products has halted development of a 6250 bpi tape drive. CalComp president, Lester Kilpatrick, told stockholders that "Operating in a positive cash flow mode must take precedence over revenue and prod-

uct growth . . . CalComp has narrowed its product lines to the memory and graphic areas where our strength is the greatest." He said CalComp will continue manufacturing its 1040 and IBM 3420-type drive, and has no plans to cut back on its Automated Tape Library which can use tape drives of various manufacturers. But no new tape drive products are planned.

**"A Focus on Future Products":** Jesse I. Aweida, a co-founder and president and chief executive officer of Storage Technology, Inc. since its inception in 1969, has dropped the job of president to "focus on future products and planning." He will continue as chief executive. New president of the Louisville, Col., mag tape and disc storage systems manufacturer is Victor A. Casebolt who joined STC from General Electric where he had been general manager of utility



JESSE I. AWEIDA

and process automation and instrumentation. The presidential shift was a part of a major reorganization of STC's top management. Executive vice-presidents Eugene E. Prince and James K. Dutton have left for positions with other firms. John J. Mehalchin, treasurer, said Prince was in line for the presidency but "it didn't work out."

**Digital Computer Will Appeal:** A Delaware chancery court found that Digital Computer Controls Inc.'s D-116 is "substantially identical" to Data General's Nova 1200 and based on the improper use of Data General design drawings. The court said it would issue a permanent injunction barring Digital Computer from using logic designs of either the Nova 1200 or the D-116 to make computers identical to the Nova 1200. Digital Computer will appeal. The Fairfield, N. J. firm said it expects to be able to continue to make "its full product line," including the D-116 minicomputer that was at issue in the trade secrets lawsuit brought by Data General. It said too that if any damages are awarded to Data General it is expected

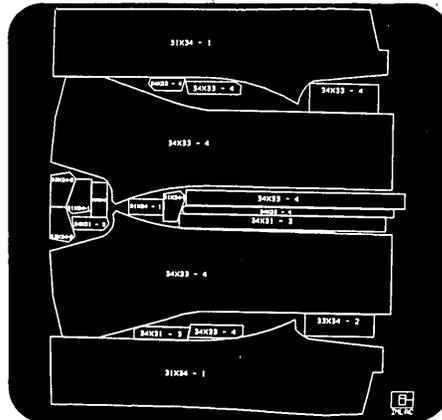
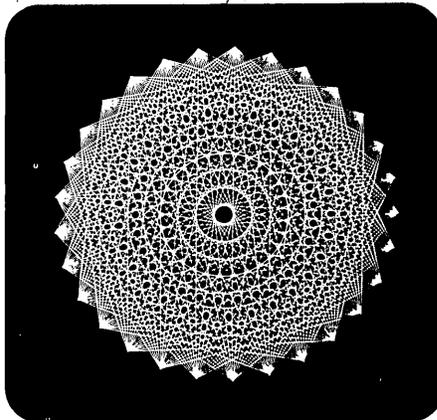
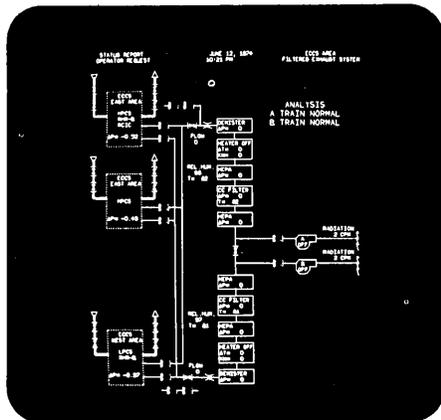
they will not exceed \$100,000. The issue of damages is to be taken up in a separate trial. Digital Computer's appeal will be to a Delaware supreme court.

**Last to Go:** Data processing staff people are among the last to be fired during a recession, said a New York City executive search firm. The Josten-Wolf Group said a survey it completed showed that while six out of ten U. S. companies were forced to cut payrolls since June 1974, fewer than four out of ten reduced the number of information systems personnel. In fact, said John Davis, a senior partner in the firm, more than one out of three companies increased the size of their information systems staffs in the same time period. Top management, Davis explained, "is increasingly dependent on the information systems for both daily operating and long-range planning data. This need to know makes companies more reluctant to cut data processing staffs than staffs in other areas of the company."

**Second Cyber 170 Down Under:** Control Data Corp. shipped its second Cyber 170 machine, a model 173, to the South Australian Institute of Technology where it will serve as the central computing facility for seven colleges. The first 170 machine shipped, a model 172, went to the National Institute of Agrarian Research in Madrid, Spain, in July. At the South Australian Institute of Technology, the Cyber 173 will be the central processing unit for SAENET, an educational network established by the South Australian Colleges for Advanced Education. Seven remote data entry stations and more than 100 terminals will be included in the initial network to serve some 14,000 students in the participating colleges.

**Wider Career Paths:** Opportunities for senior data processing managers to move into general management positions are increasing, says the Diebold Research Program, based on a survey it conducted among some 200 industrial, service and financial corporations. Joseph Ferreira, director of the research program, said that although only 25% of the data processing managers questioned said that their predecessors had been promoted outside the dp division or moved laterally into the mainstream of general corporate management, more than 40% now see valid opportunities for their own promotion outside data processing. Very few of the chief executive officers questioned, said Ferreira, saw any reasons why senior data processing executives should not be promoted to very senior corporate positions. \*

# There's no substitute for intelligence...



## especially when it comes with a Display-oriented FORTRAN IV package

Because the IMLAC PDS-4 is an intelligent computer graphics system, it has always been easy to interact with. Now, it's easier than ever thanks to our specially designed FORTRAN Graphics Package. Designed to support the display as well as the minicomputer, it provides capabilities which let you use the Keyboard and Display as logical FORTRAN devices. The compiler recognizes display variables which allow easy manipulation of display information by use of normal FORTRAN commands. And, with significant enhancement of display support, it still provides extended ANSI FORTRAN IV capabilities. To facilitate mathematical computation and complement FORTRAN, we offer a hardware Floating Point Arithmetic Module with 16, 32-bit floating point registers.

**FLEXIBLE SYSTEM CONFIGURATION** is assured with the PDS-4 because it offers a full line of digital peripherals including: Removable Dual Pack Disc for as much storage as you require, Manual Image Control for image magnification/demagnification by factor of 2 plus control

of X and Y position, Optional 21" Display (illustrated), Hard Copy Device, Read-Write Cassette, Direct Memory Access Channel, Paper Tape Reader/Punch and many others. The PDS-4 system operates on a Stand-alone basis or with any computer that supports remote terminal operation.

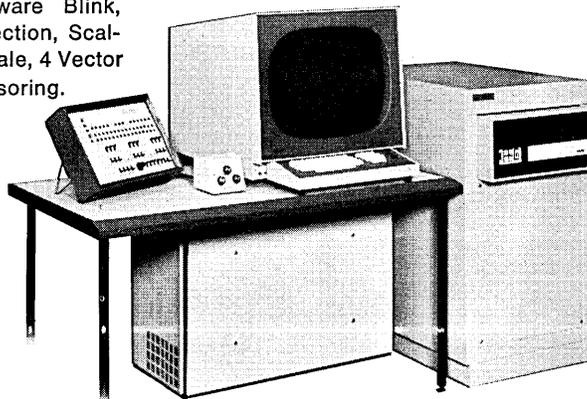
**INTERACTIVE DEVICES** include Light Pen, Data Tablet, Joystick, Trackball, Mouse and Keyset plus separate Function Keyboards with lighted or unlighted keys.

**POWERFUL GRAPHICS CAPABILITY** means that you can display more than 3,000 flicker-free characters (refreshed at 40 fps) or draw up to 2,400 inches of vector with 1024 x 1024 resolution (21" screen). Fast Data Plotting provides Auto-incrementing in either X or Y direction. Standard features include: Hardware Blink, Character Rotation/Reflection, Scaling, 16 Levels of Gray Scale, 4 Vector Drawing Modes and Scissoring.

**EXTENSIVE SOFTWARE SUPPORT** includes: FORTRAN IV Compiler, Macro Assembler, Disc Operating System, Interactive Display-oriented Debugger, Text Editor, Intelligent Terminal Graphics Control Program, Host Computer FORTRAN Callable Subroutines, etc.

We'd be happy to tell you about the creative and productive uses to which hundreds of IMLAC users are putting this interactive system.

*For complete information contact any IMLAC Sales Office or call or write: IMLAC CORPORATION, 150 A Street, Needham, Massachusetts 02194 (Tel: (617) 449-4600).*



**INTERACTIVE INTELLIGENCE**

BOSTON (617) 449-4600 WASHINGTON, D.C. (301) 277-6127 ORLANDO (305) 894-7531 CHICAGO (312) 654-1208 DAYTON (513) 254-0992 LOS ANGELES (213) 990-4244 SAN FRANCISCO (408) 245-9291 LONDON, ENGLAND (01) 903-7362

# LOOK AHEAD

(Continued from page 18)

## A LETTER TO THE MAYOR

The city of Seattle, Wash., spent almost a year evaluating facilities management (FM) as an approach to its data processing requirements. The city decided it was a good approach, one that could save it \$3.5 million over five years. It issued an RFP and was about to award a contract when a letter to the mayor put them right back where they'd started a year earlier. The letter was from a representative of one of the two contenders for the FM contract, Boeing Computer Services. The other, the contender the city favored, was Computer Sciences Corp. The BCS letter charged that the city had leaked information on its bid to CSC. John Elliot, assistant budget director for management information systems for the city, said he doesn't believe there was any kind of leak. "But there was an appearance of something wrong." So the city council threw out both bids before the report on the FM evaluation was even complete. The council now is doing what it did a year ago, considering three alternatives: re-bidding for an FM contract, continuing with a city-managed operation, or going to a jointly-managed facility with King county. The original FM request was drawn up predicated on a sharing with the county which has excess capacity in the form of a 370/155 it now wants to sell. It will put this machine up to bid Dec. 15. The mayor of Seattle still wants FM and has asked the council to approve a 1976 budget which would cover four months of continuing in-house operation, then takeover by an FM contractor. It's in the hands of the council now.

## PLANNING WITH BASIC

Many of the 200 financial analysts who answered an ad for a position in the corporate planning office of Four Phase Systems, Inc. complained that the company's requirement in the ad for "BASIC programming competence and experience is using a computer" was ridiculous and unnecessary. Nevertheless, the ad which ran in mid-November editions of the Wall Street Journal and the San Francisco Chronicle turned up about 20 persons with computer capability, says the Cupertino, Calif., company's manager of corporate planning and control, Joe Riley.

The practice may not yet be widespread, but Riley thinks it makes sense to merge financial analysis with programming. In computer-assisted financial analysis there are mechanical parts (programming) and judgment parts, Riley explains, and the programmer understands only the mechanical part. Four Phase, which now uses service bureaus, soon will begin using its own in-house computer, a Four Phase model 470.

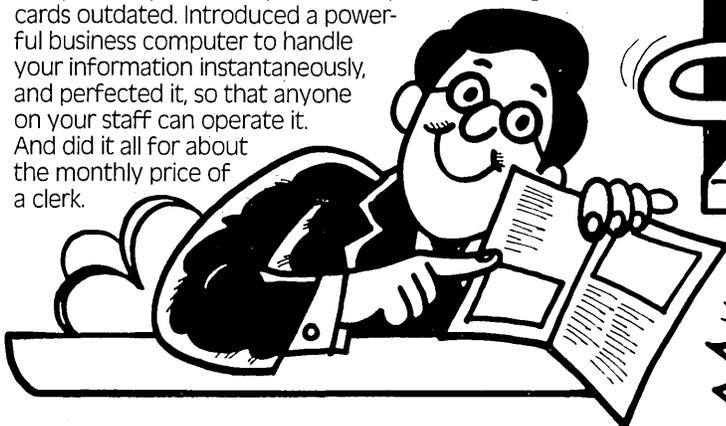
## RUMORS AND RAW RANDOM DATA

AFIPS would like to have more women on the National Computer Conference program next June in New York as speakers, panelists and referees of papers. The association issued a press release last month and also wrote to 800 women members of the Association for Computing Machinery. The coordinator, Anita Cochran of Bell Labs, says the response has been "excellent"...Security Pacific National Bank, with some 500 branches throughout California, is talking to management of major California supermarket chains and is expected to announce plans soon for installation of remote terminals in one or more chains...A Wall Street Journal report on the many consumer objections to electronic funds transfer (EFT) noted an interesting twist in the Pillsbury Co. which has 1,500 of its employees eligible for direct payroll deposit. The story quotes a computer shift manager for Pillsbury as fearing that computer errors could tangle his financial affairs. Although a third of the eligible Pillsbury employees have accepted direct deposit, only two of the 35 members of this man's department have gone along.

# It pays to know all about business computers.

## A new idea in computers.

Basic/Four pioneered in redefining the computer. Trimmed off the fat to make it profitable for the businessman running a half to 20 million dollar business. Got rid of the room-sized hardware. Eliminated your need for in-house computer experts and systems analysts. Made ledger and tab cards outdated. Introduced a powerful business computer to handle your information instantaneously, and perfected it, so that anyone on your staff can operate it. And did it all for about the monthly price of a clerk.



## Accounting is just the beginning.

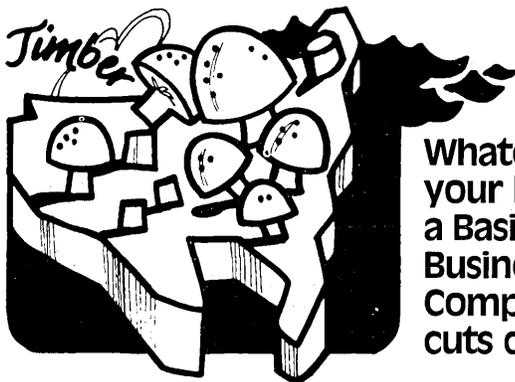
However you're doing it now—accounting machines, service bureaus, or simply by hand—the Basic/Four way can be faster and less expensive.



All that bookkeeping paperwork—order entry, invoicing, inventory control, purchase order processing, general ledger, payroll and sales analysis—is now child's play. In production, there's no limit to what a Basic/Four business computer can do. Job costing, labor distribution, bill of material, requirements planning, shop scheduling, forecasting, master shipping schedules, etc.

And the list of special applications is as all-encompassing as the metropolitan yellow pages. Property management. Insurance agency, appropriation, royalty, route and municipal accounting. And travel packaging, moving and storage and construction.

There's more to the story. Write for the complete facts about the Basic/Four business computer.



**Whatever your business a Basic/Four® Business Computer cuts cost.**

Over 2,000 of our business computers are now cutting costs for companies all over the world. In manufacturing, distribution, services, schools, retail and the government. In banking, trucking, insurance and publishing. And just about every other small to medium-sized business you can think of. Even some you can't.

Basic/Four Corporation, Dept. MSD-12  
18552 MacArthur Boulevard  
Irvine, Calif. 92707

Please send me your easy-to-read, fact-filled free color brochure on the Basic/Four Business Computer.

NAME \_\_\_\_\_

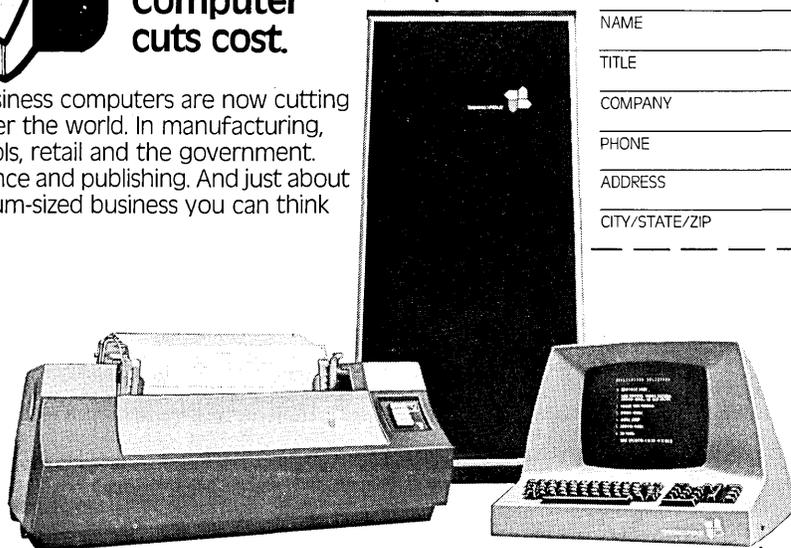
TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

PHONE \_\_\_\_\_

ADDRESS \_\_\_\_\_

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



**basic / four corporation**

A Subsidiary of Management Assistance Inc. (MAI)

SEATTLE • SAN FRANCISCO • SANTA BARBARA • LOS ANGELES • ORANGE CO • SAN DIEGO • PHOENIX • MINN/ST. PAUL • MILWAUKEE • ST. LOUIS • DALLAS/FT. WORTH • HOUSTON • CHICAGO • GRAND RAPIDS • INDIANAPOLIS • CLEVELAND • DAYTON • CINCINNATI • LOUISVILLE  
NEW ORLEANS • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • SPRINGFIELD, N.J. • BALTIMORE • WASHINGTON • PHILADELPHIA • ATLANTA • MIAMI • VANCOUVER • TORONTO • MONTREAL • OTTAWA • MEXICO CITY • PARIS • LONDON • BRUSSELS • BERLIN • FRANKFURT • HAMBURG  
STUTTGART • DUSSELDORF • MUNICH • ZURICH • AMSTERDAM • VIENNA • STOCKHOLM • COPENHAGEN • OSLO • HELSINKI • MADRID • SAN JUAN • GUATEMALA CITY • SAN SALVADOR • MANAGUA • COSTA RICA • PANAMA • CARACAS • SANTIAGO • MANILA

# Key enter OCR and MICR rejects while scanning...



## as simply as this!

No document to study. No field to search. As the 4400 System scanner encounters a document with a non-machine readable character, the video image of that character, and *only* that character is displayed at the CRT/keystation. The operator merely keys whatever character(s) is displayed, instantly correcting and releasing the record as the document passes through the scanner. This Video Correct mode of operation prevents all but a few documents from being rejected and eliminates the costly re-entry procedures that have long plagued OCR and particularly MICR processing operations.

Additional 4400 KeyScan® System advantages:

- Key Correct—simple key entry of

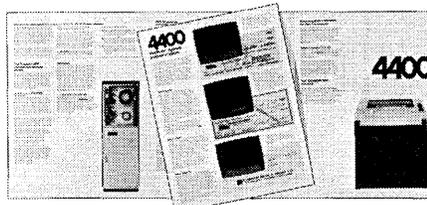
data from rejected documents. Just as in Video Correct, there's never a need to key scanned data. Key Correct only those characters depicted by question mark and cursor.

- MICR/OCR compare feature—dual read system for cross-check scanning of MICR documents reduces rejects and

eliminates mis-reads and substitutions.

- SKIL—comprehensive Scan Key Input Language for any keying and scanning application. An RPG II compiler is available for report generation and specialized applications.

Let us show you how the 4400 System has solved reject re-entry problems for banks, insurance, retail, manufacturing, and utility companies. Our new literature describes how the Cummins KeyScan System with its powerful 4400 Processor has the hardware, software, and systems flexibility to meet your data entry needs off-line at the lowest possible cost. Send for it today! Write: Cummins-Allison Corp., 800 Waukegan Road, Glenview, IL 60025.

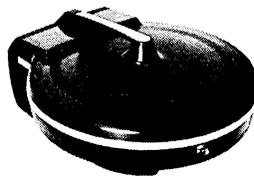


Send for our new literature today!

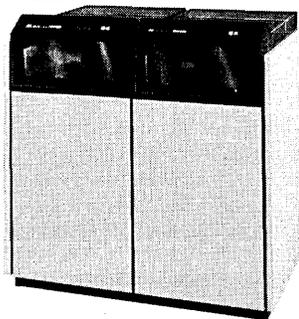
**CA CUMMINS**  
CUMMINS-ALLISON CORP.

# ASK CONTROL DATA for a competitive alternative to the IBM 3340/3344/3350.

# WE HAVE IT.



(In our new family of data module drives.)



Want proof that Control Data is the industry leader in disk technology? Check the record! As a leading OEM supplier of Disk Drive products, CDC was:

- First with a 58-Megabyte disk drive.
- First with double logical volume—as far back as 1971!
- First with a 200-Megabyte disk drive.
- First with in-line heads.
- First with a 300-Megabyte disk drive.
- First with a Storage Module disk drive.

CDC uses glass-base in-line heads for extra reliability. And does its own tests on IBM equipment before shipping.

Control Data has been around a long time. It's going to be around for a long time to come. So get CDC Disk Drive Subsystems for the most advanced technology and service — at a reasonable price.

For further information, call your local CDC sales office, or the CDC Hotline collect (612) 853-7600, or send the coupon.

T. E. Phillips, V. P. Sales, Peripheral Products Company  
Control Data Corporation, Dept. D-125  
Box 1980, Airport Station  
Minneapolis, MN 55111

Name

Phone

Title

Company

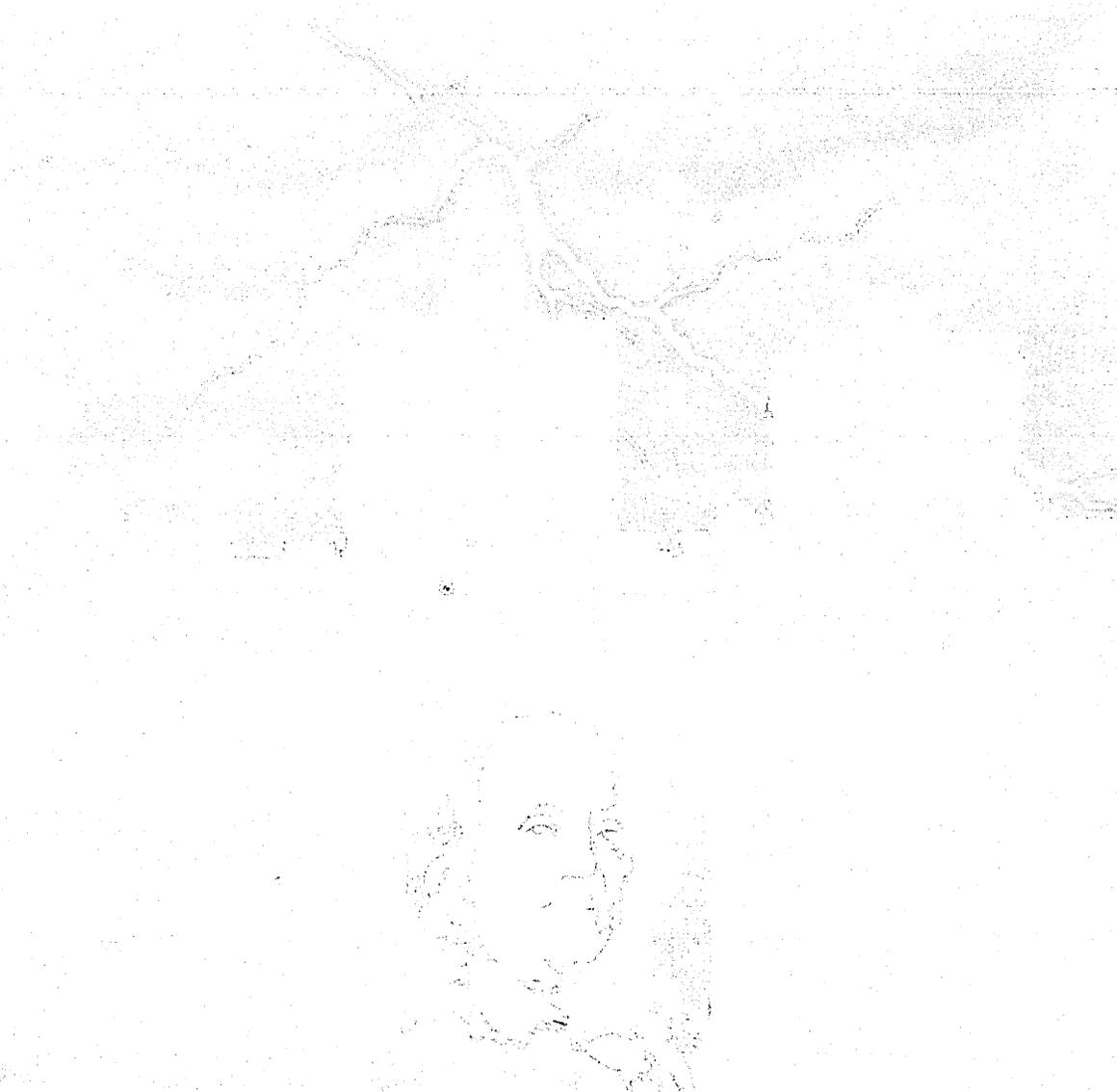
Street Address

City

State

Zip

**GD** CONTROL DATA  
CORPORATION



## Being lightning rod can't protect your computer from power outage shutdowns...but we can.

Thunderstorms can create frequent power interruptions that last for a few seconds...but a resulting computer shutdown of many hours. Before processing work is completed, you're always at the risk of another "hit".

Remember that the power break your firm loses profit opportunities. Information that is lost is a costly error in critical companies or government. A telephone department, a bank, a computer center, plus the cost of repair and possible equipment damage, can make the whole scenario very expensive.

Eliminate power out disturbances with an Uninterruptible Power System (UPS) from International Power Machines Corporation.

Choose from over 100 UPS systems throughout the world protecting virtually every line and size of computer. You can probably learn how our customers benefit from UPS in all areas.

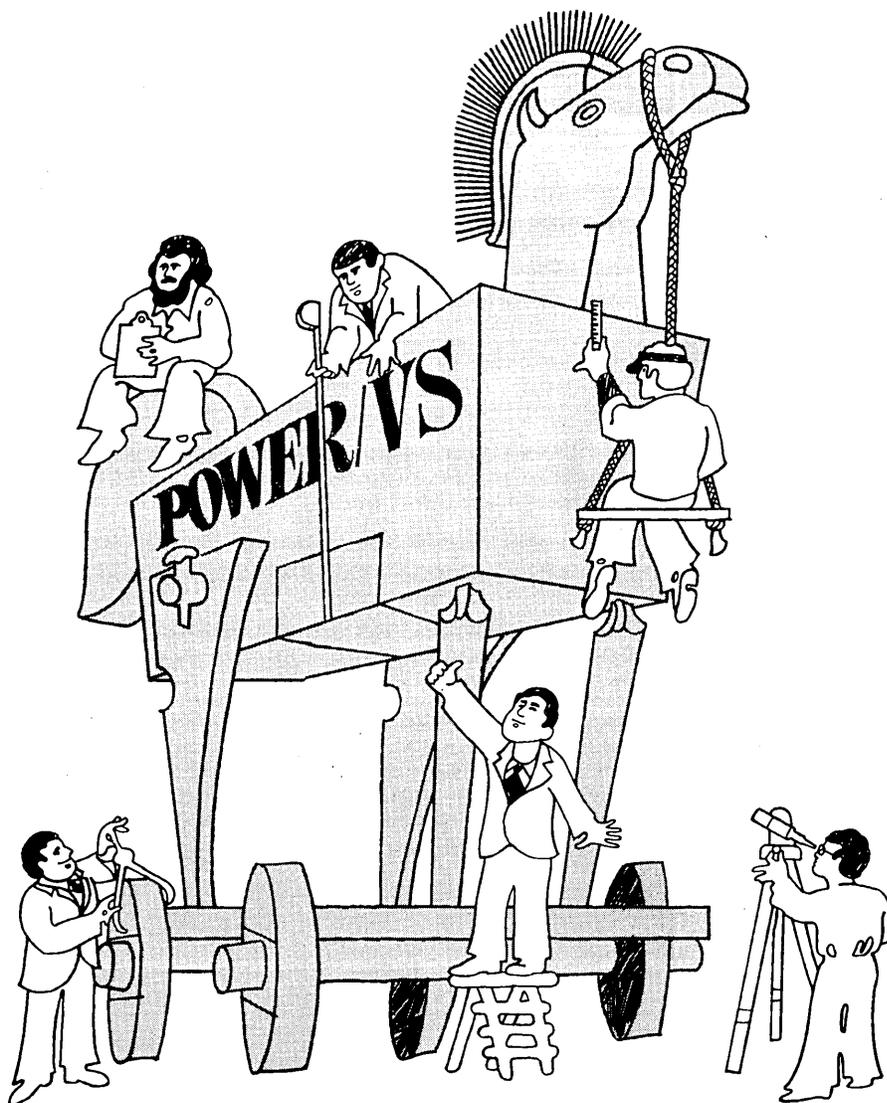
Uninterruptible Power System (UPS) technology has greatly reduced UPS costs.

Visit today for the best line of Uninterruptible Power System Management. Give us a call today. (714) 777-7777.



INTERNATIONAL POWER MACHINES CORPORATION  
20002 AMAR ROAD, SUITE 200, AMAR, TEXAS 79121  
3328 Executive Blvd. • P.O. Box 724 • Mesquite, Texas 75149  
214/288-7501 • Telex: 73-0992

# Users take the measure of this gift horse.



See how much "free" software is actually costing you.

We've been telling people for months that using GRASPVS results in an average of 27% faster CPU throughput than POWER/VS.

That GRASPVS provides meaningful job accounting using only a fraction of the CPU overhead required by POWER/VS.

And that the GRASPVS Dispatching Monitor gets the completed report finished faster.

Since then, a lot of GRASPVS users have conducted their own evaluations, and now they're telling us.

They're telling us that our benchmarks are considerably more than fair.

That our numbers are a little too conservative.

And that they're finding other benefits of using GRASPVS instead of POWER/VS we didn't even mention. Such as 200% faster spooling. Dynamic device allocation. Remote terminal support. Faster job-to-job transition. And easier, smoother operation.

Take the measure for yourself. You'll soon discover there are even more good reasons for using GRASPVS instead of the DOS/VS system software package that's supposedly "free."

**SDI** Creators of EPAT, GRASP, FMAINT & GRASPVS  
880 Mitten Road  
Burlingame, CA 94010.

In Europe, contact SDI, 24A Chemin Edouard-Sarasin, 1218 Grand-Sacconex, Geneva, Switzerland.

\_\_\_\_\_ Send me a copy of your Power/VS review.

\_\_\_\_\_ I want to make my own evaluation at no cost. Call me.

Name \_\_\_\_\_

Title \_\_\_\_\_

Telephone \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

CPU Model \_\_\_\_\_

Memory Size \_\_\_\_\_ K.

# User Ratings of Software Packages

by Daniel J. Tanner

Are the vendor's claims accurate? Does the software product have hidden flaws? Is the documentation any good? Can I rely on the vendor for support? Here's what the users say about 211 common software products.

Systems packages lead applications packages in users' overall satisfaction; software budgets are climbing at a rate of 20% yearly; and documentation, technical support, and training are noteworthy weaknesses shared by a large proportion of software suppliers. These are some of the conclusions that can be drawn from the survey of software package users recently conducted by DATAMATION and Datapro Research Corp.\*

Presuming that the way to find out what users of proprietary software products think of those products was to ask them, data processing managers across the country were polled directly, and the compilation of their responses is presented here. The conclusions above were only some of the findings of the research. Another interesting one was that users generally rate software packages from independent vendors more highly than they rate packages from their equipment suppliers. And that means a great deal for the software industry.

There was a day, not very long ago, when the idea of purchasing software, especially from anyone but a mainframe vendor, was risky at best. There were hundreds of packages available, but the products and their vendors were unproven. For a while, software vendors seemed to be dying off as quickly as new ones were born to replace them. A potential buyer of software had to wonder whether the vendor would even be around next month to support the product. Technical support and documentation were often sketchy and in some cases nonexistent.

For all of these reasons, when a user did decide to go outside for a software package, he often selected software available from his mainframe manufacturer instead of better, more efficient, and lower-cost systems offered by the independents. At least the user had some level of assurance that the company would be around to honor the contract.

But those days are gone. The software business is, today, a legitimate and thriving one in its own right. Our survey clearly showed that computer users are increasing their expenditures for

proprietary software every year. Some of the more successful software houses have tripled or even quadrupled their sales in the past few years. Most predict that this trend will continue.

Meanwhile, users are becoming more and more aware of the economic and other advantages of obtaining proprietary software. The risk now is minimal, and is usually offset by a risk of equal proportions that confronts a company developing a system in-house. At least when a proprietary software package is purchased, the cost and (hopefully) the installation time are fixed. And that's certainly more than can be said for in-house development efforts.

The "not invented here" syndrome, which plagued the software industry for so long, is dying. Granted, it is not dying quickly or easily, but it is showing a progressively fainter heartbeat. Users are increasingly aware that the use of proprietary software, when compared to the cost and uncertainty of in-house development, has a legitimate place in almost every dp installation.

## Trends for the future

There are definite trends in the kinds of software that will be first accepted, too. Users of large and small systems alike, for example, are planning to install data bases and on-line capabilities. Additionally, the computer is increasingly trusted as a tool for financial planning and the all-important functions of accounting and reporting. And more and more often, users' plans call for placing crucial financial information in data bases and for providing on-line inquiry, retrieval, and update capabilities.

But nothing in these trends foretells doom for the "traditional" packages. Most of the ambitious plans belong to users who are already running successful installations and tend to be present users of the separately priced compil-

ers, librarians, utilities, sorts, etc. And thousands of other installations remain a fertile field for the marketers of these "everyday" software aids. Also, a high proportion of the survey respondents are still looking for such straightforward applications packages as accounts receivable, accounts payable, and payroll.

But just because the software industry as a whole has come into its own, it doesn't follow that every package is clean, cost-effective, well supported, or adaptable to every installation. Even packages from highly reputable vendors may be lacking in some respects.

Before putting his money on the line for separately priced software, a user deserves to know—and should demand to know—how that software is performing in other user installations. This article, containing directly comparable ratings by the users of 210 popular software packages, provides that kind of information.

## Why use proprietary software?

There are many reasons why a user may wish to obtain a proprietary software package. The main ones are:

- avoidance of an in-house effort,
- standardization,
- improvements in the speed or efficiency of program execution,
- improvements in the control, speed, or ease of system operation, and
- the resultant cost savings from any or all of the above.

Avoiding an in-house effort is often one of the best reasons for acquiring a package. But it may also be the most difficult one to rationalize within your own company. First, you have to convince management that the money and/or the time that will be spent for the package is less than the amount that would be required for in-house development. This is often difficult to prove, especially since time and cost estimates for system development nearly always tend to be overly optimistic.

Second, you must confront the fact that avoiding an in-house effort may mean avoiding the hiring of additional programmers, and, in a few cases, actually reducing the size of your existing

Detailed results of the survey described in this article are contained in "User Ratings of Proprietary Software," a 36-page *DATAPRO 70* report available for \$10.00 from Datapro, 1805 Underwood Boulevard, Delran, New Jersey 08075; (609) 764-0100.

programming staff. Needless to say, this isn't going to go over well with your programming staff. It's no wonder that programmers often refer to proprietary software as "out-house" efforts.

Then, after you've gotten over that hurdle, you must convince management and programmers alike not to be taken in by the "not invented here" syndrome. Many people still believe that nothing from outside can possibly be as good as something they develop themselves. And, in some cases, they may have half a point. General-purpose *systems* software can frequently be installed without any modification required to make it fit the installation. But this is usually not true in the case of *applications* software.

In the survey, 490 users of 70 applications packages responded to our question "Did the package require modification?" Only 16% replied "No," whereas 29% said "Yes, by the vendor," and 55% said "Yes, by the

user." In numerous cases, both vendor and users made modifications.

It should also be borne in mind by prospective users of proprietary *applications* packages that vendors often either cannot afford to support or modify packages installed outside of a small geographic region, or may even be vending packages with the explicit understanding that modifications are not a part of their standard deal.

Thus, the buyer of applications software (and often systems software, too) must keep in mind that frequently he will have to allocate some time, manpower, and other resources to the installation of a proprietary software package. This must be considered in making the decision of whether or not to buy.

Standardization is often a good reason for a user—especially a user with multiple computer systems at various sites—to purchase proprietary applications software. This can guarantee that a particular application, such as ac-

counts receivable, will be processed the same way regardless of location.

Additionally, standardization on one or more computer sites can be achieved through the use of proprietary systems or operations software, such as library systems, documentation aids, languages, shorthands, and some accounting and reporting systems. Proper standardization can improve communication among personnel and systems, enable data to be transferred among systems, and permit simplified, standardized maintenance of programs.

To make sense as a purchase, proprietary software used to improve the execution speed of a common application must save the user at least as many dollars worth of computer time as it costs to be worthwhile. Prime examples of packages designed to do this are sorts, utilities, data manipulators, report writers and generators, language optimizers, and data base management systems.

Some proprietary software packages

## How IBM Measures Up

The 103 software packages rated by six or more users are supplied by IBM and 48 other vendors, a few of whom are also equipment vendors. But 26 of the 103, or 25% of these most frequently rated packages, are provided by IBM. (Digital Equipment Corp. is next, with six packages in this group, followed by University Computing with four, Applied Data Research, Pansophic Systems, Programming Methods, and Westinghouse, each with three, and 13 companies with two each.)

Thus, for these 103 packages, it seemed appropriate to compare the overall Weighted Averages earned by IBM in each of the seven rating categories with those of the other suppliers. On the basis of 1,584 ratings for non-IBM packages and 801 ratings for IBM packages, the ratings are:

	Non-IBM	IBM
Overall satisfaction	3.4	3.1
Throughput/efficiency	3.2	2.9
Ease of installation	3.3	2.9
Ease of use	3.3	3.0
Documentation	3.0	2.9
Vendor technical support	3.0	2.8
Training	2.8	2.7

Even though the non-IBM group includes six computer vendors, the averages for IBM were lower in all of the eight categories.

But what do these differences of a few tenths really mean? It may be helpful to examine the percentages of "excellents," "goods," etc., in the Overall Satisfaction category to see:

	Non-IBM	IBM
Excellent	52%	30%
Good	39%	54%
Fair	7%	13%
Poor	2%	3%

Now we can see that more than half of the respondents rating non-IBM packages called their Overall Satisfaction (in our opinion, the most important rating category) "excellent," compared to only 30% of those rating the IBM packages. What's more, only 9% of the ratings on non-IBM packages were less than "good" in this category, compared to 16% of the ratings on IBM packages.

Ratings expressed in terms of weighted averages have a purpose, and that purpose is concise, convenient ranking. But different distributions of scores can yield the same weighted averages. Here are the response distributions by percentage for each of the other six rating categories on the 103 most widely used packages:

	Non-IBM	IBM
Throughput/Efficiency:		
Excellent	42%	20%
Good	44%	53%
Fair	11%	22%
Poor	3%	5%
Ease of Installation:		
Excellent	50%	28%
Good	36%	41%
Fair	11%	21%
Poor	3%	10%
Ease of Use:		
Excellent	47%	31%
Good	41%	47%
Fair	10%	17%
Poor	2%	5%

Documentation:		
Excellent	32%	26%
Good	43%	47%
Fair	20%	20%
Poor	5%	7%

Vendor Technical Support:		
Excellent	32%	28%
Good	43%	39%
Fair	18%	22%
Poor	7%	11%

Training:		
Excellent	21%	18%
Good	47%	42%
Fair	24%	28%
Poor	8%	12%

Those figures support much of what we said at the outset. The independent vendors as a group (with a few other mainframe makers thrown in) have packages that are rated more highly by users than does IBM, and software suppliers in general are relatively weak in Documentation, Technical Support, and Training. But even in these categories, the non-IBM suppliers lead IBM. Frankly, we found this surprising. After all, isn't IBM's size supposed to confer upon it a unique capability for customer support and training? And aren't IBM's documentation standards high, strict, and well-followed?

The difference seems to be that smaller vendors can—and must—be more responsive to user needs; it's the factor that's most likely to make or break them in the industry. Also, IBM has one problem that the others usually don't have: the need to keep up support for superseded but still widely installed packages (such as GIS and BOMP). \*

## USER RATINGS

are designed to speed or ease the way in which a system is operated. By their nature, they may also serve to standardize system operations. Additionally, there are packages designed to improve the control management has over computer operations. The various operating system enhancements, accounting packages, library systems, documenters, some reporters, and even some sorts and utilities fall into the group providing services in all of these areas.

Cost justification for many of these packages, like that for standardizing packages, can be difficult to assess. Often, a trial is the only way to judge. Can a shift be eliminated when the package is used? Are costly operator errors being reduced? Is the number of production job reruns going down? Are deadlines being met when they weren't before? Do you need an evaluation of whether the deadlines themselves are reasonable? (There are packages for that, too.)

### What the numbers mean

The listings of user ratings in this article describe 210 packages from 92 vendors as rated by 2,819 users. Ratings were actually collected on many more packages than those included, but since it did not seem to be objective to rate packages according to what only one or two users thought about them, no package listed has been rated by less than three users.

Since people who acquire a software package can be expected to be biased in its favor, the opinions of prospective users who tried and *rejected* packages were given equal weight in the ratings. Also, since a consensus of 20 or 30 users (or "triers") should be more reliable than a consensus of, say, half a dozen, the actual numbers of respondents rating each package has been included in the presentation.

What all this means to the prospective software buyer is that by reading the listings he can determine to a considerable degree of confidence just what the strengths and weaknesses of a common software package are considered to be. Actually he can tell more than that. If a single vendor has more than one package rated here, the prospective user can tell something about the vendor, too.

Users were asked to rate the packages they were using in seven subjective categories: 1) Overall Satisfaction, 2) Throughput/Efficiency, 3) Ease of Installation, 4) Ease of Use, 5) Documentation, 6) Vendor Technical Support, and 7) Training, if applicable. Each category could be rated as

excellent, good, fair, or poor.

We then translated the users' ratings for each package into a weighted average for each category. The averages were computed in a straightforward manner similar to most college grading systems: "excellent" was weighted as 4, "good" as 3, "fair" as 2, and "poor" as 1. Then, the average was calculated by dividing the sum of the products by the total number of responses in the rating category.

Once the ratings were determined, some packages looked like really commendable products and were accorded two kinds of distinctions. Those packages which were rated by six or more users were placed on an "Honor Roll" if they met the following somewhat arbitrary but useful criteria: (1) they scored at least 3.5 in overall user satisfaction; and (2) they scored at least 2.8 in every category measured (actually, the Training category was not

## THE 1975 SOFTWARE HONOR ROLL

Package	Vendor
ALLTAX	Management Information Service
ASAP	Universal Software, Inc.
Dump/Restore/Plus & Virtual Disk Utility	Westinghouse Electric Corporation
DYL-250	Dylakor Software Systems, Inc.
EPAT	Software Design, Inc.
Fast Dump/Restore	Innovation Data Processing, Inc.
Foresight	Foresight Systems, Inc.
1130/FORTRAN	DNA Systems, Inc.
GRASP	Software Design, Inc.
IMSL	International Mathematical & Statistical Laboratories, Inc.
KOMAND-DAS	Pace Applied Technology, Inc.
LIBRARIAN	Applied Data Research, Inc.
Optimizer/Optimizer II	Capex Corporation
PAN*SORT	Pansophic Systems, Inc.
PANVALET	Pansophic Systems, Inc.
PPE	Boole & Babbage, Inc.
Quickjob I, II, & III	System Support Software, Inc.
RELO-PLUS	Universal Software, Inc.
RPG II (for System/360 or 370)	IBM Corporation
1130/SORT	DNA Systems, Inc.
SYNCSORT	Whitlow Computer Systems, Inc.
UCC ONE (TMS)	University Computing Company
UCC TWO (DUO)	University Computing Company
WATFIV	University of Waterloo
WESTI (Teleprocessing Interface System)	Westinghouse Electric Corporation

## HONORABLE MENTION LIST

Package	Vendor
BIT-FACS	American Valuation Consultants, Inc.
BOMP (for Level 62 systems)	Honeywell Information Systems, Inc.
CYTOS	DNA Systems, Inc.
DIOPEN (for System/360 & 370)	IBM Corporation
DISKPLAY	Boole & Babbage, Inc.
DISSPLA	Integrated Software Systems, Inc.
DOS/RS	Dearborn Computer Leasing Company
DUCS	C F S, Inc.
Financial Information & Control System	Management Science America
FMAINT	Software Design, Inc.
GBA DUMP	GBA International
General Ledger (NCR Century)	NCR Corporation
INQUIRE	Infodata Systems, Inc.
PSTAT	Princeton University
QCM	Duquesne Systems, Inc.
Save/Restore	Oxford Software Corporation
TSO (for IBM 1130)	DNA Systems, Inc.

counted; our rationale was that training is not always an explicit part of the deal on a package and users rated the category only when they thought it applicable for them).

An "Honorable Mention" section was constructed for packages that met the same criteria but which were rated by less than six users. We felt that since we couldn't be quite as confident in the ratings computed, those packages should not appear on the same list.

In selecting these packages for special attention, two extremely uncomfortable problems arise. The first and more obvious one is where do you draw the line? The second problem has to do with the complexity of a package; it is simply much easier for a small, simple package to meet its goals.

A number of highly regarded packages had only *one* user rating keeping them from Honor Roll or Honorable Mention distinction. For example, IBM's System/3 Disk Sort, IBM's DOS DITTO, Dylakor's DYL-260, Pansophic's EASYTRIEVE, IBM's System/360 and 370 FORTRAN, Cullinane's IDMS, IBM's IRP for System/3, Burroughs' NDL, Applied Data Research's PI SORT, Digital Equipment's RSX-11M, Oxford Software's SPRINT, and SPSS's Statistical Program for Social Sciences could each have made the Honor Roll *if a single user had made a rating change in a single category*. Clearly, these 12 packages are also outstanding.

Three packages that did not meet the Honorable Mention criteria also happened not to have a single user rate any category less than "Good." The three were IBM's System/3 Card Utilities, Arthur Andersen's MAC PAC-3, and Applied Data Research's METACOBOL. These packages, each with 100% of the users who rated them calling them "Excellent" or "Good" in every category, are certainly worthy of the consideration of prospective users.

Perhaps the ultimate answer is to categorize programs and present the ratings of the programs in each functional category in juxtaposition. Fine, but who decides just how to classify all the complex, multifunction packages currently on the market? But we won't beg the issue; we'll try it. Let's compare the ratings supplied by five or more users on their Overall Satisfaction with data base management systems. They are:

Package & Vendor	Excel.	Good	Fair	Poor	Avg.
ADABAS	5	3	1	0	3.4
DBOMP	4	20	10	1	2.8
DL/1	1	18	7	3	2.7
GIS	0	2	5	1	2.5
IDMS	6	2	2	0	3.4
IMS	5	20	8	2	2.8
Inquire	4	1	0	0	3.8
System 2000	3	7	3	0	3.0
TOTAL	51	53	12	0	3.3

Now, which is the best? Have you considered your needs? Will it run on your computer system? Under your operating system? Can it interface your files? Your data communications monitor? The languages you use? Can you afford it?

#### Unfair to big packages?

Related to that size and complexity problem, no package for data base management appears on the Honor Roll (although ADABAS, IDMS, and TOTAL all came close and INQUIRE earned Honorable Mention). Perhaps a DBMS is by its very nature too complex to please enough of the people who provide the ratings.

It appears that the most straightforward systems, especially among applications packages, have the best chances to earn Honor Roll Distinctions. Could it be that applications packages, report writing and retrieval systems, and similar programs are obtained mainly to please those outside the data processing department? If so, their acquisition may tend to position these packages with two strikes against them at the outset: they don't serve the dp department directly and are thus viewed as overhead, and they offend by being invented elsewhere.

If packages over 50K in size were given a 0.1 handicap, that is if they could score just 3.4 instead of 3.5 in Overall Satisfaction, several more products would be accepting laurels. The measly little 0.1 keeps IBM's 360 FORTRAN, Cullinane's IBMS, and SPSS, Inc.'s SPSS off the Honor Roll. It also keeps Cambridge Computer Associates' CROSSTABS, Computer Information Management's DATACOM/DC, Management and Computer Service's DATAMACS, and Applied Data Research's ROSCOE off the "Honorable Mention" list.

In spite of all the bemoaning about the unfairness of it all, the two lists of highly rated products are highlighted because they do deserve special recognition. The ratings are there for anyone ambitious enough to want to make his own list using his own criteria.

#### What's important?

In the end, what's really important is whether a package is good or bad for what the prospective user needs. And there are three tools to help him judge. First, the ratings give a good indication. Second, each package listed has a Reader Service number; circle that number on one of the reader service cards bound into this issue and we'll ask the vendor to send you more information about that product. Third, a Vendor Index is presented at the end of the package listings for those who want to go directly to the source. We encourage you to use all three tools.

While you're at it, you might keep in mind these suggestions supplied by the users whose opinions are represented:

1) Don't expect something for nothing in a software package; no package does everything automatically.

2) Beware of contracting for a package before it's written, and don't be misled by an initial low price; you could end up paying a much higher price later.

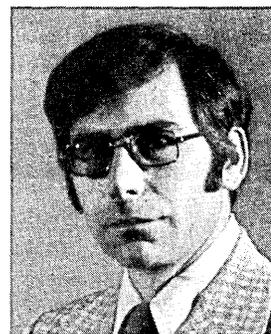
3) Try to insure that your installation has a qualified data processing, software, or applications manager who can effectively interface the users within the company and the suppliers of software.

4) If you're going to invest in performance measurement tools, be able to define in advance what you're looking for and what actions you'll take in each event.

5) Recognize that while a package that is bought will only cost about one-fifth as much as it would to develop in-house, it may still cost two to four times its purchase price to install in a manner that conforms to your standards; but don't fail to recognize that these costs can still be a lot lower than in-house costs.

6) Remember that selection and installation of a vended package takes as much planning as an in-house effort.

7) Look for independently vended software to accomplish objectives beyond the capabilities of your in-house staff. And finally, we add this observation of our own: Don't, as many of our survey respondents did, consider the cost of in-house modifications to a proprietary package to be zero; you're only fooling yourself if you do.



Mr. Tanner is presently the software editor of "Datapro 70," a three volume hardware/software reference published by Datapro Research Corp. He has also served the firm as managing editor of "Datapro Reports on Minicomputers" and "Datapro Reports on Banking Automation." His prior experience includes four years as an editor at Auerbach Corp. as well as service at RCA Corp., where he produced maintenance training programs.



Overall satisfaction 3.3  
 Throughput/efficiency 3.5  
 Ease of installation 3.3  
 Ease of use 3.3  
 Documentation 3.0  
 Vendor technical support 2.8  
 Training 3.0  
 CIRCLE 320 ON READER CARD

**APG 7**

**IBM Corporation**

*High-level program support for sensor-based IBM System/7; has PL/1 subset, runs on 16K System/7 with a disc.*

Users Reporting 3  
 Overall satisfaction 2.7  
 Throughput/efficiency 3.5  
 Ease of installation 3.0  
 Ease of use 3.0  
 Documentation 2.3  
 Vendor technical support 2.7  
 Training 2.2  
 CIRCLE 321 ON READER CARD

**APL**

**IBM Corporation**

*Terminal-oriented problem-solving language; interpreter-based for System/360 and 370; now a language for IBM's new 5100.*

Users reporting 3  
 Overall satisfaction 3.3  
 Throughput/efficiency 2.3  
 Ease of installation 2.3  
 Ease of use 3.3  
 Documentation 3.0  
 Vendor technical support 2.0  
 Training —  
 CIRCLE 322 ON READER CARD

**ASAP**

**Universal Software, Inc.**

*Spooling supplement for IBM 360 dos.*  
 Users reporting 50  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.5  
 Ease of installation 3.5  
 Ease of use 3.5  
 Documentation 3.1  
 Vendor technical support 3.2  
 Training 3.0  
 CIRCLE 323 ON READER CARD

**ASI-ST**

**Applications Software Inc.**

*Data management system for IBM 360/370; can be batch or conversational.*  
 Users reporting 8  
 Overall satisfaction 2.9  
 Throughput/efficiency 3.0  
 Ease of installation 3.1  
 Ease of use 2.8  
 Documentation 3.1  
 Vendor technical support 2.5  
 Training 2.6  
 CIRCLE 324 ON READER CARD

**ATMS (Advanced Text Mgmt. Sys.)**

**IBM Corporation**

*Conversational time-sharing method to display, edit, and update text on any IBM 360/370;*

*os version has STAIRS/vs interface.*  
 Users reporting 4  
 Overall satisfaction 3.3  
 Throughput/efficiency 2.8  
 Ease of installation 3.3  
 Ease of use 3.0  
 Documentation 3.0  
 Vendor technical support 3.0  
 Training 3.3  
 CIRCLE 325 ON READER CARD

**AUTOFLOW/AUTOFLOW II Applied Data Research, Inc.**

*Complete program development system, but best known as a flowchart generator.*

Users reporting 16  
 Overall satisfaction 2.4  
 Throughput/efficiency 2.5  
 Ease of installation 2.9  
 Ease of use 3.1  
 Documentation 2.9  
 Vendor technical support 2.4  
 Training 2.2  
 CIRCLE 326 ON READER CARD

**BASIC (for PDP-8)**

**Digital Equipment Corporation**

*Four versions for the PDP-8: 4K, 8K, os/8, and "Industrial."*

Users reporting 3  
 Overall satisfaction 2.0  
 Throughput/efficiency 2.0  
 Ease of installation 3.0  
 Ease of use 2.7  
 Documentation 3.3  
 Vendor technical support 2.7  
 Training 2.0  
 CIRCLE 327 ON READER CARD

**BASIC (for HP 2000 & 21MX)**

**Hewlett-Packard Company**

Users reporting 3  
 Overall satisfaction 3.7  
 Throughput/efficiency 2.5  
 Ease of installation 3.7  
 Ease of use 3.7  
 Documentation 1.8  
 Vendor technical support 3.3  
 Training 2.5  
 CIRCLE 328 ON READER CARD

**BASIC (System/360 & 370)**

**IBM Corporation**

*For time-sharing use under ITF or TSO.*

Users reporting 4  
 Overall satisfaction 3.3  
 Throughput/efficiency 2.8  
 Ease of installation 2.8  
 Ease of use 2.0  
 Documentation 2.3  
 Vendor technical support 2.8  
 Training 3.2  
 CIRCLE 329 ON READER CARD

**Bill of Material Processor**

**Honeywell Information Systems**

*For Honeywell Level 62 systems.*

Users reporting 3  
 Overall satisfaction 3.7  
 Throughput/efficiency 3.0  
 Ease of installation 3.0  
 Ease of use 3.7

Documentation 3.3  
 Vendor technical support 3.5  
 Training 3.3  
 CIRCLE 330 ON READER CARD

**Bill of Material Processor (S/3)**

**IBM Corporation**

Users reporting 57  
 Overall satisfaction 3.2  
 Throughput/efficiency 2.7  
 Ease of installation 2.7  
 Ease of use 2.9  
 Documentation 2.9  
 Vendor technical support 2.6  
 Training 2.4  
 CIRCLE 331 ON READER CARD

**BioMed**

**Univ. of California at Los Angeles (UCLA)**

*Statistical computing for medical and other applications.*

Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 3.0  
 Ease of installation 2.3  
 Ease of use 2.5  
 Documentation 3.0  
 Vendor technical support 2.3  
 Training —  
 CIRCLE 332 ON READER CARD

**BIT-FACS**

**American Valuation Consultants**

*Book, insurance, tax fixed asset control system for IBM 360/370 under DOS, OS, or VS.*

Users reporting 4  
 Overall satisfaction 3.8  
 Throughput/efficiency 3.0  
 Ease of installation 3.5  
 Ease of use 3.5  
 Documentation 2.8  
 Vendor technical support 3.5  
 Training 3.3  
 CIRCLE 333 ON READER CARD

**CalComp Plotter Software**

**California Computer Products**

*Software routines to control digital plotters manufactured by CalComp.*

Users reporting 6  
 Overall satisfaction 3.2  
 Throughput/efficiency 3.3  
 Ease of installation 3.3  
 Ease of use 3.2  
 Documentation 3.0  
 Vendor technical support 2.6  
 Training 2.5  
 CIRCLE 334 ON READER CARD

**CAPS-11**

**Digital Equipment Corporation**

*Entry-level cassette operating system for PDP-11.*

Users reporting 3  
 Overall satisfaction 2.3  
 Throughput/efficiency 2.3  
 Ease of installation 2.0  
 Ease of use 1.7  
 Documentation 1.7  
 Vendor technical support 1.0  
 Training —  
 CIRCLE 335 ON READER CARD

**Card Utilities (System/3)**

**IBM Corporation**

*Six MFCU functions and data recorder program for Model 10; four are available in disc-based versions for other System/3 models.*

Users reporting 3  
 Overall satisfaction 3.3  
 Throughput/efficiency 3.3  
 Ease of installation 3.7  
 Ease of use 3.5  
 Documentation 3.5  
 Vendor technical support 3.5  
 Training 4.0  
 CIRCLE 336 ON READER CARD

**CARS-2**

**Computer Audit Systems, Inc.**

*Computerized audit and reporting for ANSI COBOL systems.*

Users reporting 3  
 Overall satisfaction 2.7  
 Throughput/efficiency 2.3  
 Ease of installation 2.0  
 Ease of use 2.0  
 Documentation 2.0  
 Vendor technical support 2.7  
 Training 2.5  
 CIRCLE 337 ON READER CARD

**Certificates of Deposit Accounting**

**Florida Software Services, Inc.**

*Banking package that handles CD's and runs on IBM 360/370, System/3, Burroughs, NCR, & Honeywell mainframes.*

Users reporting 7  
 Overall satisfaction 3.1  
 Throughput/efficiency 3.0  
 Ease of installation 3.0  
 Ease of use 3.2  
 Documentation 3.2  
 Vendor technical support 2.5  
 Training 2.0  
 CIRCLE 338 ON READER CARD

**CFMS**

**IBM Corporation**

*Chained file mgmt. system that is the 360 OS equivalent to DBOMP for DOS systems. Requirements Planning System is an option.*

Users reporting 3  
 Overall satisfaction 2.3  
 Throughput/efficiency 2.3  
 Ease of installation 2.0  
 Ease of use 2.3  
 Documentation 2.7  
 Vendor technical support 2.3  
 Training 2.7  
 CIRCLE 339 ON READER CARD

**CICS**

**IBM Corporation**

*Data communications monitor; versions exist for 360/370 DOS, DOS/VS, OS, & OS/VS.*

Users reporting 136  
 Overall satisfaction 3.1  
 Throughput/efficiency 2.8  
 Ease of installation 2.4  
 Ease of use 2.8  
 Documentation 2.8  
 Vendor technical support 2.9  
 Training 2.8  
 CIRCLE 340 ON READER CARD

**CIF (Central Information File)**  
**University Computing Com-**  
**pany**

*Multi-bank, multi-branch central customer information file for IBM 360/370.*

Users reporting	3
Overall satisfaction	2.3
Throughput/efficiency	3.3
Ease of installation	2.7
Ease of use	2.7
Documentation	3.0
Vendor technical support	2.7
Training	3.0

CIRCLE 341 ON READER CARD

**COBOL (System/3)**

**IBM Corporation**

*An ANSI subset without sort or report writer.*

Users reporting	4
Overall satisfaction	3.5
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	3.5
Documentation	2.8
Vendor technical support	2.0
Training	1.7

CIRCLE 342 ON READER CARD

**COBOL (for System/360 & 370)**

**IBM Corporation**

Users reporting	79
Overall satisfaction	3.2
Throughput/efficiency	3.1
Ease of installation	3.3
Ease of use	3.5
Documentation	3.3
Vendor technical support	2.9
Training	2.7

CIRCLE 343 ON READER CARD

**COBOL (for 1130 system)**

**IBM Corporation**

Users reporting	23
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.0
Ease of use	3.4
Documentation	2.9
Vendor technical support	2.4
Training	2.5

CIRCLE 344 ON READER CARD

**Commercial Loans**

**Automated Financial Systems, Inc.**

*Accounting system for banks; runs on IBM 360/370 or Burroughs B3500; tracks collateral, has history and analysis modules and on-line inquiry.*

Users reporting	4
Overall satisfaction	1.8
Throughput/efficiency	1.8
Ease of installation	2.5
Ease of use	2.5
Documentation	2.5
Vendor technical support	2.0
Training	2.2

CIRCLE 345 ON READER CARD

**Commercial Loans**

**Florida Software Services, Inc.**

*Accounting system for banks. Runs on nearly any COBOL system; has variable interest calculations and reporting.*

Users reporting	4
Overall satisfaction	3.0
Throughput/efficiency	2.0
Ease of installation	3.0
Ease of use	2.5
Documentation	2.5
Vendor technical support	3.0
Training	2.0

CIRCLE 346 ON READER CARD

**Comput-A-Charge**

**Value Computing, Inc.**

*Job accounting & billing, written in ANSI COBOL, runs on most mainframes.*

Users reporting	13
Overall satisfaction	3.1
Throughput/efficiency	3.0
Ease of installation	3.0
Ease of use	2.6
Documentation	2.5
Vendor technical support	2.8
Training	2.6

CIRCLE 347 ON READER CARD

**COS-300**

**Digital Equipment Corporation**

*Commercial operating system for DEC PDP-8-based Datasytem 300s.*

Users reporting	3
Overall satisfaction	3.7
Throughput/efficiency	3.0
Ease of installation	3.3
Ease of use	3.3
Documentation	2.7
Vendor technical support	2.0
Training	3.0

CIRCLE 348 ON READER CARD

**CROSSTABS**

**Cambridge Computer Associates**

*Tabular statistical reporting system with retrieval option for any IBM 360/370.*

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	3.8
Ease of installation	3.7
Ease of use	2.3
Documentation	3.5
Vendor technical support	3.3
Training	4.0

CIRCLE 349 ON READER CARD

**CUE (Configuration Usage Evaluator)**

**Boole & Babbage, Inc.**

*Evaluates peripheral device usage on IBM 360/370 under OS or OS/vs.*

Users reporting	3
Overall satisfaction	3.3
Throughput/efficiency	3.3
Ease of installation	4.0
Ease of use	3.3
Documentation	2.3
Vendor technical support	2.7
Training	2.0

CIRCLE 350 ON READER CARD

**CULPRIT**

**Cullinane Corporation**

*Output processor and report creator system for IBM 360/370 (any operating system) or Univac Series 70.*

Users reporting	8
Overall satisfaction	2.9
Throughput/efficiency	2.6
Ease of installation	2.9
Ease of use	3.0
Documentation	2.8
Vendor technical support	3.0
Training	3.0

CIRCLE 351 ON READER CARD

**CYTOS**

**DNA Systems, Inc.**

*Conversational operating system for IBM 1130 and compatible systems.*

Users reporting	5
Overall satisfaction	3.6
Throughput/efficiency	3.2
Ease of installation	3.4
Ease of use	3.0
Documentation	3.0
Vendor technical support	3.8
Training	3.3

CIRCLE 352 ON READER CARD

**The Data Analyzer**

**Program Products Incorporated**

*Information retrieval & reporting on any IBM 360/370; has interfaces for IBM's IMS & Cincor's TOTAL.*

Users reporting	14
Overall satisfaction	2.9
Throughput/efficiency	2.4
Ease of installation	3.2
Ease of use	3.2
Documentation	2.5
Vendor technical support	2.3
Training	2.6

CIRCLE 353 ON READER CARD

**DATA-MAN**

**Data-Man Ltd.**

*File manager and report retrieval system for any IBM 360/370.*

Users reporting	4
Overall satisfaction	2.8
Throughput/efficiency	2.3
Ease of installation	2.5
Ease of use	2.8
Documentation	2.8
Vendor technical support	3.3
Training	2.5

CIRCLE 354 ON READER CARD

**DATACOM/DC (also known as GMT)**

**Computer Information Management**

*Generalized multi-tasking macro-regenerative data communications monitor for any IBM 360/370.*

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	3.4
Ease of installation	3.4
Ease of use	3.2
Documentation	3.2
Vendor technical support	3.8
Training	3.5

CIRCLE 355 ON READER CARD

**DATAFORM**

**Datapoint Corp.**

*Specialized form of CTOS cassette operating system for Datapoint systems, with emphasis on data entry.*

Users reporting	3
Overall satisfaction	2.5
Throughput/efficiency	2.5
Ease of installation	3.0
Ease of use	3.0
Documentation	2.5
Vendor technical support	2.5
Training	—

CIRCLE 356 ON READER CARD

**DATAMACS**

**Management & Computer Services**

*Creates test files for COBOL programs on IBM 360/370.*

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.6
Ease of use	3.6
Documentation	3.2
Vendor technical support	3.2
Training	2.5

CIRCLE 357 ON READER CARD

**DBMS-10 (Data Base Mgmt. System)**

**Digital Equipment Corporation**

*CODASYL-based DBMS for DEC system-10 or DEC PDP-10; hosts COBOL and FORTRAN.*

Users reporting	3
Overall satisfaction	3.0
Throughput/efficiency	3.0
Ease of installation	3.7
Ease of use	2.3
Documentation	2.3
Vendor technical support	3.0
Training	3.0

CIRCLE 358 ON READER CARD

**DBOMP**

**IBM Corporation**

*Data base organization & maintenance processor utility for IBM 360/370.*

Users reporting	35
Overall satisfaction	2.8
Throughput/efficiency	2.6
Ease of installation	2.2
Ease of use	2.4
Documentation	2.4
Vendor technical support	2.6
Training	2.1

CIRCLE 359 ON READER CARD

**DFAST**

**Oxford Software Corporation**

*Allows System/360 and 370 DOS and OS/vs users to automatically allocate and share disc space.*

Users reporting	10
Overall satisfaction	3.4
Throughput/efficiency	3.3
Ease of installation	3.4
Ease of use	3.3
Documentation	2.4
Vendor Technical support	2.9
Training	2.2

CIRCLE 360 ON READER CARD

<b>DIOPEN</b>		Throughput/efficiency	3.3	Ease of use	2.3	Documentation	2.7
<b>IBM Corporation</b>		Ease of installation	3.8	Documentation	2.3	Vendor technical support	3.0
<i>Disc file utility for IBM 360/370.</i>		Ease of use	4.0	Vendor technical support	3.0	Training	2.7
Users reporting	4	Documentation	4.0	Training	2.0	CIRCLE 376 ON READER CARD	
Overall satisfaction	4.0	Vendor technical support	3.8	CIRCLE 371 ON READER CARD			
Throughput/efficiency	4.0	Training	3.5				
Ease of installation	3.2	CIRCLE 366 ON READER CARD					
Ease of use	4.0						
Documentation	3.8	<b>DITTO (DOS &amp; DOS/VS ver-</b>		<b>DUCS</b>		<b>EDOS</b>	
Vendor technical support	3.3	<b>sions)</b>		<b>CFS, Inc.</b>		<b>The Computer Software Com-</b>	
Training	—	<b>IBM Corporation</b>		<i>Display control system with</i>		<b>pany</b>	
CIRCLE 361 ON READER CARD							
		<i>File copy/file management util-</i>		<i>transparent 2260 simulation for</i>		<i>Extended DOS operating system</i>	
		<i>ity.</i>		<i>IBM 360/370 DOS and DOS/VS;</i>		<i>for IBM 360/370; has spooler &amp;</i>	
		Users reporting	46	<i>local and remote versions avail-</i>		<i>handles six partitions.</i>	
<b>Disk Sort (System/3)</b>		Overall satisfaction	3.4	<i>able.</i>		Users reporting	33
<b>IBM Corporation</b>		Throughput/efficiency	3.3	Users reporting	5	Overall satisfaction	3.3
Users reporting	8	Ease of installation	3.5	Overall satisfaction	4.0	Throughput/efficiency	3.3
Overall satisfaction	3.4	Ease of use	3.5	Throughput/efficiency	4.0	Ease of installation	2.9
Throughput/efficiency	2.9	Documentation	2.9	Ease of installation	4.0	Ease of use	3.1
Ease of installation	4.0	Vendor technical support	2.9	Ease of use	3.8	Documentation	3.0
Ease of use	3.8	Training	2.8	Documentation	3.2	Vendor technical support	3.2
Documentation	2.9	CIRCLE 367 ON READER CARD					
Vendor technical support	2.9			Vendor technical support	3.8	Training	2.6
Training	2.4			Training	3.3	CIRCLE 377 ON READER CARD	
CIRCLE 362 ON READER CARD							
		<b>DL/1 (also known as VANDL)</b>		<b>Dump/Restore/Plus &amp;</b>		<b>Environ/1</b>	
		<b>IBM Corporation</b>		<b>Virtual Disk Utility</b>		<b>Cincom Systems, Inc.</b>	
		<i>Data base management system</i>		<b>Westinghouse Electric Corp.</b>		<i>Data communications monitor</i>	
		<i>for IBM 370 DOS/VS.</i>		<i>Disc-to-tape, etc. utility; called</i>		<i>for IBM 360/370; has interface</i>	
		Users reporting	32	<i>DRP for DOS systems and VDU for</i>		<i>to Cincom's TOTAL DBMS.</i>	
<b>Disk Utilities (System/3)</b>		Overall satisfaction	2.7	<i>DOS/VS systems.</i>		Users reporting	25
<b>IBM Corporation</b>		Throughput/efficiency	2.6		105	Overall satisfaction	3.2
<i>Does not include sort.</i>		Ease of installation	2.5	Users reporting	105	Throughput/efficiency	3.3
Users reporting	5	Ease of use	2.6	Overall satisfaction	3.8	Ease of installation	3.0
Overall satisfaction	3.2	Documentation	2.3	Throughput/efficiency	3.8	Ease of use	3.0
Throughput/efficiency	3.0	Vendor technical support	2.6	Ease of installation	3.8	Documentation	2.4
Ease of installation	3.4	Training	2.5	Ease of use	3.8	Vendor technical support	2.8
Ease of use	3.2	CIRCLE 368 ON READER CARD					
Documentation	3.4			Documentation	3.4	Training	2.4
Vendor technical support	3.6			Vendor technical support	3.4	CIRCLE 378 ON READER CARD	
Training	3.5			Training	3.4		
CIRCLE 363 ON READER CARD							
		<b>DOS</b>		<b>DYL-250</b>		<b>EPAT</b>	
		<b>Digital Equipment Corporation</b>		<b>Dylakor Software Systems, Inc.</b>		<b>Software Design, Inc.</b>	
		<i>Disc-based operating system</i>		<i>File maintenance and label print-</i>		<i>Keeps track of physical tape</i>	
		<i>support for COMTEX communica-</i>		<i>ing utility for IBM 360/370.</i>		<i>units on IBM 360/370 DOS or</i>	
		<i>tions on DEC PDP-11.</i>		Users reporting	18	<i>DOS/VS.</i>	
		Users reporting	11	Overall satisfaction	3.5	Users reporting	28
<b>DISKPLAY</b>		Overall satisfaction	2.9	Throughput/efficiency	3.1	Overall satisfaction	3.5
<b>Boole &amp; Babbage, Inc.</b>		Ease of installation	2.8	Ease of installation	3.6	Throughput/efficiency	3.4
<i>Locates data sets on disc under</i>		Ease of use	2.8	Ease of use	3.3	Ease of installation	3.4
<i>IBM 360/370 DOS and DOS/VS.</i>		Documentation	2.1	Documentation	2.8	Ease of use	3.4
Users reporting	4	Vendor technical support	2.0	Vendor technical support	3.2	Documentation	3.3
Overall satisfaction	3.8	Training	2.2	Training	3.0	Vendor technical support	2.8
Throughput/efficiency	3.5	CIRCLE 369 ON READER CARD					
Ease of installation	3.8			Vendor technical support	3.2	Training	2.6
Ease of use	3.8			Training	3.0	CIRCLE 379 ON READER CARD	
Documentation	3.0			CIRCLE 374 ON READER CARD			
Vendor technical support	2.8						
Training	2.3						
CIRCLE 364 ON READER CARD							
		<b>DOS/RS</b>		<b>DYL-260</b>		<b>EPIC</b>	
		<b>Dearborn Computer Leasing Co.</b>		<b>Dylakor Software Systems, Inc.</b>		<b>IBM Corporation</b>	
		<i>IBM 360/370 DOS with six parti-</i>		<i>Report writing and data manage-</i>		<i>Four program products for</i>	
		<i>tion and POWER III spooling sup-</i>		<i>ment system for IBM 360/370.</i>		<i>schools that run on 360, 370,</i>	
		<i>port.</i>		Users reporting	33	<i>System/3, and 1130 systems.</i>	
		Users reporting	4	Overall satisfaction	3.5	Users reporting	19
<b>DISKTAB</b>		Overall satisfaction	3.5	Throughput/efficiency	3.3	Overall satisfaction	2.2
<b>Donovan Data Systems, Inc.</b>		Throughput/efficiency	3.5	Ease of installation	3.6	Throughput/efficiency	1.9
<i>Disc utility program for IBM</i>		Ease of installation	3.3	Ease of use	3.3	Ease of installation	1.7
<i>1130 and compatible systems.</i>		Ease of use	3.5	Documentation	2.7	Ease of use	2.1
Users reporting	4	Documentation	3.3	Vendor technical support	3.0	Documentation	2.3
Overall satisfaction	3.5	Vendor technical support	3.5	Training	2.6	Vendor technical support	2.5
Throughput/efficiency	3.8	Training	3.0	CIRCLE 375 ON READER CARD			
Ease of installation	3.5	CIRCLE 370 ON READER CARD					
Ease of use	3.0						
Documentation	1.5						
Vendor technical support	3.3						
Training	3.0						
CIRCLE 365 ON READER CARD							
		<b>DOSSIER</b>		<b>EASYTRIEVE</b>		<b>Extracto</b>	
		<b>GBA International</b>		<b>Pansophic Systems, Inc.</b>		<b>Aquila BST Ltd.</b>	
		<i>Provides a report on programs</i>		<i>Information retrieval &amp; report-</i>		<i>Generates multiple independent</i>	
		<i>catalogued to IBM 360/370 DOS</i>		<i>ing system for IBM 360/370 &amp;</i>		<i>reports in one pass of the data</i>	
		<i>users' core image and relocatable</i>		<i>Univac Series 70.</i>		<i>file on IBM 360/370, Honeywell</i>	
		<i>libraries.</i>		Users reporting	42	<i>Series 200, and Univac Series</i>	
		Users reporting	3	Overall satisfaction	3.5	<i>70, 9000 and 1100; conversa-</i>	
<b>DISSPLA</b>		Overall satisfaction	2.7	Throughput/efficiency	3.6	<i>tional version optional.</i>	
<b>Integrated Software Systems</b>		Throughput/efficiency	2.7	Ease of installation	3.6	Users reporting	5
<i>Creates graphics on plotters,</i>		Ease of installation	3.0	Ease of use	3.4	Overall satisfaction	3.4
<i>cr't's and COM units of nearly any</i>		CIRCLE 376 ON READER CARD					
<i>manufacture on any IBM 360/</i>							
<i>370, or Univac 1100 under Exec-</i>							
<i>8, or CDC 6000 or 7000 under</i>							
<i>SCOPE or KRONOS.</i>							
Users reporting	4						
Overall satisfaction	3.8						

Throughput/efficiency 3.0  
 Ease of installation 3.2  
 Ease of use 3.4  
 Documentation 2.6  
 Vendor technical support 2.5  
 Training 2.0  
 CIRCLE 381 ON READER CARD

**Fast Dump/Restore  
 Innovation Data Processing, Inc.**

*Disc-to-tape dump/restore utility for IBM 360/370 OS or OS/VS.*  
 Users reporting 16  
 Overall satisfaction 3.6  
 Throughput/efficiency 3.6  
 Ease of installation 3.5  
 Ease of use 3.5  
 Documentation 3.1  
 Vendor technical support 3.1  
 Training 3.0  
 CIRCLE 382 ON READER CARD

**FASTER L/C  
 IBM Corporation**

*A minimal telecommunications monitor for IBM 360 DOS that is a generation earlier than MTCS; the acronym L/C means "low core," a relative term.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.7  
 Ease of installation 2.7  
 Ease of use 3.0  
 Documentation 2.7  
 Vendor technical support 2.0  
 Training 2.3  
 CIRCLE 383 ON READER CARD

**FASTER M/T  
 IBM Corporation**

*A program like FASTER L/C preceding, but with multithreading (hence, the acronym M/T), and offering mixed IBM 2260 and 3270 terminal support not found in the L/C version.*  
 Users reporting 4  
 Overall satisfaction 3.2  
 Throughput/efficiency 2.7  
 Ease of installation 3.0  
 Ease of use 3.0  
 Documentation 3.5  
 Vendor technical support 2.5  
 Training 2.2  
 CIRCLE 384 ON READER CARD

**FICS (Financial Information & Control System)**

**Management Science America**  
*Data base-oriented financial control & reporting system for banks & bank holding companies; runs on IBM 360/370, Burroughs, & Honeywell COBOL systems.*  
 Users reporting 4  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.3  
 Ease of installation 3.3  
 Ease of use 3.7  
 Documentation 3.5  
 Vendor technical support 3.2  
 Training 3.5  
 CIRCLE 385 ON READER CARD

**Financial Control System**

**University Computing Company**  
*A host of on-line & batch packages for IBM 360/370, mainly used in large banks; includes general ledger.*  
 Users reporting 10  
 Overall satisfaction 3.2  
 Throughput/efficiency 2.8  
 Ease of installation 2.8  
 Ease of use 2.9  
 Documentation 2.6  
 Vendor technical support 2.9  
 Training 3.0  
 CIRCLE 386 ON READER CARD

**Fixed Assets  
 American Appraisal**

*For most COBOL systems.*  
 Users reporting 5  
 Overall satisfaction 2.8  
 Throughput/efficiency 2.6  
 Ease of installation 3.0  
 Ease of use 3.0  
 Documentation 2.4  
 Vendor technical support 2.2  
 Training 2.2  
 CIRCLE 387 ON READER CARD

**Fixed Assets  
 Infonational, Inc.**

*For any ANSI COBOL system over 64K.*  
 Users reporting 3  
 Overall satisfaction 3.3  
 Throughput/efficiency 2.0  
 Ease of installation 3.0  
 Ease of use 2.0  
 Documentation 3.0  
 Vendor technical support 3.5  
 Training 3.5  
 CIRCLE 388 ON READER CARD

**Fixed Assets  
 Management Science America**

*For 64K or larger IBM 360/370 or Burroughs B 3500 or larger COBOL systems; interfaces company's General Ledger package.*  
 Users reporting 5  
 Overall satisfaction 2.4  
 Throughput/efficiency 2.2  
 Ease of installation 1.6  
 Ease of use 2.4  
 Documentation 3.0  
 Vendor technical support 2.4  
 Training 2.2  
 CIRCLE 389 ON READER CARD

**Fixed Assets  
 McCormack & Dodge Corporation**

Users reporting 9  
 Overall satisfaction 2.8  
 Throughput/efficiency 2.5  
 Ease of installation 2.5  
 Ease of use 2.6  
 Documentation 2.8  
 Vendor technical support 2.4  
 Training 2.3  
 CIRCLE 390 ON READER CARD

**FMAINT  
 Software Design, Inc.**

*Replacement for IBM's DOS or DOS/VS 360/370 MAINT utility;*

*runs in any partition.*  
 Users reporting 4  
 Overall satisfaction 3.7  
 Throughput/efficiency 3.7  
 Ease of installation 3.6  
 Ease of use 3.7  
 Documentation 3.2  
 Vendor technical support 3.5  
 Training 3.5  
 CIRCLE 391 ON READER CARD

**Foresight  
 Foresight Systems, Inc.**

*Statistical forecasting system written in FORTRAN.*  
 Users reporting 6  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.0  
 Ease of installation 3.5  
 Ease of use 3.5  
 Documentation 2.8  
 Vendor technical support 3.2  
 Training 3.2  
 CIRCLE 392 ON READER CARD

**FORTE  
 Burroughs Corporation**

*Disc file management system for Burroughs B 1700 and up.*  
 Users reporting 3  
 Overall satisfaction 2.7  
 Throughput/efficiency 3.0  
 Ease of installation 2.7  
 Ease of use 3.0  
 Documentation 1.7  
 Vendor technical support 1.7  
 Training 2.0  
 CIRCLE 393 ON READER CARD

**FORTE II  
 Burroughs Corporation**

*Enhanced version of FORTE; generates COBOL source code that can be catalogued.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.5  
 Ease of installation 2.0  
 Ease of use 2.0  
 Documentation 2.5  
 Vendor technical support 3.5  
 Training 3.0  
 CIRCLE 394 ON READER CARD

**FORTAN (PDP-8)  
 Digital Equipment Corporation**

*Available in three PDP-8 versions: 8K paper tape, 8K OS/8, and 8K OS/8 FORTAN IV.*  
 Users reporting 4  
 Overall satisfaction 2.7  
 Throughput/efficiency 2.7  
 Ease of installation 3.5  
 Ease of use 2.7  
 Documentation 2.5  
 Vendor technical support 2.5  
 Training 2.5  
 CIRCLE 395 ON READER CARD

**1130/FORTRAN  
 DNA Systems, Inc.**

Users reporting 20  
 Overall satisfaction 3.7  
 Throughput/efficiency 3.6  
 Ease of installation 3.3

Ease of use 3.8  
 Documentation 3.3  
 Vendor technical support 3.3  
 Training 3.5  
 CIRCLE 396 ON READER CARD

**FORTAN (System/360 & 370)  
 IBM Corporation**

Users reporting 9  
 Overall satisfaction 3.4  
 Throughput/efficiency 3.7  
 Ease of installation 3.4  
 Ease of use 3.6  
 Documentation 3.0  
 Vendor technical support 3.1  
 Training 2.2  
 CIRCLE 397 ON READER CARD

**GBA DUMP  
 GBA International**

*Utility to replace IBM's 370 DOS/VS DUMP transient.*  
 Users reporting 5  
 Overall satisfaction 3.8  
 Throughput/efficiency 3.8  
 Ease of installation 3.8  
 Ease of use 3.8  
 Documentation 3.2  
 Vendor technical support 3.7  
 Training 3.7  
 CIRCLE 398 ON READER CARD

**General Ledger (B 1700)  
 Burroughs Corporation**

Users reporting 10  
 Overall satisfaction 2.3  
 Throughput/efficiency 2.4  
 Ease of installation 2.2  
 Ease of use 2.8  
 Documentation 1.8  
 Vendor technical support 2.1  
 Training 2.0  
 CIRCLE 399 ON READER CARD

**General Ledger (System/3)  
 IBM Corporation**

Users reporting 19  
 Overall satisfaction 2.4  
 Throughput/efficiency 2.4  
 Ease of installation 2.4  
 Ease of use 2.4  
 Documentation 2.3  
 Vendor technical support 2.4  
 Training 2.6  
 CIRCLE 400 ON READER CARD

**General Ledger  
 Infonational, Inc.**

*In ANSI COBOL to run on most mainframes.*  
 Users reporting 7  
 Overall satisfaction 3.3  
 Throughput/efficiency 2.8  
 Ease of installation 3.0  
 Ease of use 3.1  
 Documentation 3.6  
 Vendor technical support 3.0  
 Training 2.6  
 CIRCLE 401 ON READER CARD

**General Ledger  
 Management Science America**

*In ANSI COBOL to run on most mainframes.*  
 Users reporting 23



**IRP (System/3)**  
**IBM Corporation**  
*Inventory and requirements planning.*  
 Users reporting 12  
 Overall satisfaction 3.3  
 Throughput/efficiency 2.9  
 Ease of installation 3.1  
 Ease of use 3.1  
 Documentation 3.2  
 Vendor technical support 3.0  
 Training 2.8  
 CIRCLE 423 ON READER CARD

**JAS/3 (Job Analysis System/3)**  
**IBM Corporation**  
*Critical path method project planning and supervising for disc System/3 Model 8, 10, 12, or 15.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 3.7  
 Ease of installation 1.7  
 Ease of use 2.3  
 Documentation 2.0  
 Vendor technical support 2.3  
 Training 2.5  
 CIRCLE 424 ON READER CARD

**JASPER**  
**Datachron Corporation**  
*Job accounting and performance analysis for IBM 360/370 DOS, DOS/VS, or EDOS.*  
 Users reporting 6  
 Overall satisfaction 2.2  
 Throughput/efficiency 2.5  
 Ease of installation 3.2  
 Ease of use 2.8  
 Documentation 2.0  
 Vendor technical support 3.0  
 Training 2.0  
 CIRCLE 425 ON READER CARD

**Job Accounting Reporting (DOS)**  
**Johnson Systems, Inc.**  
*Job accounting & report generation on IBM 360/370 DOS or DOS/VS.*  
 Users reporting 12  
 Overall satisfaction 3.1  
 Throughput/efficiency 2.5  
 Ease of installation 3.3  
 Ease of use 3.1  
 Documentation 3.0  
 Vendor technical support 3.1  
 Training 3.0  
 CIRCLE 426 ON READER CARD

**Job Accounting Reporting (OS)**  
**Johnson Systems, Inc.**  
*Job accounting and computer utilization reporting for IBM 360/370 OS or OS/VS.*  
 Users reporting 10  
 Overall satisfaction 3.4  
 Throughput/efficiency 2.4  
 Ease of installation 3.4  
 Ease of use 3.3  
 Documentation 3.0  
 Vendor technical support 2.8  
 Training 2.0  
 CIRCLE 427 ON READER CARD

**Job Monitor**  
**Westinghouse Electric Corporation**  
*Job accounting for IBM 360/370 DOS or DOS/VS.*  
 Users reporting 7  
 Overall satisfaction 3.1  
 Throughput/efficiency 3.1  
 Ease of installation 2.9  
 Ease of use 3.1  
 Documentation 2.6  
 Vendor technical support 2.7  
 Training 2.8  
 CIRCLE 428 ON READER CARD

**KOMAND - Data Acquisition System**  
**Pace Applied Technology, Inc.**  
*Job accounting and resource utilization measurement system for IBM 360/370 & OS/VS.*  
 Users reporting 8  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.5  
 Ease of installation 2.9  
 Ease of use 3.3  
 Documentation 3.6  
 Vendor technical support 3.1  
 Training 2.8  
 CIRCLE 429 ON READER CARD

**LIBRARIAN**  
**Applied Data Research, Inc.**  
*Source program maintenance on any IBM 360/370 using COBOL, FORTRAN, PL/1, or BAL.*  
 Users reporting 96  
 Overall satisfaction 3.7  
 Throughput/efficiency 3.5  
 Ease of installation 3.6  
 Ease of use 3.6  
 Documentation 3.4  
 Vendor technical support 3.1  
 Training 3.1  
 CIRCLE 430 ON READER CARD

**LILA**  
**Network Data Processing**  
*Life Insurance Logistics Automated, in COBOL for most systems.*  
 Users reporting 6  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.5  
 Ease of installation 3.2  
 Ease of use 2.5  
 Documentation 2.5  
 Vendor technical support 2.8  
 Training 2.5  
 CIRCLE 431 ON READER CARD

**LIBFIL**  
**Group/3 Div., Informatics, Inc.**  
*Copies programs from library to disc file on System/3 5444 or 5445 discs; an improvement over IBM's \$MAINT.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.3  
 Ease of installation 2.7  
 Ease of use 2.7  
 Documentation 2.7  
 Vendor technical support 2.5  
 Training —  
 CIRCLE 432 ON READER CARD

**Life 70**  
**TCC, Inc.**  
*Management information system in life and health insurance industries for home & field office administration, corporate planning; runs on IBM 360/370 and Univac Series 70.*  
 Users reporting 3  
 Overall satisfaction 3.3  
 Throughput/efficiency 3.3  
 Ease of installation 2.3  
 Ease of use 3.0  
 Documentation 3.7  
 Vendor technical support 3.7  
 Training 3.7  
 CIRCLE 433 ON READER CARD

**MAC PAC-3**  
**Arthur Andersen**  
*System/3 manufacturing planning and control.*  
 Users reporting 3  
 Overall satisfaction 3.3  
 Throughput/efficiency 3.0  
 Ease of installation 3.5  
 Ease of use 3.5  
 Documentation 4.0  
 Vendor technical support 3.5  
 Training 3.5  
 CIRCLE 434 ON READER CARD

**MARK IV**  
**Informatics MARK IV Systems Co.**  
*Data management system for any IBM 360/370; options include IMS, DL/1, & TOTAL interfaces.*  
 Users reporting 54  
 Overall satisfaction 3.2  
 Throughput/efficiency 2.8  
 Ease of installation 3.4  
 Ease of use 3.3  
 Documentation 3.3  
 Vendor technical support 3.0  
 Training 3.0  
 CIRCLE 435 ON READER CARD

**Maxi-Lib**  
**Maxima System Group**  
*Source program library system for any IBM 360/370 with 32K partition.*  
 Users reporting 5  
 Overall satisfaction 3.4  
 Throughput/efficiency 3.6  
 Ease of installation 3.2  
 Ease of use 3.2  
 Documentation 2.4  
 Training 2.5  
 CIRCLE 436 ON READER CARD

**METACOBOL**  
**Applied Data Research, Inc.**  
*COBOL programming aid with extensive macros, for any IBM 360/370.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 3.0  
 Ease of installation 3.0  
 Ease of use 3.0  
 Documentation 3.5  
 Vendor technical support 3.5  
 Training 3.5  
 CIRCLE 437 ON READER CARD

**Minicomm**  
**Programming Methods Co.**  
*Display monitor that competes with IBM's entry-level CICS.*  
 Users reporting 14  
 Overall satisfaction 3.6  
 Throughput/efficiency 3.4  
 Ease of installation 3.4  
 Ease of use 3.6  
 Documentation 2.6  
 Vendor technical support 3.0  
 Training 3.1  
 CIRCLE 438 ON READER CARD

**Minimiz**  
**The Automated Quill Inc.**  
*On-line bookkeeping and accounting system for 24K RDOS Data General Nova or Eclipse systems.*  
 Users reporting 4  
 Overall satisfaction 2.3  
 Throughput/efficiency 2.5  
 Ease of installation 2.8  
 Ease of use 2.5  
 Documentation 2.0  
 Vendor technical support 3.0  
 Training 2.3  
 CIRCLE 439 ON READER CARD

**Mortgage Loans**  
**Florida Software Services, Inc.**  
*Multiple-bank mortgage loan system for IBM 360/370, NCR Century, Burroughs, and Honeywell 6000 computers.*  
 Users reporting 3  
 Overall satisfaction 3.3  
 Throughput/efficiency 2.7  
 Ease of installation 3.3  
 Ease of use 3.7  
 Documentation 3.7  
 Vendor technical support 3.0  
 Training —  
 CIRCLE 440 ON READER CARD

**Mortgage 70**  
**Sys Con, Inc.**  
*Multi-bank mortgage loan system for any IBM 360/370 COBOL system.*  
 Users reporting 3  
 Overall satisfaction 2.0  
 Throughput/efficiency 2.7  
 Ease of installation 1.7  
 Ease of use 2.0  
 Documentation 2.0  
 Vendor technical support 2.0  
 Training 2.2  
 CIRCLE 441 ON READER CARD

**MRP (System/3)**  
**IBM Corporation**  
*Materials and requirements planning.*  
 Users reporting 7  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.9  
 Ease of installation 2.7  
 Ease of use 2.7  
 Documentation 2.4  
 Vendor technical support 2.0  
 Training 2.5  
 CIRCLE 442 ON READER CARD



vs, and other large systems.  
 Users reporting 5  
 Overall satisfaction 3.6  
 Throughput/efficiency 3.0  
 Ease of installation 3.5  
 Ease of use 3.4  
 Documentation 3.0  
 Vendor technical support 3.7  
 Training 4.0  
 CIRCLE 464 ON READER CARD

**Quantitative Computer Measurement (QCM)**

**Duquesne Systems, Inc.**  
*Measures computer utilization, does cost analysis and billing on IBM 360/370 os or os/vs.*  
 Users reporting 3  
 Overall satisfaction 4.0  
 Throughput/efficiency 3.3  
 Ease of installation 3.3  
 Ease of use 4.0  
 Documentation 3.7  
 Vendor technical support 4.0  
 Training 3.3  
 CIRCLE 465 ON READER CARD

**QUERY (System/3)**

**IBM Corporation**  
*Inquiry to a data base via disc.*  
 Users reporting 3  
 Overall satisfaction 2.3  
 Throughput/efficiency 2.0  
 Ease of installation 2.0  
 Ease of use 3.0  
 Documentation 3.5  
 Vendor technical support 2.5  
 Training —  
 CIRCLE 466 ON READER CARD

**Quikjob I, II, & III**

**System Support Software, Inc.**  
*File management and report writing system for any IBM 360/370; three versions handle 1, 2, or more input files respectively.*  
 Users reporting 11  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.3  
 Ease of installation 3.6  
 Ease of use 3.7  
 Documentation 2.9  
 Vendor technical support 3.2  
 Training 2.8  
 CIRCLE 467 ON READER CARD

**RDOS**

**Data General Corporation**  
*Real-time disc operating system for Nova or Eclipse computers.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.7  
 Ease of installation 3.0  
 Ease of use 3.3  
 Documentation 3.3  
 Vendor technical support 3.3  
 Training 2.5  
 CIRCLE 468 ON READER CARD

**RELO-PLUS**

**Universal Software, Inc.**  
*To allow cataloging of a program in core image library, execution in any IBM 360 DOS partition.*

Users reporting 6  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.7  
 Ease of installation 3.3  
 Ease of use 3.5  
 Documentation 3.2  
 Vendor technical support 2.8  
 Training 3.0  
 CIRCLE 469 ON READER CARD

**Requirements Planning (System/3)**

**IBM Corporation**  
*For manufacturing applications.*  
 Users reporting 3  
 Overall satisfaction 1.3  
 Throughput/efficiency 1.3  
 Ease of installation 1.0  
 Ease of use 1.3  
 Documentation 1.7  
 Vendor technical support 2.7  
 Training 1.0  
 CIRCLE 470 ON READER CARD

**ROSCOE**

**Applied Data Research, Inc.**  
*Remote os conversational environment for program testing (in COBOL, FORTRAN, or PL/1, JCL syntax checking, or os data set management; runs under IBM 360/370 OS/MVT or MFT-HASP, or on os/vs systems.*  
 Users reporting 5  
 Overall satisfaction 3.4  
 Throughput/efficiency 3.5  
 Ease of installation 3.7  
 Ease of use 3.2  
 Documentation 3.2  
 Vendor technical support 2.8  
 Training 3.2  
 CIRCLE 471 ON READER CARD

**RPG II (System/3)**

**IBM Corporation**  
*Output-oriented programming language for report program generation.*  
 Users reporting 42  
 Overall satisfaction 3.3  
 Throughput/efficiency 3.2  
 Ease of installation 3.5  
 Ease of use 3.6  
 Documentation 3.1  
 Vendor technical support 3.3  
 Training 2.6  
 CIRCLE 472 ON READER CARD

**RPG II (System/360 & 370)**

**IBM Corporation**  
*Output-oriented programming language.*  
 Users reporting 53  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.4  
 Ease of installation 3.5  
 Ease of use 3.6  
 Documentation 3.4  
 Vendor technical support 3.1  
 Training 3.1  
 CIRCLE 473 ON READER CARD

**RSTS**

**Digital Equipment Corporation**  
*Resource-sharing / time-sharing*

*operating system for PDP-11.*  
 Users reporting 9  
 Overall satisfaction 3.1  
 Throughput/efficiency 3.2  
 Ease of installation 3.3  
 Ease of use 3.4  
 Documentation 2.4  
 Vendor technical support 2.5  
 Training 2.8  
 CIRCLE 474 ON READER CARD

**RSX-11D**

**Digital Equipment Corporation**  
*Advanced real-time operating system for PDP-11/35 and up.*  
 Users reporting 8  
 Overall satisfaction 2.3  
 Throughput/efficiency 2.1  
 Ease of installation 2.3  
 Ease of use 2.1  
 Documentation 2.0  
 Vendor technical support 2.3  
 Training 2.3  
 CIRCLE 475 ON READER CARD

**RSX-11M**

**Digital Equipment Corporation**  
*Subset of foregoing (RSX-11D); operates on PDP-11/04 and up.*  
 Users reporting 7  
 Overall satisfaction 3.4  
 Throughput/efficiency 3.0  
 Ease of installation 3.0  
 Ease of use 3.1  
 Documentation 2.9  
 Vendor technical support 1.9  
 Training 2.5  
 CIRCLE 476 ON READER CARD

**RT-11**

**Digital Equipment Corporation**  
*Foreground / background disc operating system for real-time DEC PDP-11.*  
 Users reporting 11  
 Overall satisfaction 2.7  
 Throughput/efficiency 2.6  
 Ease of installation 2.5  
 Ease of use 2.5  
 Documentation 1.7  
 Vendor technical support 1.5  
 Training 1.6  
 CIRCLE 477 ON READER CARD

**RTE II**

**Hewlett-Packard Company**  
*Real-time executive operating system for HP 21MX and 2100 series.*  
 Users reporting 9  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.9  
 Ease of installation 2.6  
 Ease of use 2.7  
 Documentation 2.3  
 Vendor technical support 2.2  
 Training 2.6  
 CIRCLE 478 ON READER CARD

**RTOS**

**General Automation, Inc.**  
*Real-time operating system for SPC-16 and SPC-16-based systems.*  
 Users reporting 3  
 Overall satisfaction 3.0

Throughput/efficiency 3.0  
 Ease of installation 2.3  
 Ease of use 3.3  
 Documentation 1.3  
 Vendor technical support 2.7  
 Training 2.0  
 CIRCLE 479 ON READER CARD

**Save/Restore**

**Oxford Software Corporation**  
*IBM 360/370 DOS or DOS/vs disc utility, library condenser, etc.*  
 Users reporting 3  
 Overall satisfaction 3.7  
 Throughput/efficiency 4.0  
 Ease of installation 3.7  
 Ease of use 3.7  
 Documentation 3.3  
 Vendor technical support 3.0  
 Training 4.0  
 CIRCLE 480 ON READER CARD

**SIM 14**

**Dearborn Computer Leasing Co.**  
*Simulator for IBM 1401, 1440, or 1460 computers on any IBM 360/370; replaces hardware emulator.*  
 Users reporting 4  
 Overall satisfaction 3.5  
 Throughput/efficiency 2.3  
 Ease of installation 3.2  
 Ease of use 3.5  
 Documentation 2.5  
 Vendor technical support 3.2  
 Training 2.7  
 CIRCLE 481 ON READER CARD

**SLICK**

**NCI, Inc.**  
*Source program librarian for IBM 360/370 DOS or DOS/vs; os version under development; also maintains object code, JCL, data files, and text.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.7  
 Ease of installation 3.0  
 Ease of use 3.0  
 Documentation 3.0  
 Vendor technical support 2.7  
 Training 3.0  
 CIRCLE 482 ON READER CARD

**Score**

**Programming Methods Co.**  
*Multi-purpose COBOL program generator for most mainframes.*  
 Users reporting 9  
 Overall satisfaction 2.7  
 Throughput/efficiency 2.9  
 Ease of installation 3.0  
 Ease of use 3.0  
 Documentation 3.1  
 Vendor technical support 2.7  
 Training 2.9  
 CIRCLE 483 ON READER CARD

**1130/Sort**

**DNA Systems, Inc.**  
*Sort program for the IBM 1130 and compatible systems.*  
 Users reporting 11  
 Overall satisfaction 3.9  
 Throughput/efficiency 3.9

Ease of installation 3.9  
 Ease of use 3.6  
 Documentation 3.5  
 Vendor technical support 3.6  
 Training 3.5  
 CIRCLE 484 ON READER CARD

**Sort (System/3)**  
**IBM Corporation**  
 Users reporting 20  
 Overall satisfaction 3.2  
 Throughput/efficiency 2.8  
 Ease of installation 3.4  
 Ease of use 3.2  
 Documentation 2.8  
 Vendor technical support 3.1  
 Training 2.8  
 CIRCLE 485 ON READER CARD

**Sort (System/360 & 370)**  
**IBM Corporation**  
*Disc-based sort.*  
 Users reporting 70  
 Overall satisfaction 3.3  
 Throughput/efficiency 3.2  
 Ease of installation 3.4  
 Ease of use 3.4  
 Documentation 3.2  
 Vendor technical support 3.1  
 Training 3.1  
 CIRCLE 486 ON READER CARD

**SPRINT**  
**Oxford Software Corp.**  
*Spooling supplement to IBM 360/370 DOS & DOS/vs.*  
 Users reporting 26  
 Overall satisfaction 3.4  
 Throughput/efficiency 3.5  
 Ease of installation 3.4  
 Ease of use 3.4  
 Documentation 3.0  
 Vendor technical support 2.8  
 Training 2.3  
 CIRCLE 487 ON READER CARD

**SPOOLER**  
**Boothe Management Systems, Inc.**  
*Replacement for IBM's POWER spooler.*  
 Users reporting 3  
 Overall satisfaction 2.3  
 Throughput/efficiency 2.7  
 Ease of installation 3.0  
 Ease of use 2.7  
 Documentation 2.5  
 Vendor technical support 2.0  
 Training 2.5  
 CIRCLE 488 ON READER CARD

**STAIRS**  
**IBM Corporation**  
*Multi-user storage and information retrieval system for IBM 360/370; can use CICS or IMS as supervisor; for text data bases.*  
 Users reporting 4  
 Overall satisfaction 2.7  
 Throughput/efficiency 2.5  
 Ease of installation 2.5  
 Ease of use 3.5  
 Documentation 3.0  
 Vendor technical support 2.8  
 Training 3.0  
 CIRCLE 489 ON READER CARD

**Statistical Program for Social Sciences**  
**SPSS, Inc.**  
*Statistical work in the social sciences on IBM 360/370, Univac 1100, CDC 6000, or Xerox Sigma 9 systems.*  
 Users reporting 15  
 Overall satisfaction 3.4  
 Throughput/efficiency 2.9  
 Ease of installation 3.4  
 Ease of use 3.5  
 Documentation 3.4  
 Vendor technical support 2.8  
 Training 1.5  
 CIRCLE 490 ON READER CARD

**Stock & Bond**  
**The Equimatics Company**  
*Investment management and portfolio control, primarily for financial industry; runs on IBM 360/370 under os.*  
 Users reporting 3  
 Overall satisfaction 2.7  
 Throughput/efficiency 3.3  
 Ease of installation 2.3  
 Ease of use 3.0  
 Documentation 3.3  
 Vendor technical support 3.0  
 Training 2.7  
 CIRCLE 491 ON READER CARD

**STRATA**  
**Touche, Ross & Co.**  
*Audit programs for any IBM 360/370 or Burroughs B 2500 to B 4700.*  
 Users reporting 4  
 Overall satisfaction 3.2  
 Throughput/efficiency 3.2  
 Ease of installation 3.0  
 Ease of use 3.5  
 Documentation 3.0  
 Vendor technical support 2.5  
 Training 3.2  
 CIRCLE 492 ON READER CARD

**SWIFT**  
**GBA International**  
*Data communications monitor for small to medium IBM 360/370, DOS or DOS/vs.*  
 Users reporting 4  
 Overall satisfaction 3.5  
 Throughput/efficiency 3.2  
 Ease of installation 3.5  
 Ease of use 3.5  
 Documentation 2.5  
 Vendor technical support 4.0  
 Training 3.2  
 CIRCLE 493 ON READER CARD

**SYNCSORT**  
**Whitlow Computer Systems, Inc.**  
*Efficient os or os/vs disc & tape sorting on IBM 360/370.*  
 Users reporting 23  
 Overall satisfaction 3.6  
 Throughput/efficiency 3.7  
 Ease of installation 3.5  
 Ease of use 3.6  
 Documentation 3.2  
 Vendor technical support 3.4  
 Training 3.1  
 CIRCLE 494 ON READER CARD

**System 2000**  
**MRI Systems Corporation**  
*Generalized data base management system for IBM 360/370, Univac 1100, & CDC 6000 or Cyber systems.*  
 Users reporting 13  
 Overall satisfaction 3.0  
 Throughput/efficiency 2.4  
 Ease of installation 3.2  
 Ease of use 2.8  
 Documentation 2.8  
 Vendor technical support 2.9  
 Training 2.7  
 CIRCLE 495 ON READER CARD

**TASK/MASTER**  
**Turnkey Systems, Inc.**  
*Data communications monitor for IBM 360/370.*  
 Users reporting 25  
 Overall satisfaction 3.1  
 Throughput/efficiency 3.0  
 Ease of installation 2.7  
 Ease of use 3.1  
 Documentation 2.4  
 Vendor technical support 2.6  
 Training 2.5  
 CIRCLE 496 ON READER CARD

**TDS**  
**Honeywell Information Systems**  
*Allows terminal users, especially executives, to interactively retrieve and manipulate data contained in batch data bases on the company's 6000 and Series 60 systems; the acronym means transaction-driven system.*  
 Users reporting 3  
 Overall satisfaction 3.7  
 Throughput/efficiency 4.0  
 Ease of installation 3.5  
 Ease of use 4.0  
 Documentation 2.0  
 Vendor technical support 2.5  
 Training 3.0  
 CIRCLE 497 ON READER CARD

**TLMS**  
**Gulf Oil Computer Sciences, Inc.**  
*Tape library management system for IBM 360/370 OS and OS/vs.*  
 Users reporting 5  
 Overall satisfaction 3.6  
 Throughput/efficiency 3.6  
 Ease of installation 2.4  
 Ease of use 3.0  
 Documentation 3.0  
 Vendor technical support 3.0  
 Training 2.2  
 CIRCLE 498 ON READER CARD

**TOTAL**  
**Cincom Systems, Inc.**  
*Data base management system for most mainframes.*  
 Users reporting 116  
 Overall satisfaction 3.3  
 Throughput/efficiency 3.1  
 Ease of installation 3.3  
 Ease of use 3.3  
 Documentation 3.3  
 Vendor technical support 2.7  
 Training 2.9  
 CIRCLE 499 ON READER CARD

**TSO**  
**DNA Systems, Inc.**  
*Time-sharing operating system for IBM 1130 and compatible systems.*  
 Users reporting 5  
 Overall satisfaction 3.6  
 Throughput/efficiency 3.6  
 Ease of installation 3.6  
 Ease of use 3.8  
 Documentation 2.8  
 Vendor technical support 3.6  
 Training 3.0  
 CIRCLE 500 ON READER CARD

**TSO**  
**IBM Corporation**  
*Time-Sharing Option for IBM 360/370 OS/MVT or OS/vs2; supports Code & Go FORTRAN, ITF-BASIC, and ITF-PL/1.*  
 Users reporting 3  
 Overall satisfaction 3.0  
 Throughput/efficiency 3.0  
 Ease of installation 3.0  
 Ease of use 3.0  
 Documentation 3.0  
 Vendor technical support 2.7  
 Training 2.7  
 CIRCLE 501 ON READER CARD

**UCC ONE (also known as TMS)**  
**University Computing Company**  
*Tape management system for IBM 360/370 OS or OS/vs.*  
 Users reporting 17  
 Overall satisfaction 3.8  
 Throughput/efficiency 3.5  
 Ease of installation 3.1  
 Ease of use 3.4  
 Documentation 3.1  
 Vendor technical support 3.0  
 Training 2.5  
 CIRCLE 502 ON READER CARD

**UCC TWO (also known as DUO)**  
**University Computing Company**  
*Aid for conversion from DOS or DOS/vs to OS or OS/vs on IBM 360/370.*  
 Users reporting 11  
 Overall satisfaction 3.5  
 Throughput/efficiency 2.9  
 Ease of installation 2.9  
 Ease of use 3.2  
 Documentation 3.1  
 Vendor technical support 3.1  
 Training 2.6  
 CIRCLE 503 ON READER CARD

**UCC TEN**  
**University Computing Company**  
*Data dictionary manager & control statement generator for IBM's IMS.*  
 Users reporting 6  
 Overall satisfaction 3.2  
 Throughput/efficiency 3.0  
 Ease of installation 3.0  
 Ease of use 3.5  
 Documentation 2.4  
 Vendor technical support 2.6  
 Training 2.0  
 CIRCLE 504 ON READER CARD

**UNIX****Western Electric Co., Inc.**

Multi-user time-sharing system for DEC PDP-11/40 and up; supports several languages; can replace DEC's RSTS.

Users reporting	3
Overall satisfaction	3.7
Throughput/efficiency	3.3
Ease of installation	3.3
Ease of use	3.0
Documentation	1.7
Vendor technical support	2.2
Training	—

CIRCLE 505 ON READER CARD

**Versaplot****Versatec, Inc.**

Supports the company's electrostatic printers and plotters on nearly any byte-oriented FORTRAN minicomputer.

Users reporting	5
Overall satisfaction	2.8
Throughput/efficiency	2.4
Ease of installation	2.4
Ease of use	2.4
Documentation	3.0
Vendor technical support	2.7
Training	—

CIRCLE 507 ON READER CARD

**VORTEX****Varian Data Machines**

Varian omnitask real-time executive operating system for the company's 620 and V70 computers (VORTEX II for memory-mapped cpu's).

Users reporting	5
Overall satisfaction	2.8
Throughput/efficiency	2.2
Ease of installation	2.4
Ease of use	2.4
Documentation	1.8
Vendor technical support	2.0
Training	2.0

CIRCLE 509 ON READER CARD

**WESTI (also known as Teleprocessing Interface System)****Westinghouse Electric Corp.**

Display monitor for 2260 & 3270 terminals on IBM 360/370 DOS & DOS/vs.

Users reporting	24
Overall satisfaction	3.5
Throughput/efficiency	3.4
Ease of installation	3.5
Ease of use	3.4
Documentation	3.4
Vendor technical support	3.5
Training	2.9

CIRCLE 511 ON READER CARD

**Utilities (System/3)****IBM Corporation**

System/3 utility programs (not further classified by survey respondents).

Users reporting	4
Overall satisfaction	3.0
Throughput/efficiency	3.2
Ease of installation	3.7
Ease of use	3.2
Documentation	2.7
Vendor technical support	3.5
Training	2.5

CIRCLE 506 ON READER CARD

**VIDEO****IBM Corporation**

Crt-oriented on-line data entry system for IBM 360/370.

Users reporting	5
Overall satisfaction	2.8
Throughput/efficiency	2.6
Ease of installation	1.8
Ease of use	3.2
Documentation	2.4
Vendor technical support	2.6
Training	2.5

CIRCLE 508 ON READER CARD

**WATFIV****University of Waterloo**

Fast, in-memory FORTRAN compiler for IBM 360/370.

Users reporting	9
Overall satisfaction	4.0
Throughput/efficiency	4.0
Ease of installation	3.7
Ease of use	4.0
Documentation	3.3
Vendor technical support	3.0
Training	2.0

CIRCLE 510 ON READER CARD

**Work Ten****NCI, Inc.**

Creates IBM 360/370 COBOL programs and documentation from standardized input forms filled in by programmers.

Users reporting	3
Overall satisfaction	2.7
Throughput/efficiency	2.7
Ease of installation	3.0
Ease of use	3.3
Documentation	2.3
Vendor technical support	2.7
Training	3.0

CIRCLE 512 ON READER CARD

**Vendor Index**

Listed below, for your convenience in obtaining additional information, are the full names, addresses, and telephone numbers of the 92 vendors whose packages are mentioned in this article.

**Adpac Corporation**

120 Howard St.  
San Francisco, CA 94115  
(415) 981-2710

**American Appraisal, Inc.**

525 East Michigan St.  
Milwaukee, WI 53201  
(414) 271-7240

**American Valuation Consultants, Inc.**

One North Broadway  
Des Plaines, IL 60016  
(312) 297-6100

**Applications Software, Inc.**

21515 Hawthorne  
Torrance, CA 90503  
(213) 542-4381

**Applied Data Research, Inc.**

Route 206 Center  
Princeton, NJ 08540  
(609) 921-8550

**Aquila BST, Ltd.**

P.O. Box 10  
Stock Exchange Tower  
Montreal, Quebec,  
Canada H4Z 1A4

**Arthur Andersen & Company**

69 West Washington  
Chicago, IL 60602  
(312) 346-6262

**Atlantic Software, Inc.**

Lafayette Building, Suite 910  
Fifth & Chestnut Sts.  
Philadelphia, PA 19106  
(215) 922-7500

**Automated Financial Systems, Inc.**

Suite 420  
One Bala Cynwyd Plaza  
Bala Cynwyd, PA 19004  
(215) 667-1000

**The Automated Quill, Inc.**

3501 South Corona  
Suite 7  
Englewood, CO 80110  
(303) 761-2722

**Boole & Babbage, Inc.**

850 Stewart Drive  
Sunnyvale, CA 94086  
(408) 735-9550

**Boothe Management Systems**

555 California St.  
San Francisco, CA 94104  
(415) 989-6580

**Burroughs Corporation**

Burroughs Place  
Detroit, MI 48232  
(313) 972-7000

**California Computer Products, Inc. (CalComp)**

2411 West La Palma Ave.  
Anaheim, CA 92801  
(714) 821-2541

**Cambridge Computer Associates, Inc.**

222 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 868-1111

**Capex Corporation**

2613 North Third St.  
Phoenix, AZ 85004  
(602) 264-7241

**Certified Software Products**

3140 Harbor Lane North  
Minneapolis, MN 55441  
(612) 546-8919

**CFS, Inc.**

P.O. Box 662  
Brookline, MA 02147  
(617) 731-3474

**Cincom Systems, Inc.**

2300 Montana Ave.  
Cincinnati, OH 45211  
(513) 662-2300

**Computer Audit Systems, Inc.**

80 Main St.  
East Orange, NJ 07052  
(201) 736-9720

**Computer Information Management Company**

325 Oak Plaza Building  
3707 Rawlins St.  
Dallas, TX 75219  
(214) 526-4280

**Comress, Inc.**

2 Research Court  
Rockville, MD 20850  
(301) 948-8000

**Comtech Laboratories, Inc.**

135 Engineers Road  
Smithtown, NY 11787  
(516) 231-5454

**Condata, Inc.**

1809 Walnut St.  
Philadelphia, PA 19103  
(215) 569-4240

**Cullinane Corporation**

20 William St.  
Wellesley, MA 02181  
(617) 237-6601

**Data General Corporation**

Route 9  
Southboro, MA 01772  
(617) 485-9100

**Data-Man Ltd.**

Box 9234  
Bow Valley Square II  
205 Fifth Ave.  
Calgary, Alberta,  
Canada T2P 2W4  
(403) 266-6358

**Datachron Corporation**  
174 Fifth Ave.  
New York, NY 10010  
(212) 675-5333

**Datapoint Corporation**  
9725 Datapoint Drive  
San Antonio, TX 78284  
(512) 690-7000

**Dearborn Computer Leasing Co.**  
4849 North Scott St.  
Schiller Park, IL 60176  
(312) 671-4410

**Digital Equipment Corp. (DEC)**  
146 Main St.  
Maynard, MA 01754  
(617) 897-5111

**Diversified Data Systems, Inc.**  
2601 Fairview Ave.  
Tucson, AZ 85705  
(602) 792-3205

**DNA Systems, Inc.**  
1258 South Washington  
P.O. Box 1424  
Saginaw, MI 48605  
(517) 793-0185

**Donovan Data Systems, Inc.**  
666 Fifth Ave.  
New York, NY 10019  
(212) 586-0055

**Duquesne Systems, Inc.**  
1511 Park Building  
355 Fifth Ave.  
Pittsburgh, PA. 15222  
(412) 281-9055

**Dylakor Software Systems, Inc.**  
16255 Ventura Boulevard  
Suite 808  
Encino, CA 91436  
(213) 995-0151

**Educational & Administrative Systems, Inc.**  
P.O. Box 3057  
Greenville, SC 29602  
(803) 294-2021

**The Equimatics Company**  
United Fidelity Building  
1025 Elm St.  
Dallas, TX 75202  
(214) 744-4342

**Florida Software Services, Inc.**  
711 Semoran Boulevard  
Fourth Floor  
Altamonte Springs, FL 32701  
(305) 831-3001

**Foresight Systems, Inc.**  
(a subsidiary of United Computing Systems, Inc., which is a subsidiary of United Telecommunications Company, since August 1, 1975; prior to that, Foresight was a subsidiary of Johns-Manville)  
1901 Avenue of the Stars,  
Suite 585, Century City  
Los Angeles, CA 90067  
(213) 277-2722

**GBA International**  
2670 Leavenworth St.  
San Francisco, CA 94133  
(415) 673-5400

**General Automation, Inc.**  
1055 South East St.  
Anaheim, CA 92803  
(714) 778-4800

**Group/3 Division, Informatics, Inc.**  
(a subsidiary of the Equitable Life Assurance Society of America)  
21050 Vanowen St.  
Canoga Park, CA 91304  
(213) 884-6678

**Gulf Oil Computer Sciences, Inc.**  
P.O. Box 2100  
Houston, TX 77001  
(713) 228-7040

**Hewlett-Packard Company**  
Data Systems Division  
11000 Wolfe Road  
Cupertino, CA 95104  
(408) 257-7000

**Honeywell Information Systems, Inc.**  
(a subsidiary of Honeywell, Inc.)  
200 Smith St.  
Waltham, MA 02154  
(617) 890-8400

**IBM Corporation**  
Data Processing Division  
1133 Westchester Ave.  
White Plains, NY 10604  
(914) 696-1900

**IBM Corporation**  
General Systems Division  
P.O. Box 2150  
Atlanta, GA 30301  
(404) 256-7000

**Infodata Systems, Inc.**  
30A State St.  
Pittsford, NY 14534  
(716) 578-3430

**Infonational, Inc.**  
6626 Convoy Court  
San Diego, CA 92111  
(714) 560-7070

**Informatics MARK IV Systems Co.**  
(a subsidiary of the Equitable Life Assurance Society of America)  
21050 Vanowen St.  
Canoga Park, CA 91304  
(213) 887-9121

**Innovation Data Processing, Inc.**  
Clifton Executive Plaza II  
925 Clifton Avenue  
Clifton, NJ 07013  
(201) 777-1940

**Integrated Software Systems Corporation**  
4186 Sorrento Valley Boulevard  
Suite N  
San Diego, CA 92121  
(714) 272-5606

**International Mathematical & Statistical Laboratories, Inc.**  
7500 Bellaire Boulevard  
Sixth Floor  
Houston, TX 77036  
(713) 772-1927

**Johnson Systems, Inc.**  
1651 Old Meadow Road  
McLean, VA 22101  
(703) 893-8700

**Arthur S. Kranzley & Company**  
1010 South Kings Highway  
Cherry Hill, NJ 08034  
(609) 795-1515

**Management & Computer Services, Inc.**  
790 Valley Forge Plaza  
Valley Forge, PA 19482  
(215) 265-2190

**Management Information Service**  
145 Franklin Turnpike  
Ramsey, NJ 07445  
(201) 327-8510

**Management Science America (MSA)**  
3445 Peachtree Road  
Atlanta, GA  
(404) 262-2376

**Maxima System Group**  
1475 Powell Street  
Emeryville, CA 94608  
(415) 654-6030

**McCormack & Dodge Corporation**  
One Wells Avenue  
Newton, MA 02159  
(617) 965-3750

**MRI Systems Corporation**  
12575 Research Boulevard  
Austin, TX 78766  
(512) 258-5171

**NCI, Inc.**  
6075 Roswell Road, NE  
Atlanta, GA 30328  
(404) 252-9474

**NCR Corporation**  
South Main & K Streets  
Dayton, OH 45479  
(513) 449-2000

**Network Data Processing**  
321 Third St.  
Cedar Rapids, IA 52407  
(319) 365-8691

**Oxford Software Corporation**  
1567 Palisades Ave.  
Fort Lee, NJ 07024  
(201) 944-0083

**Pace Applied Technology, Inc.**  
2990 Telestar Court  
Falls Church, VA 22042  
(703) 573-9131

**Pansophic Systems, Inc.**  
709 Enterprise Drive  
Oak Brook, IL 60521  
(312) 986-6000

**Princeton University**  
Computer Center  
87 Prospect Ave.  
Princeton, NJ 08540  
(609) 452-6042

**Program Products Incorporated**  
95 Chestnut Ridge Road  
Montvale, NJ 07645  
(201) 391-9800

**Programming Methods Co.**  
(a subsidiary of Informatics, Inc., which is a subsidiary of the Equitable Life Assurance Society of America; prior to October 1, 1975, PMC was a division of GTE Information Systems, Inc.)  
1301 Avenue of Americas  
New York, NY 10019  
(212) 489-7200

**Software AG (of North America, Inc.)**  
11800 Sunrise Valley Drive  
Reston, VA 22091  
(703) 620-9577

**Software Design, Inc.** \*  
800 Mitten Road  
Burlingame, CA 94010  
(415) 697-3660

**Software International Corp.**  
(affiliate of Manufacturing  
Management Science)  
2 Elm Square  
Andover, MA 01810  
(617) 475-5040

**SPSS, Incorporated**  
National Opinion Research  
Center  
6030 South Ellis Ave.  
Chicago, IL 60637  
(312) 753-1545

**Sys Con, Inc.**  
126 Ottawa Avenue, NW  
Grand Rapids, MI 49502  
(616) 451-8471

**System Support Software, Inc.**  
1132 Donson Drive  
Dayton, OH 45429  
(513) 435-9514

**TCC, Inc.**  
3429 Executive Center Drive  
Austin, TX 78731  
(512) 345-5700

**The Computer Software  
Company**  
6517 Everglades Drive  
Richmond, VA 23225  
(804) 276-9200

**Time Share Corporation**  
3 Lebanon St.  
Hanover, NH 03755  
(603) 643-3640

**Touche, Ross & Company**  
1633 Broadway  
New York, NY 10019  
(212) 489-1600

**Turnkey Systems, Inc.**  
111 East Ave.  
Norwalk, CT 06851  
(203) 853-2884

**Universal Software, Inc.**  
136 White Street  
Danbury, CT 06810  
(203) 792-5100

**University Computing  
Company**  
(subsidiary of the Wyly  
Corporation)  
UCC Tower  
P.O. Box 47911  
7200 Stemmons Freeway  
Dallas, TX 75247  
(214) 637-5010

**University of California at  
Los Angeles (UCLA)**  
Department of Biomathematics  
Room AV111  
Los Angeles, CA 90024  
(213) 825-5697

**University of Waterloo**  
Supervisor of Technical  
Products & Program  
Distribution Computing Centre  
Math & Computer Building  
Waterloo, Ontario, Canada  
N2L 3G1  
(519) 885-1211, Extension  
3268

**Value Computing, Inc.**  
300 West Marlton Pike  
Cherry Hill, NJ 08034  
(609) 429-4200

**Varian Data Machines**  
(subsidiary of Varian  
Associates)  
2722 Michelson Drive  
Irvine, CA 92664  
(714) 833-2400

**Versatec, Inc.**  
2805 Bowers Ave.  
Santa Clara, CA 95051 \*  
(408) 257-9900

**Wang Laboratories, Inc.**  
Wang Computer Services  
Division  
836 North St.  
Tewksbury, MA 08176  
(617) 851-4111

**Western Electric Company, Inc.**  
General Manager, Patent  
Licensing  
222 Broadway  
New York, NY 10038  
(212) 571-2691  
(marketing UNIX, a package  
originally developed and sold  
by Bell Telephone Laboratories)

**Westinghouse Electric Corp.**  
2040 Ardmore Boulevard  
Pittsburgh, PA 15221  
(412) 256-5583

**Whitlow Computer Systems,  
Inc.**  
560 Sylvan Ave.  
Englewood Cliffs, NJ 07632  
(201) 568-9700 \*

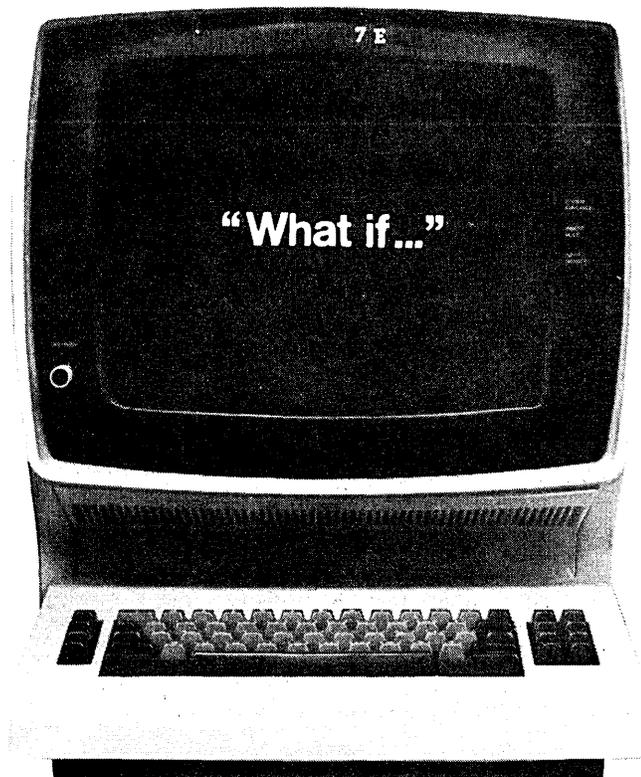


"That's Farquarson, our old vice president in charge of Management Information Systems. He couldn't get the hang of our new system so we had to find a new slot for him."

© DATAMATION ®

# ASI/INQUIRY

## The IMS DB/DC QUERY LANGUAGE



ASI/INQUIRY is an IMS DB/DC query language that operates completely as an interactive Message Processing Program. The design of ASI/INQUIRY is such that the *structure of the data base is transparent to the user*. Moreover, one need not have familiarity with DL/1 segment logic or the complexities of multi-pathing. Extremely rapid response time is assured.

### MAJOR HIGHLIGHTS

- End-user oriented
  - Easy-to-use language
  - Requires no knowledge of IMS
  - Comprehensive diagnostic messages
- Rapid response time for even the most complex queries
- Dynamic priority scheduling to maximize system performance
- Availability of default as well as user-defined screen formatting

ASI/INQUIRY has been fully operational for over six months, and is currently installed in multiple sites here and in Europe.

In summary, ASI/INQUIRY represents the state-of-the-art product in an IMS DB/DC environment. It is the only system combining an easy to use language, complete user flexibility, and rapid response time in a single package. If you want to start answering "What if . . . ." immediately, call or write today for further information.



The Software Manufacturer

Applications Software, Inc.  
Corporate Offices  
21515 Hawthorne Boulevard  
Torrance, California 90503  
(213) 542-4381

# OUR SHORT DROPS COULD BE A WHOLE LOT CHEAPER THAN YOUR LONG HAULS.

If you're thinking of expanding your communications network, then a Cable & Wireless leased circuit system is what you need. If you're already running a leased circuit there's more than a chance that if you let us look it over, we could make it a lot more cost-effective.

And, if you're a company whose major interests are in the Far East or the Middle East we could

*certainly* save you money.

Cable & Wireless have the computer-switching centres which can pick up your messages and transmit them more cheaply.

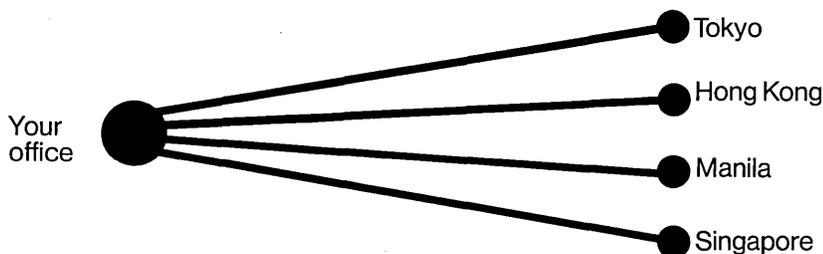
Our switching centre in Hong Kong, for instance, means that your traffic can be passed through there and routed on by a 'short drop' to, say, Tokyo and Manila at a tremendous saving in cost against a 'long-

haul' system direct from your head office.

Similarly, our switching centre in Bahrain can cut your costs in the Middle East.

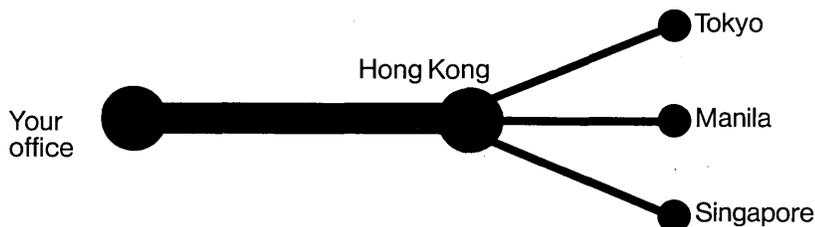
But there's a lot more to it than that, and we'd like to explain it to you.

If you think you'd like to listen, contact us at the address below. We'll send you literature, or have someone call.



## THE LONG HAUL.

This system could be costing you much more than it need!



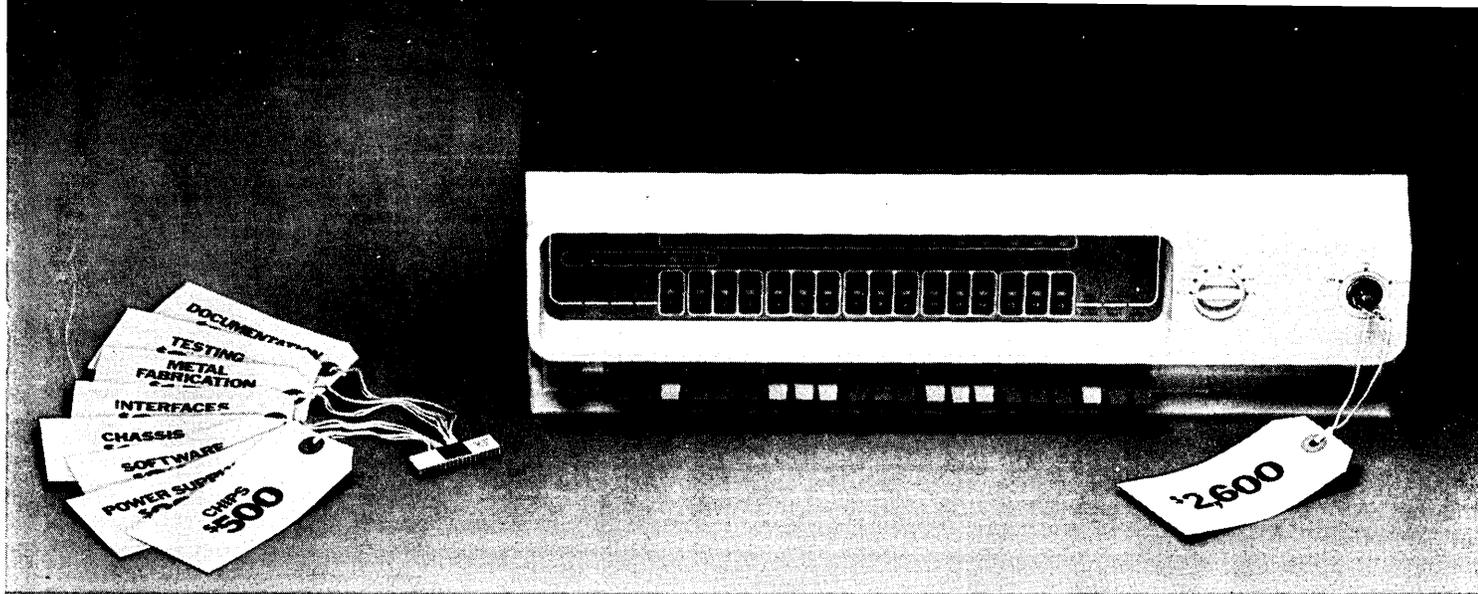
## THE SHORT DROP.

A Cable & Wireless leased circuit using short drops like this could cost you much less than you think!

 **CABLE &  
WIRELESS**

**Keeps you in touch with the world.**

Cable & Wireless, International Commercial Dept., Mercury House, Theobalds Road, London WC1X 8RX. Tel: 01-242 4433. Telex: 23181.  
U.S. Office: Cable & Wireless (NYK) Inc., Graybar Building, Suite 2020, 420 Lexington Av., New York 10017. Tel: 212-889-9020. Telex: 12094.



## Has your \$500 micro ended up costing more than our \$2,600 mini?

If you've had to spend a lot of money on a low priced micro, you may be in a position to appreciate the cost advantages of a higher priced computer.

Our \$2600 Nova 3\*.

When you buy a Nova 3, you don't have to put as much into it to get it to do your job.

You don't have to create your own operating systems. Nova 3 is software compatible with our other Novas. So you get to use all the existing Nova operating systems, language processors and utilities.

And you don't have to worry about performance. Nova 3 executes instructions in 700 nanoseconds using MOS memory. And its sophisticated architecture lets you use up to 128K Words with the optional Memory Management Unit.

You don't have to buy more

computer than you need. Nova 3 has the broadest range of compatible configurations you can get in an OEM minicomputer line. There's a 4 slot Nova 3. A 12 slot Nova 3. (It has an optional expansion chassis that gives you 12 more slots of I/O.) And you can configure multiple processor Nova 3 systems.

You don't have to worry about Nova 3 availability. We're manufacturing virtually every part of the Nova 3. Including the silicon gate N-channel MOS RAM memories. (They're coming from our Sunnyvale, California facility.)

And you don't have to go it alone. Because when you buy a Nova 3, you can get all the support Data General offers an OEM.

Write or call for the Nova 3 brochure. It may persuade you to buy more and spend less.

\*\$2600 is the single unit price for a 4K MOS memory Nova 3. Before the OEM and quantity discounts get figured in.

# DataGeneral

Nova 3: The biggest thing to ever hit the OEM market.

• Data General, Dept.L-5, Route 9, Southboro, Mass. 01772 (617) 485-9100. Data General (Canada) Ltd., Ontario. Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361/Sydney (02) 908-1366.

CIRCLE 68 ON READER CARD

# hardware

## Off-line

It would seem ridiculous for a coffee truck to show up outside your plant one morning with floppy discs next to the breakfast rolls, wouldn't it? But a new (Calif.) corporation, called Datavan, is starting a similar service together with Memorex Corp. Datavan has purchased six large camper-sized vans and will regularly call on dp centers to offer services such as ribbon re-inking, disc and tape cleaning, etc. A full line of Memorex media will also be on board as will a coffee urn, we're told....

Diva, Inc., Eatontown, N.J., has reduced prices on its minicomputer disc line. DEC, Data General, and Interdata users can now get 27.3 megabytes of disc pack storage for \$13,600 and 82.1 megabytes for only \$17,400. Prices include all interconnecting cables, terminators, emulator formatter, and diagnostic software.

The one thousandth model 2640 crt has recently rolled off the Hewlett-Packard production line in Cupertino, Calif., less than a year after announcement. (See Nov. '74, p. 146.)

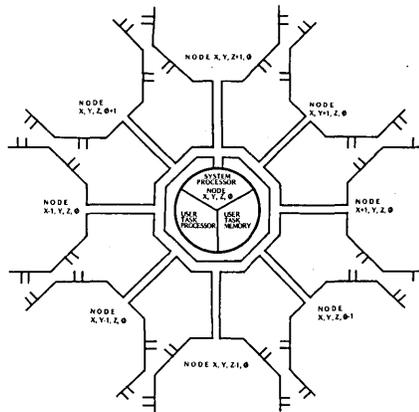
Tektronix' latest graphics announcement, the 4051, has an interesting feature that will probably be copied by other manufacturers. The optional plotter does double duty as a digitizer, thus offering another way to get information into the system. Tektronix claims it's a first.

Ball Brothers, the company that made its mark with home canning jars years ago, and has since diversified into ski resorts and aerospace, has recently purchased the Caelus 412 disc drive product line. Formal announcement is slated for early next year.

Let's Make This Perfectly Clear Dept: The \$225 price mentioned for Digi-Log's latest terminal (Oct., p. 148) refers only to the monitor, and is not the price of the entire terminal (though it's not much more than that!) The five-inch monitor is an alternative to the more expensive 12-inch unit marketed in the past.

E-Systems, Dallas, has obtained patents for an ocr device capable of reading any mail bar code the eye can see for a lower price than any other device on the market, says the company.

## product spotlight



IMSAI HYPERCUBE NODE

### Microprocessor Array

The HYPERCUBE is the first product to be announced that points the way to the computer architectures of the next several decades, if you agree with the consensus of computing experts. The price performance of microprocessors is so good that it just makes good sense to arrange them in arrays and overlap their performance. Certainly there will be some claims that may or may not be lived up to, and there will undoubtedly be teething problems, but arrays of small processors do offer some attractive monolithic systems—both hardware and software.

There are three models of this product, called the HYPERCUBE, the HYPERCUBE II, with 16 processor nodes (2x2x2x2 array), the HYPERCUBE III with 81 processor nodes (3x3x3x3 array) and the HYPERCUBE IV with 256 nodes (4x4x4x4 array). Each "node" in the array uses not one but two Intel 8080 processors and communicates via shared memories with eight adjacent nodes. One processor in each node is dedicated to system overhead and communications tasks, leaving the second processor completely free to execute user code. It's claimed that this functional separation makes system crashes caused by user software impossible. Each node of the HYPERCUBE has an execution rate of one million in-

SUPPLEMENTAL DATA

The following matrix summarizes the capabilities and cost of the three HYPERCUBE configurations announced:

	HYPERCUBE II (Order 2)	HYPERCUBE III (Order 3)	HYPERCUBE IV (Order 4)
Aggregate instruction executions per second	16 million	81 million	256 million
Aggregate programmed I/O Capacity per second	4 megabytes	20 megabytes	64 megabytes
Aggregate DMA capacity per second	32 megabytes	162 megabytes	512 megabytes
Number of I/O device controllers attachable	96	216	384
Number of Concurrently Operating tasks	16	81	256
Standard User Program Memory Size	256K bytes	1 megabyte	4 megabytes
Optional Fully expanded User Program Memory	1.2 megabytes	5 megabytes	16 megabytes
Cost	\$80,000	\$400,000	\$1,280,000

IMSAI HYPERCUBE CAPABILITIES AND COST

structions per second, a direct memory access capacity of two megabytes per second, and 16K bytes of user program memory, expandable to 64K. For the HYPERCUBE III these figures add up to a system with an aggregate instruction rate of 81 million executions per second, a DMA capacity of 162 megabytes per second, and a total user program memory of 1.2 megabytes, expandable to five megabytes.

There is an operating system called the HYPERCUBE Operating System (HOS) which resides entirely in the nodal microprocessors dedicated to system operation. HOS supports all associated I/O device controllers and provides for all internodal user and system communications. In the HYPERCUBE III, HOS supports 81 independent user tasks in parallel, providing full intertask communications while simultaneously communicating with up to 216 I/O device controllers. This contrasts with the design of the ILLIAC IV, where programs must be broken up and parcelled out to the independent processors.

What the manufacturer calls four dimensional architecture gives each node eight independent data paths to HOS, assuring failsoft internodal communication. Any data path or communication link interruption is detected by HOS and a new optimum

# The Elite 1520A Video Terminal.

## New from Datamedia.

**Conversational.** The Elite 1520A speaks your application language, and is ideal for interactive programming, data entry, information retrieval and simply anyplace the need for data communication is important.

**Expandable.** The Elite 1520A offers the standard 64-character ASCII set displaying 1920 alphanumeric characters in a 24-line/80-character format, and is optionally expandable to a 128-character set, including upper and lower case. And now, APL/ASCII switch-selectable capability.

**Separable.** This newest video terminal from Datamedia is a stand-alone unit, with the display and keyboard separated for greater applications flexibility.

**Compatible.** It's plug-compatible with Teletypewriter\* Models 33 and 35, either via a standard RS232C or an optional 20 mA current loop interface. Data rates from 50 to 9,600 bps may be accommodated.

**Economical.** No matter which performance yardstick or competitive unit you stack it up against, the Elite 1520A's \$1555 price (\$1655 with upper and lower case option) in quantities of 1 to 9 (20% lower in quantities of 100) is tough to beat.

**Reliable.** Our practical design approach is the answer, and our list of users worldwide of other proven Elite video terminals can tell you what reliability is all about in a CRT. Or we can tell you.

**Available.** The Elite 1520A is not one of those announced-today, promised-tomorrow, delivered-someday products. It's here. It's available.

**NEW!**  
**APL/ASCII**

# Phenomenal.



## Datamedia Corporation

7300 N. Crescent Boulevard  
Pennsauken, New Jersey 08110  
TEL: 609-665-2382  
TWX: 710-892-1693

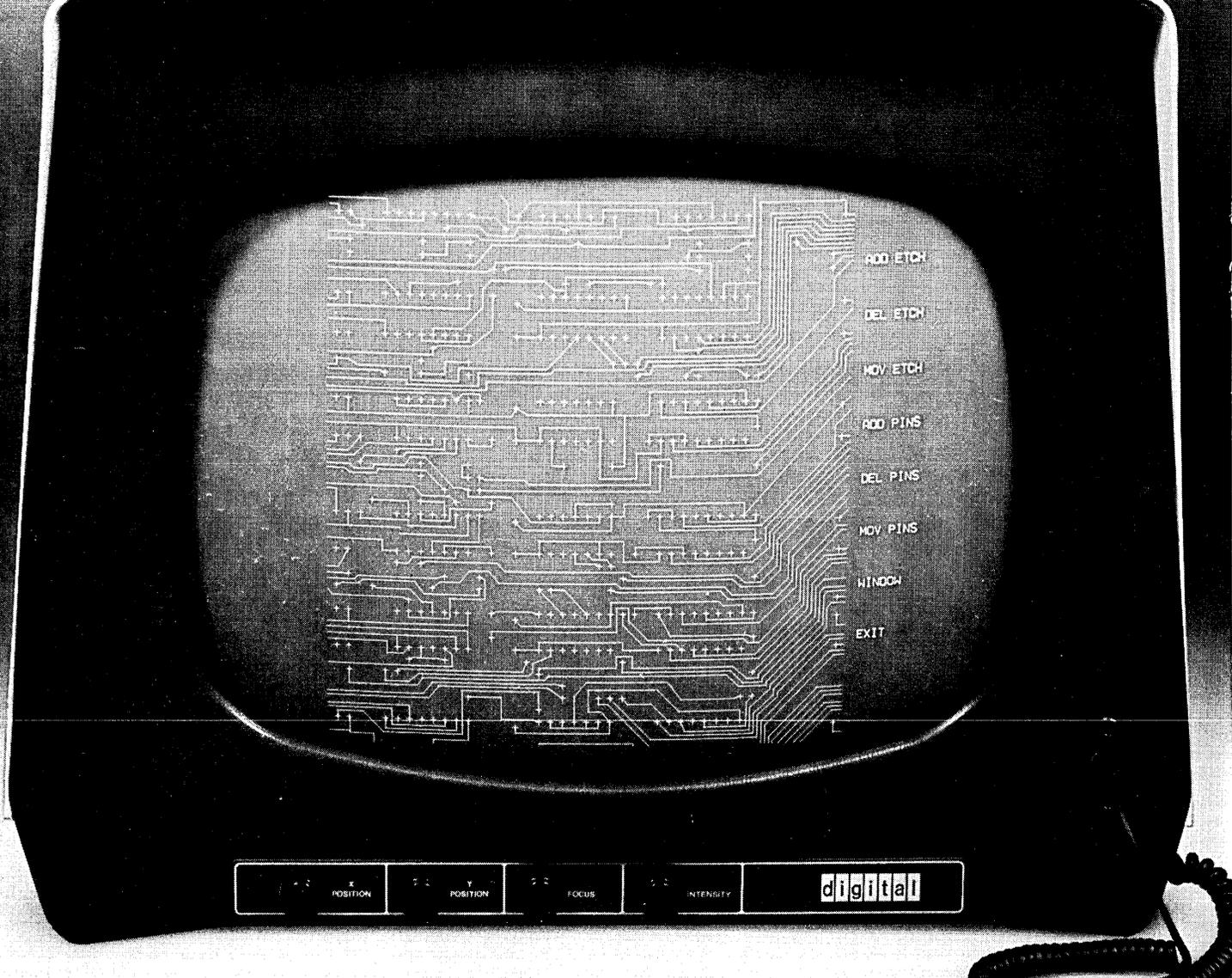
138 Duvall Lane  
Gaithersburg, Md. 20762  
301/948/1670

5456 McConnell Avenue  
Suite 150  
Los Angeles, Calif. 90066  
213/397/3556

CANADA  
Datamex, Ltd.  
Ontario/Quebec

\* Teletypewriter is a registered trade name of Teletype Corporation, Skokie, Illinois

CIRCLE 46 ON READER CARD



## Digital's PDP-11 just improved its image.

Introducing the VS60, Digital's high-performance graphics system for the 11 family.

You're looking good if you start off with a great mini-computer like Digital's PDP-11. Adding VS60 high performance graphics is one way to look even better.

With the VS60, you get a 21-inch CRT with light pen and a display processing unit with hardware vector and character generators. You also get sub-routining with automatic stacking, scaling and 2-D translation standard. Subscripting and superscripting — standard. Plus upwards compatibility with over 500 VT11 graphics terminals already installed.

And the VS60 gives you something no other high-performance system offers — the Digital name plate. It means full line compatibility with 6 different PDP-11 processors. 60 different peripherals. And 2 different operating systems, RT-11 and RSX-11. With RSX-11 software, the VS60 can be configured as a satellite terminal called the GT62.

A Digital name plate also means you get one source for all your equipment. Plus the support represented by a worldwide sales and distribution network of over 3,500 software and service specialists in 36 countries.

So if you're interested in high performance graphics, look at the big picture. Look at performance, flexibility and support. Then look up your Digital sales

representative. Or write for our brochure. Digital Equipment Corporation, Marlboro, MA 01752. (617) 481-9511, Ext. 6937. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada, Ltd.



**digital**

# hardware

alternate path selected with the break being accounted for by HOS.

Obvious applications for the HYPERCUBE include on-line information storage and retrieval applications, time-sharing networks, large scale message switching, array processing, network control, real-time interactive data reduction, program compilation, process control, simulation, and possibly artificial intelligence and text searching. The HYPERCUBE II is priced at \$80K, the HYPERCUBE III at \$400K, and the HYPERCUBE IV at \$1,280,000. Delivery is being quoted at 90 days ARO. IMS ASSOCIATES, INC., San Leandro, Calif. FOR DATA CIRCLE 214 ON READER CARD

## Flatbed Plotter

Both line and photoplotting capabilities are offered with the AP53 Graphic Plotter that features interchangeable heads and removable panels that adapt the equipment for either function in less than three minutes. High photoplotting speeds up to 10 times faster than conventional photoplotters are claimed. Average speed during "painting" is 10 ips. At all other times, i.e., when the head moves to a new position or when used for line plotting, speeds go up to 40 ips. The AP53 draws a 33x45-inch drawing on either conven-



tional or photosensitive media. Another nice feature of the plotter is an aperture plane that contains up to 144 apertures on four changeable plates. The machine's fiberoptic bundle can be rotated 180° in increments of 1°, which means that a plate need not have a particular aperture duplicated in different orientations. The positioning accuracy is 1 mil/foot/axis, holding 5 mil accuracy over the total plotting area. The unit is available for both on-line and off-line hook-up with prices starting at \$70K. APPLICON INC., Burlington, Mass.

FOR DATA CIRCLE 217 ON READER CARD

## Mini Communications

Interdata has come up with a gadget called the Quad Synchronous Adapter,

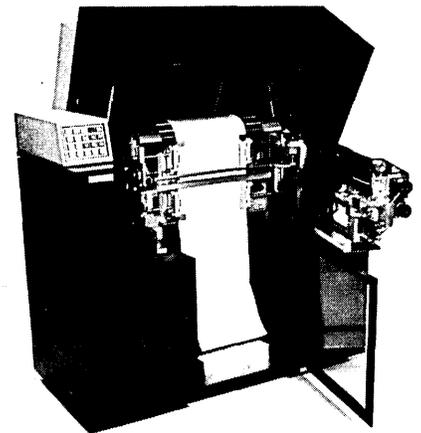
which, in effect, simplifies interfacing of four synchronous lines between its 16- and 32-bit processors and several new communications protocols, including IBM's Synchronous Data Link Control (SDLC), High Level Data Link Control (HDLC), and Advanced Data Communications Control Procedure (ADCCP). One version of the QSA communicates in traditional Bisync (Binary Synchronous Code), and can be upgraded to communicate with Bisync and the three new protocols, the prices being \$1,600 and \$2,600, respectively. One obvious use of the QSA would be to have it accommodate communication lines under program control regardless of whether the protocol was Bisync or SDLC, for example. INTERDATA, INC., Oceanport, N.J.

FOR DATA CIRCLE 216 ON READER CARD

## Line Printer

This company, renowned for its card reader products, has decided to tackle the line printer market. Its first model looks like a winner. The doc 2250 operates at 2250 lines per minute using a 48-character set across 132 columns, making it one of the fastest units available. The 2250 contains its own power supply and control logic. Other standard features include fully-buffered print lines, interchangeable character arrays, a universal character set buffer

that allows any character set to be used, vertical forms control buffer, a powered forms stacker accommodating forms from 3 to 24 inches, acoustically-insulated powered cover, resident microdiagnostics, etc. It's clear that the doc 2250 has been developed as an



oem alternative to IBM's 3211 line printer. Options include a 150 print position line. The 2250 is priced at \$32,500 before quantity discounts. DOCUMENTATION, INC., Melbourne, Fla. FOR DATA CIRCLE 215 ON READER CARD

## Customizable Terminals

This manufacturer has developed a family of customizable terminals, rang-

**LIMITED SPECIAL OFFER**

# 11 MAKE A DOZEN!

**DISC CARTRIDGES** Buy 11 and get 1 free. All are BRAND NEW, which explains why they are PROTECTED by a FULL 5 YEAR WARRANTY which includes DISK DRIVE PROTECTION. Disc/3 discs are compatible with systems and drives manufactured by IBM, DEC, Burroughs, General Automation, Hewlett-Packard, NCR, Four Phase, Singer, Data General, Datapoint, Basic Four, and others.

**\$17346**  
On offer of 2% - 20

**\$6860**  
On offer of 2% - 20

**DISKETTES GET 10 FREE!** Buy 110 diskettes and get 10 free. Highest quality diskettes available today. Protected by a 1 year parts, materials and workmanship warranty.

**\$515**  
On offer of 2% - 20

**\$7741**  
On offer of 2% - 20

**Disc/3 COMPANY**

### RUSH ORDER FORM — or call direct or collect (213) 451-8911

	(net 30)	(2%, 20)	quantity	total
DISKETTES. Highest quality available today. 10 per box. Buy 11 boxes and get box of 10 FREE!	5.25	5.15		
IBM 5440 DISC CARTRIDGES. Buy 11, get 1 FREE!	79.00	77.42		
2315 STYLE FRONT LOADING CARTRIDGES. Buy 11, get 1 FREE! (Specify disk drive mfg. and model no. (Special sector notching and TPI may be subject to upcharge)	70.00	68.60		
IBM 2316/11-HIGH DISC PACKS	177.00	173.46		
<b>TOTAL (California firms add tax)</b>				

name \_\_\_\_\_ firm \_\_\_\_\_ purchase order no. \_\_\_\_\_

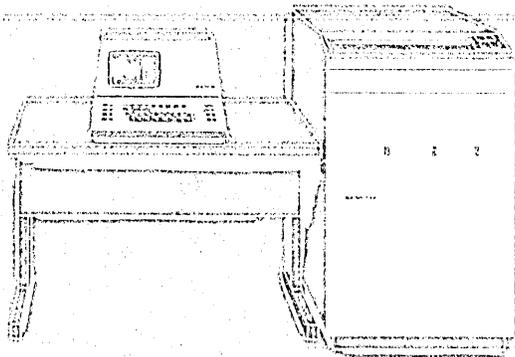
address \_\_\_\_\_ state \_\_\_\_\_ zip \_\_\_\_\_ tel. no. \_\_\_\_\_

Stock items shipped within 24 hours, UPS or best alternative.  
TERMS: 2%, 20; net 30 to well-rated firms and institutions. Advance payment required on all other orders.  
In Southern California call or write for a DEC Datasystem demonstration.

**Disc/3** DISC/3 COMPANY Overseas distributor inquiries invited.  
1840 LINCOLN BOULEVARD • SANTA MONICA, CALIFORNIA 90404 • (213) 451-8911  
CIRCLE 102 ON READER CARD

# New DATA 100 model 77

powerful,  
intelligent  
remote data entry and batch  
communications  
... for only  
\$328/month\*



The latest member of DATA 100's family of distributed processing systems is designed to provide remote entry and communication capabilities in remote processing applications. The Model 77 is an intelligent key to diskette units which permits the user to enter, edit, store and transmit data under the control of powerful data entry and communications software.

The DATA 100 Model 77 gives you all these features:

- Operates in a host-independent, verify, search, update, system displays and optional remote definition
- Designed with fixed entry validation, user-defined attributes and logic functions and sophisticated formatting
- Choice of optional line printers—432 and 425 line
- Second key station optional
- Batch data transmission via asynchronous communications discipline attended or unattended, point-to-point or multipoint
- Control of remote entry network by centralized format creation and automatic distribution
- Optional local capability for user-written application formats
- Selective data transfer to another diskette or line printer of individual data sets or complete master copy
- Technical support through a worldwide service network of more than 250 locations
- \* 3 year lease price including maintenance

Order now for May 1976 delivery.

Look for more elements of  
distributed processing systems  
from DATA 100 throughout 1976.

## DATA 100

C O R P O R A T I O N

7725 Washington Avenue South

Minneapolis, Minnesota 55425

612/431-6600

# hardware

ing from a standalone limited alphanumeric keyboard with single line display, to one-line (16-, 32-, and 80-character) displays with complete keyboards. The terminals can be interfaced to badge readers (Hollerith or magnetic stripe), strip printers (21 or 34 columns), cassettes, 3M cartridges, floppy or hard discs, etc. The Burroughs display can include display roll right/left, cursor control, etc. The entire ASCII set is available. Prices range from \$900 to \$3K each, depending on customization. VMF INDUSTRIES, INC., Bayshore, N.Y.

FOR DATA CIRCLE 218 ON READER CARD

## Graphics Subsystem

The vs60 graphic display subsystem is designed as an add-on for any PDP-11 computer, ranging from the small PDP-11/04 to the PDP-11/70. The vs60 comprises a 21-inch (53 cm) crt, light pen, and a display processing unit. The system is intended for applications in computer-aided design and rapid, high-density data display, electronic and mechanical engineering, chemical and molecular modeling, and architecture.

The first configuration to use the vs60 is the GT62, an intelligent graph-



ics terminal. This configuration includes the vs60, a PDP-11/10 minicomputer, a free-standing ASCII keyboard, and provisions for communication links. The GT62 is priced at \$47,500; the vs60 at \$38,800. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 219 ON READER CARD

## Integrated Micro to Mini Line

Texas Instruments isn't the first minicomputer manufacturer to see the market possibilities of offering a compatible range of computing power, ranging from microprocessor level through minicomputer performance, but the firm's tremendous advantage of making its own circuitry means it will always be building some of the more cost effective gear around.

The 990 series consists of the TMS

9900 microprocessor, the model 990/4 microcomputer, and the model 990/10 minicomputer. Also included in the announcement are software development aids, developmental support on time-sharing networks, and a prototyping system.

The TMS 9900 is a one-chip, 16-bit microprocessor that uses N-channel MOS silicon-gate technology. It's claimed that the combination of a versatile instruction set and a high-speed interrupt capability endow the 9900 with the performance of a 16-bit TTL mini. Oem's interested in developing programs for the 9900 can access assembler, linking loader and simulators on the National CSS, Tymshare, and GE time-sharing networks.

The next unit is the 990/4, a complete microcomputer on a single pc board that uses the TMS 9900 as its central processor. Both the 990/4 and the 990/10 mini are available in several chassis configurations: a low-cost oem package; a 7-inch (6-slot), or 12¼-inch (13-slot) rack-mountable chassis; or a tabletop enclosure. A programmer's front panel console is also available for both chassis.

The 990/10 mini is a TTL implementation of the 990 architecture that provides higher performance levels demanded of more sophisticated applica-

(Continued on page 169)

WHAT IS YOUR TRUE WORTH?

## FREE JOB OPPORTUNITIES BULLETIN

Cadillac Associates represents the nation's largest and most respected professional placement service. Our close relationship with the nation's finest firms generates continuous career opportunity information and allows us to confidentially present your qualifications to those at "decision-making" levels.

Our bulletin, published quarterly, listing available opportunities in the Systems & Data Processing field is available free of charge and will be mailed to your home upon your request.

For your free bulletin, without any obligation, circle reader service card #115. Please USE HOME ADDRESS ONLY!

## FREE CONFIDENTIAL PLACEMENT SERVICE

If you desire immediate assistance in locating an opportunity consistent with your objectives (professional/financial/geographic), CALL OR WRITE TODAY. A member of our staff of SYSTEMS & EDP SPECIALISTS will reach you by telephone to discuss your objectives and how we might help you satisfy them. A resume, or some details of background, will be appreciated.

Remember: Our client firms are located from coast to coast and assume all expenses (agency fee, interviewing & relocation).



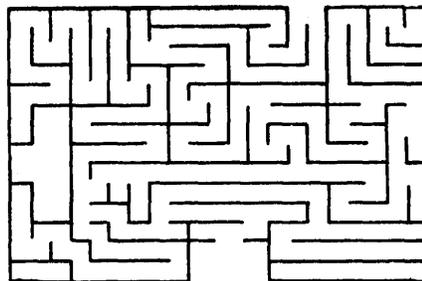
E. W. MOORE  
Executive Vice President  
**CADILLAC ASSOCIATES, INC.\***  
32 West Randolph St. Chicago, Ill. 60601  
Financial 6-9400

\*"Where More Executives Find Their Positions Than Anywhere Else in The World."

CIRCLE 115 ON READER CARD

GET 40% MORE WORK  
FROM YOUR COMPUTER NOW

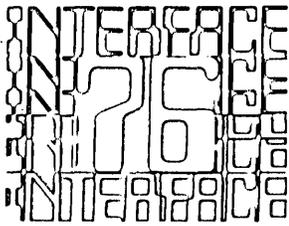
WITH OUR  
JOB MIX OPTIMIZER  
AND  
DYNAMIC PARTITION BALANCER



LABYRINTH SYSTEMS LTD  
2 PENN PLAZA  
NEW YORK NY 10001  
(212) 594-7791

CIRCLE 123 ON READER CARD

# You'll Learn More at Number Four,



# INTERFACE '76

## Fourth Annual Presentation of the Original National Data Communications Conference and Exposition

Here's the Committee . . . . . and here's the Program they've created . . . . . a three-day Program that will make INTERFACE '76 the most informative and comprehensive data communications conference you've ever attended.

The INTERFACE '76 Program Committee, composed of these leading experts in the field of data communications, has formulated program policy and procedures, coordinated speaker selection, and structured session content.

Ralph Berglund, Vice President of Kranzley and Company

John Buckley, President of Telecommunications Management Corporation

Richard L. Deal, President of Richard L. Deal and Associates

Donald Dittberner, President of Dittberner Associates, Inc.

Dr. Dixon R. Doll, President of DMW Telecommunications Corp.

Philip H. Dorn, President of Dorn Computer Consultants, Inc.

Dr. Philip H. Enslow, Jr., Professor, Georgia Institute of Technology

Phil Hirsch, Editor of DATA CHANNELS

Richard A. Kuehn, President of RAK Associates

Robert A. Lively of Creamer, Trowbridge, Case and Basford, Inc.

Einar Stefferud, President of Network Management Associates

Bernard Strassburg, Communications Consultant and Former Chairman, FCC Common Carrier Bureau

The INTERFACE '76 Conference Program is three full days of 41 different fact-filled sessions, seminars, and panels with over 100 speakers designed to bring you the latest information on every aspect of data communications.

### Product Workshops

Keeping up to date with the latest product and systems development is almost a full-time job in itself. But in these informative sessions, leading experts will unravel the complexities of what's being offered in today's marketplace. You'll get a

	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	
MONDAY	Keynote						Applications: Banking, Securities, Insurance, Manufacturing, and Process Industries			
		DataComm School #1 Fundamentals for Managers					DataComm School #2 Comm Services & Interfaces			
		Network Planning: Objectives, Justification, Budgeting, and Staffing					Network Implementation: Design, Vendor Selection, Installation, and Maintenance			
		Hosts, Front Ends, and Minis	Data Base and Comm Software				Couplers, Modems, and Multiplexers	Transmission Services		
		Who's Ahead in Transmission Services					Worldwide Nets Require Diplomacy			
							We're Going to Point of Transaction			
							Consultant's Corner			
		EXHIBITS OPEN 10:30-5:30								
	TUESDAY	Applications: Retailing, Wholesaling, Transportation/Distribution, Service Industries, Computer Services						Applications: Banking, Insurance, Manufacturing (Repeat Sessions)		
			DataComm School #3 Comm Processors and Software					DataComm School #4 Terminals and Terminal Systems		
		Network Management: Involvement, Accountability, Payback and Expansion					Network Implementation (Repeat Session)			
		Network Planning (Repeat Session)					Hosts, Front Ends, and Minis (Repeat Session)	Data Base and Comm Software (Repeat Session)		
		CRT's and Teletypewriters	Remote Batch, Data Entry and Satellite Systems				DataComm Software Needs Standards Management			
		Protocols or Promises for Productivity					Terminals Grow into Minis via Micros			
			Data Base Management Decentralizes Again				Consultant's Corner			
		EXHIBITS OPEN 10:00-5:00								
WEDNESDAY		Applications: Utilities, Government, Law Enforcement, Health Care and Education						Applications: Government, Law Enforcement, Health Care, Education (Repeat Session)		
		Applications: Retailing, Service Industries, Transportation, Distribution, Computer Services (Repeat Session)						Maintenance: Managing with Distributed Computing		
		Common Carrier Interconnect Policy Update					CRT's and Teletypewriters (Repeat Session)	Remote Batch, Data Entry and Satellite Systems (Repeat Session)		
		Network Management (Repeat Session)					Carriers Are Offering Package Deals			
		Couplers, Modems, and Multiplexers (RS)	Transmission Services (RS)				Five-Year Planning for Data Comm			
		Keys to Privacy in DataComm					Consultant's Corner			
			Data Entry is Still in Transition							
		EXHIBITS OPEN 10:00-5:30								
		9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00



thorough understanding of the role that specific products and services play in data communications along with advice on evaluation and selection.

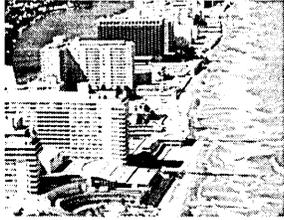
### Methods Workshops

In these updated sessions, you'll hear about the latest methods and procedures needed to plan, implement, and manage a data communications system. Emphasis will be on the latest networking approaches.

### Application Sessions

You can select from a comprehensive schedule of industry application areas. Listen as experienced users and consultants detail case history studies in specific application areas. You'll find out how to avoid expensive pitfalls . . . how to operate productively and stay within budgets and time constraints.

# Bigger and Better Than Ever Before!



Co-sponsored by **DATAMATION** magazine

**MARCH 29-31, 1976**  
**MIAMI BEACH CONVENTION CENTER**  
**MIAMI BEACH, FLORIDA**

## Highlight Sessions

Hear incisive, in-depth analyses of the provocative issues of the day. Well-informed panel members discuss the pros and cons of issues that are likely to affect everyone working in today's data communications environment.

ence management has arranged "out-of-season" rates — as much as 45% reduction — for attendees at a wide variety of luxury hotels, but reservations must be made with INTERFACE '76, who will forward them on to the designated hotels.

## DataComm School

This conference-pleaser from INTERFACE '75 will be repeated at INTERFACE '76 — with additional material. It's designed especially for newcomers, experienced staffers who want a refresher course, and executives and managers from other areas who want an introduction and overview of data communications.



## Plus Exhibits Galore

A great conference also means great exhibits. As in the past, INTERFACE will have a dazzling array of the latest products and services from the industry's leading suppliers. You'll have a once-a-year opportunity, in one place, to evaluate the hardware, software, and systems that make things happen in data communications — all on display for INTERFACE '76 attendees.

## Plus Superb Location

INTERFACE '76 will be staged in one of America's most spectacular cities — fabulous Miami Beach. Known throughout the world for its balmy, sunny climate and miles of sandy, palm-fringed beaches fronting the sparkling, blue Atlantic Ocean.

## And Special Features And Attractions

Special Low Conference Hotel Rates — Even though March is an "in-season" month in Miami Beach, INTERFACE Confer-

We've Held The Line On Prices — INTERFACE '76 is inflation-proof. Despite rising costs in all areas of operations, registration fees will be exactly the same as last year.

Economical Team Discounts — To enable as many members of your data communications team as possible to attend, INTERFACE '76 has arranged special rates for the third and each additional member of your organization from one location. The discount is 47% for the full three-day Conference and 50% for single days.

**It all adds up to the most comprehensive and exciting Data Communications Conference ever held.**

### INTERFACE '76 industry-wide Editorial Advisory Board:

Ken Bourne, COMMUNICATIONS NEWS  
John Kirkley, DATAMATION  
Arnold Keller, INFOSYSTEMS  
Robert M. Patterson, MINICOMPUTER NEWS

Alan Kaplan, MODERN DATA  
Michael Sadofsky, TELECOMMUNICATIONS  
Ray H. Smith, TELEPHONE ENGINEER AND MANAGEMENT  
Leo Anderson, TELEPHONY

# SCHLAGE ELECTRONICS REINTRODUCES REAL COMPUTER ROOM SECURITY..

## without card slots, push buttons or key holes.

For fifty years Schlage has been the leader in "lock and key" security. Today, however, many high technology facilities require more sophisticated access control. The Schlage Access Control System provides this sophistication.

What makes Schlage's Access Control concept unlike anything else in the Security market today is that there are no key holes, card slots or push buttons. Every element of this system can remain concealed and secure yet effectively and conveniently permit or deny access to almost any desired area. Now, access to computer rooms, data centers, tape storage areas, any critical area, can be controlled by a system utilizing the same technology operating in the areas it protects. And the Schlage Access Control System can be easily installed in any existing facility or designed into future plans.



The concept works very simply. Hold a valid Command Key within 4 to 6 inches of a concealed sensor. The entry point is activated within 800 milliseconds. The sensor, a flat circular disc, need never be exposed. It can be located within a wall or on plate glass doors or any other area adjacent to the desired controlled entry point. The credit card sized Command Key may double as an employee ID card and can be used to activate the Schlage system while remaining in a pocket or purse.

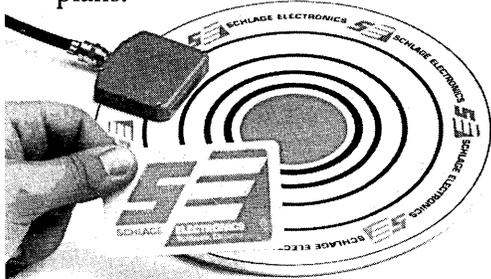
The Schlage Access Control System consists of the Sensor Discs, one for each entry; the Command Key Cards, one for each individual; and one Control Unit which contains the power supply and electronics to activate the individual electro-mechanical locking devices at each entry. Monitoring, recording, and programming units are available for installations requiring even more sophisticated security.

Schlage's "proximity operation" means that you may no longer need mechanically controlled locks, expensive security guards or closed circuit TV monitoring. Economical to install and easy to maintain, the Schlage Real Access Control System works 24 hours a day to provide the ultimate in user convenience, security and reliability.

For further information or demonstrations call or write your local Schlage Electronics Representative.

### **SCHLAGE ELECTRONICS**

1135 Kern Avenue  
Sunnyvale, California 94086  
408/736-8430



# hardware

tions. The important thing to remember is that the systems share the same instruction set, making it relatively easy for designers to interface various models of the 990 series. There are numerous options for the various models, including up to 58K bytes for the 990/4 and a memory mapping feature for the 990/10 that provides memory protection and privileged instructions and support for memory expansion up to two megabytes.

The 990/4 is priced at \$368 with 512 bytes of memory, \$512 with 8K. The 990/10 mini is priced at \$1,968 with 16K bytes of memory. Prices are based on orders of 50. Deliveries commence during the first quarter of 1976. TEXAS INSTRUMENTS, INC., Houston, Texas.

FOR DATA CIRCLE 223 ON READER CARD

## Remote Batch Terminal

IBM has a new entry in the remote batch terminal arena. It's called the 3777 and it more than doubles the fastest printing speed previously available with the 3770 series of general purpose terminals. The terminal's printer, a new model of the 3203, can operate with any of 15 different type sets. The printer can achieve a speed of 1,000 lpm with a 48-character set, compared with the medium-speed 3776 communication terminal's maximum printing speed of 400 lpm. The 3777 can communicate with a virtual storage 370 at up to 9,600 baud over non-switched teleprocessing networks using SDLC. It can operate at the same speed under binary synchronous line control and is available with a switch that eases the change between the two protocols. There are three choices of card readers: previously announced models that operate at 150 and 300 cpm, and a new model, the A3, that runs at 400 cpm. The 3777 is available with one or two console-mounted diskette units. Optional data security features include an operator identification reader for magnetic stripe ID cards and a mechanical keylock to help prevent unauthorized use. A typical terminal, including the 1,000 lpm printer, A3 card reader and appropriate attachment for communications features rents for \$1,565 on a 24-month lease. First shipments won't reach customers until the third quarter of 1976. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 220 ON READER CARD

(Continued on page 170)

# NCR

## Terminal Systems Division—Cambridge

NCR's Point-of-Sale Terminal Systems Division in Cambridge, Ohio has several opportunities for computer professionals in the development of present and next generation retail terminal systems.

### PROJECT LEADER—SOFTWARE DEVELOPMENT

To develop the necessary software for the design and simulation of Advanced Retail Terminal Systems in the 'Hospitality' Industry.

Will be responsible for developing necessary software and simulation for all the projects in the department and provide direction, technical guidance, and coordination to the assigned programmers.

Will represent the department in any software-related task forces or meetings whenever necessary.

BS/MS in Computer Science or Electrical Engineering. Requires a minimum of 5 years experience in the field of software design development and simulation. Management experience or ability is highly desired. Any knowledge of communications control procedures would be helpful.

### SENIOR SOFTWARE ENGINEER

The Senior Software Engineer will contribute to Advanced Development Group investigating future hardware and software systems for retail products. Participate in projects concerned with file management techniques, system software, and storage technologies to support file-oriented system studies. Required are a BS in Computer Science, Electrical Engineering or related area (MS highly desirable) and 4+ years experience in the design, implementation, and use of file management systems. Knowledge of information storage/retrieval systems, computer networks and communication systems, and retail systems would be useful. Experience with real-time software, modeling, and simulation is highly desirable.

### SYSTEMS ENGINEERS

Analysis and simulation of microcomputer systems and evaluation of alternate approaches, both in hardware and software. Will be required, with minimal guidance, to prepare simulation programs using SIMSCRIPT language. From the results, will be required to prepare specifications and functional requirements for microcomputer systems. In later stages of development, will be required to evaluate systems and hardware/software modules.

BS or MS in Computer Science or Electrical Engineering and 4-5 years experience in computer or terminal design. Must have a proven in-depth experience in system simulation and analysis. Should have or desire "hands on" experience in hardware design and programming (assembly language) experience using mini or microcomputers.

Respond now to:

**Robert W. Donovan**  
**Industrial Relations**

Terminal Systems Division—Cambridge  
NCR Corporation  
Cambridge, Ohio 43725

Phone: 614/439-0398

An Equal Opportunity Employer

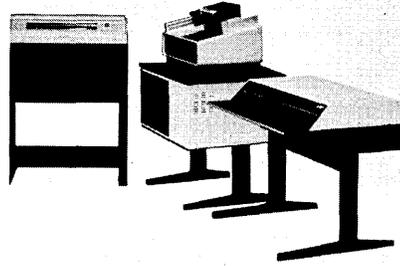
CIRCLE 124 ON READER CARD

# hardware

## Remote Batch Terminal

The System 525 intelligent remote batch terminal offers a lot of features for the price, it would seem. The unit communicates at speeds up to 4800 baud with a 300 cpm 80-column card reader and 300 lpm line printer. Other peripherals available include a tty, crt, and 100-285 cpm card punches. The 525 emulates most popular remote batch terminals including the Burroughs bc1100, The Univac 1004, the CDC UT200, Honeywell 115, and the IBM

2780, 3780, and 360/25 using HASP. The basic system (300 cpm



reader/300 lpm printer described above) rents for \$615/month on a one-year lease (\$550/month on a

three-year contract), including maintenance. The price is \$19,990. M&M COMPUTER INDUSTRIES, INC., Orange, Calif.

FOR DATA CIRCLE 213 ON READER CARD \*

## Data Entry

Inforex is the industry leader in small key-to-disc installations, and with its new model 1300, will try to expand that base to an even smaller class of customer—of which there are probably many. The 1300 supports from one to four data entry keystations, a 5,000 record disc drive, an 800-bpi tape drive, and four operator stations. A three-year lease on the configura-

Say good-bye to the tedium of keyboard data entry with graf/pen™ the only digitizer that makes sense



— enters both graphic and alphanumeric data automatically simply trace a curve, circle a printed character or make a checkmark with a pen or cursor.

— not restricted to a "tablet" Graf/Pen can be mounted on a drawing table, a blackboard, a projection screen, a CRT display or any other flat surface.

— permits human judgement unlike automatic optical data entry systems, permits human judgement to intervene when needed.

— cuts graphic data entry time users have experienced reduction of 90% compared with manual scaling and keyboard entry.

— widely applicable currently used for such diverse purposes as planning radiographic treatment in medicine and as entering part numbers in order processing and inventory control.

— systems oriented interfaces available to almost every kind of minicomputer, programmable calculator or RS-232 device. Complete off-line systems use punched paper or magnetic media.

— low cost compared with other digitizers; compared with other data entry techniques.

No wonder Graf/Pen is the most widely used digitizer in the world!

For all the details, just ask Rolf Kates, vice president for marketing.

**SAC** SCIENCE ACCESSORIES CORPORATION  
Kings Highway West  
Southport, Connecticut 06490  
(203) 255-1526



tion is \$683/month, including maintenance. Both Inforex synchronous and binary synchronous communications, at speeds up to 9600 baud, are offered with the 1300. INFOREX, INC., Burlington, Mass.

FOR DATA CIRCLE 222 ON READER CARD

## Crt Terminal

The model B-R-B video terminal displays 1280 ASCII dot-matrix characters in 16 lines of 80 characters. The unit features selectable standard baud rates from 110-9600, RS-232 serial data interface, backspace capability, detachable keyboard, half- and full-duplex



operation, and composite video output. The B-R-B is available in a board only model for oem's, in custom designs, and as a suitcase unit. The unit shown is priced at \$875. WINTEK CORP., Lafayette, Ind.

FOR DATA CIRCLE 221 ON READER CARD \*

# AWESOME

The most awesome family of machines offered in the industry, the D-216/D-316/D-416/D-616. Awesome in packaging technology. Awesome in price/performance ratio.

The full range from computer-on-a-board through midi's at mini prices. All four computers fully upward compatible with over 5,000 D-116's in the field.

Imagine a minicomputer with 32,000 words of memory, power monitor, automatic program load and Teletype I/O on a single printed circuit board.

Imagine a minicomputer running at 660 nanoseconds with 32,000 words of multi-bank/multi-ported memory on a single printed circuit board for double the throughput of traditional midi's.

For an awesome insight call . . .



**DIGITAL COMPUTER  
CONTROLS INC**

12 Industrial Road  
Fairfield, New Jersey 07006  
(201) 575-9100 • TWX #7107344310

CIRCLE 32 ON READER CARD

# “With our Video 100 you don't need a ton of paper to debug a program.”

Debugging a program with hard copy can be tough. You can't get to the bottom of the problem 'til you get to the bottom of the heap.

That's why we've come up with the Video 100 terminal. Fast visual display of data makes it the perfect problem solving supplement to your teleprinters. And it gives you the advantages of a video terminal at teleprinter prices: just \$65 a month.

The Video 100 is perfect for in-house timesharing and remote inquiry applications. It's fast and quiet with an easy-to-use typewriter keyboard. It's also the

only display terminal anywhere that comes with Termicare—our nationwide diagnostic, maintenance and support service. One toll-free call gets immediate assistance.

Let the most experienced data terminal company in the timesharing field help you select the right terminal for your needs. The Video 100 for debugging; our teleprinters for hard copy print-outs.

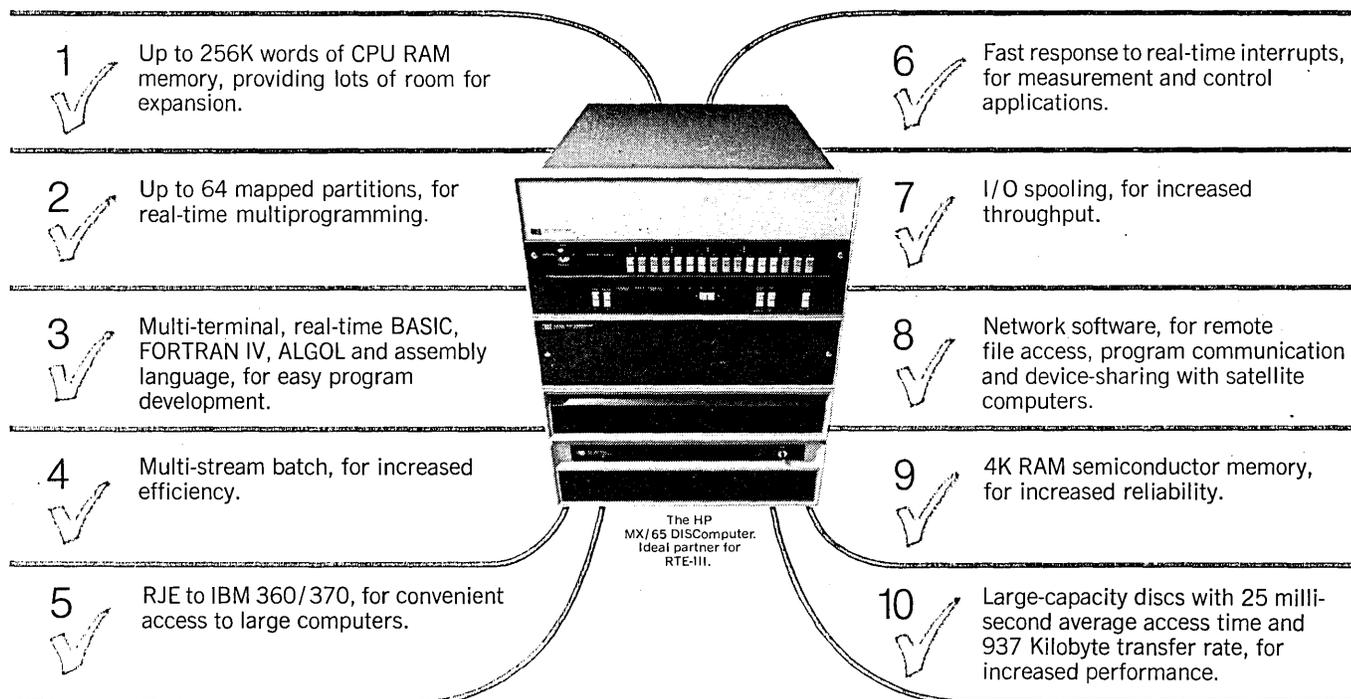
For more information, call me today. Z. V. Zakarian, President, Western Union Data Services Company, at 800-631-7050. (New Jersey 201-529-1170.) Or write to 70 McKee Drive, Mahwah, N.J. 07430.



# Powerful and Friendly.

## The Hewlett-Packard RTE-III operating system.

### Check it out.



RTE-III. The HP 21MX series does it again! Now, there's Real Time Executive-III. Just one more reason to choose HP's 21MX series for your real-time applications.

RTE-III gives you an operating system geared to the complex and varied needs of automated testing, research and production environments.

RTE-III is an ideal partner for HP's MX/65 or MX/55 DISComputers. Or use it with our 9600MX Measurement and Control systems.

Prices for complete systems start at a low \$38,150\* for a 32K word system.

There are no "maybes" about this operating

system. It's the latest in HP's family of proven, upward-compatible, Real Time Executive systems. Systems that have been proven in hundreds of on-the-job applications.

To check out all the benefits of HP's RTE-III system for yourself, give your nearby HP field engineer a call.

\*US Domestic Price only.

## HP minicomputers. They work for a living.

HEWLETT  PACKARD

Sales and service from 172 offices in 65 countries.  
1501 Page Mill Road, Palo Alto, California 94304

22537A

# software & services

## Updates

With 175,000 vehicles and \$350 million in operating expenses to monitor, the Bell System has enlisted the aid of a new computer program developed in-house called MOVIMS (Motor Vehicle Information Management System.) MOVIMS tracks operating expenses for the life of a vehicle, from purchase to retirement. Generated reports show monthly, year-to-date, and cumulative expenses per vehicle, garage, district area, and company. Other reports can be prepared to aid in administrative tasks such as registration and excise taxes. It is estimated that MOVIMS could save the Bell System up to \$6.5 million annually.

A research grant of \$120,000 has been awarded Informatics Inc. by the National Science Foundation Office of Science Information Service, for a study defining the development of computer-based crises information systems. The work will be performed at the company's Rockville, Maryland headquarters. According to Richard C. Lemons, president of Information Systems Co., an operating unit of Informatics, "The nation has entered an era of social crises in many areas, such as energy, crime, pollution, and privacy. It is vital that all relevant knowledge be brought to bear on the problem areas as quickly as possible to meet the needs of legislators in creating new national goals and reordering program priorities."

Integral Systems, Inc., a software and systems consulting firm in Flemington, N.J. that specializes in higher educational institutions, has just finished a Human Resources system for the Univ. of Pennsylvania. The system replaced three existing payroll systems and a personnel system that were being used to handle the university's 13,000 employees. Top-down techniques in both the implementation and installation phases of the system are credited for the relatively painless installation and customer satisfaction.

Howard Bromberg, President of International Computer Trading Corp., a San Francisco software house, is rather sensitive to charges that programmers spend money like drunken sailors. "That's absolutely untrue," claims Howard. "Drunken sailors spend their own money."

## Relational Data Base Time-sharing Service

Relational data bases have been the topic at many computer conference sessions in recent years, but the MAGNUM product is very likely the first commercial usage of the technique. Briefly, relational data bases can be thought of more in terms of logical organization of information than as hardware boxes storing unrelated information in unique files. The advantages of the approach, which should certainly be applicable to all data base users, are a reduction in file sizes (identical data need not be stored in multiple files), simplified maintenance, and reduced complexity.

Eight English commands are at the hand of the MAGNUM user, sitting at a conversational terminal. Any operation that cannot be accomplished by using these eight commands can probably be handled by creating a program procedure out of MAGNUM's high-level procedure language. The vendor estimates that the time required to design and get a data base up and running is

typically reduced by 60-65% of the time normally required using earlier systems. Also, data base maintenance, which might normally take as much as half the time and resources of an installation, can be reduced to about 15%. Field tests have been completed, and MAGNUM is now available as a time-sharing service to medium and large organizations. TYMSHARE, INC., Cupertino, Calif.

FOR DATA CIRCLE 211 ON READER CARD

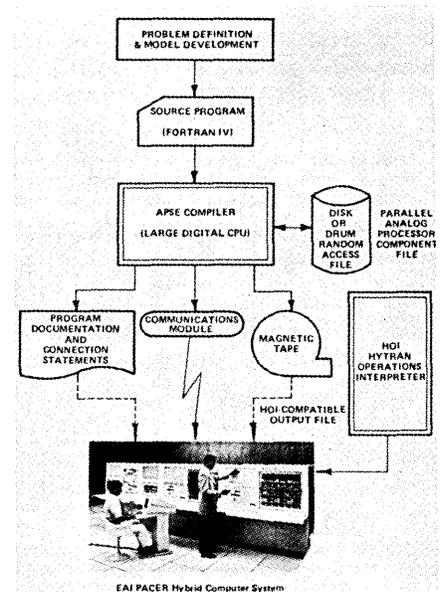
## Bill of Materials Conversion

The developers of the very successful IDMS data base management system have come up with a no-cost option to assist users of IBM's BOMP, DBOMP, Material Requirements Planning (MRP), and CFMS (Chain File Management System) packages in developing applications under IDMS. BOMP "Bridge" consists of a manufacturing bill of material prototype program, the bridge program to interface IBM's bill processor retrieval programs to the IDMS data base, and a documentation

## software spotlight

### Hybrid Computing

This company, a leader in the hybrid computing field, has addressed one of the problems that has helped restrict the use of hybrid computing techniques—that of the tiresome manual preparation for computing runs. With its proprietary product ECSSL (pronounced "excel"), most of the drudgery is gone. The package runs on many cpu's with at least 32-bit words (among them the 360/40, 44, 50, 65, 370/165, ICL 1905, 1909, Univac 1108, Honeywell GE615, Xerox' Sigma Series, CDC 6600, and EAI's own 8400). All the necessary analog and digital programs required for the continuous system simulation run are generated, and in addition, the patch board set-up is defined, and panel switch settings are generated. The basic language for specification is FORTRAN or FORTRAN-based dialects. An additional bonus of



ECSSL is that it extends the scope of analog/hybrid computation facility to digitally-oriented specialists not having prior analog computation experience. All in all, the development should make it easier to use one of the more interesting computing modes. ECSSL is priced at \$10-15K, depending on the amount of user training required. ELECTRONIC ASSOCIATES, INC., West Long Branch, N.J.

FOR DATA CIRCLE 210 ON READER CARD

# YOUR DATA BASE



## GO TOGETHER

More IMS and TOTAL installations have chosen ASI-ST to implement data base applications than any other product. ASI-ST's dominance in data base environments is easily explained:

- Operates under all IBM 360/370 versions of DOS, DOS/VS, OS and OS/VS.
- Fully supports all TOTAL, IMS and DL/1 features including TOTAL 7 and secondary indexing under IMS/VS.
- Permits creating and updating TOTAL and IMS data bases as well as retrieval.
- Includes automatic positioning which permits users unfamiliar with data base structures to easily obtain information.
- Supported in both batch and on-line environments.

IMS users such as *American Airlines, Dow Chemical, TWA, American Can, The Hartford, Union Carbide*; and TOTAL users like *Combustion Engineering, Northwestern Mutual Life, Anheuser-Busch, Corning Glass Works, Eli Lilly and Holiday Inns* are a few who agree ASI-ST and data base belong together. In addition, ASI-ST provides an unequalled return on investment by maximizing the productivity of both man and machine. Since ASI-ST fully supports conventional data files as well as relational data bases, these benefits are not restricted to IMS and TOTAL users. To obtain more information contact:



The Software Manufacturer

December, 1975

APPLICATIONS SOFTWARE, INC.

Corporate Offices

21515 Hawthorne Boulevard

Torrance, California 90503

(213) 542-4381

# software & services

package to assist in using the programs and bringing up applications. The ANSI COBOL programs run on IBM 360 and 370 hardware, and the conversion time from BOMP, DBOMP, MRP, or CFMS applications is said to be minimal. IDMS prices start at \$40K. CULLINANE CORP., Wellesley, Mass.

FOR DATA CIRCLE 212 ON READER CARD

## Structured Programming

It's official: one of the first attempts to build a truly useful FORTRAN "restructuring engine" is now a finished product (see Aug. '74, p. 120.) S-FORTRAN is an extension to the FORTRAN language that has constructs for nested IF's, DO WHILE, DO UNTIL, DO CASE, internal procedures, and ways to handle abnormal returns and arithmetic IF's in a structured manner. S-FORTRAN operates as a high-speed preprocessor for a FORTRAN compiler and produces code that is matched to the requirements of the target compiler (IBM 360/370 or Univac 1100 series) to obtain relatively high execution efficiency. The package is available for a

one-time charge of \$2K. Versions of S-FORTRAN for other computer systems are under development. CAINE, FARBER & GORDON, INC., Pasadena, Calif.  
FOR DATA CIRCLE 224 ON READER CARD

## CPA Services

This nationwide computer services company which has specialized in data management systems for business for years, is announcing COMPASS for Professional Accounting Systems and Services. COMPASS is a system of time-sharing programs that permit certified public accountant firms to add to their accounting and management services as well as monitor in-house time and billing, general ledger reporting, project accounting, and staff scheduling. The sales pitch is that now any medium or small CPA can log onto a system developed in conjunction with the most successful large CPA firms in the country and use the same systems and a small fraction of the development cost. COMPASS includes a time and billing system, general ledger, project accounting, and a staff scheduling system. There is no initial fee or monthly minimum for COMPASS usage, either, with billing based on how much the customer has actually used. COMPASS is currently on the air nationwide. COMSHARE, INC., Ann Arbor, Mich.

FOR DATA CIRCLE 227 ON READER CARD

## Microcomputer Applications

DEVELOP-80 has been used by this manufacturer to develop system software for the Intel 8080 microprocessor that includes a BASIC interpreter, a text editor, monitor and utilities. The program is now available to other firms using the Intel product and having access to a Digital Equipment Corp. DecSystem 10 mainframe. The package consists of a macro assembler, an 8080 simulator, a modified version of the DDT debugging package, and various support programs. The principal virtues of DEVELOP-80 are said to be the cross reference assembly listings it generates, its high speed simulator, symbolic debugging capability, and execution profiles for speed optimization.

The simulator portion of DEVELOP-80 is coded in machine language and runs only about five times slower than the 8080 itself, which differs with FORTRAN simulators that tend to use far more cpu time. Other features include halts on references to nonexistent memory locations and jumps to the debugging package. Also included with DEVELOP-80 are programs to produce object tapes in INTEL compatible or ALTAIR compatible format. The ALTAIR is this manufacturer's low-cost microcomputer that uses Intel 8080 chips. DEVELOP-80 is priced at \$750. MITS, Albuquerque, N.M.

FOR DATA CIRCLE 226 ON READER CARD

# Culprit

(the fastest retrieval system)

# Just got faster!

New version 4.0 has a host of new features — including subscribing and dynamic core allocation — which add even more speed to the acknowledged speed-leader.

We use CULPRIT too, so we know exactly how much this saves in your production reporting costs. Fact is, using version 4.0, we're running twice as fast and paying half as much for CPU time.

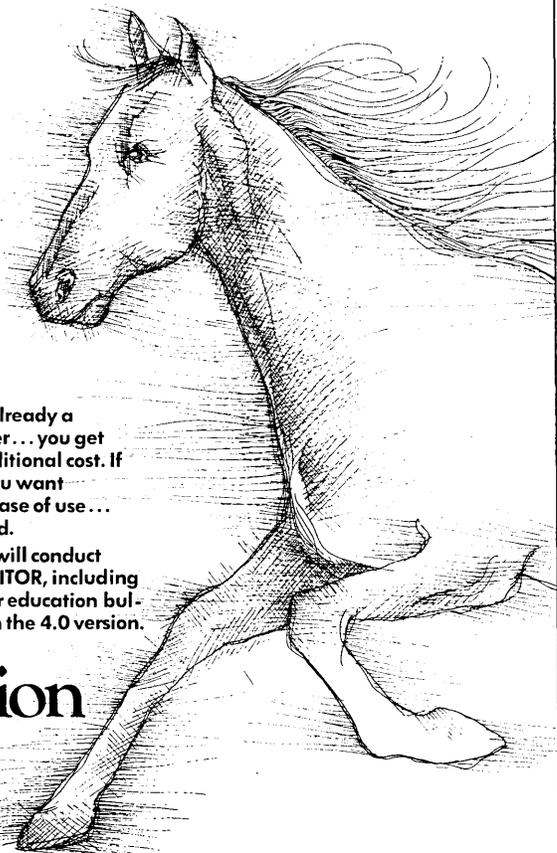
Remember... if you're already a CULPRIT/or EDP-AUDITOR user... you get the new 4.0 version at no additional cost. If you're not now a user, and you want extreme speed, power, and ease of use... now's the time to get on board.

Our Education Division will conduct courses on CULPRIT/EDP-AUDITOR, including new version 4.0. Write for our education bulletin or for a new brochure on the 4.0 version.



## Cullinane Corporation

Wellesley Office Park, 20 William St., Wellesley, Mass. 02181. (617) 237-6601





# Man in the middle

*Management wants planning information faster, fresher and more complete. You are expected to deliver without disrupting schedules or budgets.*

**RAMIS** lets you get out of the middle. It frees up your staff by making them more productive. It frees up your time by letting you link management directly with the computer. In minutes they can get what they need and you control the level of involvement.

**RAMIS** is an integrated family of systems. At its core is a complete, automatic Data Base Management System, but you get much more. It

is also a report preparation system, a comprehensive records management system and applications control system. It is designed for both interactive and batch usage.

More than a million management decisions are made each year with **RAMIS**—one of the simplest, most widely used computer languages in the world.

**RAMIS** means portability. If your computer is overloaded, **RAMIS** applications can be developed on an outside computer, then brought into the house when complete. **RAMIS** also means speed. In fact, applications can be set up five times faster with **RAMIS**.

Today, more than 400 companies around the world are using **RAMIS** in thousands of applications in manufacturing, finance, personnel, planning, distribution and much, much more.

Tell us about your headaches. We'll tell you how **RAMIS** can help. Write to: Richard H. Cobb, Vice-President Mathematica, P.O. Box 2392, Princeton, N.J. 08540

**RAMIS**<sup>™</sup> *The computer system by Mathematica*

P.O. Box 2392/Princeton, N.J. 08540/(609) 799-2600

# The Software Marketplace...

## advertisers' index

American Valuation Consultants, Inc. ....	182
Apodictics Inc. ....	180
BSA Company ....	180
Cambridge Computer Associates, Inc. ....	180
C F S, Inc. ....	184
Comserv Corporation ....	178
Cullinane Corporation ....	180
Cyborg Systems ....	178
Data Universal ....	178
Datathon Corporation ....	183
Dataware Inc. ....	183
Dearborn Computer Leasing Co. ....	185
Dylakor ....	184
Foresight Systems Inc. ....	185
Forth Inc. ....	180
The Franklin Institute Research Laboratories ....	179
General Electronics ....	179
Hospital Financial Services, Inc. ....	179
Infonational ....	179
Informatics/PMI ....	181
Information & Communications, Inc. ....	181
Insurance Systems of America, Inc. ....	181
Jefferson Financial Systems, Inc. ....	180
K & H Computer Systems ....	184
LCS Corporation ....	181
Management and Computer Services, Inc. ....	184
Management Science America, Inc. ....	181
Manufacturing Data Systems Incorporated ....	181
Mathematica ....	181
Maxima Systems Group ....	185
Mini-Computer Business Applications, Inc. ....	184
Mini-Computer Systems, Inc. ....	179
Mnemonics Incorporated ....	182
Mortada International ....	183
National Information Service for Earthquake Engineering ....	178
William Nix Associates ....	179
NTIS ....	185
Pace Applied Technology, Inc. ....	183
Pansophic Systems, Inc. ....	182
Personnel Data Systems, Inc. ....	178
Prodata International Corporation ....	185
Program Products Incorporated ....	181
Precision Wire Products ....	184
Programming Methods Co. ....	183
Real-Share, Inc. ....	180
Software '70 ....	178
SPSS Inc. ....	184
Synergetics Corporation ....	182
SYS CON, Software Division of Systematics, Inc. ....	180
System Support Software ....	183
Systonetics, Inc. ....	182
United Airlines ....	185
Universal Software, Inc. ....	184
Value Computing Inc. ....	182
Wang Laboratories, Inc. ....	182
Werner Henri, Inc. ....	182
Westinghouse Electric Corporation ....	185

## FORTRAN IV USERS

Developed for the mini-computer user, these established packages are designed to extend the capability of Fortran IV.

**ISAM70:** Overcomes the file access limitations of Fortran IV by providing the ability to read/write disc records based on alphanumeric or binary keys.

Features include: file creation, addition/ updating/deletion of keyed records, file statistics, sequential access, file copying. Price: \$150.00.

**SORT80:** Provides a general purpose disc sorting capability. Sorts may be based on up to 5 variable-length sort fields (byte or word), ascending/descending, full/subfile sorts. Price: \$95.00.

Both packages are written in ANS Fortran IV and operate on the PDP-11, NOVA, SPC-16, IBM and INTERDATA computers.

## SOFTWARE'70

P.O. Box 3623 Anaheim, California 992-2230

CIRCLE 173 ON READER CARD

## CYBORG PAYROLL SYSTEM

The CYBORG PAYROLL/PERSONNEL SYSTEM handles multiple companies with hundreds of separate earnings and deductions. The expandable data base design allows each user to add, edit and report on as many new fields as required without any reprogramming. CYBORG provides a complete payroll system with all states, city and county taxes and complete audit and accounting reports. CYBORG has automatic check reconciliation, historical reporting, labor reports, including budget to actual comparisons with dollar and variance differences. The CYBORG REPORT LANGUAGE allows for the creation of special reports or output files (card tape or disk) to meet your unique requirements without reprogramming. The system is written entirely in ANS COBOL and will operate efficiently in 52K.

## Cyborg Systems

CIRCLE 156 ON READER CARD

## RPG II USERS REJOICE!

If you have an IBM 360 or 370 and use RPG II, premature job termination can be a thing of the past with the HELPME software routine. Instead of permitting the DOS supervisor to cancel the job, HELPME traps data checks and program checks and then requests the operator to choose an alternate solution (bypass the record, alter memory and retry, etc.). Reduce rerun costs; shorten debugging time; use HELPME. (Not available for System/3).



SYSTEMS - SOFTWARE - SERVICE Phone 201 836-2700

**DATA UNIVERSAL** ▶

121 CEDAR LANE, TEANECK, NEW JERSEY 07666

CIRCLE 157 ON READER CARD

## PASS PERSONNEL ACCOUNTING & SKILLS SEARCH

PASS is a prepackaged system which gives the user the capability to create and maintain a Data Base of Employee Personnel records on the computer. All current personnel data is maintained on the Data Base along with history which is automatically generated when a change is applied to the file. In addition to standard reports such as Salary Review Notices, Employee Benefits Statement, Absentee Accounting, EEO and many others, the system provides a complete Staffing Control Module and a Skills Inventory/Search capability. A very powerful user oriented report generator is also a standard module of the system. An interface module provides linkage to existing payroll systems and allows for a single entry point for Data entering both systems.



personnel  
data  
systems,  
Inc.

WHITEMARSH PLAZA  
15 EAST RIDGE PIKE  
CONSHOHOCKEN, PA. 19428  
(215) 828-4294

CIRCLE 152 ON READER CARD

## SEISMIC SOFTWARE

The National Information Service in Earthquake Engineering (NISEE) is an ongoing public service by the Earthquake Engineering Research Center of the University of California at Berkeley. Its purpose is to collect, compile, and disseminate the information being generated around the world in earthquake engineering for use in structural design, research, and education.

The information resources available through NISEE include:

**EERC LIBRARY:** a specialized collection of technical reports, journals, and maps—accessible by mail or by visit.

**ABSTRACT JOURNAL IN EARTHQUAKE ENGINEERING:** a comprehensive annual survey of world literature in earthquake engineering—available by subscription.

**COMPUTER PROGRAM APPLICATIONS:** computer software from NSF-sponsored earthquake engineering research—distributed to researchers for a nominal fee.

For further information, write or call.



**NATIONAL INFORMATION SERVICE  
FOR EARTHQUAKE ENGINEERING**

National Information Service—Earthquake Engineering, Davis Hall, University of California, Berkeley, CA 94720, (415) 642-5113 or (415) 235-6000, x303

CIRCLE 160 ON READER CARD

## CAS III-EXTENDED

The computerized general ledger/financial reporting system is designed to be totally controlled by accounting personnel. CAS III-Extended allows a company to select its own philosophy of accounting and reporting and incorporate it directly into the system. The user aspects of CAS III-Extended permit data processing to become a utility.

- No programming modifications required
- Dedicated system report writer
- Fast, economical thruput
- Multi-level, multi-company reporting
- Historic, firm budget, flexible budget, variable budget
- Totally modular
- Mini Data Base Manager

CAS III-Extended includes a new concept in user documentation. "Interdependent Referencing" allows the user to reach the level of documentation required for his personal understanding. The documentation is straightforward, efficient and easy to grasp.

**comserv**   
CORPORATION

3050 METRO DRIVE, MINNEAPOLIS, MINN. 55420

**DATAMATION**

## BUDGET PERFORMANCE

Assists in preparation of budgets for 3-year period including current year. Spreads individual department revenue/expenses during year by using up to 999 spread variations of fixed, variable, semi-variable revenue and expense; also stores growth intensity and escalation/inflation factors. Performance budgeting by section, department, product; comparison of actual vs. budget against annual approved budget and monthly performance budget.

With flexible budgeting, revenue and expense can be related to activity levels on a departmental basis. Management is then able to deal effectively with unpredicted situations by applying known standards to modify operating plans and budgets.

ANSI COBOL, fully documented with source code. Lease \$500/Mo. for 12 months or purchase for \$5,000.

WILLIAM NIX ASSOCIATES, 170 Newport Center Dr., Suite 240, Newport Beach, CA 92660

## Stress Analysis of Complex Structures

For routine and non-routine computer stress analyses of complex structures, pressure vessels, and piping systems, consider:

- PIPDYNTM Static, dynamic, and thermal analyses of piping systems with ASME nuclear code evaluations.
- FELAPTm Static, thermal, and dynamic analyses of arbitrary structures modeled as an assemblage of plates, beams and stiffeners.
- DYPLAS Static and dynamic elastic-plastic-creep analysis of three-dimensional structures modeled as an assemblage of plate and shell elements, or revolved 3-D and shell elements.
- SPHNOZ/CYLNOZ Computation of local stresses in spherical and cylindrical shells in accordance with WRC Bulletin #107.

For further information contact Dr. M. M. Reddi, Manager, Engineering Mechanics Laboratory, 215/448-1134.



THE FRANKLIN INSTITUTE  
RESEARCH LABORATORIES  
Philadelphia, Pennsylvania 19103

CIRCLE 159 ON READER CARD

## ACCOUNTS RECEIVABLE

The INFONATIONAL Accounts Receivable System provides multi-company capability to handle over 10,000 operating entities with different charts of accounts. It handles multiple accounting periods simultaneously; highlights sales returns and adjustments; provides extensive credit control information; maximizes the control of cash flow; and gives a close look at the performance of salesmen, products, and customers. It provides management tools for reporting receivables data and collecting outstanding items. The System validates and maintains detail distribution for automatic interface into the Sales Analysis and General Ledger Systems. Other features include: discount calculation; discount earned; flexible application of cash; computer generated statements, service charge calculation; automatic dunning; sales distribution balancing; open item or balance forward processing; variable length aging categories; extensive audit trails. ANSI COBOL, PRICE UPON REQUEST.

## INFONATIONAL

P. O. Box 82477  
San Diego, Ca. 92138  
714-560-7070

CIRCLE 175 ON READER CARD

## MICOS MEANS BUSINESS!

We can make that claim because MICOS is installed in over 250 businesses in the U.S., Canada, and Sweden. In fact, developing business systems on mini-computers is our only business and has been for over six years. The attraction MICOS has for end-users, system houses, and service bureaus is a result of careful planning in operating system design and hardware selection. Recent purchases by the American Stock Exchange, Greyhound, and Shell Oil indicate large corporation acceptance of our services. In addition, many successful smaller companies have purchased systems for use in retailing, distribution, manufacturing, etc. Whether you have an in-house computer, utilize a service bureau, or have no EDP experience, you can benefit from MCS' proven capabilities.



mini-computer systems, inc.

525 Executive Blvd. • (914) 592-8812  
Elmsford, New York 10523

CIRCLE 158 ON READER CARD

## GUARANTEED SOFTWARE

# 100%

FREE TRIAL, FREE MAINTENANCE, LOW COST, SOURCE CODE, EASY TO USE SOFTWARE PRODUCTS.

Not just words but our way of doing business. All designed to increase efficiency for IBM 360/370 DOS/OS/VS installations.

Marketing and support in GERMANY, SOUTH AFRICA, THAILAND, LATIN AMERICA, NEW ZEALAND/AUSTRALIA.

GENERAL ELECTRONICS  
P. O. Box 79, Lyons, Illinois 60534  
312-447-4515

CIRCLE 174 ON READER CARD

## ACCOUNTS PAYABLE

The INFONATIONAL Accounts Payable System is an automated vouchersing system that calculates discount amount, determines discount due date and prorates taxes and freight to accounting line items, generates recurring contract payments, and balances accounting distribution. Debit memos, credit memos, expense reports, and check requests are accommodated. The system allows for the processing of "one-time" vendors, 10,000 entities with differing charts of accounts and report requirements can be processed simultaneously. Errors are automatically transferred to a suspense account. The system provides for interfaces into General Ledger, Inventory, and Check Reconciliation Systems. The System allows user controlled check writing and reporting cycles. Includes purchase Order Commitment, Check Reconciliation, Standard Cost, and Duplicate Invoice Screening modules. ANSI COBOL, PRICE UPON REQUEST.

## INFONATIONAL

P. O. Box 82477  
San Diego, Ca. 92138  
714-560-7070

CIRCLE 176 ON READER CARD

## HOSPITAL SYSTEMS

**PATIENT ACCOUNTING SYSTEM:** In/Outpatient billing, A/R, Revenue source, statistical data. Current status any account via terminals. 80 Prog. **ACCOUNTS PAYABLE SYSTEM:** Open order, data base. Report Generator. Encumbrance. 11 Prog. **FINANCIAL MANAGEMENT SYSTEM:** General Ledger, Cost Allocation, Trends and Financial Reporting. Unlimited summary/detail reports. 47 Prog. **BUDGET FORECAST SYSTEM:** Prepares hospital budgets over 3-year period. Interfaces with any general ledger system. Compares actual vs. budget against annual approved and monthly performance budgets; fixed, variable, semi-variable classifications. 7 Prog., 8 Reports. **HOSPITAL PROFILE SYSTEM:** Creates common data file from demographic, statistical, financial sources. User retrieval/data report to 5 levels of detail to individual reqmts., e.g., physician, diagnoses, age, sex, type pay. 6 Prog., 20 Reports. ALL SYSTEMS ANSI COBOL.

HOSPITAL FINANCIAL SERVICES, Inc.,  
170 Newport Center Dr., Ste. 240,  
Newport Beach, CA 92660 714: 644-6411

## GENERAL LEDGER

The INFONATIONAL General Ledger System is a responsibility and financial reporting system which produces consolidated and operating reports with comparative analysis. It integrates forecasts, flexible budgets, actual performance, and historical data into comparative management information. It processes up to 10,000 entities with their own chart of accounts. It automatically consolidates over 100 levels upward. The System uses automatic reversal of accruals and monthly generation of recurring vouchers plus the automatic transfer of edit errors to a suspense account. The user determines his own responsibility reporting requirements, level of supporting detail, and report format options. The Report Writer module allows custom reporting, while the flexible Cost Allocation module provides for pooling and distributing expenses. ANSI COBOL, PRICE UPON REQUEST.

## INFONATIONAL

P. O. Box 82477  
San Diego, Ca. 92138  
714-560-7070

CIRCLE 177 ON READER CARD

## FIXED ASSETS

The INFONATIONAL Fixed Assets System provides the following features: Physical inventory control, including transfers; maintenance of separate records for tax and corporate; optimization of depreciation methods; flexible depreciation proration; flexible reporting sequence/subtotals on reports; automatic conversion of accelerated methods to straight line; calculates investment tax credit; highlights assets which are requiring substantial maintenance costs; automatically projects depreciation expense into twelve time periods; automatically "recaptures" depreciation upon retirement using the ADR regulations; automatically assigns assets to vintage accounts using the class/life theory; takes maximum benefit of the latest ADR tax laws; up to 10,000 entities with different chart of accounts can be processed independently. The system provides for an automatic interface into the INFONATIONAL General Ledger. ANSI COBOL, PRICE UPON REQUEST.

## INFONATIONAL

P. O. Box 82477  
San Diego, Ca. 92138  
714-560-7070

CIRCLE 178 ON READER CARD

# The Software Marketplace...

## CONTROLLING YOUR \$

To support growth and assure maximum profit is a challenge to management in a dollar-squeezed economy. The need to be informed quickly, to analyze intelligently and to plan realistically requires a financial information system that feeds you accurate and complete dollar knowledge. The Financial Control System (FCS) provides your tailored reports for dollar control and management. FCS will work for you with its unique and proprietary financial data base feeding a multitude of varied and highly sophisticated financial reports which have been written by the end-user through the financial report writer. FCS offers optimal efficiency, timely processing, user-responsiveness and significant return on the data processing dollar. We invite your inquiry on the proven and tested FCS method to controlling the \$.



JEFFERSON FINANCIAL SYSTEMS, INC.  
177 North Franklin Street  
Chicago, Illinois 60606  
(312) 372-8411

CIRCLE 199 ON READER CARD

## SYSTEM/32 FORTRAN

Expand the capabilities of IBM's new small computer by utilizing FORTRAN to handle scientific and engineering tasks. Features included are:

File compatibility with IBM's RPG II  
2 to 8 byte INTEGERS and FLOATING POINT  
Extended FORMAT capability with RPG type edit control  
Expressions may be used for indices and list variables  
Sequential and random files supported  
Annual license fee of \$690, 3 year \$1710

ASSEMBLER available also. The assembler allows the user to code assembly language routines for RPG II EXIT and RLABL calculation statements. Five year period license fee \$300. 30 DAY FREE TRIAL.

APODICTICS INC.  
P.O. Box 2109, 321 S. Main Street  
Ann Arbor, Michigan 48106 (313) 769-4458

CIRCLE 172 ON READER CARD

## USER SATISFACTION

is the key to success of all our IBM 360/370 software: CROSTABS . . . our "top 200" statistical/retrieval reporting system, a powerful management tool in use at 100 business and government installations. UTILITY-CODER . . . the most comprehensive and efficient utility programming language on the market. AUTO-GRAF . . . an innovative graphing package which produces profile graphs, scatterplots, and horizontal, vertical, and multiple-strip bar graphs on an ordinary line printer. PROFILE . . . a matching, scoring, and retrieval system which compares records in one file with those in another, like job applicants to openings, or students to colleges. All packages are fully supported and consistently enhanced by CCA's system design and documentation experts. Send today for complete information.



CAMBRIDGE COMPUTER ASSOCIATES, INC.

222 Alewife Brook Parkway  
Cambridge, Mass. 02138

CIRCLE 182 ON READER CARD

## PAYROLL/PERSONNEL

Multi-company multi-division  
Written for large companies and payroll services  
Federal, state and local withholding and reporting  
Unemployment and disability taxes  
Sick pay—FICA exempt wages  
Personnel reporting  
Inventory skills  
Complete range of reports and report options  
Labor distribution  
Budget comparisons  
COBOL



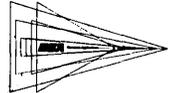
SYS CON  
Software Division of Systematics, Inc.  
126 Ottawa, N.W.  
Grand Rapids, Michigan 49502  
(616) 451-8471

CIRCLE 162 ON READER CARD

## CREDIT UNION APPLICATION (BSA)

This multi-credit union package is installed at several independent service companies and one of the largest state leagues. It now processes over 1/2 million credit union members' accounts. The basic system, for only \$286 monthly, is complete with share and loan accounting, special savings deposits, open-end loans, real estate escrow, automatic delinquency notices, statements, and dividends.

The basic system includes many service "selling" features. Optional modules are offered for general ledger accounting (\$124 monthly), automatic reporting of federally-insured student loans (\$91 monthly), Rite-on-Line (\$91 monthly), CD's (\$91 monthly), share drafts (\$91 monthly), and on-line terminal processing (\$351 monthly). Terms include on-site help and a perpetual use option price. Programs are ANS COBOL on IBM 360/370 and UNIVAC computers.



BSA COMPANY  
1714 Brogan St.  
San Antonio, Texas 78232  
(512) 222-2767

CIRCLE 171 ON READER CARD

## CUSTOM MINI SOFTWARE

Forth does what software packages can't do! And we do it on PDP-11, DG Nova and most other mini and microcomputers.

Applications and custom turn-key systems for:

- Telescope Control • Interactive Graphics
- Environmental Monitoring
- Mobile Data Acquisition and Analysis
- Quality Control & Test
- Multiprogrammed Laboratory Data Management
- And More

(213) 372-8493



815 Manhattan Avenue  
Manhattan Beach, CA 90266

CIRCLE 169 ON READER CARD

## MORTGAGE PACKAGE

Multi-bank processing—Correspondent services  
Full investor capabilities  
Participations  
FNMA—Single debit—Single Credit—Metro  
Escrow analysis  
Multiple escrows and balances  
Construction loan reporting  
Warehousing reporting  
Automatic payments  
Variable due dates  
Subsidized loans  
Variable interest rate  
Prepayment or postpayment interest computations  
Coupons and/or bills  
Fully automated accruals  
COBOL



SYS CON  
Software Division of Systematics, Inc.  
126 Ottawa, N.W.  
Grand Rapids, Michigan 49502  
(616) 451-8471

CIRCLE 163 ON READER CARD

## CULPRIT

(The fastest retrieval system)  
just got faster!

New version 4.0 has a host of new features—including subscribing and dynamic core allocation—which add even more speed to the acknowledged speed-leader.

We use CULPRIT too, so we know exactly how much this saves in your production reporting costs. Fact is, using version 4.0 we're running twice as fast and paying half as much for CPU time.

Remember . . . if you're already a CULPRIT or EDP-AUDITOR user . . . you get the new 4.0 version at no additional cost. If you're not now a user, and you want extreme speed, power, and ease of use . . . now's the time to get on board!

More information on version 4.0? Use our key number—or phone.



Cullinane Corporation  
Wellesley Office Park, 20 William St., Wellesley, Mass. 02181  
(617) 237-6601

CIRCLE 170 ON READER CARD

## CREDIT BY VOICE

Whether you offer a credit bureau service or need an in-house point-of-sale credit verification system, this is what you've waited for.

- Your terminals are touch-tone phones
  - Sales personnel are guided by easy step-by-step computer-generated voice instructions
  - Ambiguous inquiries are automatically switched to human operators
  - All reports, information updates, accounting and billing are on-line
  - Automatic monitoring detects suspicious runs on credit
  - Will handle up to 32 simultaneous callers—over a million calls a month
  - Designed for hardware redundancy where required
- A complete turn-key system costs \$89,500. Included are: video operator's terminals, PDP-11 computer, capacity for 50,000 bad risks, 4 custom voice response units, printer & all software support



Real-Share, Inc.  
Pacific Trade Center, Suite 890  
Honolulu, HI 96813

CIRCLE 153 ON READER CARD

### FIND JIM SMITH!!!

Looking for Smith, James, account number unknown, lives in Ohio? With index cards, tub files, or Microfiche, it may take hours to find him and get his file. With ISA's On-Line Alpha System, you can find him in seconds. Search with name and date-of-birth, or zip code, or account number, or whatever—the On-Line Alpha System will find him even if the name is misspelled. The information you want is displayed in your format—on the terminal of your choice. The On-Line Alpha System: contains powerful search logic—is adaptable to your file content—operates in batch or on-line—is teleprocessing monitor independent—uses virtually any type of terminal. For IBM 360/370, OS or DOS. Contact:



INSURANCE SYSTEMS  
OF AMERICA, INC.  
Box 47975, Atlanta, Georgia 30340  
(404) 449-3950

CIRCLE 180 ON READER CARD

### RAMIS FOR RESULTS

The Need: Obtain information,

- Now—not after many meetings
- Now—not at the end of a project
- Now—not when the data is old.

The Problems:

- Workload,
- Programming schedules,
- Budgets.

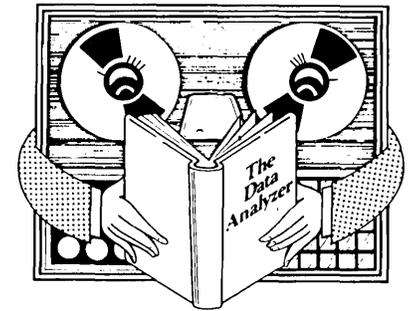
The Solution:

- RAMIS provides information when needed,
- Without conflicting with other jobs,
- Without damaging programming schedules,
- Without aggravating budgets.

To find out why RAMIS is truly a Rapid Access Management Information System, contact us.

MATHEMATICA  
Princeton Station Office Park  
P.O. Box 2392; Princeton, New Jersey 08540

### THE DATA ANALYZER



A complete information retrieval, analysis, and presentation system for business and data processing applications. For IBM 360/370's, it produces reports quickly and in any format, including cross-tabs and graphics. It offers an English-like coding language as well as programming level coding for sophisticated reports. Interfaces with IMS, TOTAL, and ADABAS.

#### Program Products Incorporated

95 Chestnut Ridge Road  
Montvale, New Jersey 07645

CIRCLE 165 ON READER CARD

### EDITOR™

Need to modify JCL parameters? Have source data files to edit? ICI's EDITOR™ is a software product which performs batch processing text editing. It specifically assists programmers maintaining source programs and any textual data files normally maintained in card or card image format.

EDITOR™ checks for a data string and replaces it. The search may be restricted to a data subset. Up to 32 characters of data may be tested and/or replaced. Up to 32 edit cards may be submitted per run.

EDITOR™ operates on the IBM 370's.

EDITOR™ is priced at the low monthly license cost of \$1/day, or \$540 for a permanent license.

To order EDITOR™ for your installation or to request a free 30 day trial, write:

INFORMATION & COMMUNICATIONS, INC.  
99 East San Jose Avenue  
Burbank, Calif. 91502

CIRCLE 181 ON READER CARD

### COMPACT II ON 360/370

COMPACT II® is a universal N/C programming system for point-to-point and contouring applications on mills, drills, punches, flame cutters and EDM machines. COMPACT II meets the requirements of both manufacturing and data processing. It is compatible with all IBM 360/370 systems operating under DOS, OS, TSO or CMS. COMPACT II is also available through a nationwide computer time-sharing network and on ACTION CENTRAL, a minicomputer based system. For more information call 313/761-7750, or write:

**INDSI** manufacturing data systems incorporated

320 North Main Street  
Ann Arbor, Michigan 48104

CIRCLE 179 ON READER CARD

### SHRINK

SHRINK is a generalized data compression package for IBM 360/370 computers that is capable of 40 to 75% compression on most commercial application files while requiring minimal CPU and core resource requirements. The compression methods include dictionary referencing, number system conversion, and a frequency analysis technique that computes the least redundant coding scheme for each file. SHRINK custom compiles its code for each file which accounts for its low CPU overhead—100K bytes per CPU second on a S/370/158. Designated key fields can be exempted from compression to permit the sorting of compressed files, thereby reducing sort time and workspace. Redundancy checking ensures absolute integrity. SHRINK is applicable to disk, tape and CPU to CPU transmission, for batch and on-line programs, plus IMS/VS. A no obligation trial is available.

INFORMATICS/PMI  
PSD, 1301 6th Avenue  
New York, New York 10019

CIRCLE 167 ON READER CARD

### WORD PROCESSING/ TEXT EDITING

The Compu-Text word processing system is a mini-computer word processing system utilizing disk storage and IBM Selectric, video or electronic typing stations with high or low speed printers to do output only. Compu-Text can handle all word processing requirements including: transcription; repetitive; boilerplate documents; long documents requiring heavy text editing; mass mailing with permanent storage of names and addresses with sort capability; and statistical typing. Up to twelve typing stations and 8 disks (8,000 pages of storage) can be used simultaneously. Compu-Text can be purchased or leased.

**Compu-Text**  
LCS CORPORATION WORD PROCESSING SYSTEM

31 Elm Street  
Springfield, Massachusetts 01103

### THE FINANCIAL SOFTWARE COMPANY

We develop and market financial software systems to more than 1800 world-wide clients. We help them in the areas of general ledger, payroll, personnel management, receivables, payables, inventory and fixed asset accounting. If you would like to find out more about a new era of managed growth call or write William M. Graves at the address below.

Management Science America, Inc.  
3445 Peachtree Rd., N.E., Suite 1300  
Atlanta, Georgia 30326  
(404) 262-2376

CIRCLE 194 ON READER CARD

### INTERCOMM

INTERCOMM is the most advanced TP monitor available for OS and OS/VS. It provides the ultimate DB/DC environment with full integrated support for ADABAS, IDMS, MODEL 204, TOTAL, SYSTEM 2000 and DL/1; full recovery is provided for messages, queues, standard files, and data bases. INTERCOMM permits separately servicing multiple, on-line systems concurrently in a shared communications environment: each system cannot address the other's core, files or data bases. INTERCOMM provides extensive utilities that greatly simplify programming requirements for COBOL, PL/1, ALC, or FORTRAN. Special performance options make INTERCOMM highly desirable for large volumes or networks, particularly in VS. A wide variety of terminal types are supported.

INFORMATICS/PMI  
PSD, 1301 6th Avenue  
New York, New York 10019

CIRCLE 168 ON READER CARD

# The Software Marketplace...

## MARKETAB III

Three phase market research survey and audit system. Cleaning phase provides complete column editing, logical cleaning, recode or summary punching and full printed report including logical hit/miss counts, full punch counts and total respondent based percentages.

Data manipulation phase provides complete recode capability, physical and/or mathematical manipulation of the data, trailer record generation and other time saving features.

Tabulation phase provides virtually infinite combinations of tab and formatting options to satisfy most survey and/or audit tabulation requirements. Market research oriented spec language reduces or eliminates spec writing and requires less than one week of training.

Operational on 360/370 OS or DOS. Universal Fortran version, for other computer configurations, available first quarter 1976.



280 CONNECTICUT AVE., NORWALK, CONN. 06854

CIRCLE 196 ON READER CARD

## FIXED ASSETS AND YOU

What makes software successful for you? AVC provides the best ingredients for fixed asset management systems: proven programs, personal concern and support, and completely satisfied users—over 100 of them. Our PAC-FACS and BIT-FACS systems encompass all phases of a fixed asset life cycle—from the initial capital budget through the retirement. System parameters are customized to fit your organization and account coding. PAC-FACS provides cash flow budgeting data and a detailed C-I-P audit trail. BIT-FACS outputs correspond specifically to all external reporting forms—the SEC 10K, ADR 4832, Federal Tax Schedules D, G, M, 4255, etc. Whatever your tax, accounting, insurance, capital budgeting, or engineering needs for asset data, call the experts in property systems and consulting.



american valuation consultants, inc.  
One North Broadway Des Plaines, Illinois 60016

CIRCLE 197 ON READER CARD

## SCHEDULING

For the single computer or for an entire multi-machine data center environment, Value Computing's SCHEDULING SYSTEMS select the best machine, the best job mix, minimize contention and optimize machine loading. Based upon an automatically generated and updated data base, a model of the computing environment (hardware/software) and Value's finely tuned scheduling algorithm, the SCHEDULING SYSTEMS can be the key to the success of your installation. The Value SCHEDULING SYSTEMS help you: Get reports to users on time. Maximize multi-programming throughput. Reduce idle time. Provide better utilization of your hardware. Give the operators a road map to run by. Reduce paging and input/output contention. Plan better through long-range and short-range simulation capability. Communicate to management and users alike that the data center is organized.

VALUE COMPUTING INC.  
300 VCI Building, West Marilton Pike  
Cherry Hill, N.J. 08034

CIRCLE 195 ON READER CARD

## Data Catalogue

The Comprehensive Data Dictionary

Data Catalogue is an established data management system which provides the Data Administrator, End Users and System/Programmers with facilities to control, design and document large data collections. It is written entirely in COBOL, operates on OS, DOS, VS and Univac 1100 computers. Catalogue installs in minutes and is easy to operate.

The Catalogue has been rapidly attracting users and has been steadily enhanced. It now:

- Supports TOTAL
- Supports IMS
- Supports MARK IV
- Supports Conventional Files
- Generates COBOL, BAL & PL/I Data Division Entries
- Has a powerful Query Language
- Can create input from COBOL, BAL & PL/I programs
- Online and/or Batch

SYNERGETICS CORPORATION

1 Garfield Circle  
Burlington, Mass. 01803

CIRCLE 186 ON READER CARD

## SUPER Payroll/ Personnel/Pension

SUPER Payroll features many earnings/deductions, labor cost and multiple payment methods. SUPER Personnel handles skills inventory, benefits, and manpower budgets and planning. SUPER Pension tracks 7 plans per employee, 99 iterations of history and 20 breaks in service. SUPER users receive instant updates to new government requirements, documentation and maintenance.



LABORATORIES, INC.  
COMPUTER SERVICES DIVISION

836 NORTH STREET, TEWKSBURY, MASSACHUSETTS 01876, TEL. (617) 851-4111

CIRCLE 155 ON READER CARD

## PROJECT CONTROL!

If you're using CPM/PERT as a project planning, scheduling and control tool, you should be using EZPERT too! It can save you time, money and improve your project control.

So what's EZPERT? Briefly, it's an automated graphics system that operates on your computer and automatically transforms normal tabular outputs into the graphics you need—time scaled networks, Gantt barcharts and cost/resource graphs—produced on pen, film or electrostatic plotter.

SYSTONETICS, INC.  
600 NORTH EUCLID STREET  
ANAHEIM, CALIFORNIA 92801

CIRCLE 151 ON READER CARD

## PRO/TEST IMS DATA GENERATOR

### TEST DATA FOR IMS USERS

PRO/TEST IMS Data Generator generates physical and logical data bases from simple parameters. It generates any data base with any combination and number of segment formats with up to 15 levels of hierarchy; generates constant, random, range and calculated values in any data format.

SYNERGETICS CORPORATION

1 Garfield Circle  
Burlington, Mass. 01803

CIRCLE 187 ON READER CARD

## UP YOUR COMPUTER

Quality products with quality support. That is the formula that has made Pansophic the most-preferred name in utility software today. PANVALET, EASYTRIEVE, PAN\*DA and PAN\*SORT meet real data processing needs for over 3,000 companies, protecting and managing data without fail, year in and year out. Let us up your computing capability.

## PANSOPHIC

PANSOPHIC SYSTEMS, INC.  
709 Enterprise Drive  
Oak Brook, Illinois 60521

## TAXCAL

Is the most advanced, flexible and inclusive payroll tax module available. Custom generated to management and tax jurisdiction requirement of individual installation. Single CALL computes applicable federal, state, county, local (over 3,000) withholdings; FICA, disability, unemployment. TAXCAL's analysis of marital status, exemptions, dollar exemption adjustment, domicile, work location, reciprocity and payroll period determines applicable deductions. Handles special situation calculations: commission, supplemental, cumulative, multiple entity earnings. Computes employer liability: FICA, unemployment, disability, workman's compensation, M&C. Purchase includes installation assistance and original maintenance. Maintenance: account representative assigned, law changes in source card form. Four versions to choose from: COBOL, RPG II, FORTRAN, Assembler.

WERNER HENRI, INC.  
P.O. Box 53264  
Houston, Texas 77052

CIRCLE 161 ON READER CARD

## JASPER

JASPER is a Job Accounting and billing system for DOS or DOS/VS computers.

The VS version captures paging statistics and utilizes the POWER/VS Spooler accounting records to measure reader, printer and punch activity and provide turnaround and que time statistics.

User billing is handled by a sophisticated report generator program that lets you "do it your way".

An optional performance analyzer program gives JASPER a "hardware monitor" capability that no other job accounting system can match. CPU, Paging and device activity are plotted by a graph generator in a series of "Activity vs Time" graphs that measure overall computer performance and spotlight over and under utilized equipment.

JASPER installs quickly and is easy to use. Run time of the Daily programs on a 370/135 is 5-10 minutes.

### DATACHRON CORPORATION

174 Fifth Avenue, New York, N.Y. 10010  
Telephone: (212) 675-5333

CIRCLE 192 ON READER CARD

## RPG/RPGII TO COBOL

Package accepts Sys/3 RPGII, MOD 20 DPS RPG, 360/370 DOS and OS RPG and can produce either DOS or OS ANS COBOL. Inherent functions such as Match Record, Chaining, Subscripting, as well as Table Handling are converted by the system. A cross-reference worksheet of the original RPG statements aligned with the resulting COBOL is produced. Dataware offers 2 service forms: Clean Compile and Full Implementation. Lease and License are also available.

We also have translators for:

Autocoder/SPS-To-COBOL  
Easycoder/Tran-To-COBOL  
BAL/ALC-To-COBOL  
PL/1-To-COBOL  
Autocoder (7070)-To-COBOL  
COBOL-To-COBOL



### DATAWARE INC.

495 Delaware St., Tonawanda, N.Y. 14150  
(716) 695-1412

CIRCLE 193 ON READER CARD

## REPLACE CICS ???

With BETACOMM, a monitor designed to provide low cost on-line application implementation. Multi-thread/multi-task processing, broad terminal support, data base interface, comprehensive 3270 mapping, storage protection, and data entry (replacement for Video 370) are but a few of the features which make BETACOMM an ideal replacement for DOS-DOS/VS CICS. Extensive on-line testing facilities and programming language flexibility (ANSI COBOL, PL/I, BAL, RPG II, FORTRAN) will reduce development costs. On-site education and installation are provided as part of the package.



PROGRAMMING METHODS CO.  
Division of Informatics, Inc.  
1301 Avenue of The Americas  
New York, N.Y. 10019

CIRCLE 188 ON READER CARD

## PACE /KOMAND OS/VS JOB ACCOUNTING AND BILLING

WE ARE...  
NOT LIMITED TO SMF

- Account Code Validation
- JCL Error Accounting
- Inline Step and Job Statistics
- Recovery of SMF Data After System Crashes
- Extensive SMF Data Editing
- Occupancy Time Calculation
- System Overhead Calculation
- Utilization Checkpointing

SYSTEM AND OPERATIONS ORIENTED

- Device Utilization
- Scheduling Aids
- TSO Accounting
- Paging Statistics
- Utilization graphs
- HASP/ASP/JES Interface

COST CONSCIOUS

- Formal Invoicing
- Revenue Analysis
- EDP Related Billing
- Prorated Job Charges
- Budget Control
- Forms Billing

FLEXIBLE

- Table-Driven Algorithm
- Statistical Report Writer
- On-site Installation Support

THE PACE FOR TODAY... AND TOMORROW

PACE APPLIED TECHNOLOGY, INC.  
2990 Telestar Court  
Falls Church, Virginia 22042  
(703) 573-9131

CIRCLE 198 ON READER CARD

## OIL AND GAS SYSTEMS

For production accounting and petroleum engineering applications including:

- Processing tank and meter tickets, computing barrels and API gravity at 60°F; incorporating rigorous edit routines; maintaining master file for tank increments and meter factors.
- Pricing run tickets and computing net value taking into account pricing structure, production taxes and transportation charges.
- Developing reports for production management including artificial recovery projects and incorporating runs, production, API gravity, allowable, well count and well status; allocates commingled production among wells and reservoirs.
- Economic evaluation and reserve keeping.
- Planning optimal field development and artificial recovery projects.

### MORTADA INTERNATIONAL

7616 LBJ FREEWAY, SUITE 406  
DALLAS, TEXAS 75240  
(214) 233-7703

CIRCLE 166 ON READER CARD

## QUIKJOB

"The Performance Expander"

An economical general purpose utility, mini-language, and report writer for IBM S/360-370. QUIKJOB is a simple but powerful tool designed to minimize programmer time. QUIKJOB is coded like a COBOL procedure division but requires no lengthy file or data definitions. Emphasis is toward Report Writing, File Maintenance, Data Selection, Test Data Generation, Custom Utilities, Unit Record replacement, and other applications not justifying a significant programmer effort. QUIKJOB is used by over 200 companies. Two consecutive years on Datapro Honor Roll. A 30-day free trial is available—thereafter QUIKJOB can be rented for as little as \$2.50 per day. For more information call Bob at 513-435-9514 or write:

SYSTEM SUPPORT SOFTWARE  
28 East Rahn Road  
Dayton, Ohio 45429

## ECONOMICAL ON-LINE

With Minicom, System 360/370 DOS/VS Tele-processing Monitor with Economy of Core and Economy of Price. Minicom will operate in a CPU with as little of 24K and support PL/I, Cobol, BAL, and RPG II applications. Supports 2260 and 3270 local and remote networks with comprehensive 3270 mapping. High speed program library, overlay, cancel traps, data capture and warm restart are among features. Education and simple installation provided by vendor on user site. Installed in greater than 90 locations—Supported by Programming Methods.



PROGRAMMING METHODS CO.  
Division of Informatics, Inc.  
1301 Avenue of The Americas  
New York, N.Y. 10019

CIRCLE 189 ON READER CARD

## WHAT'S SCORE IV?

- FOR FAST REPORT WRITING
- FOR EFFICIENT FILE MAINTENANCE
- FOR COBOL PROGRAM GENERATION

If your company wants to:  
MEET EDP BUDGET PROJECTIONS!!  
CUT MACHINE RUNNING TIME!!  
SHORTEN PROGRAMMING TIME!!  
RELIEVE PRESSURE ON THE D.P. DEPT!!  
LET US SHOW YOU WHAT THE SCORE REALLY IS.



PROGRAMMING METHODS CO.  
Division of Informatics, Inc.  
1301 Avenue of The Americas  
New York, N.Y. 10019

CIRCLE 190 ON READER CARD

# The Software Marketplace...

## K & H CPM/RPSM

K&H Critical Path Method/Resources Planning & Scheduling Method systems are network-based project management systems that are in use on 6 continents and are available on IBM, CDC, UNIVAC, and ICL hardware. They feature extremely efficient processing, powerful features for time analysis and resource leveling, and flexible report writers to provide tailored reports.

The 8 current K&H systems represent over 10 years of development, evolution, and user feedback. The result of these efforts is that the user has access to well-proven, practical systems that are unmatched in price-performance. Organizations in both the public and private sectors have chosen K&H systems for their cost-effectiveness as management and planning tools.

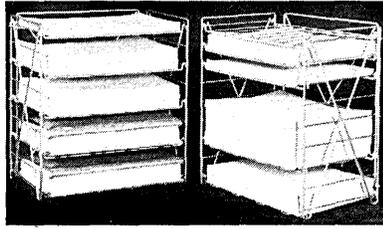
### K & H Computer Systems

78 BROADWAY 9 VILLIERS ROAD  
DENVER NJ 07834 KINGSTON, ENGLAND  
(201) 627-2510 01 549-5777

BOX 371 STATION K  
TORONTO 12 CANADA  
(416) 488-3088

CIRCLE 154 ON READER CARD

## PRINTOUT ORGANIZER



Sturdy steel construction. Room for nine adjustable shelves. Collapsible for storage and shipping. Basic unit includes five shelves. In chrome—one unit, \$18.00—10 units, \$17.00 ea. 100 units, \$16.00 ea. Set of four additional shelves, \$8.00. Also available in brass or bronze. Custom units made to order.

F.O.B. Los Angeles, California  
Approx. weight—8 lbs.

PRECISION WIRE PRODUCTS  
11215 So. Wilmington Avenue  
Los Angeles, California 90059  
213-569-8165

CIRCLE 257 ON READER CARD

## DYLA KOR SOFTWARE

16255 Ventura Blvd., Encino, Ca. 91436  
(213) 995-0151



THANK YOU  
1,000 users



DYLA KOR made the  
DATAPRO HONOR ROLL  
3rd consecutive year

DYL-250

DYL-260

CIRCLE 260 ON READER CARD

## DOS ENHANCEMENTS

Universal Software offers a variety of enhancements to DOS and DOS/VS which improve the efficiency of the data processing installation.

ASAP, ranked among the top 25 software products by DATAPRO, is the price/performance leader in DOS spooling systems. Conservative in its requirements and transparent in operation, ASAP's facilities include complete I/O spooling, immediate device start, partition independence, RJE support, partition balancing and complete job accounting.

RELO-PLUS, also included in the DATAPRO Honor Roll, provides relocatability for all programs, both single and multiphased. RELO-PLUS additionally improves program efficiency through its use of in-core directories and blocked fetch facilities.

AVR-PLUS provides automatic volume recognition and device equate capabilities which make JCL partition independent thereby facilitating scheduling procedures and minimizing operator intervention.

UNIVERSAL SOFTWARE, INC.  
136 White Street  
Danbury, Connecticut 06810  
Telephone 203-792-5100

CIRCLE 258 ON READER CARD

## DOCS-DOS CRT CONSOLE

DOCS PROVIDES IBM S/360 DOS USER WITH 3277 DISPLAY UNIT SYSLOG SUPPORT. DOCS is simply installed on any DOS system with no user changes required. DOCS executes independently of user partitions providing SPEED, MULTIPLE CONSOLES, OUTSTANDING READS FROM MULTIPLE PARTITIONS, MULTIPLE EXTERNAL INTERRUPT KEYS. DOCS supports all 1052 functions yet eliminates dependency on the typewriter. DOS/VS support will be available for S/370 135 & 145 at a later date. DOCS is available on monthly, yearly or one-time lease for \$175.00, \$1,890 or \$5,670 respectively. Complete documentation along with license agreement will be sent upon request.



C F S, Inc.

BOX 662, Brookline, Ma. 02147  
(617) 731-3474 Telex 94-0285

CIRCLE 256 ON READER CARD



The U.S. Army  
salutes  
\$97,150 savings

DATAMACS<sup>®</sup>  
Automatic  
Test Data Generator  
is the reason.

A recently issued technical bulletin from the Department of the Army confirms what we've been saying for some time. And that is that dramatic cost savings can be realized from the use of the DATAMACS Automatic Test Data Generator.

\$97,150 savings to be exact, in an average data processing installation, in the first year alone. Beyond that, the U.S. Army Computer Systems Support and Evaluation Command foresees "average follow-on annual savings of \$103,000+."

That's nothing new to our ears. The more than 300 users of DATAMACS have been enjoying dramatic cost savings; improved levels of quality, standardization, and accuracy; and increased user satisfaction.



macs  
management and computer services, inc.  
790 valley forge plaza  
valley forge, pa. 19482 215-265-2910

CIRCLE 191 ON READER CARD

## SPSS

The Statistical Package for the Social Sciences is an integrated system of computer programs for the statistical analysis of data. It is a comprehensive set of statistical functions which enable a researcher with no programming experience to perform a wide variety of data analyses in a simple and convenient manner on most large computer systems, including IBM (OS, DOS), UNIVAC (70,1100), CDC (3000,6000), HONEYWELL, BURROUGHS, XEROX, ICL, DEC, FACOM, SIEMENS, and TELEFUNKEN. Two manuals are available from McGraw-Hill which describe the system: SPSS, a 675-page manual which discusses the statistical routines and their use; and the SPSS PRIMER, a 134-page introduction to computer technology and some major features of the SPSS system.

# SPSS inc.

6030 South Ellis Avenue  
Chicago, Illinois 60637

CIRCLE 164 ON READER CARD

# DEC 310 & 350

BUSINESS  
SOFTWARE

- ORDER ENTRY (INVOICING)
- INVENTORY CONTROL
- RECEIVABLES • PAYABLES
- PAYROLL • GEN. LEDGER
- SALES ANALYSIS

OEM INQUIRIES INVITED

**MCBA** 3142 WILSHIRE, SUITE 7  
LOS ANGELES, CA 90010  
(213) 480-3063  
MINI-COMPUTER BUSINESS APPLICATIONS, INC.

CIRCLE 259 ON READER CARD

## TIME MOVES ON

... and it's time to move to UNITED!

Hardware: IBM 360/195, OS-HASP (RJE), 2.2 meg, 3330's, 2314's (360/65 fallback)

Software: UAL/ACS ICES! MPSX, GPSS, PMS, SSP, OSIRIS, BMD, All standard compilers.

Communications: 2000 to 9600 BAUD, Dedicated or Dial-Up, Auto-Answer WATS lines.

Service: Guaranteed Turnaround!

Cost: You'll save up to 50%.

Experience: Over 4 years serving companies on a nationwide basis.

Reliability: Better than 98.5% uptime!

The move to United will save you time and substantially decrease your data processing expense. Let us show you. Contact us today to schedule a benchmark or for additional information.

UNITED AIRLINES

Computer and Communications Services Division Denver Tech Center—5350 So. Valentia Way Denver, Colorado 80110 / Telephone (303) 398-5936 or 779-2000

CIRCLE 254 ON READER CARD

“★★★★”

—plus.

DOS/RS makes a superstar of your S/360 for a flat, fair \$500 per month.

Since being rated by Datamation readers, a host of important new features have been added. Write for facts:

**dearborn**



dearborn computer leasing co

CIRCLE 252 ON READER CARD

## DISK UTILITY SYSTEM

Referred to by DATAPRO as “among the best liked software products in the EDP industry,” the success and satisfaction of this product is clearly evidenced by more than 2,500 installations to date. The product provides users with a fast, reliable and easy to use means of backing up or copying disk files (including libraries) and data bases, either to tape or disk and time savings. In general, the programs can dump multiple disk volumes and/or files of different organizational structure to tape, can selectively restore any file or volume dumped to tape and can copy complete volumes and/or files from disk to disk.

Features of the product include full verification of data, self relocation for running in any or all partitions, ISAM reorganizations and re-blocking VSAM support, device independence among all IBM supported disk devices and equivalents, self adaptation to core and channel configurations, simple format parameter card input and library backup, condense and reorganize capabilities including selective bookname restore offer considerable operation convenience and time savings.

Operating Software Packages

Westinghouse Electric Corporation

2040 Ardmore Boulevard

Pittsburgh, Pa. 15221

(412) 256-5583



CIRCLE 184 ON READER CARD

## MAXI-LIBE PROTECTS!

MAXI-LIBE brings ease-of-use, highest compression, control of changes, audit trails and level-checking within reach of all IBM DOS and OS budgets. This proven, self-relocating library system provides the features of more-expensive systems, and goes further, with inclusion of a COBOL pre-compiler, automatic checking of backed-up members, multiple SCAN capability in one pass, and a temporary INCLUDE feature that calls up to seven nests of code. This well-documented System provides interfaces with teleprocessing monitors and data-bases through its 21 exit-points. A read-only access call provides quick retrieval of data directly, without executing MAXI-LIBE. PERPETUAL LICENSE: \$2,662 DOS; \$3,197 OS. Includes first-year maintenance. Telephone (415) 654-6030 or write:

**MAXIMA SYSTEMS GROUP**

1475 Powell Street  
Emeryville, CA. 94608

CIRCLE 200 ON READER CARD

## TP MONITOR ON MINI

Prodata International Corporation of Santa Rosa, California announces the availability of a high-volume, large CRT-terminal and file-handling capacity Teleprocessing Monitor for the Varian V-70 Series Computers, called PRONTO, with the full spectrum of services and facilities normally found in large IBM main-frame environments. Facilities include user transaction program multi-tasking, CRT page-file handling, automatic input transaction and file update logging, support for IBM 3270, Hazeltine 2000, Hewlett/Packard 2640A, and other CRT terminals, as well as point-to-point and multi-drop BSC communications to several IBM 360/370 computers simultaneously. User programs may be written in FORTRAN IV, COBOL, RPG II, or Assembler, including full support for ISAM, QSAM, and TOTAL. Installed locations (4) include a Service Bureau, a State Government Agency, and two large manufacturers. For further details, write or call:

PRODATA INTERNATIONAL CORPORATION

Post Office Box C

Santa Rosa, California 95402

Telephone (707) 544-2865



CIRCLE 253 ON READER CARD

## JOB ACCOUNTING

The Westinghouse Job Monitor is a low cost accounting system designed to inform you on a daily basis how your computer is being used and how to make better use of the system's resources. Job Accounting information for DOS, DOS/VS, and/or POWER/VS is captured and put into comprehensive reports which provide systems, operations, and management personnel with the following information: (1) chronological reports showing daily activity of job streams, (2) Daily partition utilization, (3) CPU hourly activity, (4) Graphic analyses of overload conditions and machine and device availability, (5) Start I/O by device, paging by job and resource usage summaries, (6) 30-day statistical summaries, and (7) POWER/VS statistics by day and job for users of POWER/VS Accounting. The complete package is provided requiring no special education or programming costs and no dedication of hardware units. One time charge for purchase and free trial available.

Operating Software Packages

Westinghouse Electric Corporation

2040 Ardmore Boulevard

Pittsburgh, Pa. 15221

(412) 256-5583



CIRCLE 183 ON READER CARD

## from NTIS

The 1976 Directory of Computerized Data Files, Software and Related Reports is your comprehensive source book for computer programs and data files generated by the Federal Government and available from the National Technical Information Service of the U.S. DEPARTMENT OF COMMERCE. Reviews and tells how to obtain over 1100 computer programs and data files by giving comprehensive abstracts containing full descriptions. This book is your best source to find out how to obtain the results of millions of dollars of Government-funded technology. Order NTIS-SR-75-02 in papercopy or microfiche for \$50 domestic (\$60 foreign).

**NTIS**

425 13th Street, NW., Suite 620  
Washington, D.C. 20004

CIRCLE 255 ON READER CARD

## FORESIGHT®

An “application language” for financial and management purposes. Its English-language command structure requires no programming knowledge. It has been used to develop budgets, merger and acquisition analyses, real estate feasibility analyses, banking applications, corporate management reports, and corporate financial and simulation models. Changes are easily accomplished; provides self-documentation of all the logic and data; consolidation of all kinds can be performed. Iteration, looping, and forward and backward modeling is possible through conditional branching routines. Statistical forecasting based on historical data can be done. Financial routines include Present Worth, Discount, Rate of Return, Amortize, Depreciate, and Spread. FORESIGHT models can be saved, retrieved, or modified. Other corporate files can be accessed through DATA IN; DATA OUT allows FORESIGHT applications to be used by existing routines.

Installed on machines of 8 different manufacturers, Min. 65K Bytes, Timesharing, RJE, or Batch as appropriate for the operating system of each computer—FORTRAN IV.

FORESIGHT SYSTEMS INC.

A United Computing Systems Co.

1901 Avenue of the Stars

Los Angeles, California 90067

CIRCLE 251 ON READER CARD

## WESTI TP-INTERFACE

The Westinghouse Teleprocessing Interface System provides a low cost, low overhead, easy-to-use interface for local/remote 2260/3270 type display terminals operating in a DOS or DOS/VS environment.

The monitor portion of the system manages all terminals, application programs, user core areas, disk work space, display screen files, user work areas and handles all error correction. The system can control up to 255 terminal devices and application programs and operates in a single terminal environment, multi-terminal mode enabling many terminals to communicate with the same application simultaneously or in a special multi-copy mode.

Special functions included in the monitor are high speed roll-in/roll-out, data base independence, the ability to run as a subtask, enqueueing, logging, and a collection of supportive utilities. The monitor itself can be generated to operate in as little as 2K of real core on a virtual system.

Operating Software Packages

Westinghouse Electric Corporation

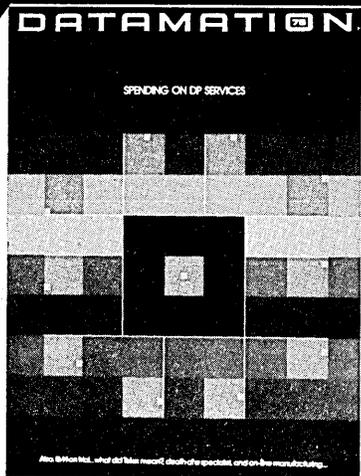
2040 Ardmore Boulevard

Pittsburgh, Pa. 15221

(412) 256-5583



CIRCLE 185 ON READER CARD



## When target selling is the aim of business, Technical Publishing Company supplies the market.

No one zeroes in on specialized industrial markets like Technical Publishing Company. Besides *Datamation*, "Technical" publishes six other national business/professional magazines:

*Consulting Engineer, Plant Engineering, Pollution Engineering, Power Engineering, Purchasing-World-and-Research/Development.* Each one is recognized as a prime source for technical and business information. Each one enables business to aim its selling message to a specialized audience. This targeting concept has been so successful, in fact, that last year six of our seven publications were among the top 100 specialized business magazines in advertising revenues.

Technical Publishing Company further helps business with its annual *Plant Engineering Directory and Specifications Catalog*, industry's prime reference source for product information, plus services such as specialized product postcards, mailing list rental and market research.

In addition, our TPC Training Systems provide an innovative, economical method for training maintenance craftsmen for industry, and DBI Books, Inc., (formerly Digest Books, Inc.) serves the consumer leisure market with over 55 titles devoted to sports, hobbies and crafts.

Technical Publishing Company is a growth company targeted to growth fields. We are publicly-owned and our stock is traded over-the-counter. For information on any of our properties or the company, write James B. Tafel, President and Chief Executive Officer.



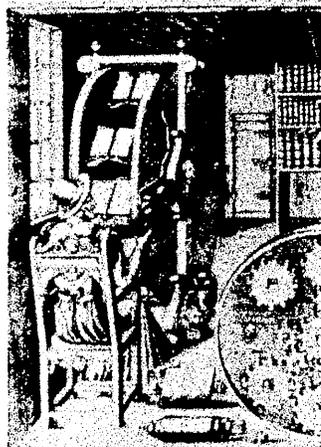
**Technical Publishing Company**  
1301 South Grove Avenue  
Barrington, Illinois 60010

# advertisers' index

AC Manufacturing Company ..... 94  
 †ALSPA ..... 132-P  
 American Telephone and  
 Telegraph Company ..... 41  
 Anderson Jacobson ..... 66  
 Applications Software, Inc. ... 155, 175  
 Applied Data Research Inc. .... 5  
 Applied Digital Data  
 Systems Inc. .... 104  
 Ball Computer Products, Inc. .... 84  
 †BASF ..... 132-Y—132-DD  
 BASF Systems ..... 16  
 Basic/Four Corporation ..... 133  
 John Beall & Co., Inc. .... 128  
 Bell & Howell Business  
 Data Products Division ..... 116  
 Boeing Computer Services, Inc. .... 76  
 Cable & Wireless ..... 156  
 Cadillac Associates, Inc. .... 163  
 California Computer Products, Inc. . 46  
 Capital Calculator Company ..... 85  
 Cardkey Systems, A Division  
 Greer Hydraulics, Inc. .... 87  
 Centronics Data Computer Corp. ... 6  
 Chemetron Corporation ..... 90  
 †CII ..... 132-F, 132-G  
 Codex Corporation ..... 95  
 Computer Network Corporation ... 98  
 Computer Information Management  
 Company ..... 81  
 Computer Machinery Corporation ... 1  
 †Computer Program Products .. 132-QQ  
 The Computer Software Company .. 195  
 Computer Transceiver Systems  
 Inc. .... 108  
 Computer Transmission Corporation 96  
 Control Data Corporation .... 135, 192  
 Cullinane Corporation ..... 176  
 Cummins-Allison Corp. .... 134  
 Data Communications Interface  
 ..... 164, 165, 166, 167  
 Data General ..... 157, 189  
 Data 100 Corporation ..... 162  
 †Data Recording Instrument  
 Company Limited ..... 132-R  
 Datamedia Corporation ..... 159  
 Datapoint Corporation ..... 99  
 Dataproducts ..... 9  
 Datum, Peripheral Equipment  
 Division ..... Cover 3  
 Delta Data Systems  
 Corporation ..... 194  
 Digi-Data Corporation ..... 67  
 Digital Computer Controls Inc. .... 171

Digital Equipment Corporation  
 ..... 24, 25, 160, 197  
 Disc/3 Company ..... 161  
 Electronic Memories & Magnetics  
 Corporation ..... 72, 73  
 Fabri-Tek Inc. .... 110  
 H. Dell Foster Co. .... 82, 83  
 Fujitsu Limited ..... 20, 21

Gates ..... 4  
 General Automation, Inc. .... 74, 75  
 Goodyear Aerospace Corporation .. 48  
 Graham Magnetics ..... 91  
 GTE Laboratories Inc. .... 198  
 GTE Sylvania, Incorporated ..... 126  
 Gulf Computer Sciences, Inc. .... 78  
 Hewlett-Packard .. 19, 29-36, 112, 173



## Early Information Retrieval System

In the 1600's, this revolving book shelf could have been considered the latest thing. Each shelf was geared to the shaft to maintain horizontal alignment.

## In Software Design, the Challenge is to stay ahead of Obsolescence!

Our client, one of the nation's largest and most prestigious equipment and systems innovators, is looking for individuals with outstanding technical credentials in the field of complex real-time software systems, preferably command and control, weapons, radar and communications. A background in some of these areas will be considered: Data Base Management; Radar & Communications System Programming; Radar, Weapons, Missile Simulation; Operating System Software Development; Real-time Software Design; Software Project Management; Weapon System Software Development; New Business Acquisition; Micro Programming Systems; Real-time Executive System Design; Computer Systems Architecture. If you have a successful background in some of these areas, we can offer long-term career opportunities that include attractive immediate rewards and extraordinary advancement potential. Please write in complete confidence to:

LRK ASSOCIATES, 6845 Elm Street, McLean, Virginia 22101  
 U.S. CITIZENSHIP REQUIRED

**LRK**  
 ASSOCIATES

Representing an Equal Opportunity Employer M/F

# advertisers' index

†Hewlett-Packard, S.A. ....	132-L
Hydro-Temp Controls, Inc. ....	196
IMLAC Corporation .....	131
Infodata Systems Inc. ....	38
Informatics Mark IV Systems Company .....	60, 61
Information Terminals .....	190
Integrated Software Systems Corporation .....	26
Intel Memory Systems .....	106
Interdata .....	118, 119
International Communications Corporation .....	47
International Power Machines Corporation .....	136
Itel Corporation .....	2
†Itel Corporation .....	132-H
Kennedy Co. ....	Cover 2
Kybe Corporation .....	196
Labyrinth Systems Ltd. ....	128, 163
Lear Siegler, Inc., Electronic Instrumentation Division .....	44

LRK Associates .....	187
Mathematica .....	177
MDB Systems .....	80
†MDB Systems, Inc. ....	132-PP
†Memorex Corporation 132-KK—132-NN	
Methods Research .....	96
Modular Computer Systems Inc. .	68, 69
Mohawk Data Sciences Corporation .....	45
National Blank Book Company, Inc. ....	97
NCR Communications Systems Division .....	191
NCR Data Processing Division .....	188
NCR Terminal Systems Division .....	169
North-Holland Publishing Co. ....	8
N. V. Philips' Gloeilampenfabrieken .....	132-V
Quest Systems Inc. ....	198
†Racal-Milgo Limited .....	132-K
Raytheon Data Systems .....	10

RCA Service Company, A Division of RCA, Technical Services .....	125
Realist, Inc. ....	121
†Regnecentralen .....	132-E
Research Inc. ....	43
RSVP Services .....	198
Rusco Electronic Systems .....	127
†Saab-Scania Group ...	132-FF, 132-GG
Sanders Associates, Inc. ....	114
Schlage Electronics .....	168
Science Accessories Corporation ...	170
†Selenia .....	132-U
Singer-M&M Computer Industries, Inc. ....	92
Software AG .....	120
Software Design .....	137
Software International .....	122
Source EDP .....	191
Sycor .....	88, 89
Systems Engineering Laboratories ...	40
Tab Products Co. ....	62
TDK .....	4
Technical Publishing Company ....	186
Tektronix, Inc. ....	39
Teletype Corporation .....	Cover 4
Texas Instruments Incorporated, Digital Systems Division .....	14, 15
†TRT Telecommunications Radioelectriques et Telephoniques .....	132-O
†TRW Datacom-International .....	132-RR, 132-SS
United Airlines Cargo .....	23
University Computing Company .....	100, 101, 105, 107, 109, 111, 113, 115, 117
†US Trade Center .....	132-II
Varian Data Machines .....	86
Versatec, Inc. ....	59
Wango Incorporated .....	64
Western Union Data Services Company .....	172
Westinghouse Electric Corporation .	42
Whitlow Computer Systems, Inc. ...	13
Yourdon Inc. ....	123
Zeta Research .....	124
†European Insert Advertisers	

## NCR

Data Processing Division — Wichita

NCR's Data Processing Division—Wichita has immediate openings for both junior and senior level engineers on **Advanced Development** and **Product Development** programs involving next generation minicomputer development.

### MINICOMPUTER ENGINEERS

#### ☆ SOFTWARE DESIGN ☆

- System Software Architecture • Compilers
- Operating Systems • Utilities

#### ☆ COMMUNICATIONS ENGINEERS ☆

Requires experience in communication design for Digital Computer Systems, Multi-Computer Networks, Digital Communications Discipline.

#### ☆ HARDWARE DESIGN ☆

- Processor Design • Memory Design • I/O Controller Design • Firmware Development

#### ☆ DESIGN SUPPORT ☆

- Semiconductor Components • Peripherals and Controllers

#### ☆ PACKAGING ENGINEER ☆

3 or more years Electrical/Mechanical experience in Design of Electronic Packaging for developing of Modules and Cabinets using new and innovative concepts. Assignment will be in an Advanced Development Department.

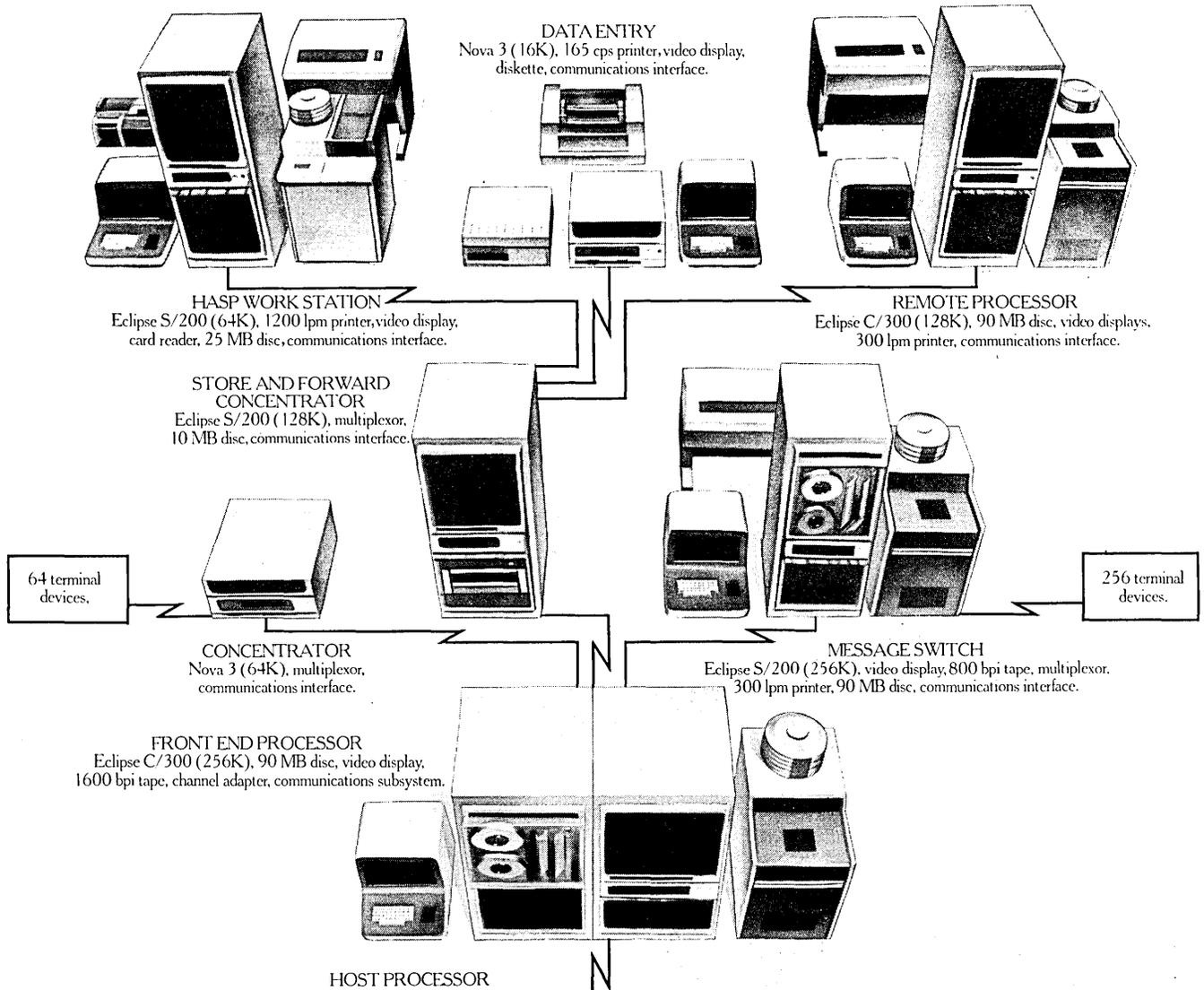
Get all the details today.

Send complete resume, including salary history and requirements to Ron Clarke, Professional Placement Office, P.O. Box 1297 AS, Wichita, Kansas 67201.

An Equal Opportunity Employer

CIRCLE 112 ON READER CARD

# We not only make all this communications equipment. We make it all work together.



If you buy your communications equipment from Data General, you can avoid a lot of problems.

It's easy to configure your system. Because you get to pick from all the standard communications equipment you see here. And you get to use all the Data General communications software you don't see here.

And it's just as easy to expand a Data General communications system. Because it's completely modular. All our computers share the same

architecture. All our peripherals and interfaces are interchangeable with all our computers. All our software and all your applications programs are upward compatible.

But a Data General communications system isn't just less trouble.

It's also less expensive. You don't have to buy more than you need. You don't have to buy as many network spares. Because our subsystems are completely interchangeable. And you can get quantity discounts on your hardware.

And when you buy all your equipment from Data General, you don't have to wonder who's responsible for service and maintenance. We are.

Write for more information.

That way, you'll end up with a communications system that works with you instead of against you.

## DataGeneral

• Data General, Dept. M1, Route 9, Southboro, Mass. 01772 (617) 485-9100. Data General (Canada) Ltd., Ontario. Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361/Sydney (02) 908-1366.

# IBM. You rascals. You've done it again.

We're referring to your new IBM 5100 "Portable Computer".

That's a very neat system.

Compact.

Portable.

Applicable.

Usable.

And at a great price to a great many potential users.

Our personal interest is, of course, prompted by your use of the 1/4" cartridge. We're sure you know that 3M makes one. And, that we make a great one.

Ours is certified 100%.

And comes in a protective, reusable box.

It could make quite a difference to someone.

Our whole line of magnetic media is like that.

Like IBM's new 5100. Neat. Applicable.

Usable.

So as we said before:

"IBM.

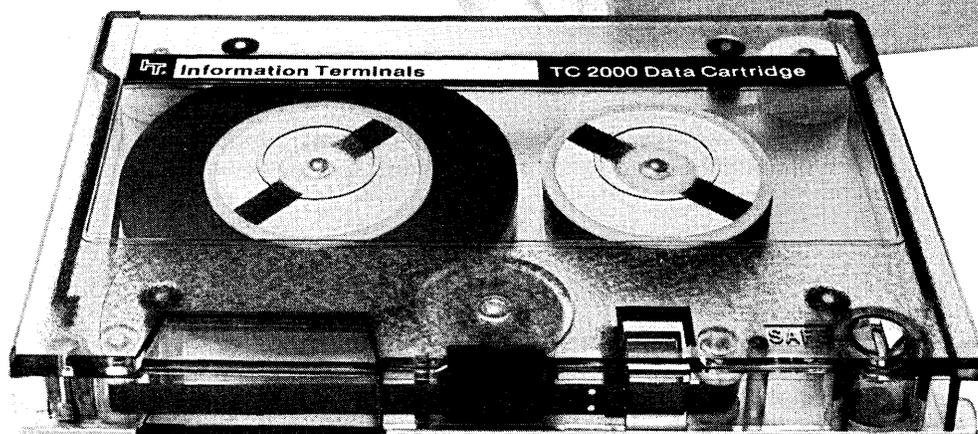
You rascals.

You've done it again."

Peace!

 **Information  
Terminals**

323 Soquel Way  
Sunnyvale, Ca. 94086  
(408) 245-4400  
TWX (910) 339-9381



# NCR

Our new Communication Systems Division has immediate openings for Electrical Designers, Systems Analysts to develop Microprocessor based Communications Modules.

## ADVANCED SOFTWARE DEVELOPMENT

We need key contributors for variety of programs aimed at advancing the state-of-the-art in small systems software. Examine large-scale system software for carry-over to microcomputer environment. Investigate new options for the microprocessor technology.

## SYSTEMS ANALYST

Design and develop basic software tools relating to Microprocessors used in Terminals, Controllers, Front End Systems and Stand Alone Computer. Must communicate with user community and hardware designers.

## TELECOMMUNICATIONS

Systems Engineers and Programmers with Mini and Microcomputer experience. Knowledge of Asynchronous and Synchronous Communications desirable.

## TEST EQUIPMENT

Manufacturing Test Equipment Engineer with experience in PCB Test using automatic test equipment for Microprocessor based equipment. Desire strong Software background with knowledge of 8080 Assembler Language.

If you are interested in working in this high technology, R&D environment located in central South Carolina, please send your resume with salary requirements to:

**Thomas B. Thrailkill**  
Communication Systems Division  
NCR Corporation  
3325 Platt Springs Road  
West Columbia, South Carolina  
29169

An Equal Opportunity Employer

## Technical Publishing Company

Arthur L. Rice, Jr., Chairman of the Board  
James B. Tafel, President  
Gardner F. Landon, Exec. Vice President  
Calverd F. Jacobson, Financial Vice President and Treasurer  
Thomas A. Reynolds, Jr., Secretary  
M. Jay Turner, Jr., Director of Circulation  
Paul C. Jarvis, Director of Information Services

## Advertising Offices

**Eastern District Managers**  
A. Treat Walker,  
Warren A. Tibbetts: Greenwich, Ct. 06830  
35 Mason St. (203) 661-5400

**New England District Manager & Vice President**  
Warren A. Tibbetts: Manchester, N.H. 03104  
112 W. Haven Rd.  
(603) 625-9498

**Midwest District Manager**  
John M. Gleason: Chicago, Ill. 60606  
205 W. Wacker Drive  
(312) 346-1026

**Western Manager and Senior Vice President**  
Hamilton S. Styron: Los Angeles, Calif. 90035  
1801 S. La Cienega Blvd.  
(213) 559-5111

**District Manager**  
Alan Bolté, Jr.: Los Angeles, Calif. 90035  
1801 S. La Cienega Blvd.  
(213) 559-5111

**Western District Manager**  
James E. Filiatrault: Mountain View, CA 94043  
2680 Bayshore Frontage Rd.  
Suite 101  
(415) 965-8222

**U.K., Scandinavia, Benelux**  
Intergroup Communications, Inc.  
Wallace K. Ponder, European Director  
Paul D. Dimmock, Regional Manager  
31 Lyncroft Avenue  
Pinner, Middx. HA5 1JU  
England  
Tel: (01) 868 9289  
Cables: PACOM, Pinner

**Germany, Austria, Eastern Europe**  
Fritz Taeuber  
Solteauer Strasse 85  
D-340 Lueneburg  
Germany  
Tel: (0 41 31) 43 849

**France, Switzerland, Italy, Spain**  
Gerard Lasfargues  
32 rue Desbordes Valmores  
75016 Paris  
France  
Tel: (1) 288 90 22

**Japan**  
Shigeru Kobayashi  
Japan Advertising Communications, Inc.  
New Ginza Building  
3-13 Ginza 7-chome  
Chuo-ku, Tokyo 104, Japan  
Tel. (03) 571-8748

## Other

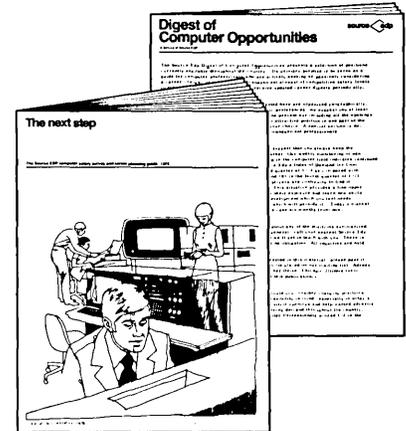
Plant Engineering      Pollution Engineering  
Power Engineering      Purchasing World  
Research/Development      Consulting Engineer

## Magazines

**Beat the Big One...  
Heart Attack  
Give Heart Fund**



# 1975 Computer Salary Survey- Yours Free!



Do you know how much money your colleagues make for doing the work you do? Do you know which computing skills are most lucrative? Do you know how to get a better position?

Source Edp does. And we'll share what we know with you. Our ninth annual salary survey and career planning guide, "The Next Step," compiles salary data received from over 15,000 computer professionals. We add to that advice developed over our thirteen years of computer recruiting experience: danger signals that mean you should start looking for a new position, mistakes to avoid, strategy in career planning. You'll also receive the "Digest of Computer Opportunities," our periodic supplement listing positions available right now in every part of the country.

Source Edp is the largest nationwide recruiting firm devoted exclusively to computer professionals. We offer "The Next Step" as a service to people like you. Fill out the reader reply card and we'll send you one absolutely free. Or write:

Source Edp  
Corporate Headquarters  
100 South Wacker Drive  
Chicago, Illinois 60606  
312/782-0857

source edp

## REGIONAL OFFICES:

ATLANTA	404/634-5127
CHICAGO	312/782-0857
CLEVELAND	216/771-2070
DALLAS	214/638-4080
DETROIT	313/352-6520
HOUSTON	713/626-8705
IRVINE, CA	714/833-1730
KANSAS CITY	816/474-3393
LOS ANGELES	213/386-5500
MINNEAPOLIS	612/544-3600
NEW YORK	212/682-1160
NEW ORLEANS	504/523-2576
NORTHFIELD, IL	312/446-8395
OAK BROOK, IL	312/323-8980
PALO ALTO	415/328-7155
PHILADELPHIA	215/665-1717
SAN FRANCISCO	415/434-2410
ST. LOUIS	314/862-3800
UNION, NJ	201/687-8700

IBM 3340 users:

# Ask Control Data about a new more cost-effective DATA MODULE for your system.\*



\*Learn about the new 35 and 70 MByte Data Modules incorporating Control Data's total technology in heads, disks and drives. For details, call collect (612) 853-7600. Or return the coupon.

Mr. R. F. Carlton, Product Manager Business Products  
Control Data Corporation, Dept. D-125  
P.O. Box 1980, Airport Station, Minneapolis, MN 55111

Tell me about your new Data Modules.

NAME

TITLE

COMPANY

ADDRESS

CITY

STATE

ZIP

PHONE

**GD** CONTROL DATA  
CORPORATION

This forum is offered for readers who want to express their opinion on any aspect of information processing. Your contributions are invited.

---

# the forum

---

## You've Come a Long Way, Baby

In the last few months, many survey articles have been published concerning the status of women in computing. They contain the usual clichés, make the usual points, and fall short of providing any help to the woman who aspires to improve herself, or to the manager (usually male) who wishes to help her advance.

In my consulting business, I become closely involved with about 12 clients a year. I work as a troubleshooter, a systems designer, and as a management consultant. I'm treated as a member of the management team, expected to adopt and abide by the operating principles of the client organizations, and I'm frequently at the right place at the right time when decisions are being made. I'd like to distill some of this experience to help women who are trying to get ahead.

### A decade of movements

In the last 10 years we've lived through several movements all aimed at improving the status of women. They've burned their bras, raised their consciousness, organized for the common good (whatever that is), and generally made a lot of noise. Most managements I've seen treated all this with benign neglect.

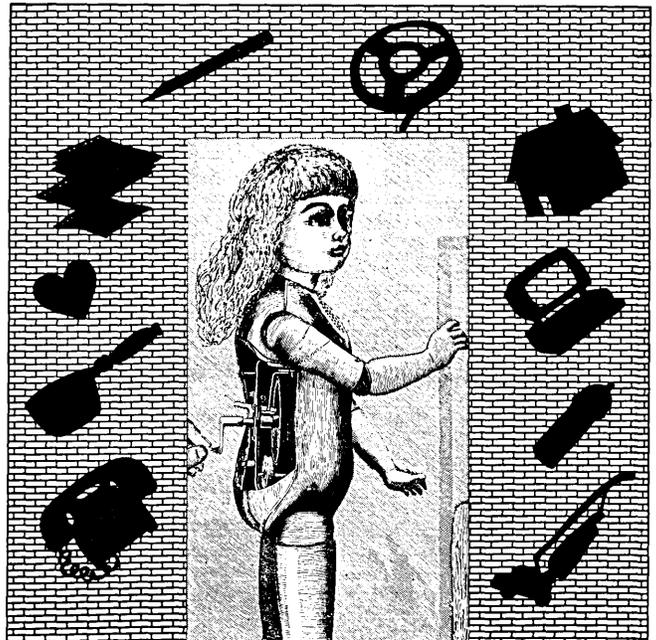
The most significant movement in the last 10 years has been the slow pursuit of legal equality. The federal laws passed in 1964 took six years before anybody noticed them, and eight years before management started to take them seriously. But the last two or three years have seen some real changes. Job descriptions are being rewritten to remove any residual bias. Employment ads indicate that equal opportunities are available, and, in fact, in many cases equal opportunity does exist.

However, now that the opportunities are available we're suffering from a paucity of qualified female candidates. One of my clients, a large West Coast industrial firm, recently staged a major recruitment advertising campaign to build a new group, and received 800 resumes. Only 15% were from females. When we are promoting from within, we have similar problems. Since we don't have many women in

supervisory ranks, we don't have many women candidates who are qualified for managers' jobs.

### Reverse discrimination doesn't work

Now some believe we should rectify past wrongs (if we have been guilty of wrongs in the past) by making an extra



effort to seek out qualified women, jump them in salary a couple of levels, and push them into management to make up for the statistical imbalance that exists. To do so would harm the movement to a greater degree than imaginable. Consider the following case.

One of my clients has been active in establishing equal opportunity for some time, and half of his programmers are females. With one or two rare exceptions, these are solid

# ECONOMY, SPEED, INTELLIGENCE



The new DELTA 4000 microprogrammable video display terminal—\$2500 each in quantities of six

## Solve your budget and your application problem with one terminal buy.

This is the new DELTA 4000 microprogrammable video display terminal. If what you want is economy, speed and intelligence in your next terminal buy, you'd do well to learn more about this terminal before making a final decision. With the facts in hand, we believe you will find that the DELTA 4000 offers more for your terminal dollar than any other terminal available today.

The DELTA 4000 offers more standard and custom features, more advantages to help meet your special application while cutting costs, saving time, improving efficiency. We can prove all this, and will be happy to tell you all you need to know. Contact us today for a demonstration, literature or applications assistance.



Woodhaven Industrial Park  
Cornwells Heights, PA 19020  
(215) 639-9400

DELTA DATA SYSTEMS, LTD.  
London: 01-580-7621

Service in 42 locations in the U.S., and 13 European countries and Canada

CIRCLE 103 ON READER CARD

## the forum

citizens of the professional community—not stridently militant, and not prone to lecturing about male chauvinist attitudes while wearing short skirts or tight slacks. Over the years this client has chosen females using the same selection criteria as males: quality college education, appropriate years experience in the field, measurable skills in the programming trade, and reference checks which require two positive replies. When the women are working as individual programmers, they are paid equally with their male counterparts and are expected to produce results equal in quantity and quality. And here comes the rub.

There are a significant number of these women who don't seem to take their work as seriously as do their male counterparts. Some of them are distracted during the day by having their consciousness raised, their dance lessons scheduled, or their heads shrunk. Now I must hasten to admit the boys talk about motorcycles or skiing, cars or girls, but when the time comes to get serious about a job and a career, they do get serious. It doesn't look as though the girls are keeping up. This may be a result of training and upbringing.

A fellow is conditioned from a very early age to know he will have to go out on his own, be a breadwinner, and support a wife and family. He knows when he enters the labor market that he is likely to work for 35 to 45 years before he retires. That's a long pull and he's mentally conditioned for it.

In the 25 to 30 age group, you'll see his adolescence disappearing and a strong emphasis on professional advancement becoming apparent. Young professional men subscribe to technical magazines, read technical books, and attend conferences and seminars. Those on the way up also participate in activities of professional societies and special interest groups. An old consultant once told me you can measure a person by reading the titles of the books on the shelves in his office. I think it's true.

Women should try that comparison on themselves and start to get a measure of their activities versus those of male competitors.

Long before the 1964 laws were passed, the males in the work force were unconsciously preparing for their careers. They competed with one another (usually at a cost of a black eye or two); they engaged in team sports; they got practical leadership training in the Boy Scouts, the "Y", or some other group; and when they went to college, they actively participated in student government, fraternities, service groups, or student technical clubs.

Those of us who grew up as engineers spent many thousands of hours tinkering with cars, motorcycles, ham radios, electronic kits, and the like. In short, when we entered the work force, we had some experience in group dynamics, we knew something about the practical applications of our trade, and some of us were well on the way toward being leaders.

While it's true there are some women who did the same or similar things, it is also true that those same women have achieved success in whatever profession they selected. A case in point is a female engineer who graduated from MIT long before it was fashionable for women to do so. I met her several years ago in a parking lot at Burroughs where she was repairing her balky car. She was employed there as an engineer and I was there on a consulting assignment. We struck up a friendship and I've watched her grow for 15 years.

She is now a manager of a programming group, has both women and men working for her, has had several nice salary advances, and is an outstanding example of the successful female in a competitive world. But she prepared

herself all her life for that success. She is outspoken without being raucous, has a fine sense of humor, but what's most important to her employer, she has the skills necessary to get the job done.

**It's an opportunity to fail, too**

Another friend of mine who works for a California-based government contractor is not so successful. She had the education, but not the seasoning. She had held a staff position for several years and had apparently been successful. She was in the forefront of several women's and professional groups, and when the time came for a promotion, she was the logical choice. Unfortunately the project she inherited was in trouble. She knew it was in trouble. She had even been in on the audits that had taken place before the previous project manager was relieved of his responsibilities. However, when she took over the project, she let business continue as usual.

She was very sensitive to the desires of the work force, and she slowly started making changes for the better. If we had 30 months to produce the product, she might have made it, with an harmonious work force to boot. However, we had some immediate deadlines. The boat was sinking. Pressures were terrific and decisive management action was required. In the few months she was in charge, the pressure got to her. After one particularly exhausting set of meetings,



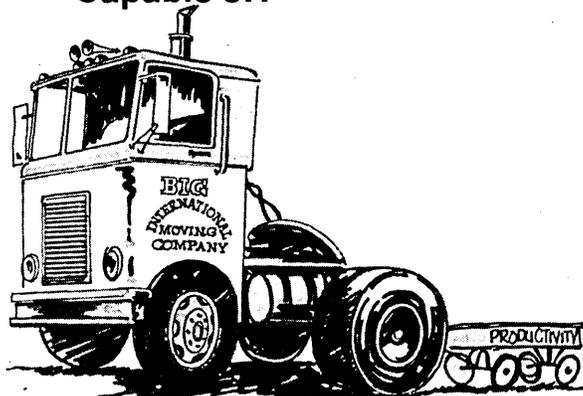
she said to me privately, "I don't have to take all of this. I can go back to school and my husband will pay for it."

She had a husband and several kids, and they constituted one of her distractions and one of her afflictions. She didn't need that job and she didn't take the decisive action one would have taken had one seriously been dedicated to producing for her employer. It took 120 days for her to be relieved. She had held her own, but she hadn't turned it around. When the situation showed no signs of dramatic improvement, she was eased out and a tough minded SOB dedicated to success replaced her.

In some ways that's what equal opportunity is about. A woman may get an opportunity to succeed or fail, but before she accepts that opportunity, she should soberly assess whether she is ready to make the move or not.

With all the push for equal opportunity, I see more formalism occurring in the personnel administration of my clients, in hiring, interviewing, and post-hire evaluation. The formalities of personnel administration have also extended into formal job descriptions. One of my larger clients (staff of 600, half of them programmers) has prepared job de-

**Is Your System Delivering All the Productivity it's Capable of?**



**With EDOS it Will!**

EDOS is helping hundreds of system 360's and 370's, throughout the world, deliver more productivity.

**PERFORMANCE**

Total throughput improvements of 25 to 50%.

**OPERATIONAL EASE**

Brings the operational enhancements of OS to the DOS environment... without conversion.

**SUPPORT**

The Computer Software Co. provides a full range of service including on-site installation support.

The features of EDOS include...

**BASIC** — a performance oriented operating system for the System/360 and 370.

**DSM** — a complete DASD File Management System including an Extended Disk Sort.

**TMS** — a Tape Management System which provides flexibility, protection and control for all tape volumes.

**Extended Spooling Facility** — a unique high performance spooling system including extensions in RJE and class scheduling.

**Six Partitions** — increases partition availability.

**Gemini** — allows two CPU's, either 360's or 370's to operate together with significantly improved performance.

**EDOS/DOCS** — 3270 operator console support.

**Datacom** — a data base/data communications control system providing the facilities necessary to develop, implement and maintain efficient data base and/or on-line applications systems.

**EDOS/30** — A special version of EDOS that is designed for the 64K System 360/30.

Please send me more information.

**EDOS**

**THE COMPUTER SOFTWARE COMPANY**  
6517 EVERGLADES DRIVE  
RICHMOND, VIRGINIA, USA 23225

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

CIRCLE 70 ON READER CARD

# WATER and HUMIDITY

are as destructive to computer systems as heat and cold.

There is one system which oversees all of these factors and has multiple other protective applications... all at a reasonable cost, and it is available TODAY.

Isn't your computer system worth a phone call? Certainly your peace of mind is.

Call 504-522-0541.

## HYDRO-TEMP CONTROLS, INC.

203 Carondelet St., Suite 817, New Orleans, LA 70130

CIRCLE 97 ON READER CARD



## The beauty is more than skin deep.

Introducing the first low cost digital cassette subsystem that's pretty on the outside and downright beautiful on the inside where it counts. Precision performance with the flexibility to serve as a read/write or read-only memory, baud rate multiplier or terminal text/data buffer.

Bidirectional file skip, selectable baud rates and simultaneous RS-232C/20MA loop interfaces are built-in standards, not extra-cost options. Our CT-103 is ready to plug in and simple to use.

The CT-103 was designed and built for long life and error-free operation by KYBE—the #1 name in magnetic media maintenance. More than a decade of tape handling experience went into making the CT-103 the best (as well as the most beautiful) digital cassette subsystem on the market today. Find out for yourself. Contact:



### KYBE

KYBE CORPORATION  
132 Calvary Street, Waltham, Mass. 02154  
Tel. (617) 899-0012, Telex 94-0179

Sales Offices  
Boston—(617) 899-0012  
Chicago—(312) 658-7391  
Houston—(713) 524-3111  
Los Angeles—(213) 980-8365  
New York—(212) 594-9273  
Wash., D.C.—(703) 527-2292

CIRCLE 98 ON READER CARD

## the forum

descriptions for every job. These describe the activities the incumbent must perform, the skills that person should possess, and the likely experience and background the person should have to be thoroughly seasoned.

### Advice to the ambitious (of either sex)

Those of you who aspire to more responsibility, be you male or female, be well advised to see if your employer has such a set of job descriptions. If they are available, request a copy of the description for your current job, take it home, and do some introspective analysis:

Is your formal education equal to that of your colleagues, or should you be taking some night or extension courses from your nearest university?

Do you handle people well? Can you get them to do what you want? If not, a good book on personnel administration plus some astute observation may improve your acceptance.

How do you express yourself? Do you have good thoughts in your head and a big lump in your throat? If so, being active in a business or professional club, a Dale Carnegie course, or a stint with the Toastmasters may dissolve that lump so your thoughts can get out.

Can you express yourself on paper? Do your good proposals get rejected? Perhaps you think logically but your writing doesn't show it, or you belabor the trivia and neglect to emphasize the important points. If you have good ideas and can't sell them, you need to improve your writing skill. This is harder than just taking a course or learning a new programming language because you need a friend who will critically review what you've written before you publish it. Find someone whose writing you admire and ask him to help you. Review his style and see how he develops technical points and makes his recommendations appear natural. Naturally you have to choose a friend who is a better writer than you are, and your friend has to have time to read your draft copies and comment constructively.

If you aspire to a position in management, are you acquainted with the tasks managers perform that technicians do not? What do you know about planning, budgeting, project management, technical audits, or status assessment? If you have weaknesses in these areas, collect some past plans and reports from the files, read through them at your leisure, and note which ones seem to be particularly outstanding. Then go see the authors and ask them if they have any reference material you could borrow, a personal checklist they might lend you, or a course they might recommend. It takes a little humility to ask a person for help, but that's the way to grow.

Ask yourself if you have the seasoning and experience the boss expects. Be frank with yourself and write down any deficiencies you may have. Then in the course of the next few months, find an opportunity to discuss these deficiencies with your immediate boss and together come up with a program for gleaning the experience or education you lack. It will take quite a bit of ego to do that—to go up to your boss and say, "I don't think I handle people very well and do you know of any books, seminars, or short courses I could take to learn to be more effective?" but it will be worth it.

In some cases your deficiencies may be technical, and that makes them easier to deal with. If you don't know PL/I, you can learn. There are some good books out on JCL. If you don't have any feel for computer operations, you can ask for a temporary assignment so you can learn what is going on.

All in all, if you aspire to promotion, you can work off your deficiencies, become fully qualified in your current job, and then seriously contemplate what you should do to be



## Sears Roebuck, look out.

Introducing Digital's Direct Sales Catalog. The world's first catalog to offer computers and computer-related products by mail, with off-the-shelf delivery.

In addition to the convenience of catalog buying, you also get a nifty 5% discount on quantities to 49, plus another 4% if you send cash with your order.

Products offered include micro-computers, logic modules, terminals, even things like cabinets, connectors, supplies, and accessories.

You get a 10-day free trial period, plus our standard 90-day warranty. (Though since we're selling by mail, you do have to install the equipment yourself.)

The Digital Direct Sales Catalog.  
A 9% discount.  
A 100% convenience.

For your free copy, call 800-225-9480 (Mass. 617-481-7400 ext. 6608). Or write: Components Group, Digital Equipment Corp., One Iron Way, Marlborough, Mass. 01752. (Catalog sales to U.S. only.)

**d.i.g.i.t.a.l.**  
**COMPONENTS**  
**GROUP**

## Even Webster's Knows About QUEST

**QUEST** (kwest). v. 1. To make a search; to go on a quest.

**QUEST SYSTEMS, INC.** n. 1. A corporation founded in 1968. 2. The largest professional recruitment firm in the U.S. functioning solely in the computer sciences; its client companies pay all employment fees, interviewing and relocation expenses. Quest is known for its deep personal commitment to relate to each candidate as an individual with individual goals. 3. Its professional staff averages over 6 years of experience in EDP recruiting (additionally, staff members have direct hands-on experience in programming, systems, hardware sales, etc.) 4. Quest is presently searching for programmers and analysts (commercial, scientific, systems software) for over 3,500 client companies in the U.S. Quest has openings in over 700 U.S. towns and cities. 5. Methodology — see Questsystem.

**QUESTSYSTEM** (kwest sis'tem). n. 1. Discussing with an individual what he would like to be doing in light of what he has been doing. 2. Analyzing the realities of his objectives as they relate to the current job marketplace. 3. Contacting client companies and other Quest staff personnel to identify positions of possible interest. 4. Introducing the job candidate to his prospective employers by providing complete details to each about the other, ensuring the efficacious use of everyone's time. 5. Arranging interviews. 6. If employment offers are extended, Quest assists in evaluating the responsibilities, compensation and opportunities (and relates those to the initially stated objectives). The Questsystem has been working for thousands of professionals at no expense, whatsoever. Ask your friends of their past dealings with Quest. Then, put the Questsystem to work for you. For additional information on this subject, please inquire directly to Quest Systems, Inc. (All inquiries/resumes received will be responded to immediately and in confidence.)



**QUEST SYSTEMS INC.**

6400 Goldsboro Road

Washington, D. C. 20034 (301) 229-4200

Baltimore: (301) 265-1177 • Philadelphia: (215) 667-3322

CIRCLE 113 ON READER CARD

## SOFTWARE ANALYSTS

GTE Laboratories . . . ideally located in suburban Boston . . . and the central research and development facility for the General Telephone & Electronics Corporation, currently has positions available for programming analysts to develop software for real-time control applications, especially the generation of programs used to control circuit switches. Methods to be used include structured programming and design, and higher order languages.

MS in Computer Science, Math or related field with 5 years experience in state-of-the-art computer programming, including structured software concepts, Assembly language and knowledge of operating systems required. Exposure to systems programming, mini-computer software and PL-1 would be helpful.

Please send resume to: **K. P. Lyman, Personnel Supervisor, GTE Laboratories Inc., 40 Sylvan Road, Waltham, Mass. 02154.**

**GTE LABORATORIES**  
INCORPORATED

An Equal Opportunity Employer (M/F)

CIRCLE 109 ON READER CARD

## the forum

selected for the next job you choose.

### Accentuate the positive

In many cases I find women fail to exploit the skills they have. While sweeping generalities are always risky, I've usually found the gals can write better than the guys can. Furthermore, the ability to think logically appears to be independent of leadership experience or early training. Consequently many women are very competitive with the fellows in debugging.

Now I'm not counseling a secondary role for you ladies, but your boss is more interested in getting the work done than he is in having his social consciousness raised. If you can do something well that he needs done badly, you get brownie points. Enough brownie points will make you a candidate next time there is an opportunity for promotion or you request a job which will round out your experience profile.

The computer field needs middle management badly. Qualified persons of either sex move up if they are well rounded technically, and thoroughly seasoned. I don't mean to imply that all bias is gone and that there are no chauvinists among us. A woman must still be outstanding to be considered "equal" to her male counterparts. But I think the first phase of the women's movement is passing and the time has come for them to prepare technically and emotionally for promotion, to learn how the game is played, and then to make damn sure they are the most qualified before they think about raising too much hell.

—Robert L. Patrick

Aside from consulting, Mr. Patrick is also a contributing editor to Datamation.

## PROGRAMMERS AND ANALYSTS

Free Employment Service

Serving Northeast, Southeast and Midwest U.S.

- Scientific and commercial applications
- Software development and systems programming
- Telecommunications
- Control systems
- Computer engineering
- Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Or check the reader service card for a free sample resume. We will answer all correspondence from U.S. citizens and permanent residents and will guarantee our best efforts in a professional and ethical manner to all qualified applicants that we think we can help. Our client companies pay all of our fees.



**RSVP SERVICES, Dept. M**  
Suite 700, One Cherry Hill Mall  
Cherry Hill, New Jersey 08034  
(609) 667-4488

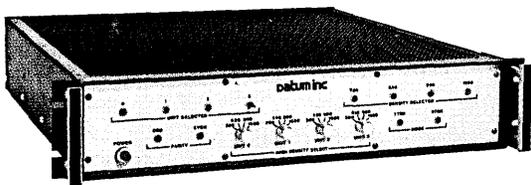
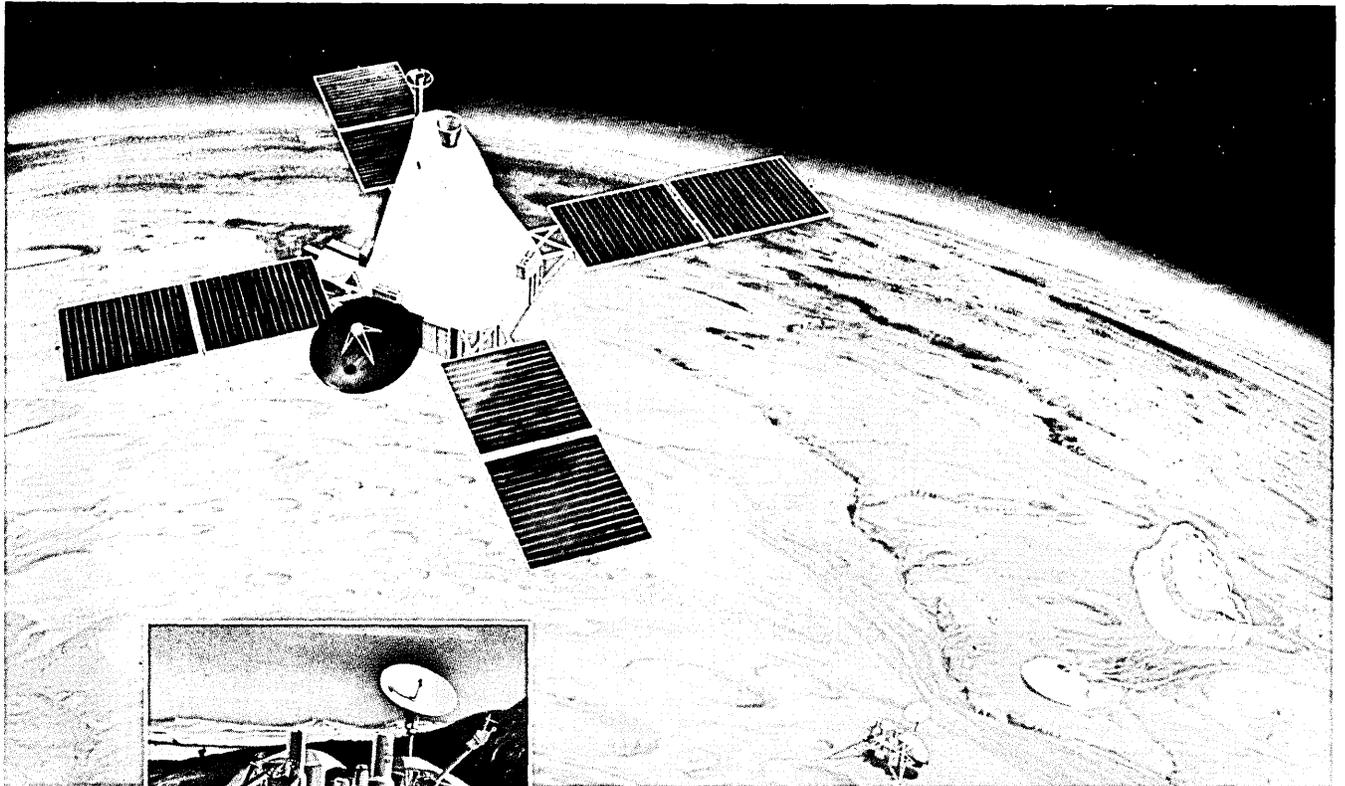
**RSVP SERVICES, Dept. M**  
Suite 300, Dublin Hall  
1777 Walton Road  
Blue Bell, Penna. 19422  
(215) 629-0595

**RSVP SERVICES**

Employment Agency for Computer Professionals

CIRCLE 110 ON READER CARD

# Datum Magnetic Tape Systems at work!



Datum Model 5191  
Magnetic Tape Controller

Several of the 3000 Datum mag tape memory systems installed to date . . . are used in an image-enhancement system at JPL that will increase the clarity of pictures from all NASA/JPL deep space probes. For instance, in the Viking mission to Mars pictured above, the Viking lander will descend to the Martian surface and send back pictures and data gathered in its search for microbial life. Viking data will also identify organic molecules, will determine elements and properties of Martian surface and soil and will gather seismological and meteorological data. Viking orbiter will take pictures of Mars, measure concentrations of water vapor, gather surface-temperature data and relay lander data to Earth.

For reliable response to rugged standards, specify DATUM disk or magnetic tape memory systems or controllers. Control as many as four disks or mag tape transports; handle multi-speed, multi-density (1600, 800, 556 and 200 bpi) tapes. You'll get immediate delivery for most minicomputers. Systems and controllers are compatible with your computer software; components plug together and into the computer for uncomplicated installation. Complete with controls, power supply, all necessary cables, diagnostic software and instruction manual.

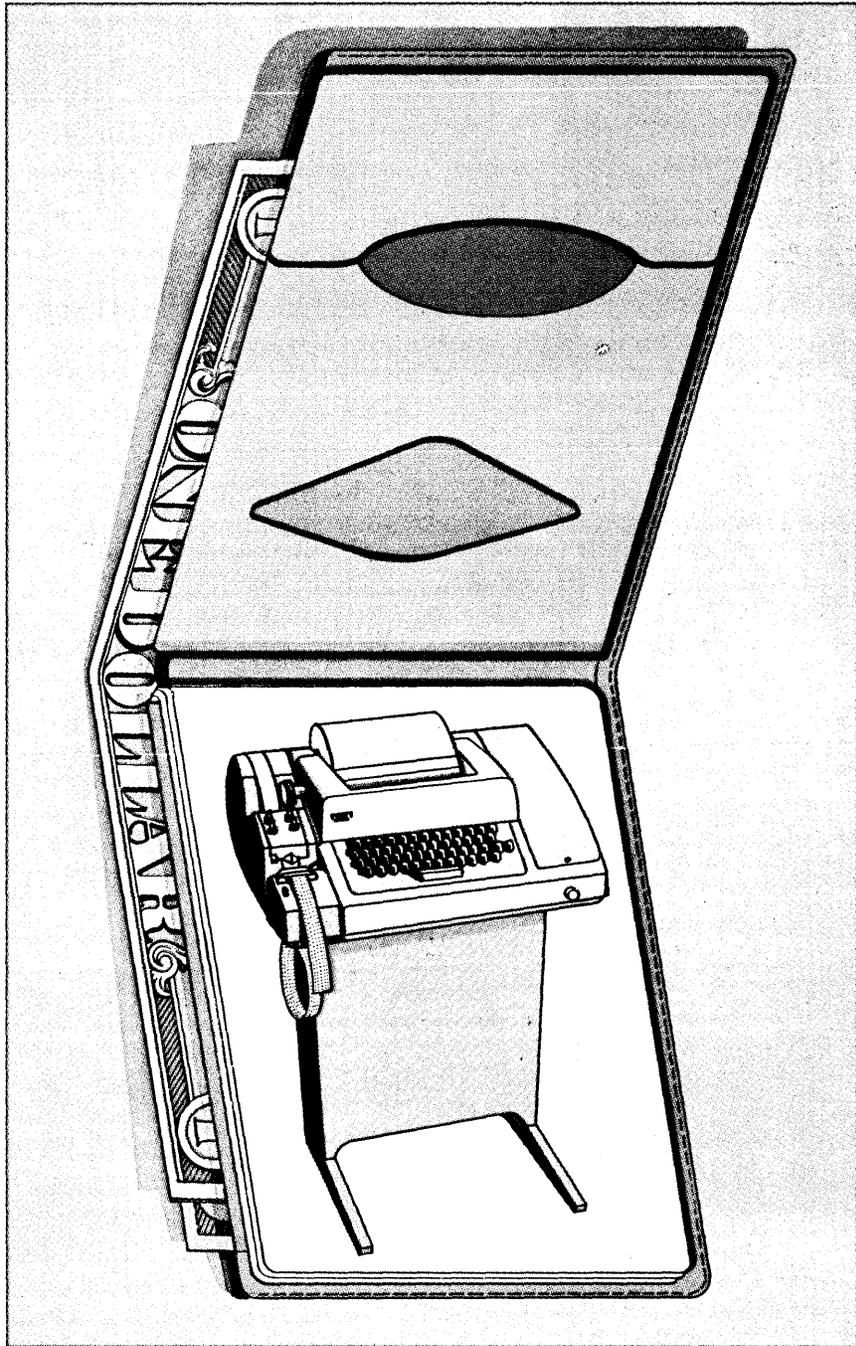
Datum also manufactures minicomputers, minicomputer-directed data acquisition and control systems, timing instrumentation, digital cassette recorders and rotating drum memories.

  
**Datum inc**

#### Peripheral Products Division

1363 S. State College Blvd., Anaheim, Ca 92806 • 714/533-6333  
EUROPE: Datum House, Cranford Lane, Harlington, Middlesex,  
UK • 01-897-0456

**This member  
of our family  
is still the  
thriftiest ASR  
terminal  
around.**



Teletype is a trademark registered in the United States Patent Office.

Dollar for dollar, the Teletype® model 33 is the least expensive, most reliable data terminal in its class. Because once you see how well it performs, you won't believe its price.

That's one reason why the model 33 is the most popular terminal in the industry. But it's hardly the only reason.

The model 33 is designed and built for extremely reliable operation at 100 wpm. And since

it operates on the eight-level ASCII code, it speaks the language most computers understand. Both mini-computers and maxi-computers. Which makes compatibility another reason behind its popularity.

Then there are some reasons you can't see. But they're there just the same. Like complete technical sales and service back-up to help you with installation and maintenance.

Available in three basic configurations, the model 33 is a lot of machine. At a very small price.

It takes more than manufacturing facilities to build the machines Teletype Corporation offers. It also takes commitment. From people who think service is as important as sales. In terminals for message communications and computers.



**The computercations people.**

For more information about any Teletype product, write or call: TERMINAL CENTRAL, Teletype Corporation, Dept. 81P, 5555 Touhy Avenue, Skokie, Illinois 60076. Phone 312/982-2500.