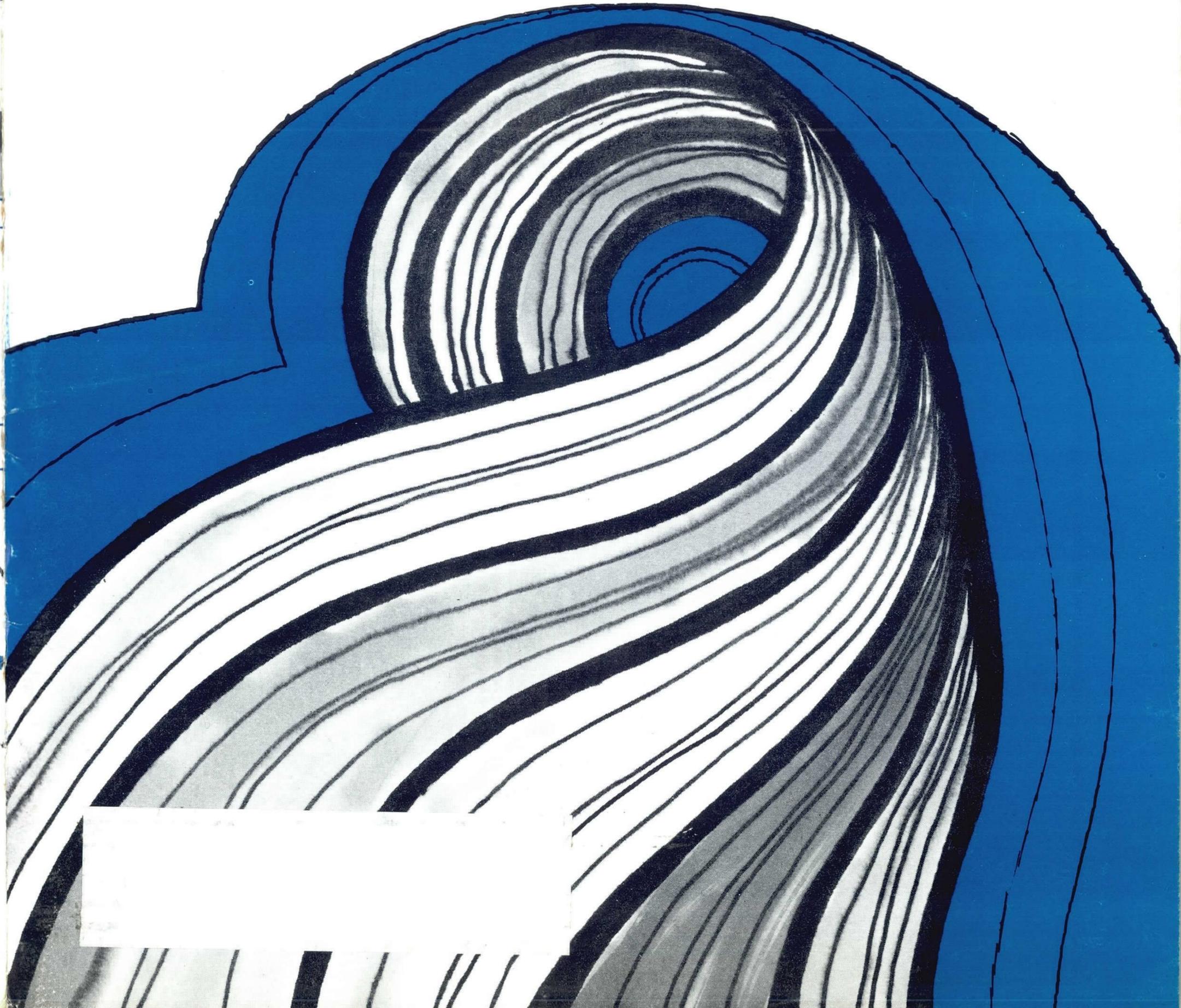


product profile:

COMPUTER FACILITY SUPPORT EQUIPMENT AND SYSTEMS

PART 2

**ENVIRONMENTAL,  
FIRE PROTECTION  
& SECURITY SYSTEMS**



It's everything you've ever wanted in a peripheral for your mini. With a price/performance ratio superior to every other electrostatic printer/plotter on the market.

In fact, the Gould 5000 gives you 1200 lines per minute — or 600 more than Brand V. And at a lower price.

That means you get high speed for improved mini throughput efficiency. Low cost for economic justification. And, of course, high reliability backed by Gould's reputation for quality.

But you also get a lot more. Resolution of 100 dots per inch. Full alphanumeric and graphic capabilities. 132 characters per line. A 64 ASCII character set. Fan fold and roll paper. 8 bit wide data path.

Optional features? The Gould 5000 is loaded. 96 ASCII character set, upper and lower case. 128 ASCII character set custom designed to your requirements. On-line mini-computer and off-line magnetic tape interfaces.

What's more, Gould software is the most efficient and flexible available anywhere. It lets your mini print and plot considerably faster than competitive units.

We say that the new Gould 5000 is the best buy on the market, with the best features of any mini-computer printer/plotter. And our Pete Highberg or Bill Koepp can prove it to you. Get in touch with them now at Dept. MD8, Gould Inc., Data Systems Division, 20 Ossipee Road, Newton Upper Falls, Mass. 02164.

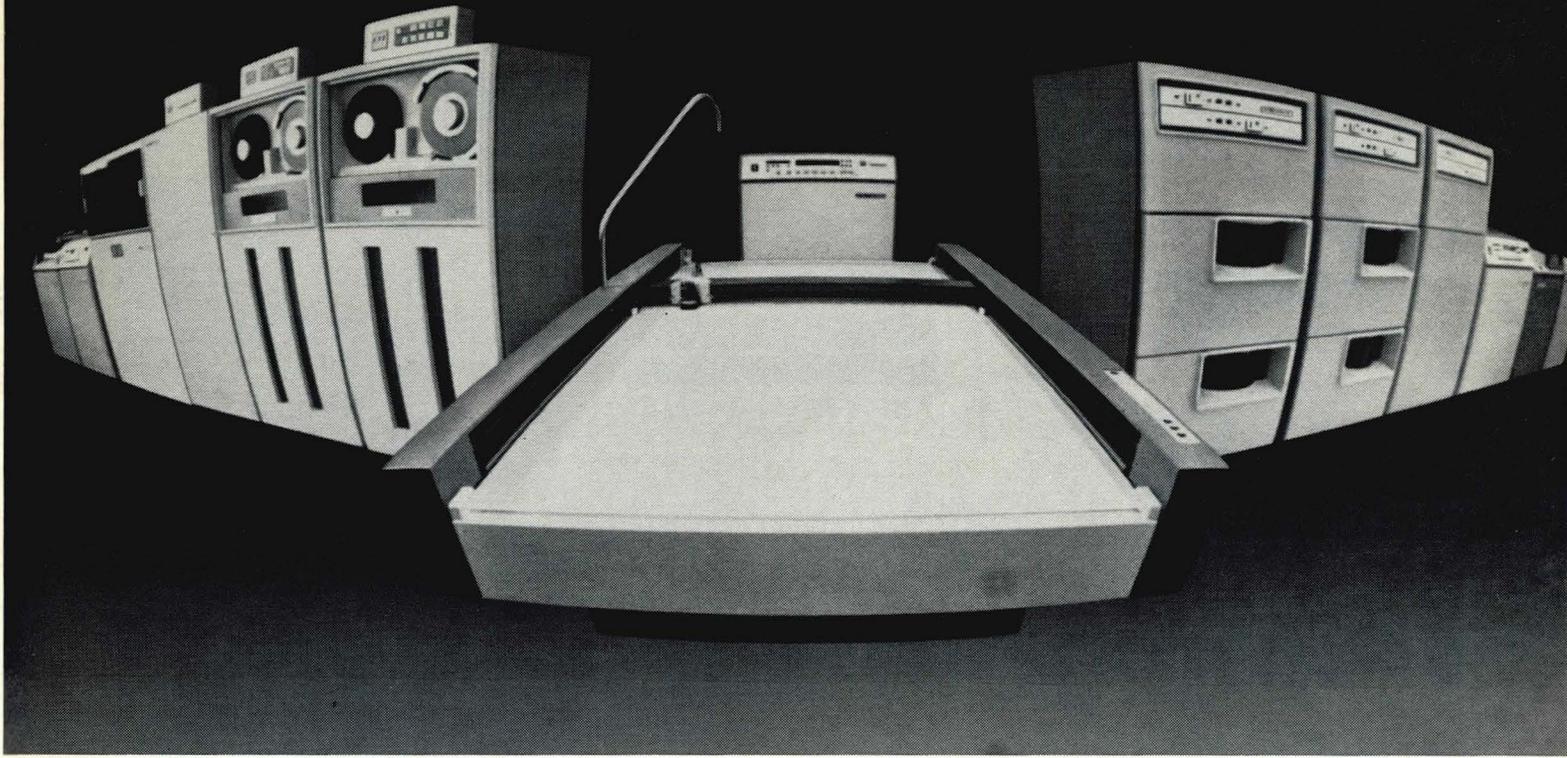


# The new Gould 5000. Twice as fast as any printer/plotter ever designed for mini-computers.

DATA SYSTEMS DIVISION

 **GOULD**

CIRCLE NO. 1 ON INQUIRY CARD



# Peripheral vision.

From the beginning, we have preferred concentration to diversification. We don't supply everything that attaches to your computer. But the things we do supply are the best.

What do we supply?

*Drum plotters.* We're the world's leading supplier of both hardware and software.

*Flatbed plotters.* Several years ago, we saw a need and an opportunity to expand the plotter's uses. The flatbed plotter allows a variety of materials to be substituted for paper; and it has expanded the

market for computer graphics, as well.

*Microfilm plotters.* Here, we got bigger by getting smaller. With microfilm. Our 1675 COM plotter/printer and our 2100 COM printer deliver the best price/performance in the industry.

*Disk memory equipment.* This was our second area of concentration. In a remarkably short time, we have become the leading independent supplier:

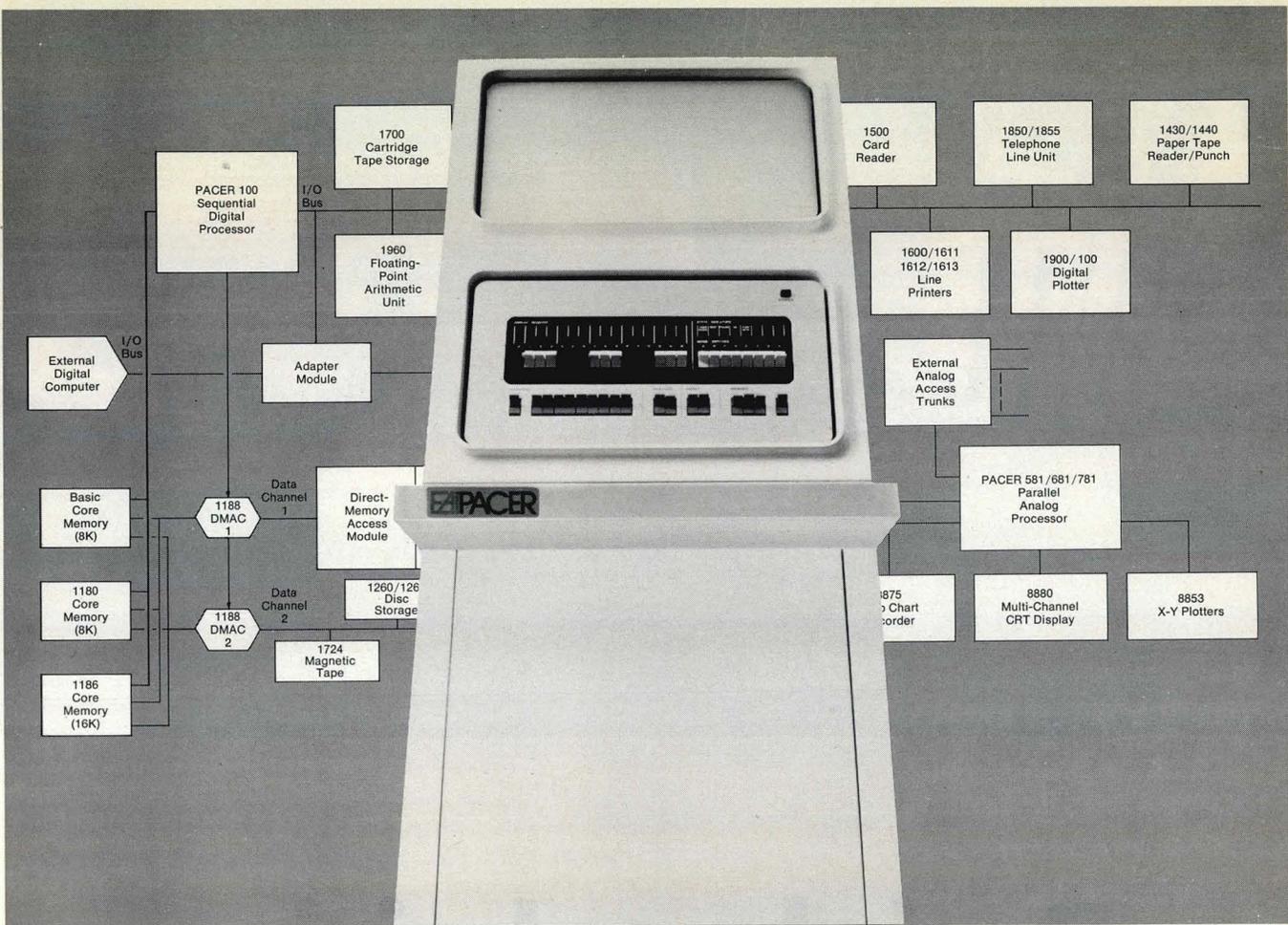
*Tape systems.* We've recently begun to concentrate on tape. The result is that

our new 1040 Tape Drive combines the features of others with our own experience. We intend to be a leader in this field.

The point is we have not grown by accident. Thirteen years after our beginning, we have become a leader in computer peripherals.

For information on peripheral products, call your local CalComp office, or contact California Computer Products, Inc., MD-M8-73, 2411 West La Palma Avenue, Anaheim, California 92801. (714) 821-2011.

**CALCOMP**



# PACER 100

## What a Way to Grow!

**It's EAI's digital cornerstone.** Our PACER™ 100 is no ordinary computer. It's the beginning of a new growth story, a digital especially designed to work with our new parallel processors. And work it does in expandable systems that provide unequaled throughput in scientific and engineering problem solving.

We put the PACER 100 at the digital corner of three different series of new PACER systems, each larger than the next: PACER 500. PACER 600. PACER 700.

Then we provided options to help you grow, to let you fine-tune your system to exactly the type and scale of problems you face. Up to giant-sized.

At each level, your PACER system can deliver far more scientific and engineering design-problem solutions—per day or per dollar—than any other system available.

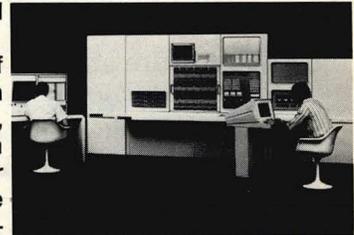
Meanwhile, your techniques and solutions will be state-of-the-art in the areas you choose: Optimization. Simulation. Control. Design. Data Reduction.

Further, we have a huge library of software to help you—including a foreground/background Real-Time Operating System. And we have more than 5,000 case

histories of applications to prove our software expertise.

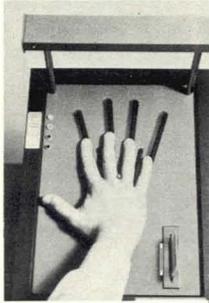
As you can see, we make no ordinary claims. Now, thanks in part to our new digital, we can make one more dramatic assertion: PACER systems can offer you performance/price ratios that run to over 100 times those of conventional digital systems.

That's the sort of efficiency that's worth writing home about or, more to the point, worth writing to us. The faster you do, the sooner we can send you more information to help you start a new growth story of your own.



Electronic Associates, Inc.  
185 Monmouth Parkway  
West Long Branch, New Jersey 07764  
(201) 229-1100

## 41 PRODUCT PROFILE



### COMPUTER FACILITY SUPPORT EQUIPMENT & SYSTEMS

#### Part II — Environmental, Fire Protection, & Security Systems —

*This concluding part of Modern Data's Profile on EDP facility support hardware consists of three articles covering equipment and systems used to protect the computer room from the hazards of heat, humidity, fire, and sabotage. The operation, applications, and manufacturers of air conditioning, fire suppression and detection, and data and access security products tailored to computer site needs are discussed, complementing last month's survey on power support equipment.*

## 30 CONFERENCE REPORT

### NCC — WHERE THE MINI-ACTION WAS

*In reviewing the status of the minicomputer world as represented by the exhibitors at the recent NCC, Modern Data's editorial consultant gives his analysis of where this world is heading.*

## 24 CORPORATE PROFILE — COMPUTER PRODUCTS, INC.

## 26 SOURCE DATA AUTOMATION — ALL KEYPUNCHES AREN'T ALIKE

- 8 EDITORIAL
- 11 LETTERS TO EDITOR
- 12 BOOKSTORE
- 14 NEWS ROUNDUP
- 16 INTERNATIONAL NEWS
- 18 DC DATASCAN
- 19 ORDERS AND INSTALLATIONS
- 20 CORPORATE & FINANCIAL NEWS
- 40 WHBW DEPT.
- 52 NEW PRODUCTS
- 54 NEW SOFTWARE & SERVICES
- 55 NEW LITERATURE
- 56 INDEX TO ADVERTISERS



## 34 COMMUNICATIONS CLINIC

SHOW BUSINESS

## 36 DATACOM NEWS

A SUMMARY OF RECENT DATA COMMUNICATIONS PRODUCTS, SERVICES, AND EVENTS.

## 39 DATACOM Q & A

HOW ARE ERRORS DETECTED?

# UVI Is Not the Only Telephone Company In Town

## That's Why We Offer Direct Line Telecommunications Service at Rates Up to 30% Below Your Present Cost

United Video, Inc. (UVI), a majority-owned subsidiary of LVO Cable, Inc., is an organization based upon competitiveness, one of the new breed of specialized common carriers that is offering communications users an *economical* and *reliable* alternative to standard direct line phone service for voice and data traffic.

The basis for UVI's existence is our ability to provide you a better communications service at a lower cost, through our expertise in advanced microwave transmission technology. But as a newcomer to the common carrier industry (although we've carried television signal traffic over our facilities for some years), we know we'll have to prove ourselves and our service.

We'll do this in several ways. The first is by offering you more attractive rates for communications services. Depending on length of contract, UVI can save you up to 30% on your present direct line phone costs for voice and data transmission between selected cities. Think about it. *Up to 30%*. And of course, at UVI, direct line communication service is our total common carrier business. Your requirements

and needs are our biggest concern — as our customer you don't take second or third place to any other consideration. And your reliability with our network is guaranteed to be at least as good as you currently experience with your present service.

Primary basis for the UVI transmission capability is a 700-mile microwave network now being constructed between Dallas and St. Louis and also linking Oklahoma City, Tulsa, and Kansas City, which is slated for completion in late 1973. In addition we have interconnect arrangements with other common carriers that enable us to offer an integrated Coast to Coast and North to South transmission service linking most of the nation's major metropolitan areas such as New York, Chicago, Houston, Atlanta, Los Angeles, and San Francisco. United Video is here, we're highly competitive, and we want to talk to you about your communication requirements. For a free corporate folder on UVI and precise rate data and other information, write or call collect to United Video, Inc., Attention: Marketing Department, P.O. Box 2686, Tulsa, Oklahoma 74101, (918) 587-1171.



**UVI**  
UNITED VIDEO Inc.  
P.O. Box 2686,  
Tulsa, Oklahoma 74101  
(918) 587-1171  
An LVO Cable Company

# MODERN DATA

**Publisher** ..... S. Henry Sacks  
**Assoc. Publisher** ..... William A. Gannon  
**Editor** ..... Alan R. Kaplan  
**Assoc. Editor** ..... John A. Murphy  
**Chief Ed. Consultant** ..... Dan M. Bowers

**Washington Editor:** Alan Drattell  
**Financial News Editor:** James I. Leabman  
**Internat'l., News Editor:** Bohdan O. Szuprowicz  
**European Correspondent:** Richard Pettersen

**CONSULTING & CONTRIBUTING EDITORS**  
 Boris Beizer  
 Mauritis de Regt  
 L. A. Feidelman  
 Walter A. Levy  
 Ralph Berglund  
 Ken Falor  
 Ivan Flores  
 Martin Nussbaum

Joseph Popolo

## EDITORIAL PRODUCTION

**Manager** ..... Stephen Martin  
 Lynda Volpe

## ADVERTISING PRODUCTION

**MANAGER** ..... BERNARD GREENSIDE

**COVER ARTIST**  
 William Kwiatkowski

**ASST TO PUBLISHER**  
 Judy DeWitt Diane Burkin

**CIRCULATION DEPARTMENT**  
 Carol Grace, Mgr. Sally Haskins  
 Pamela E. Page

All correspondence regarding circulation, advertising, and editorial should be addressed to the publication offices at:

Modern Data  
 3 Lockland Avenue  
 Framingham, Mass. 01701  
 (617) 872-4824

Published monthly and copyrighted 1973 by Modern Data Services, Inc., 3 Lockland Ave., Framingham, Mass. 01701. The contents of this publication (in excess of 500 words) may not be reproduced in whole or in part without written permission.

**SUBSCRIPTIONS:** Circulated without charge by name and title to U.S.-based corporate and technical management, systems engineers, systems analysts, EDP managers, software specialists, and other personnel who qualify under our qualification procedures. Available to others at the rate of \$18.00 per year; single issues \$1.75. Subscription rate for all foreign subscriptions is \$25.00 per year (12 issues). **POSTMASTER: Send Form 3579 to:** Circulation Dept., Modern Data, 3 Lockland Ave., Framingham, Mass. 01701. Controlled circulation postage paid at Concord, N.H.



## SALES OFFICES

**Sales Mgr.** ..... Robert J. Bandini  
**Mktg. Services Mgr.** ..... Melvin L. Hayden

### NEW ENGLAND

Melvin L. Hayden  
 3 Lockland Ave.  
 Framingham, Mass. 01701  
 (617) 872-4824

### NEW YORK

Robert J. Bandini  
 18 East 48th St.  
 N.Y., N.Y. 10017  
 (212) 753-0375, (203) 226-3544

### MIDWEST & SOUTHWEST

Gerald E. Wolfe  
 Dick Govatski  
 Dick Powell  
 Manley Ludwig  
 The Patis Group  
 4761 Touhy Ave.  
 Lincolnwood, Ill. 60646  
 (312) 679-1100

### WEST COAST

David E. Pearson  
 711 East Walnut St. Lands Bldg.  
 Pasadena, Cal. 91101  
 (213) 681-1133

Back issues of Modern Data are available on microfilm. Contact University Microfilms, 300 North Zeeb Rd., Ann Arbor, Michigan 48106 for ordering information.

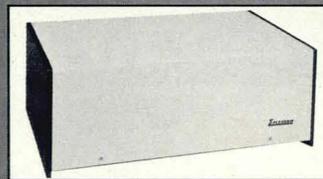
**THIS ISSUE  
 OVER 90,000 COPIES**

## COMMUNICATIONS TESTING AND CONTROL

### DEBUG ON-LINE SYSTEMS

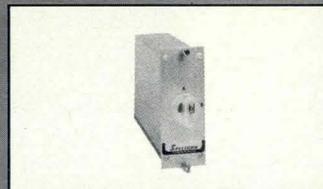


The Universal Monitor insures fast, accurate diagnosis of problems in hardware, software, and communication lines. Hard copy printout of everything sent or received on the data link, including line control characters, makes errors visible. Accommodates any 5 to 8 bit code, and speeds to 9600 bps.



### SHARE YOUR MODEMS

The Modem Interface Splitter enables multiple connections to a single RS232 interface. Eliminate multiple modems and service terminals where several polled terminals are located next to each other.



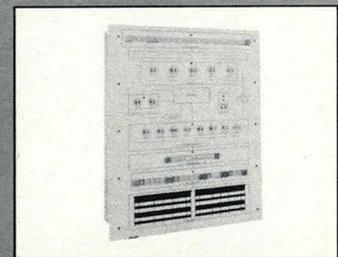
### LINE SELECTORS

Manual or relay controlled switches for interconnection of RS232 interfaces.

Each Selector transfers up to 16 leads of one interface to either of two others. May be customer patched or factory wired in various gang or tandem configurations for virtually any switching arrangement. Free standing, desk cabinets, and rack mountings available.

Offers new speed and convenience in rearranging circuits between ports, data sets, and terminals.

### TECH CONTROL CENTERS



Custom design arrangements of patching fields, switches, and status indicators for monitoring and control of communication systems.

Rearrange leased lines; bring in spare modems; switch to backup systems; bridge for testing.



Church Rd. & Roland Ave.  
 Moorestown, N. J. 08057  
 (609) 234-5700

Products in Service  
 Worldwide  
 For Better  
 Telecommunications

CIRCLE NO. 6 ON INQUIRY CARD

# WE CROSSED AN WITH OUR INTELLIGENT GOT AN



**Corporate Offices:** Ann Arbor, Michigan 48104 (313) 971-0900. **District Sales Offices:** Atlanta (404) 457-1166 - Boston (617) 890-7290 - Chicago (312) 986-1833 - Cleveland (216) 831-8625 - Dallas (214) 521-6710 - Detroit (313) 522-0080 - Hartford (203) 235-4125 - Houston (713) 688-5224 - Indianapolis (317) 784-6779 - Los Angeles (213) 640-0120 - New York (212) 371-9050 - Philadelphia (609) 665-1170 - Pittsburgh (412) 922-3350 - San Francisco (415) 349-6626 - St. Louis (314) 878-0090 - Washington (703) 525-7300.  
**In Canada:** Sycor International Ltd., Toronto (416) 429-0883. **Service Centers in 80 cities.**

# ON-LINE TERMINAL OFF-LINE TERMINAL AND INTELLIGENT "3270"

## INTRODUCING THE SYCOR 250.

It's our new intelligent on-line terminal that's lower priced than IBM's 3270\* and compatible in both hardware and software.

In fact, you can just plug it into any IBM network and let it go to work.

But, unlike the 3270, our Sycor® 250 has many of the intelligent features that have made our Model 340 remote batch terminal so popular.

Features that let the 250 check branch office key entry field-by-field instantly, providing clean



data to the computer and significantly improving operator efficiency.

What goes into the computer goes in clean (at up to 4800 baud)

— and you spend less time on the line. So, you can install more terminals per line, and probably end up needing fewer lines and ports.

## NEW DUAL TRACTOR PRINTER

The 250 has some pretty impressive optional equipment, too. It's available with a badge reader, a light pen and a family of versatile printers.

The printers are our new 2580 series, with

40, 80 or 165 cps speeds. They feature dual tractors that handle two independent continuous forms simultaneously. So now you can combine your forms printing and administrative message traffic on one printer.

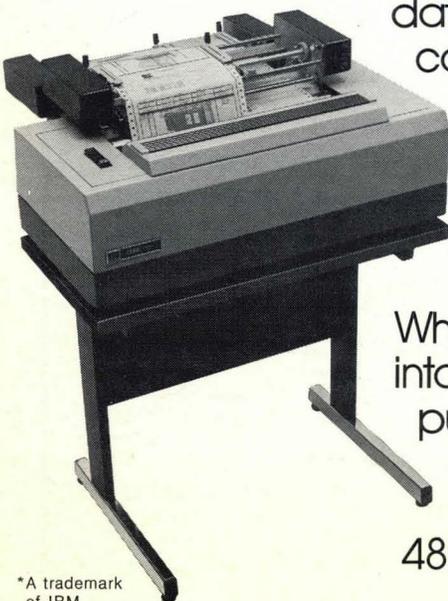
## HOOK A SYCOR 250 INTO YOUR 3270 NETWORK

See what our 250's intelligence can do for you. We think it's the best in the industry.

And we're the people who invented intelligent terminals in the first place.

# SYCOR

*Sycor has opportunities for experienced data processing equipment salesmen and systems engineers in major cities.*



\*A trademark of IBM

## EDITORIAL

# PROGRAM TO OPTIMIZE RETURNING NORMATIVE OPINIONS

*Our representative democracy is a concession to the reality that not all of us can govern all of us all of the time. Some of us have other things to do, like earning enough money to contribute to political campaigns. So we elect representatives to attend to such governmental details as investigating each other. The definitive democratic desideratum, however, remains a "government of the people, by the people, and for the people."*

*The Supreme Court's recent decision allowing communities to define what is and isn't pornography has raised a number of problems. Not the least of these is determining who in the community should be given the power to decide what others in the community may or may not see. Fortunately, good old American technology in the form of computers and communications promises a solution.*

*It is now possible for CATV subscribers to register opinions or order merchandise or services by means of terminals connected between their television sets and a central computer. In one such system implemented last year in South Orange, N.J., a subscriber need only push the right buttons on his terminal to call*

*for a stock market report, a pizza, or the police.*

*The implications of such a system for public polls boggle the brain. Centralized computer networks permit the television-owning public to deliver a mandate on any public issue as easily as an air force general can initiate an atomic war from his bathroom. Millions of Americans with boob-tube terminals could be asked for their opinions on such issues as whether we should bomb Bermuda, wipe out hippies or hard hats (choose one), or re-allocate unnecessary public health funds to subsidize needy tobacco growers.*

*We think the pornography issue is the place to start. Everybody could participate in deciding what's good for their neighbors. Controversial films could be previewed on home T.V.s, and anyone desirous of preventing them from being shown at the local movie house could so indicate by pressing the NO button. Data from all the terminals in a community could then be collected and processed by a program we have tentatively called "Program to Optimize Returning Normative Opinions (PORNO)."*

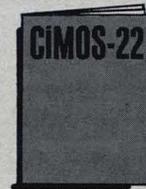
*Once again technology can be put to serving the public interest!* A.R.K.



# Minicomputer SOFTWARE

Here's an exciting new operating system with RPG that dramatically simplifies and speeds data processing applications

**CiMOS-22** is a disk-based operating system for the CIP/2200 minicomputers which consists of language processors, programming and debugging aids and services that simplify data processing applications. The capabilities of CiMOS-22 are packaged in a flexible system design so that each user can tailor the operating system to his individual needs. From either RPG or assembly language programs, the user can take advantage of the high-level data management facilities of CiMOS-22. These facilities include the ability to organize, catalog, store, retrieve and update data files. From a system console or assembler language program the user can create and delete disk-based files. On-line editing capability permits the user to build and maintain data files as well as source and object program libraries. There is much more to CiMOS-22 that you should know about. It's all detailed in our new brochure shown here . . . and it's yours free. Cincinnati Milacron, Process Controls Division, Lebanon, Ohio 45036.



**FREE**

**minicomputers**



**CINCINNATI  
MILACRON**

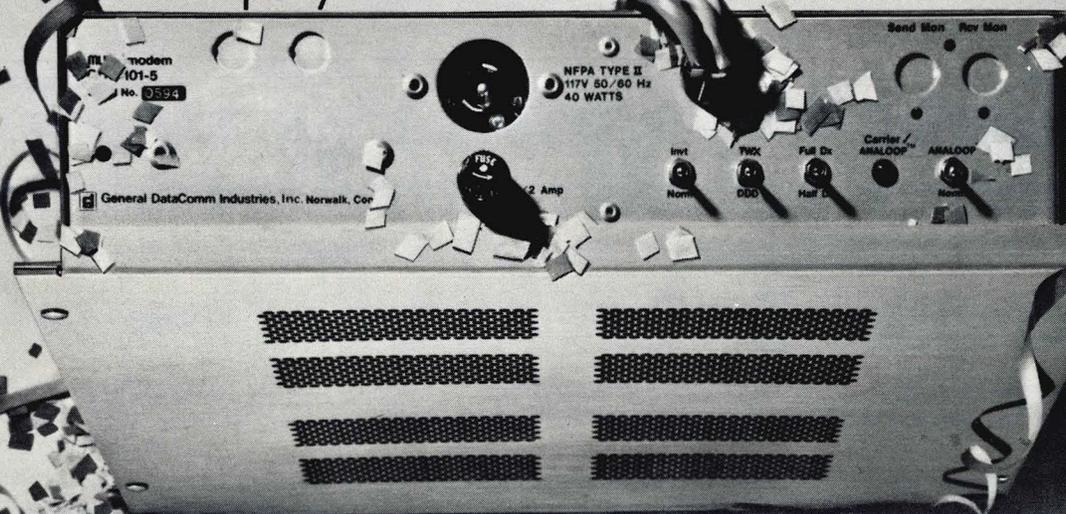
**Machine Tools  
Process Controls  
Chemicals  
Plastics  
Plastics Processing Machinery  
Abrasives**

**CIRCLE NO. 8 ON INQUIRY CARD**

Cincinnati area (513) 494-5444 • Chicago area (312) 439-5726 • Los Angeles area (213) 582-8361 • Detroit area (313) 557-2700  
New York area (201) 687-4500 • Houston area (713) 622-4620 • San Francisco area (408) 735-0701 • Atlanta area (404) 634-6312

When you marry  
your teletypewriter  
to the TWX/DDD networks....

## General DataComm's 101-5 Multimodem™ will help you tie the knot



Are you planning to take advantage of the cost-saving opportunity presented by Western Union's new tariff schedules which permit you to connect your own teletypewriters to the TWX network?

Then you're going to need WU-spec modems to interface between your terminals and the TWX system.

### One teletypewriter, both networks

General DataComm's 101-5 Multimodem meets all required specifications — and then some. It works with both the TWX and the DDD networks, which means that you need only one teletypewriter for the two communications services. Your operator simply selects the network he desires for transmission; your teletypewriter automatically receives from either communications line. The

GDC 101-5 is a direct replacement for Western Electric 101C data set.

Incorporated in the GDC 101-5 are unique diagnostics — Analoop® which permits local testing of data set operation by merely flicking a switch and, optionally, Dataloop® which permits testing from a remote location.

The 101-5 incorporates the full set of operating features needed to control the TTY33 and TTY35 — Automatic Answer, Automatic Answer-Back Control, End-of-Transmission Disconnect, Abort Timer, Loss-of-Carrier Disconnect, Send-and-Receive Clear, Send-and-Receive Break, Low-Paper and Paper-Out warnings and Form Feed

### Universally compatible

A restraint feature is included so that your machine will be compatible with

all other TWX machines and with international connections.

GDC 101-5's mount right on TTY 33's and 35's, so there's no space or location problem.

Delivery is quick. Prices are competitive.

Our brochure gives full specifications. It's yours for the asking.



**General DataComm Industries, Inc.**

131 Danbury Road, Wilton, Connecticut 06897  
(203) 762-0711

CIRCLE NO. 9 ON INQUIRY CARD

# LETTERS TO EDITOR

## TO THE EDITOR:

When Watergate and Big Brother are too much with us, the human soul turns for refreshment to little things. The perspective thus gained is illuminating; attention to trivia permits us to view the world in an entirely different light. Speaking of trivia, did you know, as 1984 draws inexorably nearer, that your magazine has a seriously compromised telephone number? I could not help but notice; the May issue carried a page promoting your Mini-computer Market Survey and bearing the defective number in bold face type. (Being loathe to use it, I am transmitting this message to you through the mails in a plain unmarked envelope.) As to the incriminating number, I invite you to inspect it: (617) 872-4824. The last six digits, 72-48-24, comprise a trio of doublets which in each case are multiples of 24, the number of hours in the day, and they correspond, respectively, to three days, two days, and one day; six days in all. Interesting but not yet fatal; there were after all *Seven Days in May*. But suppose you have an additional day concealed in the remaining digits? Next note that the only primes involved in this series are two and three. Twenty-four can be written as  $2^3 \times 3$ , 48 as  $2(2^3 \times 3)$ . The initial number in the series of seven digits in the local number is eight, which is  $2^3$ . Even the area code is tainted. It is 617; 6 being  $2 \times 3$ , and 1 and 7 adding up to 8, which again is  $2^3$ . Altogether, it is the most suspicious telephone number I have ever seen. I am not at this point suggesting any impropriety on the part of the telephone company; conceivably they could maintain that the above material is the purest whimsy. But be careful. Numerology has spoken and its message is clear. Though your *telephone* be clean as new mag tape, your telephone *number* is definitely bugged.

**Stanley Durland**  
Director of Public Information  
Softech, Inc., Waltham, Mass.

*The local number is further tainted. The sum of the digits of the total (35) also equals  $2^3$ . In any case, you certainly "have our number."* — Ed.

## TO THE EDITOR:

In MODERN DATA's "Product Profile" on communications terminals (April, 1973), I believe there is an error in the listing of Wiltek equipment. The final column of the listing "Other Features," states that our 500 stand-alone CRT terminal has a 50,000 character buffer and is 2260-compatible. This is in error. This equipment does, in fact, feature a 50,000 character buffer; but it is not 2260-compatible. It is 2780-compatible.

**Tak Argentinis**  
Manager, Marketing Administration  
and Systems Engineering  
Wiltek, Inc., Norwalk, Conn.

## TO THE EDITOR:

Re. "Predicting Future Computer Developments" by Dan Bowers (MODERN DATA, May, 1973), Mr. Bowers states that at 10 MHz logic speeds, one foot

of wire represents a one cycle delay. By my calculations, one cycle at 10 MHz equals 100 nanoseconds, and in this time an electrical signal will travel approximately 100 feet.

**George Mirabella**  
Boca Raton, Fla.

*Reader Mirabella is, of course, correct, and I appreciate his pointing out the careless error so that others will not be misled. The correct figure is, of course, 1 GHz, or  $10^9$  Hz.* — D.N.B.

## TO THE EDITOR:

We feel that the article "Communications Terminals" by P. K. Ciolfi in your April 1973 issue was well written, precise, and very informative. It makes an excellent reference source for terminal and feature comparisons for those of us who are involved in the marketing of such products on a daily basis.

**J. Canary, Mgr., Data Entry Prods.**  
The National Cash Register Co.  
Dayton, Ohio

## VIDEO FRAME FREEZE



### Now you can give your electronic displays stop-action and storage capabilities at low cost.

Introducing the Hughes Model MSC-1 video storage unit. It's a completely self-contained electronic image memory system. Specially designed for high-volume (525 line) applications. With a price tag to suit the discriminating buyer.

It stores alphanumeric, graphic and pictorial data.

It integrates signals (automatically enhancing low level images).

It converts slow-scan and x-y information to TV format.

The MSC-1 can make your displays more versatile, more competitive. Write for new brochure: 2020 Oceanside Blvd., Oceanside, CA 92054.

Or call  
(714)  
757-1200.

**HUGHES**  
HUGHES AIRCRAFT COMPANY  
INDUSTRIAL PRODUCTS DIVISION  
IMAGE DEVICES  
OCEANSIDE, CALIFORNIA

CIRCLE NO. 10 ON INQUIRY CARD

# FREE! 48-Page Booklet

## "How to write effectively"

This time- and work-saving booklet can give your memos, letters, speeches, reports, a new clarity, brevity and impact. Included are guides to grammar, style vocabulary building... plus mistakes to avoid, and tips on organizing and outlining that make writing a breeze. Free when you order a free-trial copy of any book below.

WHEN YOU ORDER A FREE-TRIAL COPY OF ANY OF THESE **wiley** BOOKS



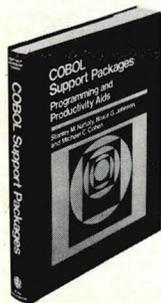
**1**  
**Ways to Profit from the Vast Capabilities of Minicomputers**

### A PRACTICAL GUIDE TO MINICOMPUTER APPLICATIONS

Edited by Fred F. Coury

Authorities tell you if, and how, minicomputer techniques can be applied to your specific problems... what is involved in bringing a minicomputer to bear on those problems... and how to go about selecting the hardware to do the job. And they give you criteria for comparing sensors, interfaces, and minicomputer units. They also give you details on software, aids to setting up systems for minicomputer operations, and ways to use the minicomputer as an effective control element... plus checklists, forms, tables, and hundreds of illustrations.

\$9.95



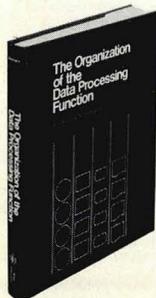
**2**  
**How to Get, and Profitably Use Available Packages**

### COBOL SUPPORT PACKAGES

By Naftaly, Cohen, and Johnson

Make programming implementation cycles more efficient with the various software aids packages you'll find detailed and evaluated in this unique guide. Included is a list of 100 packages, many described at length, with names and addresses of suppliers. In addition, you're given specifics on debugging, quality control, documentation aids, COBOL subset and other standards, composition and role of an installation-based COBOL manual, decision table translator, and shorthand packages.

\$12.95



**3**  
**Descriptions of Successful DP Functions in Actual Operation**

### THE ORGANIZATION OF THE DATA PROCESSING FUNCTION

By Frederic G. Withington

As you read these details of the DP operations of 11 firms of varying size, you'll have workable guidelines for planning, implementing, and maintaining successful DP systems. You'll see specifics on data center operations, the structure of batch processing centers... plus a blueprint of on-line information systems, a most timely and important activity. Proven in hundreds of real-life situations, this practical guidance is clarified by scores of examples and illustrations.

\$10.95



**4**  
**A Valuable New Tool That Makes the Design Job Easier**

### COMPUTER SIMULATION APPLICATIONS

By Julian Reitman

Benefit in many ways from the new computer-aided design tool, discrete-event simulation. See how to apply it in a variety of system design areas, including transportation, scheduling, communications, and manufacturing processes. You'll get a thorough background on simulation, the use of random numbers, the peculiarities of simulation and computer languages, and details of what to look for and what to avoid. This new tool will be especially valuable where relationships between key variables cannot be expressed analytically.

\$19.95



**5**  
**What Is A Compiler? How Is One Written?**

### COMPILER CONSTRUCTION FOR DIGITAL COMPUTERS

By David Gries

See practical examples of the major techniques used in compiler writing, including symbol table organization, grammars and languages, error recovery, code generation, code optimization, scanning, and debugging. Other topics deal with recognizers, semantic routines, interpreters, production language, allocation of storage to runtime variables, and translator writing systems. One entire chapter is devoted to valuable time- and work-saving hints for the compiler writer. Ideal for self-study or instant reference.

\$14.95



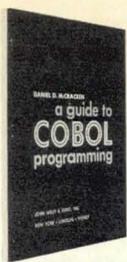
**6**  
**Details of a Highly Effective Computer Language That's Easy to Learn**

### GPSS PRIMER

By Stanley Greenberg

The ease with which GPSS can be learned, and its effectiveness in a wide range of situations, have made it the leading simulation language. This primer tells you exactly what GPSS is, how to use it, how it works, and the kinds of problems to which it can be applied. You'll find concepts and components, details on program writing, tabular summaries, and the logical structure and inner workings of the language. Comprehension is made easier with step-by-step explanations, concrete examples and nine illustrative programs.

\$14.95



7

**A Quick Way to Learn How to Solve Business Problems with the Computer**

**A GUIDE TO COBOL PROGRAMMING**

Second Edition

By McCracken and Garbassi

You'll find this an ideal way to equip yourself and others on the staff with a practical working knowledge of COBOL and its problem-solving uses. Three extended case studies give you over-all views of full-scale realistic applications. All the programs for the studies have been run on a computer, and the output you'll see was actually produced by the machine. The material is arranged so you can start where you want, and concentrate on what interests you most.

\$9.95

8 **Ways to Achieve the Valuable Benefits Offered by Modularity**

**MODULAR PROGRAMMING IN COBOL**

By Russell M. Armstrong

\$10.95

9 **How to Increase Profits With Computerized Credit Systems**

**EDP SYSTEMS FOR CREDIT MANAGEMENT**

By Conon D. Whiteside

\$11.95

10 **Ways to Tap the Valuable Potential of A Data Base**

**AN INTRODUCTION TO DATA BASE DESIGN**

By J. K. Lyon

\$10.95

11 **An Easy-to-Learn Language for Solving Elementary and Sophisticated Problems**

**PROGRAMMING TIME-SHARED COMPUTERS IN BASIC**

By E. H. Barnett

\$10.95

12 **Solve Problems of Systems Development and Control More Easily, Effectively**

**CONTROL OF THE INFORMATION SYSTEM DEVELOPMENT CYCLE**

By R. I. Benjamin

\$10.95

MAIL COUPON TODAY FOR FREE BOOKLET!

**MODERN DATA**  
3 Lockland Avenue, Framingham, Mass. 01701

Please send me, to use FREE for 10 days, the book(s) I've circled below. For those I keep, I'll send the amount(s) shown, plus postage. I'll owe nothing for any book(s) I return. Include my FREE writing booklet, which is mine to keep whether or not I buy any books.

- ① 1-18050-5    ② 1-62840-9    ③ 1-95700-3    ④ 1-71625-1
- ⑤ 1-32776-X    ⑥ 1-32490-6    ⑦ 1-58244-1    ⑧ 1-03325-1
- ⑨ 1-94080-1    ⑩ 1-55735-8    ⑪ 1-05400-3    ⑫ 1-06589-7

Name \_\_\_\_\_

Firm \_\_\_\_\_

Street \_\_\_\_\_

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

Make check payable to John Wiley & Sons, Inc. and mail coupon and check to Modern Data Bookstore Section, Dept. JWS-1, 3 Lockland Avenue, Framingham, Mass. 01701 063 A4192-NP MD-873



**MODERN DATA BOOKSTORE**

**BOOK REVIEWS**

**COMPUTER POEMS**, collected by Richard W. Bailey. 55 pages, Potagannissing Press, 1609 Cambridge Road, Ann Arbor, Michigan 48104. \$2.25 postpaid.

Back in 1964 this reviewer attempted to program a small system to generate humorous poetry and news releases. The results were awful. Now a little book has come along to prove that the system was not at fault. Every selection in this anthology of "computer-assisted" verse by sixteen poet-programmers is, if not excellent, at least fun to read. Some of the lines, in fact, would not be inappropriate in any collection of modern poetry, computer or otherwise.

For example, "wandering in stars/standing by fallen acorns/snowshoe hares drowsing," from Robert Gaskins' "Haiku Are Like Trollies (There'll Be Another One Along in a Moment)," is classic haiku not only because it contains the required number of lines and syllables, but for its spare oriental imagery. And Pete Kilgannon's line, "the swinging solution is to perform quickly on someone," from "A Lament of Communal Living," could as well have been penned by Updike, Rainer, Bishop, or half-a-dozen other flesh-and-blood poets. Even the wilder experiments, like Edwin Morgan's two "computer dialect" poems (based on the glossaries of John Clare and Robert Burns, respectively), are more than just interesting: both are full of clever and bawdy free-associations.

But the unique flavor of computer poetry is best captured in a stanza from a quintet by Marie Boroff: "Furtive is mahogany/And delirious are the shadows of its pants;/But it is among the pastures, and there only,/That the furtiveness of mahogany may uplift us/And the shadows of its pants may be dissolved." From any human author these lines would be silly, but originating from a computer, they are weirdly funny.

It is unfortunate that the anthologist did not explain the techniques used to produce these poems as that knowledge would have been valuable to readers approaching the subject of computer poetry from either direction. Nonetheless, both poets and programmers should get considerable enjoyment from *Computer Poems*. — A.R.K.

**THE ART OF COMPUTER PROGRAMMING - VOL. III, Sorting and Searching** by Donald E. Knuth. 722 pages, Addison-Wesley Publishing Co., Reading, Mass. \$19.50.

This book comprises Chapters 5 and 6 of the material on Information Structures which begins in the earlier volumes in this series. Chapter 5 is concerned with sorting into order, and Chapter 6 with the problem of searching for specified items in tables or files. While there is no shortage of excellent literature on sorting and searching (e.g., Flores: *Computer Sorting*, Prentice-Hall), the present work is certainly the most comprehensive, and will probably become the definitive, treatment of these subjects. — A.R.K.

# NEWS ROUNDUP

## MASS. REJECTS FBI TIE

Massachusetts Governor Francis W. Sargent has refused to allow his State's automated criminal history system to link up with the FBI system. In contrast to the FBI's National Criminal Information Center, only conviction records are retained in the Mass. system, and access is limited to agencies with specific statutory authority to use such records. In a letter to U.S. Attorney General Elliot Richardson (a former Mass. State Attorney General), Governor Sargent wrote: "[The Mass. criminal history system] has been designed to provide . . . safeguards against potential abuse. Unfortunately, I have seen on similar action on the part of the Department of Justice, attorney general, of FBI to construct similar safeguards for the National Criminal Information Center."

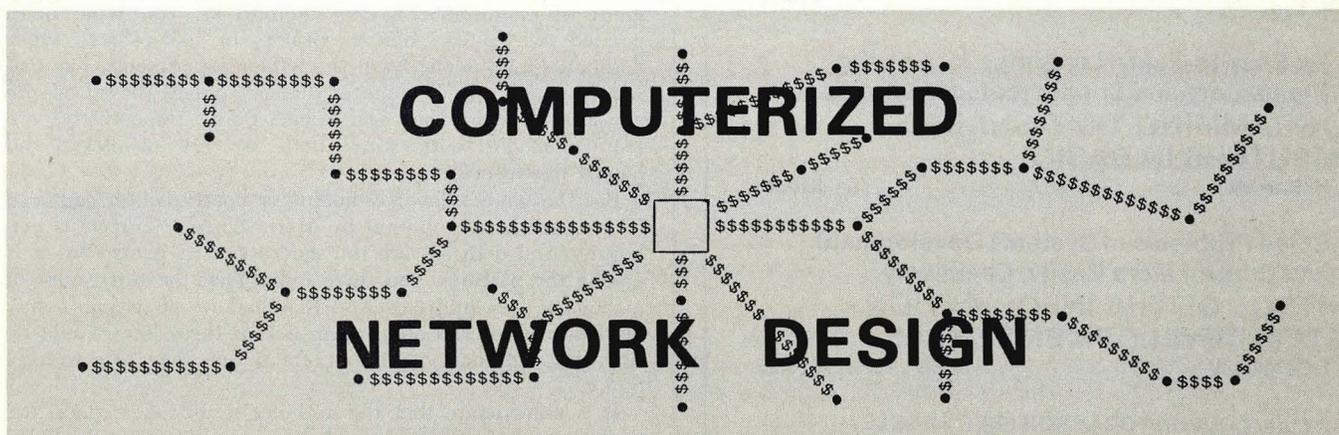
The Governor's reservations would seem to be supported by a number of recent occurrences involving misuse of national, state, and local law enforcement files. A few months ago, for example, a San Francisco husband and wife entered a \$250,000 suit against the Santa Clara County Sheriff's Dept. contending they had been falsely arrested and held for 18 hours on suspicion of car theft. The couple had been arrested while driving their own car, which had been reported stolen two years earlier. The police had not removed the listing from their wanted files after the car was found and returned.

## INFOREX AWARD GOES TO FOUR-PHASE

The General Services Administration has cancelled a \$4-million contract with Inforex for 70 key-to-disk data entry systems involving 851 keystations and awarded the contract to Four-Phase Systems, the second-lowest bidder. GSA said it found Inforex in default when the systems failed to pass a pre-delivery checkout test. Inforex claims GSA had altered the software requirements of the contract after it had been signed in April, and that the company had asked for a 6-week extension on the software only. Inforex has appealed the GSA decision to the General Accounting Office, although the Four-Phase units have been operating at Social Security Administration centers in Pennsylvania and New Mexico since early July.

## JUDGE CHRISTENSEN'S DELEMMA

Although he had been expected to comment on the IBM-Telex antitrust case immediately after the trial ended, Federal District Court Judge A. Sherman Christensen decided to postpone any remarks until he has studied the exhibits further. Judge Christensen said he was concerned that any less-than-final conclusion might give courtroom insiders special advantages. At the same time, he expressed a desire to solicit the reactions of both parties to his tentative conclusions. It appears the only way the judge might solve this dilemma is by conferring with the litigants separately and privately, and then delivering only a final ruling publicly.



- **PLANET** --- Private Line Analysis and Network Engineering Tool --- is a new system of computer programs for planning and optimization of data communication systems. Tailored specifically to each client's needs, the service includes substantial pre- and post-installation consultation on its structure and application.

- Typical programs in a **PLANET** system include one or more simulators, and multipoint and concentrator network synthesizers. Heavily parameterized for maximum flexibility, **PLANET** enables specification of terminals, modems, multiplexers/concentrators, protocol, and network routing, all to obtain economic systems within throughput or response time requirements.

- In system planning, **PLANET** helps avoid poor performance from underdesign, and expensive performance from overdesign. For existing systems, **PLANET** can reduce operating expenses and insure cost-effective changes and expansions. With the high costs for data communications, **PLANET** can pay for itself in a few months.

- **OEM'S AND CONSULTANTS.** . . .Our OEM **PLANET** is a valuable marketing aid for product planning, proposal support and customer service. And under our **PLANET** Ambassador Service you can make **PLANET** available to your customers.

## BERGLUND ASSOCIATES, INC.

Consultants in Applied Telecommunications  
Church Rd. & Roland Ave., Moorestown, N. J. 08057  
609-234-1111

CIRCLE NO. 11 ON INQUIRY CARD

## NCC FINAL FIGURES

The final attendance figure of 32,643 for the 1973 National Computer Conference in New York City this June confirms that the first annual meeting of the 13-organization American Federation of Information Processing Societies was an unqualified success. A breakdown of the NCC total, with comparable figures for the '72 fall and spring meetings shown in parenthesis, follows. Paid registrants: 10,523 (8,039/7,257); exhibitor guests: 14,945 (9,152/3,931); exhibitor personnel, program participants, and press: 7,175 (3,842/2,671). Particularly worth noting was that the 215 companies which exhibited this year occupied 612 booths, an increase in both quantity *and* ratio compared to the 165 companies in 408 booths at the Anaheim Convention Center last fall. The statistics look even better for the 1974 NCC scheduled for Chicago's McCormick Place next May 6-10. By early July, AFIPS reported it had already received commitments from 106 companies for 591 booths.

## MEMOREX DROPS MAINFRAMES; OFFERS CONTROL

On this page last month we reported that Memorex was considering discontinuing its fledgling MRX mainframe line. In July the company stated that it had decided to do just that. Memorex also announced that it was engaged in discussions with the Singer Company which could lead to Singer's investing \$15-million in exchange for a controlling interest and the right to acquire a majority of Memorex

common stock. The deal depends, among other things, on whether Memorex can first convert some of its \$200-million in senior debt to preferred stock and adjust certain other obligations. If the Singer offer or another satisfactory equity arrangement is not concluded soon, a hinted mid-year write-off of some \$50-million in MRX and leasing inventories, and another \$35-million from terminating its policy of deferring costs for lease acquisition and R & D, would result in Memorex having a negative net worth. Hopefully Part 2 of this tale of woe won't appear as Chapter II.

## BITS & BITES

You think *you're* having trouble keying names in files? The computers at British Rail have to cope with the name of a little railroad station in Wales called (take a deep breath):

Llanfairpwllgwyngyllgogerychwyrndrobwlllantysiliogogoch.

Attention former RCA Computer Division employees! Ed Cunningham, P.O. Box 844, Palatine, Ill. 60067, is compiling an "Alumni Locator." If you don't qualify for disaster relief, you may at least get the chance to march in a parade.

An all-day seminar on "How to Write for Publication" at Boston University, Oct. 19, will bring together editors from 14 national industry publications, including *Computer Design*, *Computerworld*, *Data and Communications Design*, *Digital Design*, *EDN*, *Electromechanical Design*, *Telecommunications*, and (yup!) *Modern Data*. For info., write: Mrs. Shirley Coyne, Boston University - S.P.C., 640 Commonwealth Ave., Boston, Mass. 02115.

### SPECIAL REPORT FROM MODERN DATA

## "Access Control And Personal Identification Systems"

This report provides a thorough education in the field of equipment for access control and personal identification:

- the conceptual bases of the available systems • operating details and costs • list of manufacturers
- criteria for selecting equipment • future advancements expected in equipment and techniques.

The basic principles upon which all such systems are based are presented and analyzed. Four basic kinds of systems are described in detail and an exhaustive presentation of each manufacturer's devices is included. The four types of systems are:

- personal attribute (fingerprint, hand geometry, microfilm) • stored-code (pushbuttons) • portable-key (card-access) • code-plus-key (pushbuttons and card).

Equipment costs are presented and analyzed, and guidelines for product selection by the user are presented. The report analyzes where the technology is going and what can be expected in the future.

The Report is available at a price of \$15/copy from MODERN DATA SERVICES, INC. on a 15-day free trial basis.

### USE HANDY ORDER COUPON

MODERN DATA 3 LOCKLAND AVE  
FRAMINGHAM, MASS. 01701

Please enter my order for \_\_\_\_\_ copies of the  
ACCESS CONTROL SYSTEMS REPORT at \$15 per copy  
including U.S. postage.

Payment enclosed

Bill me

Purchase Order Number \_\_\_\_\_

Name \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

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

# INTERNATIONAL NEWS

## SIX RIAD COMPUTERS SHOWN AT SUPEREXHIBIT

The RIAD computer exhibit which opened in Moscow last May grouped for the first time all the RIAD computers manufactured by the participating COMECON countries. The systems shown were the R-10, R-20, R-20A, R-30, R-40, and R-50 with full complements (over 80) of peripherals. The main attraction of the show was the RIAD R-50 built by the Soviet Union, which was shown in public for the first time. The R-50 is the largest computer in the RIAD series. It has a 1 microsecond memory cycle time with a range of 128K to 1,024K bytes of memory. A still larger machine, the R-60, is known to be under development.

Soviet officials at the Moscow exhibit, which was organized by the Intergovernmental Computer Committee of the COMECON countries, already claim a "foreign" client for their R-50 computer. They hope to export between 20 to 30 of the large systems during the next 2 to 3 years.

## FRENCH EDP GROWTH

According to French government sources, the number of computers in operation in France increased from 6,700 in 1971 to a total of 8,900 systems in one year, which amounts to a 33% growth in computer installations. Most of the growth occurred in the small computer category, which increased from 4,655 in 1971 to 6,100 units in 1972. Medium-sized machines increased from 1,855 to 2,450, and large systems from 288 to 370 during the same period. Total deliveries amounted to 5 billion francs, which is close to 1 billion dollars and represented a 20% increase compared with the previous year.

The U.S. Dept. of Commerce predicts France will spend over \$7-billion for EDP equipment between 1972 and 1977. For information on participating in D of C's exhibit of EDP products at the U.S. Trade Center in Paris next January, contact Mike Hanpeter at (202) 967-3748.

## POLAND'S COMPUTER EXPORTS

The Polish State computer manufacturer, ELWRO, recently released total production and export figures for its Odra 1003, 1013, 1204, and 1304 computers. Of a total of 555 units produced during the last few years, 379 computers were eventually installed in Poland while the remaining machines were exported mainly to neighboring socialist countries.

|                            |     |
|----------------------------|-----|
| Poland                     | 379 |
| U.S.S.R.                   | 63  |
| Czechoslovakia             | 45  |
| German Democratic Republic | 39  |
| Hungary                    | 17  |
| Bulgaria                   | 5   |
| Romania                    | 4   |
| North Korea                | 2   |
| Pakistan                   | 1   |

The new third generation Odra 1305 and 1325 computers, only now entering into serial production, are not included in this count.

## COMPUTERS IN IRAN

After Lebanon and Egypt, Iran with about 25 computers is the third largest user in the Arab world. The recent installation of a large Honeywell computer system by the Imperial Iranian Air Force brings Iran into focus as one Arab country considerably enhancing its computing power. But Israel, with its 300 computers, still has almost twice as many machines today as all Arab countries combined.

The new Iranian acquisition, valued at \$3.1-million, includes a Honeywell 6060 with 128K of internal memory, 12 CRT terminals, and a satellite HIS 105 for remote batch processing. The computer system will be used for spare parts inventory.

## MINSK COMPUTERS OPERATING IN HOLLAND

ELORG, a Netherlands firm 65%-owned by the Soviet foreign trade organization ELEKTRONORGTEKHNIKA, has been operating a MINSK 22 computer in their offices at the Hague for the last two years, and recently installed a MINSK-32 computer at its Hilversum office. The two computers are used to test their compatibility with various Western peripherals for the purpose of developing systems that could sell abroad, particularly in the lucrative capitalist markets. The MINSK machines are the most popular computers in the Soviet Union today.

## RIAD USERS LOOKING FOR U.S. SOFTWARE

The RIAD computers designed by the Soviet Union and the East European countries have several operating software. Soviet computer experts at the recent Moscow exhibit of the RIAD computers indicated that many software programs designed to operate with the IBM 360 series will run under the RIAD operating systems, although "some small modifications may be required in some cases."

The RIAD operating systems include a DOS and OS as well as a MOS, which is the so-called Small Operating System. For the smallest RIAD computer, the R-10, there is a special OS/10 operating system which includes an assembler and Fortran compilers. All the other operating systems include assemblers, RPG, and Fortran and PL/1 compilers. The DOS and OS also have Cobol compilers.

The Russians are interested in obtaining some software from the West particularly where it can be purchased on a one-time basis. They do not wish to discuss licensing, leasing, or multiple payment arrangements and want to be free to reproduce foreign software without restriction.

## QUICKLY AROUND THE WORLD

Memorex Corp. has concluded a contract to supply disk drives for the Felix-250, a computer built in Romania under license from Compagnie Internationale pour l'Informatique of France. The contract is valued at approximately \$250,000.

Available at no charge to marketing personnel is a new publication that explains the French system of postal separation and postal coding as well as the French system of basic geographical divisions. It also contains some population statistics. For a copy of "Administrative and Marketing Geography of France," write: Mr. Lewis Rashmir, Dart Industries Inc., 15233 Victory Blvd., Suite 612-MD, Sherman Oaks, Cal. 91403

# If you use more than one of these media

## WE CAN HELP YOU MANAGE BETTER

Just look at all the different types of media you are using today.

As a manager, how can you organize your operations to get the highest productivity from the people and machines that use these media? And, if you are adding such things as microfilm, microfiche, word processing equipment, terminals and computer reports; how can you create storage systems and work station environments that will provide high efficiency, reduced worker fatigue and better housekeeping?

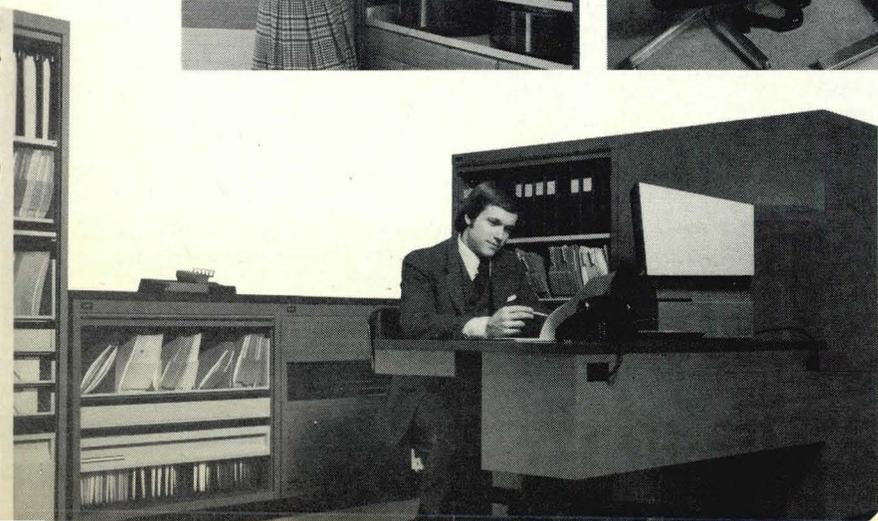
One thing you can do is to recognize the fact that the office furniture you've been used to all these years just can't adapt to the media explosion.



That's why we started with the basic problems of media and the people who work with them and designed an entirely new concept in equipment for the office and computer room.

### THE OPTIMEDIA™ CONCEPT

It's called Optimedia because it allows you to tailor your systems to provide optimum use of media by both people and machines. Optimedia also gives you a built-in hedge against obsolescence since it is a living system which you can change at any time to meet your changing requirements. We'd like the opportunity to show you how the Optimedia concept can help you manage better. It's detailed in our new brochures. To receive copies, just circle the readers service number, or contact your nearest Wright Line Media Management Specialist. You'll find him in all principal cities.



**Wright**  
LINE  
MEDIA MANAGEMENT SYSTEMS

160 GOLD STAR BOULEVARD, WORCESTER, MASS. 01606  
A DIVISION OF BARRY WRIGHT CORPORATION  
CIRCLE NO. 12 ON INQUIRY CARD

**BANK BILL:** Rep. Joseph P. Addabbo (D-N.Y.) has introduced H. R. 8062, a bill aimed at correcting "a serious defect in the Foreign Bank Secrecy Act which Congress passed last year to require banks to microfilm and store all checks." Addabbo's bill would give a civil cause of action to a bank customer whose records or checks have been disclosed without authority or court order. The privacy bill, according to Addabbo, "would prevent fishing expeditions and snooping by government agencies using copies of checks and bank records as a new form of eavesdropping."

**CENTRAL DATA BANK:** Sen. William D. Hathaway (D-Me.) has introduced S. 1992, a bill that proposes the establishment of a national center for the selection, storage, retrieval, and dissemination of information to meet the requirements of all branches of the Fed for fiscal, budgetary, and program-related data. The center would be developed and maintained by the Comptroller General of the U.S., and each federal agency would be required to furnish the center with data relating to its budget requests, functions, programs, projects, and activities. The bill also calls for the standardization of all federal fiscal and budgetary information systems and mandates that information and data in the center also be made available, so far as possible, to state and local governments. The proposal, according to Sen. Hathaway, reduces Congress' dependence on the executive branch for fiscal and budgetary information and puts both branches "on a more equal footing." At the same time, he said, it saves the taxpayers money by mandating that facilities and professional personnel be shared.

**EDP FUND:** The General Accounting Office has taken a look at the EDP fund administered by the General Services Administration. The fund — which through fiscal year 1972 had appropriations totaling \$30-million — will be used to acquire the Fed's general-purpose EDP equipment for lease to user agencies when the fund is fully capitalized. The GAO examined the management policies of the fund's equipment lease program to determine whether it is being administered as intended by the law which created it (the Brooks Bill) and whether it is effectively assisting in achieving economies. GAO recommended to the Office of Management and Budget and GSA that: (1) purchased equipment be capitalized at cost; (2) purchased equipment which has been capitalized at fair market value be revalued at cost, and lease agreements be amended to provide for charges based on fund costs; (3) additional income realized from leases of purchased equipment, as a result of lease charges which recover fair market value rather than cost, be transferred to the Treasury Dept.; (4) criteria be established which would facilitate uniform, objective determinations of capitalized values for equipment acquired by transfer from other agencies, when the fund's cost does not realistically indicate the equipment's value; (5) criteria be established which would facilitate uniform, objective determinations of lease charges for identical or similar equipment acquired by purchase or transfer; and (6) the 10% charge for anticipated losses due to early lease terminations be eliminated.

**GAMING:** The General Accounting Office, in a review of the development and use of computer models in the Dept. of Defense, has recommended to Congress that the Secretary of Defense formally adopt, as DoD policy, guidelines for reporting study results similar to those of the Operations Research Society of America. In addition, GAO suggested that DoD establish a requirement for periodic, independent technical reviews of computer models to insure improvement in their development and use, as well as in the studies in which they are employed. DoD endorsed the general concepts indicated in GAO's recommendations, although maintaining that establishment of more formal guidelines was unnecessary. GAO's report, "Advantages and Limitations of Computer Simulation in Decisionmaking" found that development of DoD models was about equally divided between contractors and in-house activities. Reported costs of building 104 models totaled better than \$28.8-million. The average cost per model was nearly \$277,000, with the range being from \$1,200 to \$3-million. In about one-third of the models, GAO found that "independent checks were not made to insure the accuracy, timeliness, consistency, and overall quality of the data used."

**DRIVERS:** States are using the Dept. of Transportation's computerized National Driver Register more and more, and as a result increasing numbers of irresponsible drivers are being removed from the nation's highways. The states feed driver license revocation and suspension information into the Register. During 1972, participating states requested a check on more than 17 million names, out of which the Register identified 124,000 "probables" who may have lost their licenses in other jurisdictions. The names are stored on 24 reels of mag tape, updated daily, and replies are sent to the states within 24 hours of inquiry. The Register is maintained by the National Highway Traffic Safety Administration, utilizing computer facilities provided by the Federal Highway Administration. Both are DoT organizations.

**R&D:** Research and development spending in the U.S. is up 3% this year over a year ago to an estimated \$30.1-billion, according to a report, "National Patterns of R&D Resources, 1953-1973 — Funds and Manpower in the United States," released by the National Science Foundation. R&D is expected to account for 2.4% of the nation's gross national product in 1973, down from 2.5% in 1972 and from 3% in 1964. The report covers R&D performance and funding by all sectors of the economy. Federal support of R&D is estimated at \$16-billion for 1973, some 1% above 1972's figure.

## IN BRIEF

Sen. Ted Kennedy (D-Mass.) in his authorization funding bill for the National Science Foundation for FY 1974 has recommended that \$10-million be used for computing activities.

Dr. Ernest Ambler has been appointed deputy director of the National Bureau of Standards, replacing Dr. Lawrence M. Kushner, who accepted another White House assignment.

# ORDERS AND INSTALLATIONS

Eglin Air Force Base, Florida, headquarters of the Air Force System Command's Armament Development and Test Center (ADTC), has installed its second Control Data 6600 Computer system. Housed in Eglin's Computer Sciences Laboratory, the new CDC 6600 serves primarily as a backup to the 6600 installed in 1968, and also handles timesharing applications via a network of remote visual display and Teletype terminals at Eglin and at Tyndall Air Force Base in Panama City, Fla.

The Air Force Systems Command's Electronic Systems Division has selected Burroughs Federal and Special Systems Group, Paoli, Pa., as its EDP vendor at the Air Force Military Personnel Center, Randolph Air Force Base, Texas. Under the \$16-million contract, a three-processor Burroughs B6700 system will support the Advanced Personnel Data System and will replace two Burroughs B5500 multiprocessor systems and a Honeywell 1250 system. Initial installation of the new system is to be completed by October of this year.

The Washington State Patrol has awarded an \$865,000 contract to Trans-A-File Systems Co. to provide an automated document storage and retrieval system for the Patrol's newly formed Identification Section, which will maintain fingerprint and related records on behalf of all criminal justice agencies in the state.

The first IBM System/370 Model 125 to be delivered to a customer has been installed at the Wells Fargo Bank's Sonoma Mortgage Division in Santa Rosa, California.

Litton Industries announced receipt of a \$2-million order from Morse Shoe, Inc., Canton, Mass., for 500 Sweda point-of-sale electronic cash registers and associated system equipment. Installation of the Sweda Series 700 electronic systems will begin in January in Morse and Fayva retail stores throughout the U.S.

Alfred Herbert, Ltd., the largest machine tool manufacturer in the United Kingdom, has ordered a \$1-million Univac 9700 system to expand administration and production functions. The 9700 replaces an IBM 360/40.

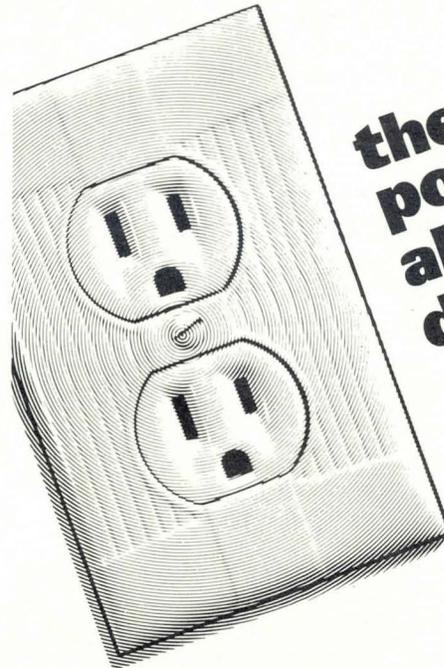
System Development Corp. of Santa Monica has been awarded a \$9.5-million contract by the Army Advanced Ballistic Missile Defense Agency (ABMDA) for the production, installation, and testing of a Parallel Element Processing Ensemble (PEPE) ballistic missile defense system. The PEPE system will be installed and tested at the ABMDA Research Center in Huntsville, Alabama.

Harris-Intertype Corp. has received a \$38,300,000 Navy contract for computer-controlled avionics testing systems, the largest single order in the company's history.

The Glendale (Cal.) Federal Savings and Loan Association, the nation's second-largest federal S & L, has placed a \$2.1-million order with Financial Data Sciences, Inc., for an on-line transaction system. The order includes 181 teller terminals, 69 terminal processors, and associated on-line storage devices.

The Netherlands Ministry of Finance has ordered a system built around a dual configuration of Honeywell's Model 6080 processor to assist in assessing and collecting taxes. The \$10-million order is the largest ever received in The Netherlands by Honeywell Bull, HIS's French Computer subsidiary.

Informatics has reached an agreement with Dun & Bradstreet to provide two Xerox Sigma 9 computers, plus 75 disk storage units and Informatics software to D & B for its new on-line nationwide reporting system. Designated AOS (for advanced office system) it is expected to involve some \$20-million by the time it is completed in 1975.



**the  
power supply  
all the others  
depend upon**

Without it, the supplies in your computer, peripherals and other critical devices won't work, and with the increasing energy shortage, the chances of your being without it are growing.

Avtel manufactures all solid state AC power systems designed to connect between the power line and your essential equipment. They provide precise power, filtered and regulated at the frequency you need (50, 60, or 415 cycles, for example) and the Uninterruptible models insure that all your other power supplies keep working, regardless of power line conditions.

Get the complete story.

**AVTEL**  
CORPORATION  
an Airtronics Subsidiary  
1130 East Cypress St. • Covina, Calif. 91724  
(213) 331-0661

CIRCLE NO. 13 ON INQUIRY CARD

# CORPORATE AND FINANCIAL NEWS

University Computing Co. is generally understood to be reaching deep to finance its Datran (Data Transmission Co.) subsidiary. UCC's sale earlier this year of Communications Systems, Inc. to Harris-Intertype (for \$20-million in cash and 20% of CSI's net income through 1978) was an example of this. But if UCC is hurting, you'd never know it from Chairman Sam Wyly. At the company's recent annual meeting, Wyly reported that UCC reduced its debt by more than \$13-million so far this year and by more than \$70-million since the end of 1970. Wyly also said that although UCC's present investment in Datran now exceeds \$21-million, only \$6-million of an existing \$25-million revolving credit line has been used for that purpose. Hardly more attention-grabbing than that news was the announcement that the name University Computing Co. would henceforth apply only to the firm's computer services business. It's new corporate title is Wyly Corp., which will now be the organizational parent of UCC and Datran, as well as Gulf Insurance Co. and Computer Leasing Co.

Ford Motor Credit Co. subsidiary American Road Equity Corp. (AMREC) has designated DPF Inc. to perform marketing and brokerage services in connection with Ford Credit's S/370 operating lease program. Under the AMREC agreement, DPF will offer S/370s under operating lease terms ranging from three to five years. The initial Ford allocation for this effort is \$50-million, with at least another \$100-million planned for the program over the coming 18 months. But DPF should have no problem getting even more capital if it needs it. Ford Credit's assets now exceed \$5.6-billion and its capital funds exceed \$1-billion, ranking Ford as one of the largest finance companies in America.

California Computer Products has consummated a \$60-million revolving credit agreement with four major banks led by First National City Bank as agent. Other participating banks were Wells Fargo N.A., The First National Bank of Chicago, and Manufacturers Hanover Trust.

## BOX SCORE OF EARNINGS

| COMPANY                             | PERIOD           | REVENUES    | NET EARNINGS (Loss) | EARNINGS (Loss) PER SHARE |
|-------------------------------------|------------------|-------------|---------------------|---------------------------|
| Addressograph Multigraph            | 9 mos. 4/30/73   | 351,181,000 | 8,785,000           | 1.09                      |
|                                     | 4/30/72          | 319,036,000 | 10,471,000          | 1.30                      |
| Adv. Micro Devices                  | 12 mos. 3/31/73  | 11,401,007  | 1,322,774           | .61                       |
|                                     | 3/31/72          | 4,657,101   | 176,367             | .10                       |
| Advanced Systems                    | 12 mos. 3/31/73  | 3,414,000   | 18,000              | .02                       |
|                                     | 3/31/72          | 3,296,000   | 406,000             | .43                       |
| AGS Computers                       | 3 mos. 3/31/73   | 404,838     | 25,245              | .06                       |
|                                     | 3/31/72          | 299,698     | 27,762              | .06                       |
| Analog Devices                      | 27 wks. 5/5/73   | 9,874,377   | 615,516             | .46                       |
|                                     | 26 wks. 4/29/72  | 7,244,528   | 395,715             | .30                       |
| Codex                               | 6 mos. 3/31/73   | 3,073,000   | 829,000             | .57                       |
|                                     | 3/31/72          | 1,414,000   | (82,000)            | (.06)                     |
| Cognitronics                        | 3 mos. 3/31/73   | 938,950     | 119,043             | .08                       |
|                                     | 3/31/72          | 555,314     | (143,452)           | (.10)                     |
| Collins Radio                       | 40 wks. 5/4/73   | 251,112,000 | 6,770,000           | 1.52                      |
|                                     | 39 wks. 4/28/72  | 174,338,000 | (59,790,000)        | (20.54)                   |
| Cmptr. Investors Group              | 12 mos. 3/31/73  | 17,160,000  | 332,000             | .19                       |
|                                     | 3/31/72          | 13,902,000  | 2,132,000           | 1.03                      |
| Computer Machinery                  | 3 mos. 3/31/73   | 10,685,050  | 386,416             | .08                       |
|                                     | 3/31/72          | 3,184,822   | (1,499,496)         | (.31)                     |
| Computer Sciences                   | 12 mos. 3/30/73  | 120,500,000 | 367,000             | .03                       |
|                                     | 3/31/72          | 107,498,000 | (35,749,000)        | (2.67)                    |
| Cordura                             | 6 mos. 4/30/73   | 59,129,000  | 3,702,000           | .60                       |
|                                     | 4/30/72          | 49,401,000  | 3,595,000           | .56                       |
| Data Products                       | 12 mos. 3/31/73  | 59,789,000  | 2,275,000           | .34                       |
|                                     | 3/25/72          | 50,889,000  | 703,000             | .10                       |
| Graphic Sciences                    | 9 mos. 3/31/73   | 8,649,000   | 793,000             | .26                       |
|                                     | 3/31/72          | 6,671,000   | 357,000             | .12                       |
| Hudson General                      | 9 mos. 3/31/73   | 29,338,000  | 673,000             | .42                       |
|                                     | 3/31/72          | 28,185,000  | 1,139,000           | .72                       |
| ITEL                                | 3 mos. 3/31/73   | 33,325,000  | 721,000             | .10                       |
|                                     | 3/31/72          | 19,444,000  | (1,527,000)         | (.21)                     |
| Mathematica (Incl. Ed. Coordinates) | 9 mos. 3/31/73   | 7,472,500   | 384,500             | .54                       |
|                                     | 3/31/72          | 6,257,100   | 308,500             | .44                       |
| Megadata Cmptr. and Comm.           | 6 mos. 4/30/73   | 403,060     | 29,867              | .09                       |
|                                     | 4/30/72          | 185,000     | (400)               | (—)                       |
| Metromation                         | 3 mos. 2/28/73   | 194,810     | 2,844               | .01                       |
|                                     | 2/28/72          | 14,503      | (44,527)            | (.20)                     |
| Nat'l. Information Systems          | 12 mos. 12/31/72 | 7,889,120   | 168,848             | .04                       |
|                                     | 12/31/71         | 6,489,132   | (162,974)           | (.04)                     |
| On-Line Systems                     | 9 mos. 1/31/73   | 4,550,605   | 456,010             | .58                       |
|                                     | 1/31/72          | 2,375,830   | 91,205              | .13                       |
| Pertec                              | 9 mos. 3/30/73   | 19,442,000  | 1,162,000           | .35                       |
|                                     | 3/31/72          | 16,830,000  | 1,553,000           | .50                       |
| Recognition Equip. Equip.           | 6 mos. 4/30/73   | 18,033,000  | (458,000)           | (.09)                     |
|                                     | 4/30/72          | 18,612,000  | 196,000             | .04                       |
| Redactron                           | 9 mos. 3/31/73   | 7,599,117   | 125,558             | .13                       |
|                                     | 3/31/72          | 748,673     | (1,955,162)         | (3.37)                    |
| Rockwood Computer                   | 12 mos. 3/31/73  | 47,110,000  | (32,894,000)        | (6.77)                    |
|                                     | 3/31/72          | 47,626,000  | 1,997,000           | .57                       |
| Sanders Associates                  | 9 mos. 4/27/73   | 125,703,000 | 3,431,000           | .75                       |
|                                     | 4/28/72          | 106,695,000 | 1,591,000           | .35                       |
| Scientific Cmptrs.                  | 9 mos. 3/31/73   | 2,802,061   | 106,112             | .13                       |
|                                     | 3/31/72          | 2,667,428   | 129,944             | .16                       |
| Scientific Software                 | 12 mos. 1/31/73  | 1,966,731   | (1,251,310)         | (.77)                     |
|                                     | 1/31/72          | 1,480,000   | 13,477              | .01                       |
| Visual Sciences                     | 6 mos. 4/30/73   | 2,150,074   | 78,843              | .06                       |
|                                     | 4/30/72          | 587,183     | (270,415)           | (.26)                     |
| Wiltek                              | 6 mos. 4/30/73   | 4,728,000   | 99,000              | .07                       |
|                                     | 4/30/72          | 2,712,000   | 223,000             | .16                       |

Computer Automation, Inc., Irvine-based "Naked Mini" manufacturer, reported shipping more than \$10-million worth of minicomputers during the first 11 months of Fiscal 1973.

**MERGERS AND ACQUISITIONS:**  
**Advanced Memory Systems** has completed its previously announced acquisition of **Computer Microtechnology Inc.** . . . **American Management Systems** of Arlington, Va., a consulting and services firm, has acquired **Compass Co.**, which operates project control and financial systems for clients in Washington, D.C., Chicago, and Texas . . . **Graphidyne Corp.**, a graphics and media services group based in California, has agreed in principle to acquire **ComTrol, Inc.**, a telephone communications consulting firm headquartered in St. Paul, Minn. . . . **Control Data** has acquired the Brazilian data services operation of ITT. The operation, to be known henceforth as *Control Data do Brasil Computadoras, Ltda.*, has been a division of **Standard Electric, S.A.**, a subsidiary of International Tel. and Tel. CDC also announced its acquisition of **Greenwich Data Systems**, a wholly-owned subsidiary of **Planning Research**, for an undisclosed price . . . **Cogna Systems Corp.** is the new name of the data processing subsidiary of GSI, Inc. **Cogna** became a subsidiary of GSI in late April when Swift & Company businesses were reorganized into **Esmark, Inc.**, a holding company complex with interests in food, chemicals, insurance and business services, and energy . . . **Lockheed Electronics Co.** of Plainfield, N.J., has completed its acquisition of the Los Angeles-based **Controls Division of Leach Corp.** The acquisition includes a line of magnetic tape recorders, manufacturing and test equipment, and a three-building leased facility located in Azusa, California

**RECENT ENTRIES;** *Computer Sciences Corp.* has formed a **System Sciences Division** headquartered at Silver Spring, Md., to support organizations in physics, engineering, system programming, and related disciplines . . . **A Software Products Group** has been formed within *Index Systems* of Cambridge, Mass., primarily to design, develop, and install *Index Systems'* existing Portfolio Management System

# 300 to 2400 bps modems



## Bell-compatible

Write or call today for data on data sets you can own for the price of a 1-year lease.

**Career opportunities** available for data communications engineers. Write Mr. W. Booth.

*Equal opportunity employer M/F.*

# TELE-DYNAMICS

DIVISION OF

**AMBAC**

525 Virginia Drive, Fort Washington, Pa. 19034 (215) 643-3900  
CIRCLE NO. 14 ON INQUIRY CARD

The new GTE Information Systems' IS/7800 Series Intelligent Video Terminals cost an average of 10-15% less than IBM 3270's on rental and 20-33% less on purchase.

But we don't just cost you less than they do. We also offer you more than they do. The IS/7800 offers four character capacity choices, not just two: 1920, 960, 480, or 240 characters. We offer upper and lower case and double-width characters. We offer an extended character set with bar graphs, charts, histograms and line drawings. We offer an inverted image (black characters on white background). We offer underlining. We offer a

character blink. We offer a choice of impact or thermal printers operating at from 30cps to 165 cps. Like the IBM 3270, the IS/7800 offers complete character addressability of any character on the screen and an optional light pen.

And everything we offer is truly plug-to-plug compatible with the IBM 3270 and interfaces with IBM Systems 360/370. No hardware or software changes. Even the cables are compatible.

But even that's not all. The IS/7800 terminals are microprogrammed to handle today's problems. And you can have them reprogrammed to meet tomorrow's.

## We cost a lot less than they do



So in addition to giving you more for today, we're giving you all of tomorrow as well.

Costs less, does more. What's more, the IS/7800 is backed up by our 700-man service organization working out of 96 locations all across the country. And behind them is GTE Information Systems itself. We're probably the best single source for data communications equipment you'll ever find. Terminals, modems, multiplexers, controllers, even programming.

We've got what you need to get closer to your computer.

And just remember: Sometimes the best way to get

more is to pay less.

GTE Information Systems, One Stamford Forum, Stamford, Connecticut 06904. Regional offices: Mt. Laurel, New Jersey, 609-235-7300; Chicago, Illinois 312-332-7800; Fullerton, California, 714-523-9440; Montreal, Quebec, 514-866-9324; Toronto, Ontario, 416-362-1541.

**GTE INFORMATION SYSTEMS**

# and we do a lot more than they do.



CIRCLE NO. 15 ON INQUIRY CARD

# CORPORATE PROFILE

Featured this month:

## COMPUTER PRODUCTS, INC.

(Over-the-Counter)

Fort Lauderdale, Florida

**OFFICERS & DIRECTORS:** *David C. Yoder*, President, Chairman of the Board; *Edward J. Schneider*, Vice President-Manufacturing, Director; *Keith F. Vreeland*, Vice President-Finance; *Dorothy F. Dwyer*, Secretary; *Bert Sager*, Director, Partner, Sager and Burns, Attorneys-at-Law; *Daniel S. Wiper*, Director, Investments; *Edward H. Claggett*, Director, Consultant.

**BACKGROUND:** Computer Products was incorporated in Florida in March 1968 to design, develop, manufacture, and market electronic instrument power supplies and standardized interfaces. During 1968 and 1969, power supplies were the company's principal product. Interfaces were first sold in 1970 and are now Computer Products' main source of revenue. President David C. Yoder was a member of the founding group of Systems Engineering Laboratories, where he held several product development and planning positions from 1961 to 1968. Daniel S. Wiper was national sales manager of Systems Engineering Laboratories from January 1966 to April 1967, having been employed by SEL since 1963. He has also worked as a consultant in the electronics industry.

**FACILITIES:** Computer Products currently occupies 15,000 ft.<sup>2</sup> of manufacturing and administrative space in a new complex in Fort Lauderdale's Gateway Industrial Park, with plans for doubling this capacity during 1973. The company employs 87 people in addition to manufacturers' sales representatives in certain regional trade areas. Design Technology, Inc., owned 22% by Computer Products, performs frequent industrial design services for the company. OEM agreements with Allen-Bradley and Bailey Meter were signed during the first quarter of 1973.

**PRODUCTS:** The company's primary product line is its RTP 7400 Real-Time Peripheral family of analog/digital interface equipment. This product line was introduced in 1970 to provide standardized, documented input/output interfaces between minicomputers and a wide variety of analog and digital industrial and scientific devices, including voltmeters, thermocouples, spectrometers, X/Y plotters, stepping motors, control relays, optical sensors, and clocks. The RTP series can also be used for asynchronous data communications, e.g., to and from teletypewriters. Installed interfaces are being used with minicomputers made by Digital Equipment Corp., Data General, Interdata, Hewlett-Packard, Computer Automation, Honeywell, Varian, Lockheed, General Automation, Texas Instruments, Datacraft, Systems Engineering Laboratories, and Modular Computer Systems. Each major type of interface is available with a wide variety of options and a variable number of channels; a typical price is \$1,000. The secondary product line is a series of very compact (about the size of a pack of cigarettes), epoxy-encapsulated, single-voltage DC power supplies designed for use in electronic instruments. Prices range from \$25 to \$65.

**CURRENT POSITION:** In 1972, RTP interfaces accounted for 52% of total revenues and power supplies contributed 36%. Since the company designs its products for the industrial/commercial market, government sales have been and continue to be a minor portion of total sales. Both major product lines are marketed to OEMs and end-users. During 1972, Computer Products added to its list of RTP interface customers several prestigious names, including IBM, Westinghouse, General Electric, Union Carbide, Continental Oil, the National Aeronautics and Space Administration, and Johns Hopkins University. Recent RTP sales in foreign markets include those in Australia, Canada, South Africa, Japan, and Germany. The company sees itself as the only supplier of "universal, off-the-shelf interface equipment for popular minicomputers in today's marketplace," and as the "industry leader in encapsulated power supplies."

**OUTLOOK:** Computer Products expects private label marketing of, and increasing foreign interest in, its encapsulated power supplies to add significantly to its increasing sales of these products. The company also sees a foreign market expansion for its RTP interface line, and has recently engaged product representatives in Australia, Canada, Germany, the United Kingdom, South Africa, and Japan. OEM agreements in this product line were recently signed. A new service approach ("Total Systems Capability") accounted for nearly 10% of 1972 revenues and is expected to double its contribution in 1973. Under this approach, Computer Products acts as a single-source vendor of minicomputers, software, and RTP interface equipment.

**FINANCIAL SUMMARY:** Computer Products made an initial public offering of 196,031 shares of common stock at \$3.25 per share on December 9, 1969; distribution was underwritten by Baroody & Co. of Fort Lauderdale, Fla., and Consolidated Securities Corp. of Pompano Beach, Fla. At that time, capitalization consisted of a \$25,000 bank note at 7½% interest, and 890,028 shares of common stock (par value \$.01). Common shares issued and outstanding as of year-end 1972 were 1,133,597, out of 2,000,000 authorized. These shares are carried at a book value of \$.60. Current number of shareholders is approximately 1,000. At year-end 1972, options for 67,100 shares were outstanding at prices ranging from \$1.33 to \$3.25 per share, of which 23,098 shares were exercisable (none have been exercised). Requirements for NASDAQ listing were met in early 1973, and the stock is quoted under the symbol CRPD. Stockholders' equity at year-end was \$675,176, up from \$469,348 for 1971. Notes payable as of year-end 1972, ranging from 7% to 8%, totaled \$63,267, up from \$22,585 for 1971. Year-end 1972 deficit was \$467,533, down from \$673,361 for the previous year. Combined tax loss carryforwards for Computer Products and Design Technology expire as follows: 1973, \$7,000; 1974, \$179,000; 1975, \$269,000; 1976, \$30,000. Order backlog at the present time is more than \$1,000,000.

| Period Ending | Revenues  | Net Income (Loss) | Earnings (Loss) Per Share |
|---------------|-----------|-------------------|---------------------------|
| F.Y. 12/31/68 | 2,215     | .                 | .                         |
| F.Y. 12/31/69 | 217,839   | .                 | .                         |
| F.Y. 12/31/70 | 662,792   | (645,693)         | (.58)                     |
| F.Y. 12/31/71 | 1,262,825 | (27,668)          | (.02)                     |
| F.Y. 12/31/72 | 1,911,412 | 205,828           | .18                       |
| Qtr. 4/1/73   | 583,077   | 51,532            | .05                       |

\* Pre-operating

# If you liked APL, you're gonna love this.

## Now we can put you face to face with our 4013 computer graphics terminal.

It delivers the 4013's CRT graphics in switchable APL/ASCII —so you can run BASIC or FORTRAN as well. Our software lets you plug interactive graphics right into your present APL-speaking system. Including your 360 or other 2741-compatible APL system.

If you ever thought there might be more to APL than noisy, slow, paint-by-number plotting, you owe yourself a date with the 4013.

Once you touch our standard keyboard and watch that screen respond, we think it's going to be love at first sight. Complete with speedy, dry-process keepsakes from our plug-in hard copy unit.

We'll even help you get introduced. Our applications engineers can wheel a 4013 right into

your office for a demo, or send you literature on APL, or answer your specific questions.

So don't be shy. Call your nearest Tektronix field office, or write Tektronix Information Display Division, P. O. Box 500, Beaverton, Oregon 97005.



**TEKTRONIX®**



For those who  
think tomorrow.



# ALL KEYPUNCHES AREN'T ALIKE

The trend away from keypunching to a more sophisticated data entry system is becoming obvious. Even IBM now admits that some keypunches should be replaced. Yet with the so-called death knell of keypunching, Decision Data introduces a new 80-column buffered keypunch. You must wonder why anyone would want to market a new keypunch, or for that matter what significant improvements could be made. After all, aren't all keypunches alike?

## KEYPUNCH MARKET

To answer the first question, there are estimated to be approximately 350,000 keypunches in the United States and 600,000 in the world, of which approximately 100,000 are buffered. The number of keypunches in the ten and lower unit installations is 225,000. This is generally accepted to be within the present buffered keypunch market. The punched card is certainly not obsolete and keypunching still has a few years of life left.

## PRESENT 80-COLUMN BUFFERED KEYPUNCHES

The 80-column keypunch market has been left mainly to Univac and IBM. The Univac 1700 keypunch/verifier was the first keypunch to utilize a memory to increase operator keying rate. Furthermore, Univac introduced primary and auxiliary input hoppers for inserting master or program cards in a deck during keying (or blank cards for card correction during verification), and the concept of two output stackers. The Univac 1700 VIP also could interpret prepunched cards.

IBM responded by modifying its 029 keypunch to the 129 buffered keypunch. The IBM 129 increased the number of program levels to six and added batch total and production statistics capabilities. However, the IBM 129, which causes hesitation in keying short cards (less than eight columns of data), is slower in punching rate than the Univac 1700. And both units are subject to delays during verification caused by reading in the punched card before rekeying.

## BUFFERED KEYPUNCHES

|                                  | <u>IBM 129</u>  | <u>UNIVAC 1700</u>            | <u>DECISION DATA 8001/8010</u> |
|----------------------------------|-----------------|-------------------------------|--------------------------------|
| BUFFERED STORAGE (CHARACTERS)    | 240             | 160                           | 240-800                        |
| PROGRAM LEVELS                   | 6               | 2                             | 8                              |
| PUNCH/PRINT SPEEDS (COL./SEC.)   | 18              | 35                            | 60                             |
| NO. & CAPACITY of INPUT HOPPERS  | One (500 cards) | Two (600 cards & single card) | Two (600 cards & 400 cards)    |
| NO. & CAPACITY OF OUTPUT HOPPERS | One (500 cards) | Two (600 cards & 20 cards)    | Two (400 cards each)           |

## FORMAT AND EDIT FUNCTIONS

|                          |                 |                         |                           |
|--------------------------|-----------------|-------------------------|---------------------------|
| FIELD DEFINITION         | yes             | yes                     | yes                       |
| CHECK DIGIT              | yes             | yes                     | yes                       |
| PRODUCTION STATISTICS    | yes             | yes                     | yes                       |
| INTERSPERSED MASTER CARD | no              | yes                     | yes                       |
| BATCH TOTALS             | yes             | no                      | no                        |
| ON-LINE FEATURE          | no              | no                      | yes                       |
| PROGRAM CHANGE           | manual          | manual                  | auto. to program selected |
| DATA DISPLAY             | no              | yes                     | yes                       |
| BASIC PURCH. PRICE       | \$6,125-\$7,350 | \$4,970- <u>\$7,560</u> | \$5,500-\$7,300           |

Available in interpreting and non-interpreting models, Decision Data's buffered 80-column keypunch recorders offer features that include dual input hoppers and output stackers, access to eight format programs, a punch rate of 45 to 75 CPM, a read rate of 200 CPM, on-line and off-line read/punch capabilities, and print edit and punch suppress. Used as on-line peripherals under CPU control, the CPU can select the input hopper; control all read, punch, or read/punch functions; and direct cards to either of the output stackers. Single-unit purchase prices are \$5,500 for the Model 8001 recorder, \$7,300 for the Model 8010 interpreting data recorder, and \$385 for an OEM interface option.



### A NEW 80-COLUMN BUFFERED KEYPUNCH

In the midst of this somewhat indifferent keypunch equipment environment, Decision Data has announced its 8001/8010 80-column buffered keypunch models. Decision Data prides itself on being second to IBM in selling 96-column buffered keypunches (being second to IBM has become a noteworthy distinction).

The Decision Data 8001/8010, as can be seen by the comparison table, has eight program levels, two large input hoppers for card insertion with no need for manual card entry during keypunching or verifying, sufficient storage capacity to provide for separate editing between punching and printing, a separate read station, and a program revert feature that permits the operator to select the next program

level automatically. Furthermore, Decision's buffered keypunches can operate on-line to a computer and are presently being interfaced to intelligent terminals.

Notwithstanding more sophisticated data entry equipment, the new Decision Data products promise an increase in keying and verification production rates at installations employing ten or fewer operators. Certainly they add significant new features to the time-tested keypunch, which, like the double-breasted suit, still has its place. ▲

Mr. Feidelman is president of Management Information Corp., of Cherry Hill, N. J., and is a regular contributor to *Source Data Automation*.

**When you can't lug around your Maxi-System...**



**...you can count on one of Summit's little minis.**



Summit's little handful of power can take the burden off your back. It's compact, cute, and does clever things — all in the milliseconds you're used to.

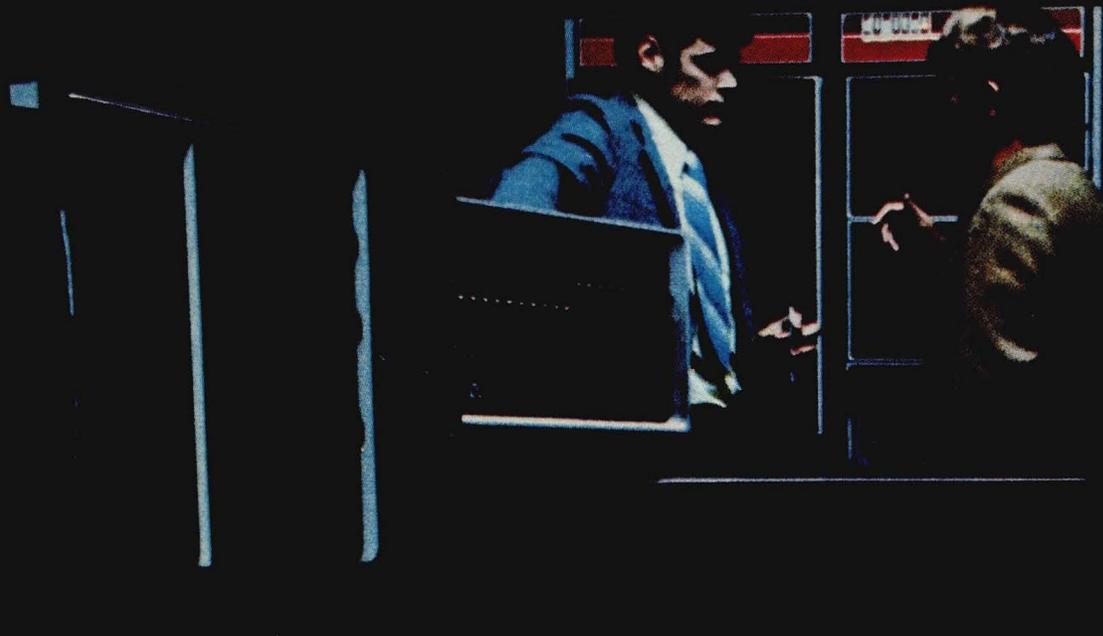
Summit has desk models and minis, with and without memory, for your office and personal needs. Contact us today.



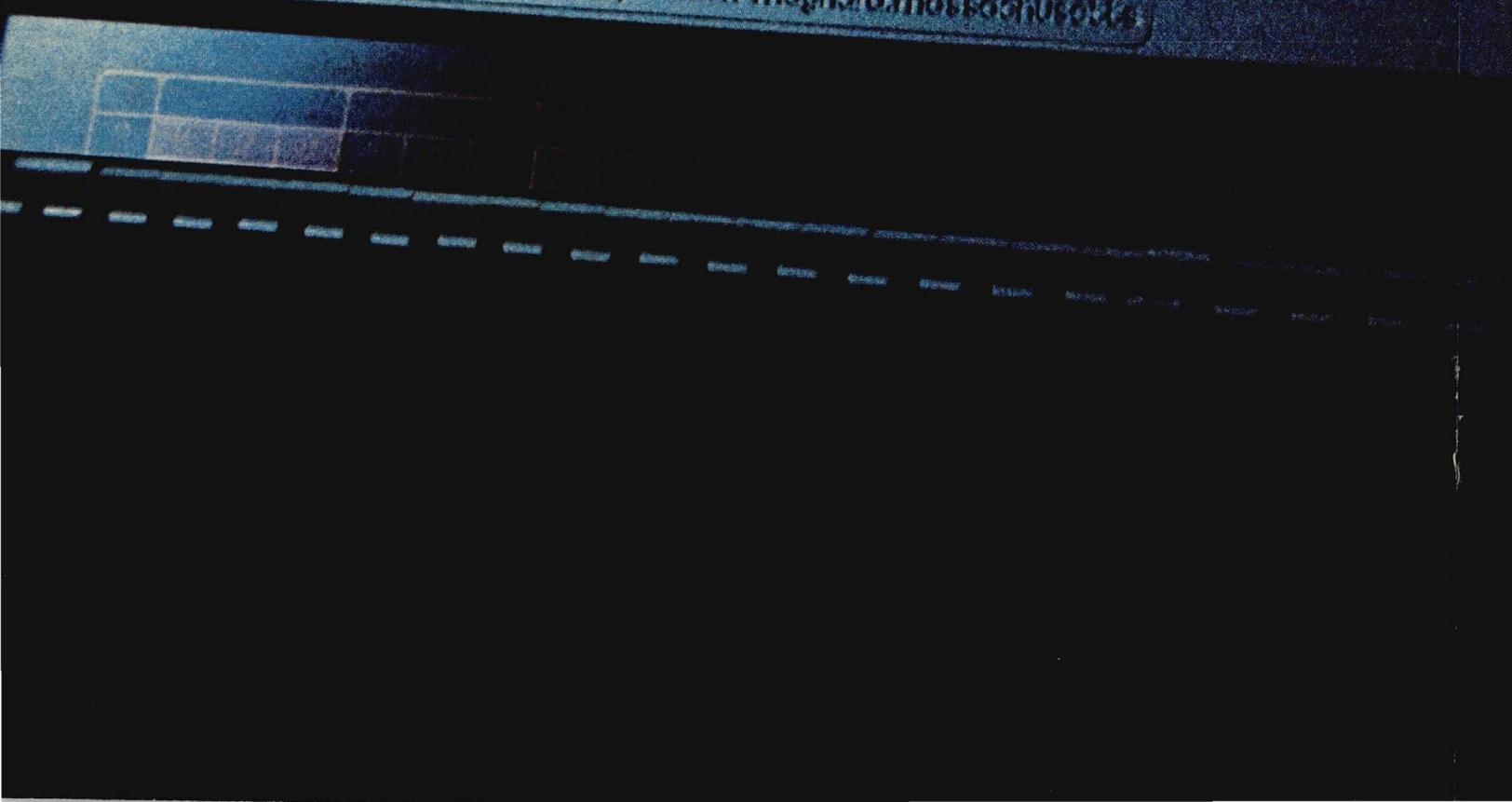
180 West 2950 South  
Salt Lake City, Utah 84115  
(801) 486-7255  
Telex: 388 443 Summit SLC

CIRCLE NO. 17 ON INQUIRY CARD

**Every day of every year we compete for  
OEM business on the basis of product selection.**



**digital** digital equipment corporation • maynard, massachusetts



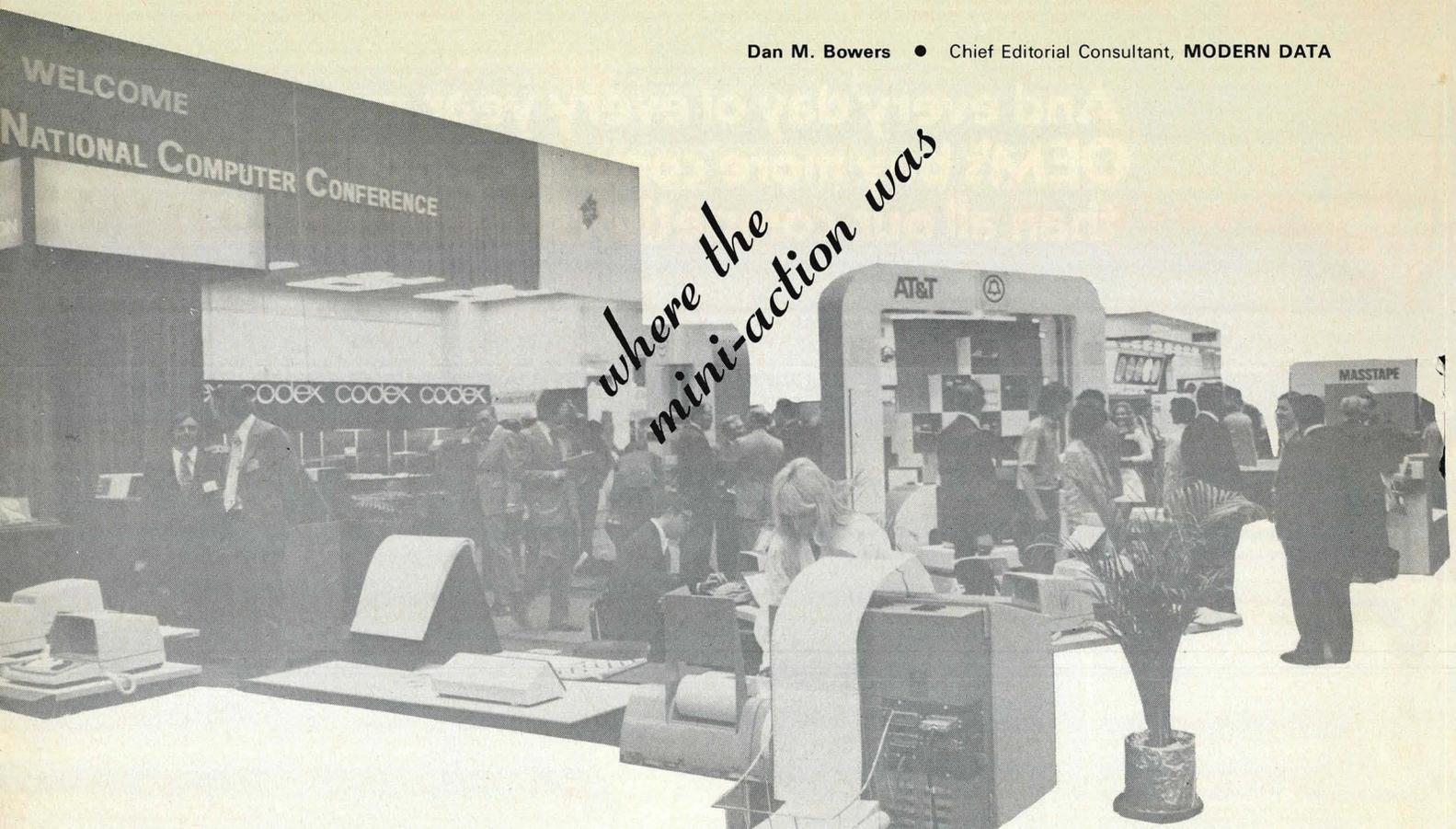
**And every day of every year, more  
OEM's buy more computers from us  
than all our competitors combined.**

A photograph of a computer room. In the foreground, a printer sits on a desk with a sheet of paper. Behind it are several tall, dark computer cabinets. The leftmost cabinet has a control panel with two vertical handles and a red digital display. The middle cabinet has a large circular window. The rightmost cabinet is taller and has a 'Speed' label. The background is dark, and the overall lighting is dramatic, highlighting the equipment.

**digital**

Digital Equipment Corporation, Maynard, Mass. 01754. (617) 897-5111. European headquarters:  
81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada Ltd.  
P. O. Box 11500, Ottawa, Ontario, K2H 8K8. (613) 592-5111.

CIRCLE NO. 18 ON INQUIRY CARD



where the mini-action was

---

**EDITOR'S NOTE:** Our chief consultant took on the assignment of reviewing the status of the minicomputer world as represented by the exhibitors at the 1973 NCC. His report here predicts gloom for some and boom for others plus a hint of exciting changes to come.

However, as is pointed out in the article, Mr. Bowers apparently overlooked a news item that appeared in our recent May issue — an indication that he isn't reading MODERN DATA as thoroughly as he should — and, of course, the comments of anyone who doesn't thoroughly read MODERN DATA should be weighed very carefully.

---

The first of the yearly National Computer Conferences, recently held in New York in June, cannot be said to be truly representative of the computer industry. Granted, IBM was there, and IBM has the power singlehandedly to define what represents the industry. However, the bulk of the computer user dollar-volume is represented by large-scale installations, massive mainframes, rows of tape units, and disk files, etc. and these machines were not displayed, nor any new ones introduced, to those wandering through the aisles of the New York Coliseum. To a great extent, the 1973 NCC was a mini-world.

Together with enough exceptions to prove the rule, the 1973 NCC featured mini-computers, mini-peripherals, mini-companies, and, as yet, mini-mally-used technology. The big dollar action is in the world of big, mundane processing systems, but the big and "exciting" technological and personal action is in the mini-world.

## STORAGE SYSTEMS

Information storage has been a vital portion of the industry since a can of mercury with two transducers was made a part of Univac I's walk-in central processors and since some Vermont Yankees sprayed iron oxide onto a metal cylinder.

We frequently forget that for every successful device we have been through at least two disasters. For every magnetic drum, disk pack, and half-inch tape, we have experienced two multiple-tape-loom memories, Bernoulli disks, optical photoscopic disks, and chip and strip memories. So turmoil has always reigned in the storage arena, and it still does. Two out of every three new devices or systems introduced have gone down the drain, and they probably still will. The current storm is centered in the mini-tape region.

In response to an urgent need for inexpensive mini-storage, several years ago the Phillips cassette was impressed into computer use. Created for low-performance audio use, the cassette had first to be fitted with computer-grade tape; then a tape drive mechanism had to be created, and much of the required hardware was devoted to overcoming the fundamental shortcomings of the cassette, which was never originally intended to operate above 7½ ips. Due to a lack of reasonable alternatives, sufficient resources were expended to produce entirely workable and usable devices. At the NCC, Peripheral Dynamics Corp. showed a 75 ips, 4-track, 1600 bpi drive for the Phillips cassette.

Despite these accomplishments, there has never been great happiness with the Phillips cassette as a computer storage medium. The medium and the drives are sufficiently inexpensive, but reliability and speed have always been problems. Several companies developed more sophisticated cartridge systems, but none had the muscle to gain any acceptance for his products until 3M checked in with its DC-300A Data Cartridge (see MODERN DATA, March 1973). One of NCC's most visible phenomena was the battle of the mini-tapes, with a half-dozen companies (including 3M itself, and at least two companies secreted away in off-Broadway hotel suites) introducing drives for the DC-300A. These drives sell in the same price range as drives for the Phillips, but the cartridge sells for more than twice the price of a Phillips. My judgement is that the greatly superior performance and reliability of the DC-300A will far outweigh the disadvantage of higher cartridge price, and that the Phillips cassette for mini-storage is doomed. "Doomed", of course, in

the computer business is a relative term. Perforated paper tape (there are still those of us who recall arguing the merits of "chad" vs. "chadless") has been "doomed" for ten years, but was still very much in evidence at the NCC (in the Remex booth, for example). Try finding a perf tape reader or punch in a 370-165 installation! However, in the mini-world, perforated tape is alive and well, if not exactly kicking.

During the recent period when the industry scrambled to create a mini-storage, another device emerged: the "floppy", or small cartridge disk. In this device, the 3M Cartridge tape faces a formidable opponent: the tape offers nearly one order of magnitude greater storage capacity, but the disk provides nearly two orders of magnitude faster access. Vendors of storage devices are choosing sides and, at present, the floppy disk appears to have more backers. These backers themselves have, however, created a fundamental problem for the floppy disk industry: non-standardization. We have several kinds of cartridges, we have stationary disks with rotating heads, in fact we seem to have everything except a device where everything stands still and only the bits rotate. Oldtimers will recall that such a device once existed; it was called a digital delay line. ("Newtimers" can tell Mr. Bowers about moving magnetic domain memories which do indeed involve the motion of "bits". See recent May issue of MODERN DATA, page 18 — Ed.)

One hoped we had learned our lesson in the past — you cannot succeed by offering the customer a choice in basic technology, because he is not equipped to make a decision at that level, nor should he be. It appears that most users receive reassurance that the fundamental techniques they choose are correct only when they see others or, perhaps just IBM, using these techniques. Thus, in the magnetic tape business, IBM's bit densities, record formats, and tape widths are used and similarly in the magnetic disk business, etc., etc., etc.

It is too early to pick a winner in the floppy disk vs. 3M tape cartridge contest, but it is not too early to advise that the floppy disk vendors had better all get with a standard cartridge or they may miss the boat. In this business, a product must catch on within its first two years, or the world has moved on and left it standing at the gate.

It is worth asking what would happen if IBM were to introduce a tape cartridge in competition with 3M. Obviously 3M does not think this will happen, and the boys from Minneapolis are no dolts. A battle, however, would match two of the three best sales forces in the business, with one having the lion's share of the existing business, and the other having a nearly two-year head start. Such a confrontation should be the best spectacle we have seen since Viatron days.

As a final note on storage systems, we should comment on the NCC showing of Grumman's Masstape due to the popularity of the exhibit and because Masstape is built around a multiplicity of tape cartridges. However, it should be pointed out that the system is not being directed to the minicomputer market. In my opinion, Masstape represents another example of a very interesting, viable, and cost-justifiable concept from a technological point-of-view, but highly questionable from a sales point-of-view. It faces extremely difficult odds in the marketplace because the commercial computer market is largely disk-oriented and Grumman has never sold to or serviced this type of market.

### MINI-PROCESSORS AND MINI-SYSTEMS

Mini-computers and mini-computer systems were, unsurprisingly, big at NCC. The mini-computer business is visibly maturing, as dozens of companies, such as Tennecomp Systems, Lexicon, Systems Search Development, Computer

Operations, Iomec, PSC Technology, Telefile Computer Products, offered their peripherals compatible with, and interfaced to, the popular minis. The major mini-computer manufacturers themselves offer full lines of peripherals. Even devices which have not popularly been associated with mini-systems showed up with mini-computer interfaces — graphic terminals from Imlac, Ontel, and Houston Instrument, for example, and trackballs and joysticks from Singer.

In the peripherals area, three devices, none of them new, indicate the diversity of the mini-systems, their applications, and the hardware they use. Two varieties of data tablets (from Connecticut neighbors, Scriptographics and Science Accessories) were shown, audio response terminals, and telephone handset card readers and portable terminals were demonstrated by Northern Electric, Northern Telecom, and Transcom. To the long-range thinker, these devices may be the first indications of a revision in input/output terminal concepts, perhaps the beginning of inexpensive, mass-use terminals requiring virtually no operator training.

Keyboard-CRT terminals are now routine items, the problem now being to keep track of all of the vendors, rather than to find an adequate terminal. This year's big boom is in teletypewriters and teleprinters. Five years ago, the choice for the system designer was between Teletype's models 33 and 35 and the IBM Selectric I/O; a well-recognized need existed for terminals faster than 15 cps, and under \$3000 in price. A major phenomenon in terminal equipment at this year's NCC was the presence of hoards of teletypewriters and teleprinters, impact and non-impact, ranging up to 165 cps in speed, and in the \$2500-\$5000 price range, from companies such as Di/An Controls, Printer Technology, Diablo, Interdata, Odec, Centronics, Computer Devices, Litton, and Facit.

The maturity of the mini-computer system business is accompanied by its continued spectacular growth. As we know from the Theory of Bowers' Limit (See May 1973, MODERN DATA) however, exponential growth foreshadows an eventual traumatic re-orientation, and perhaps the seeds of the decline of the mini-computer industry, as we know it today, were visible at NCC, in booths bearing the names Intel, Automatic Electronic Systems, and Omron. Even as the integrated circuit destroyed the once-booming market for transistorized digital modules, forcing two dozen companies to find another means of livelihood, large-scale integration may ultimately allow the present buyers of mini-computers to purchase and assemble only the microfunctions they need for their application. This could destroy the continued growth of the mini-computer business as we know it today; however, as in the case of perforated tape, of course, "destruction" is quite a relative term.

### RETURN TO THE 60'S?

Lastly, some of the boom atmosphere of the late 60's returned to NCC, spurred by the large number of new products, but evidenced by the largest number of new company names in many years. However, the unhealthy aspects of the boom years have in no sense returned, but one at least observes some activity in new startups, probably at a much more sensible level than we saw five years ago. Let us not anticipate a return to those "easy-money, high-technology reigns 60s." Success is built on sound (but not spectacular) technology, adequate resources, effective marketing, and a well-grounded sense of where the industry is, where it's going, and where each product fits. We at MODERN DATA are dedicated to providing you with the information required to make judgements in these areas. We hope that this very successful first NCC provides the impetus for what will be called the healthy boom years. ▲

# MODERN DATA EXPANDS MINICOMPUTER TECHFILE SERVICE

A CONTINUOUS UP-DATING REFERENCE TO THE ENTIRE SPECTRUM OF MINICOMPUTER HARDWARE, SOFTWARE, AND SYSTEMS INCLUDING:

- MINICOMPUTER MAINFRAMES, PROGRAMMABLE CONTROLLERS, AND MICRO-PROCESSORS
- MINICOMPUTER PERIPHERALS – CORE & SOLID STATE MEMORIES, DISK/DRUM STORAGE, MAGNETIC TAPE RECORDERS, CASSETTES & CARTRIDGES, PRINTERS, AND OTHER PERIPHERALS OR SUBSYSTEMS.
- MINICOMPUTER SOFTWARE – OPERATING SYSTEMS, EMULATOR PACKAGES, ASSEMBLERS, APPLICATIONS PACKAGES, ETC.
- MINICOMPUTER-BASED SYSTEMS – SMALL BUSINESS/ ACCOUNTING SYSTEMS, BATCH-CONVERSATIONAL TERMINALS, COMMUNICATIONS PROCESSORS, PROCESS CONTROL, AND MANY OTHER SYSTEMS INCORPORATING MINICOMPUTERS.

## UP-TO-DATE PAGES NOW INCLUDE:

- OVER 230 MAGAZINE-SIZE PAGES REPRESENTING DATA ON OVER 290 MANUFACTURERS
- MAJOR OPERATING CHARACTERISTICS OF 73 MINI-COMPUTER MODELS
- MAJOR OPERATING CHARACTERISTICS OF 161 MINI-PERIPHERALS
- THE LATEST DEVELOPMENTS IN MINICOMPUTER HARDWARE, SOFTWARE, AND PERIPHERAL EQUIPMENT
- UP-TO-DATE DIRECTORY OF MANUFACTURERS

**MODERN DATA'S TECHFILE SERVICE** is up-dated periodically to give you finger-tip access to the latest in technology, relevant data on available products, and an up-to-date list of suppliers.

The Reports are supplied with a beautiful loose-leaf binder with topic dividers to keep the data organized for easy reference.

*The Minicomputer TechFile is organized into seven sections:*

1. **Basic Review** – A basic tutorial description of the operation and applications of minicomputers and minicomputer systems.
2. **Characteristics** – Tabulations and summaries on the performance features of mini mainframes, peripherals, and systems.
3. **Market Data** – Number of minicomputers in use, applications, and pricing trends.
4. **Developments** – Recent product introductions and recent news events relevant to minicomputer technology and applications
5. **Literature** – Data sheet literature on minicomputer mainframes, peripherals, and systems.
6. **Directory** – Up-to-date listing of manufacturers and their local sales offices.
7. **Index** – Ties together all sections for easy cross-referencing to manufacturers and products.

Order your year's subscription now on a 30-day free examination basis.

Quantity discounts are available.

To: **Modern Data Services, Inc./Techfiles**  
One Lockland Avenue, Framingham, Mass. 01701

Please enter my subscription to your TechFile Service on Minicomputers as checked below.

- 1 yr. Subscription at \$ 90.00 (USA & Canada), \$120.00 (Other)
- 2 yr. Subscription at \$160.00 (USA & Canada), \$220.00 (Other)
- 3 yr. Subscription at \$210.00 (USA & Canada), \$300.00 (Other)

Send To:

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

COMPANY \_\_\_\_\_

DIV. OR DEPT. \_\_\_\_\_

STREET \_\_\_\_\_

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

(Orders submitted without check or purchase order should be on Company letterhead.)



## Nixdorf...the simple way to build your business.

If you're in a small business, the Nixdorf Business Computer is the way to grow. It can do all your receivables, payables, payroll, inventory, sales analyses, everything. It's as big as your job, and costs as little as \$7,990.

Other small computers become obsolete as you grow bigger. But you can't outgrow Nixdorf. Because the Nixdorf computer is modular. Memory cells, discs, printers and cassettes simply plug into it like accessories on a stereo.

Nixdorf is simple to program, too. We actually program it before you pay for it. And to service the

system, all we do is unplug one module and plug in a spare.

If you're buying your first small computer or even a complete data processing system, you'll find it at one of Nixdorf's 20 U.S. offices. You'll also find Nixdorf fits in nicely with your present operations... or as on-line terminals to large-scale computers.

For a full color brochure on how Nixdorf can help build your business, write us now: Nixdorf Computer, Inc., O'Hare Plaza, 5725 East River Road, Chicago, Illinois 60631. It's that simple.

**NIXDORF**  
**COMPUTER**

*More than 30,000 computers installed around the world.*

**CIRCLE NO. 19 ON INQUIRY CARD**

DATACOM NEWS

DATACOM Q &amp; A



COMMUNICATIONS CLINIC

## COMMUNICATIONS CLINIC

**SHOW BUSINESS**

Having finally emerged from the mountain of literature, annual reports, press releases, and hospitality suite invitations, we find an encouraging perspective from the major spring trade shows. These were the International Communications Association (ICA) in Boston in early May, and the National Computer Conference (NCC) at the New York City Coliseum in June. Based on our impressions of these shows, the industry is alive and well: innovation and product improvement continue, and we noted the appearance of several freshly-minted companies as well as a renaissance of some companies which we thought had gone belly-up during the recession — all of which suggests continuing recovery and growth of the industry.

The aura of the ICA show was one of specialized carriers, modems and multiplexers, network control, management and test equipment, and some minis and terminals. From a communications point of view, NCC was mostly terminals, although there was the usual representation of modems, multiplexers, and mini systems. Notable was the fact that MCI was the only specialized carrier exhibiting at the NCC, and even then only as a late arrival.

Of all the new products at which we looked, the Oscar for maximum cost-effectiveness potential to the most users in a new product introduction goes to Western Union Data Services for their EDT33 MSR terminal. Basically a combination of a Model 33 Teletype and a 50,000 character cassette buffer, the terminal can transceive at either 30 cps or 120 cps. In configuration and general purpose, the device is, of course, neither new or unique, and industry veterans will recall predecessor versions even from the mid-Sixties, such as the Communitype terminal and the DCI Databank. Of more recent

vintage in this class of terminal, we have such offerings as Teletype's 4210 magnetic tape terminal, the Texas Instruments twin cassette Silent 700, and the Wiltek 300 terminal. Even the Wiltek unit is an evolutionary form of what they marketed in the early Sixties under their predecessor company name, TRAK Electronics.

The Western Union Data Service offering, however, is more of a "keep it simple" terminal in this class, with appropriate monthly rental levels (e.g., \$129 a month for an ASR, \$121 a month for a one year contract). Nevertheless, it has character editing, search, and remotely controllable retransmission. Formatting and related variable data entry is under the control of the paper tape reader. Formats can be stored on cassette and dumped to the paper tape punch when required. One disappointment is that the terminal is not offered with an integral modem. This should at least be an option as it is with WUDS' conventional Teletype terminals. We understand that it will be by year-end.

The TI twin cassette Silent 700 and the Wiltek 300 were also at the shows. The TI unit provides format control with the second cassette, and accommodates up to 310,000 characters per cassette and printing speeds up to 30 cps. With other features comparable to the WUDS terminal, 90 day rental is about \$160/month, or \$147/month for a one-year plan. The Wiltek 300, interestingly different, uses a non-changeable 50,000 character magnetic tape loop in lieu of cassettes, and has no format control capability. Its design emphasis is more towards applications requiring more frequent batch transmissions during the day, e.g., message switching. It includes two buffers so that data may be entered from the keyboard while the terminal is also receiving from the line. Also any completed messages keyed into the send buffer will be sent upon poll without interrupting data entry.

This general class of terminal (i.e., for off-line data entry, with batch transmission via off-peak DDD or WATS) continues to make a lot of sense to us for many applications. Once again, systems are cheaper and easier to manage if designed for on-time rather than real time.

Another noteworthy introduction was Codex's Bipler, a zinger for high-speed remote line printers and other high data rate applications. The Bipler transmits 19.2

Communications Clinic is a regular monthly column written by the staff of Berglund Associates, Inc., consultants in telecommunications. Readers are invited to submit questions on any aspect of communications or suggestions for future Clinics to:

**Communications Clinic**  
c/o Berglund Associates, Inc.  
1060 Kings Highway North  
Cherry Hill, New Jersey 08034

Kbps by using two voice grade channels at 9600 bps each. Where a user is presently leasing a wideband facility for 19.2 Kbps, Codex estimates savings for circuits of 80 miles and above. On a New York-Chicago circuit for example, we calculate the savings at over \$5000/month. Of course, if the wideband channel is being otherwise used and can't be eliminated, the savings won't be dramatic. In such situations, however, the Bplexer using only two voice channels would free up four for other uses.

At the ICA show, Dennis Goddard, ebullient vice president of marketing for American Satellite Corporation, was busily closing contracts for their Phase I offerings due in service this fall. Indicated rates for voice grade channels between New York, Dallas, Chicago and Los Angeles are on the order of 50% of present private line rates. Subject to FCC approval it looks as though ASC will be the first DOMSAT carrier in commercial service. Back in the terminal bag, the NCC emphasis seemed to be on CRTs, and rather polarized between high and low performance range. In the latter category, we noted a new buffered/conversational terminal series from TEC, which already has one of the widest CRT product lines in the industry (13 models), and we listened closely when Sycor described its new Model 250 intelligent on-line terminal as "the best '3270' in the market". The Model 250 is, of

course, designed as an alternative to the IBM 3270, and Sycor claims better communications efficiency by doing more editing and format/field content verification prior to transmission. Another high performance entry was that of Omron Systems, Inc., which showed a microprocessor-controlled, databus-organized CRT with up to 16K of ROM and/or RAM.

Some interesting low-cost CRT devices are being offered by Digi-Log Systems. Their Model 209 at \$1295 consists of keyboard, acoustic coupler, and video output signal, and is intended for use with any TV set or video monitor. Their Model 33 at \$1395 includes the display and is intended as a TTY replacement. Aside from the pricing, Digi-Log is interesting in that it has pulled off a couple of marketing coups that larger CRT suppliers might envy. Digi-Log is supplying displays to 350 Stuckey's stores across the country to implement Stuckey's Highway Emergency Locating Paging Service. Digi-Log has also developed a small portable CRT terminal for use by travel agents. We learned that American Express has purchased several units for evaluation, and American Airlines is planning to start placing units with travel agencies this summer.

Summing up, if the 1973 shows are any indication, this could be the best year yet for the still young data communications industry. ▲

## NEW

. . . IN THIS YEAR'S REPORT . . .

A SPECIAL SECTION ON MINIPERIPHERALS

Minicomputer  
Market  
Survey

NOW AVAILABLE  
AT \$60

(50% off  
original price  
while limited  
supply lasts)

Survey replies from 5,000 participants representing 3,200 minicomputer buyer/user organizations are tabulated and analyzed in this unique report. The respondents reported plans to order a total of 23,000 minicomputers plus an assortment of 41,000 miniperipherals this year. Included among the 45 pages of charts and tables are . . .

- Share-of-market figures for the major minicomputer suppliers
- Current installation figures by model number
- Projection of sales for the top suppliers for 1973
- List of suppliers being considered for sole source procurements and the number of mainframes to be purchased
- Distribution of minicomputers by industry sector, application, OEM/end user mix, and geographic location

use handy coupon  
on page 47

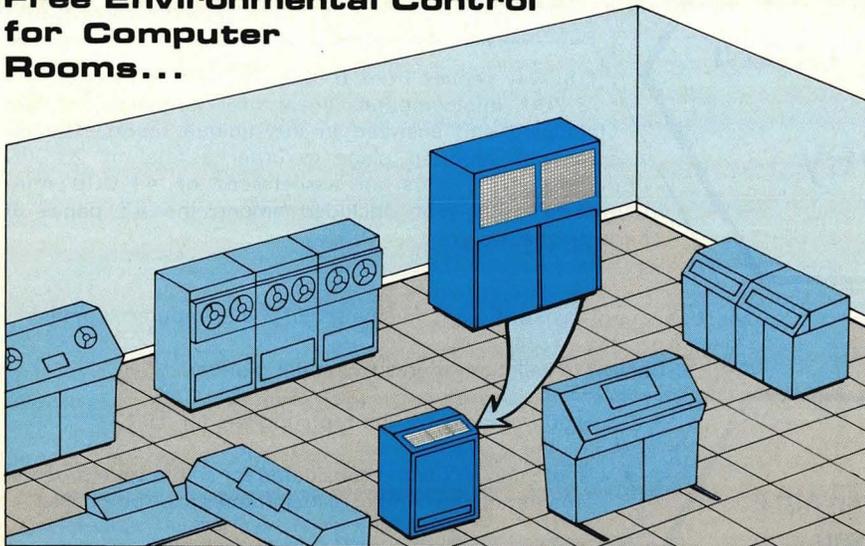
## DATACOM NEWS

**C-SYSTEM** — Four years ago, when Collins Radio was sweating out a takeover threat by Electronic Data Systems, a *N.Y. Times* column reported that Collins' technology was such that it could strike back not only at "middlemen" like EDS but at the giant mainframe makers themselves. The C-System is presumably the embodiment of that portentous technology. And it's quite a system. Offered in modules so flexible that it could appeal to everyone from medium-sized users (64 lines or less) to the biggest of big industry and big government, the C-System is obviously a well-planned, powerful, total communications system. Complete with hardware, system and application software, and maintenance support, the C-System has a three-tier network structure: a high-speed Time Division Exchange (TDX), with 16 two-megabits/sec channels; a Time Division Multiplex (TDM) exchange for up to 256 low- to medium-speed devices, with combinable channels totalling 1.23 megabits/sec; and a Programmable Channel Termination Group (PCTG), used for remote devices such as teleprinters and CRTs. The number of each type of facility can be expanded to build virtually any size system. Located in the TDX loop(s), the Collins C8500 processor is the building block for network control. Usable in front-ending, message switching, and data collection applications, the C-System connects to IBM S/360 and S/370 and Univac 1100 systems, and interfaces with IBM Univac system software. But while it's an impressive data communications system, Collins' technological achievement probably won't put IBM out of business in the foreseeable future, the *Times* notwithstanding.

**ANOTHER 3705 REPLACEMENT** — Harris Communication Systems (Dallas, Texas), a newly-acquired (from UCC) subsidiary of Harris-Intertype, has announced an IBM 270X/3705 replacement that sells for about 15% less than a 3705. The COPE 4705 Communications Controller, as the new Harris front-end is called, is plug-to-plug compatible and operates under BTAM, QTAM, and TCAM (see MODERN DATA: February 1973) without hardware or software modification to the IBM S/360 or S/370 host processor. The MSI-built front-end, which includes a 1.1  $\mu$ sec processor with a 250 nsec control memory, connects directly to the multiplexor channel of the host processor via standard IBM I/O cables. Available in a variety of modularly-expandable configurations, the 4705 accepts two- and four-wire circuits and simultaneously handles IBM and non-IBM terminals in a mixture of line speeds, message formats, and character codes, including synch/asynch lines up to 9600 baud. A basic system can manage up to 40 lines with 8K of memory.

**CONTRACTS:** GTE Information Systems will help to speed supplemental Social Security payments to aged and handicapped persons by means of a nationwide communication system it will build for the Social Security Administration. The network, including 14 GTE IS/1000 processors and 800 IS/7102 and IS/7702 video terminals, has a developmental price tag of \$3-million plus \$18-million over five years for the system . . . **Standard Electrica, S.A.**, a Spanish subsidiary of ITT, has a contract from the Algerian government for \$17-million worth of telephone equipment, plus \$18-million more under a pending agreement . . . **ITT Space Communications** will build four earth stations for **American Satellite Corp.**'s domestic communications satellite system.

### A New Concept for Total, Efficient, Maintenance Free Environmental Control for Computer Rooms...



Good engineering design and common sense dictate that cooling and humidification are not compatible functions. High maintenance costs and poor efficiency are the natural consequences of a humidifier built into an air conditioner.

**AIRFLOW COMPANY** dares to reverse the trend introducing a rational approach to EDP environmental control systems.

A separate EAC Series Air Conditioner — water cooled, air cooled, self contained or chilled water — will meet your cooling requirements.

A companion **DRYOMATIC® FS Series Steam Humidifier** will provide humidity where it is needed — in the room air. This is an inexpensive to install humidifier designed for new installations or for updating existing ones.

... we've taken the Humidifier out of the Air Conditioner Unit, and put it where it belongs!!

WRITE OR PHONE TODAY AND REQUEST FREE BROCHURE EAC 7304.



MONTGOMERY COUNTY AIRPARK  
GAITHERSBURG, MARYLAND 20760  
PHONE: (301) 948-5000

CIRCLE NO. 20 ON INQUIRY CARD

\***DRYOMATIC®**  
DIVISION OF AIRFLOW COMPANY

**CONFERENCE** — Dr. Wernher von Braun will deliver the keynote address at the Tele-Communications Association's Eleventh Annual Conference. "Telecommunications — Horizons Unlimited" is the theme of the conference, scheduled for September 25-28 in San Diego. Contact TCA, C.H. Buxton, P.O. Box 2869, Anaheim, Cal. 92804, prior to August 31.

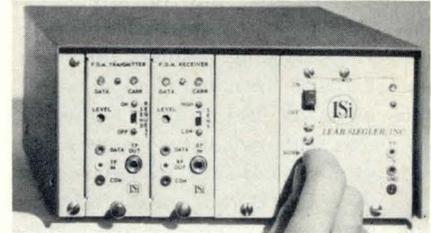
**SEMINAR** on "Data Communication Systems" will be sponsored by the American Institute of Industrial Engineers (AIIE), Computer & Information Systems Division, at the Ambassador Hotel West, Chicago, on August 15-17, and the Hotel Roosevelt, New York, on September 12-14. Contact: Registrar, AIIE, P.O. Box 25116, Los Angeles, Cal. 90025, telephone (213) 826-7572.

**SATELLITE NEWS** — In the first demonstration of U.S. domestic communications satellite service, American Satellite Corp. transmitted television coverage of the Jerry Quarry-Ernie Shavers boxing match at Madison Square Garden to the National Cable Television Association convention in Anaheim, Cal. The satellite portion of

the link was relayed via ASC's recently leased portion of the Telesat Canada's Anik I satellite (see **MODERN DATA**, July) . . . Fairchild Industries and TRW have signed a minimum-five-year joint agreement to design, develop, and manufacture commercial communications satellites for domestic and international use. The first proposal under the agreement will be for a domestic satellite to RCA Global Communications/RCA Alaska Communications, followed by a proposal on an ASC 24-transponder satellite. Both Fairchild and TRW have existing government contracts involving communications satellites.

**SHARING** — Users of the Datapoint 2200 computer can now interconnect up to eight Datapoint 3300 or 3360 CRT terminals as well as Model 33, 35, or 37 teleprinters (or compatible terminals) using a new software system called Datashare. Each terminal, hardwired or connected via common carrier, has direct access to the 2200's processor under Datashare, which runs in turn under control of the Datapoint Disk Operating System. The firm's Databus compiler is used with the Datashare software.

**MODEMS, MUXES, and MISC.:** GTE Information Systems' fills the lower end of its IS/1100 Series of IBM 270X replacements. The new programmable controller consists of a 750-nanosecond processor, channel adapter(s) and 40-line (24 asynch., 16 synch.) communications scanner. Basic configuration, including one asynch. line set, sells for \$25,500, leases for \$820/month . . .



Single-channel version of Lear Siegler's FDM.

GTE Lenkurt has added the 26U-1200, a Bell 202C/D-compatible, 1200-baud modem to its datacom product line . . . From Lear Siegler's Electronic Instrumentation Division (Anaheim, Cal.), an FD multiplexer for up to 22 channels on a single voice-grade line. Compatible with the firm's 7700A CRT terminal, the new FDM operates at all CCITT and Bell standard rates up to 600 baud and is available in one- and four-channel subset versions.

**LITERATURE, FREE . . . Intrastate and Interstate data services** — Two price lists for common carrier tariffs available from the Center for Communications Management, Inc., which claims to have the most complete tariff data base in the United States.

Circle No. 170 on Inquiry Card.

**25D Telegraph Transmission System** — A 36-page, highly detailed description from GTE Lenkurt.

Circle No. 171 on Inquiry Card.

**Intertel Modems IN202 Series Model 2026** — Four-page brochure describes new Bell 202D-compatible modem.

Circle No. 172 on Inquiry Card.

**Innovation in Data Communications** — Six-page brochure, described by Novation as a "short-form catalog."

Circle No. 173 on Inquiry Card.

**Data Communications Products with Service and Support** — Another "short-form catalog," this one from Paradyne includes PIX Remote I/O System.

Circle No. 174 on Inquiry Card.

**. . . AND LITERATURE, OTHERWISE:** To follow up on its recent report, "A Major Rate Restructuring in the Making," on AT&T's proposed "HiLo" private line tariff, the **Center for Communications Management, Inc.**, is now offering "A New Private Line Rate Structure," available for \$30 from P.O. Box 324, Ramsey, N.J. 07446 . . . A limited number of copies of "ARPANET: Design, Operation, Management and Performance," describing the Defense Department's Advanced Research Projects Agency's computer resource sharing network, are available from **Network Analysis Corp.**, Beechwood, Old Tappan Rd., Glen Cove, N.Y. 11542, at \$20 each . . . A 30-man-year, \$1.5-million study of European data traffic growth contains some surprising and, to datacom suppliers, highly encouraging projections. For example, with just about zero population growth and 4.6% average annual GNP growth in Western Europe, remote computing should grow at nearly 30% annually over the next five years and at 22% over the next 12 years. Further, by 1985 commercial timesharing service will account for over 43% of all data traffic, according to "EURODATA: European Computer and Communications Markets, 1972-1985," prepared by **Quantum Science Corp.** and **PA International Management Consultants**, under the sponsorship of 17 government telecommunications authorities. Contact: Mr. Mike Burwen, Quantum Science Corp., 851 Welch Rd., Palo Alto, Cal. The price tag on the three-volume study says (please remain calm) \$15,000.

**TERMINALS:** Model ASR208A1 Serial ASR Display Controller from **Ann Arbor Terminals** (Mich.) is an 80 x 24-character OEM terminal with eight cursor commands that operates with standard 525-line video monitors. Controller, keyboard, and video monitor total \$1,990 . . . **Burroughs** has expanded its banking terminal line with the TCS 1000 Terminal Computer System and TU 700 Teller Terminal. Available with two data channels and memory up to 64K, the TCS 1000 handles up to 15 TU 700s and/or TU 500s and connects to other existing Burroughs terminals. A passbook terminal, the TU 700 has automatic passbook reading, numeric or alphanumeric keyboard, alphanumeric printing, and optional magnetic card reading. A typical TCS 1000 system with a mix of TU 700s and TU 500s would cost from \$6,000 to \$10,000 per terminal . . . **Digi-Log Systems** (Willow-Grove, Pa.) exhibited its Model 33 and 209 portable CRT terminals at the National Computer Conference in New York City. The firm also showed a Travel Agent Terminal that interconnects with American Airlines' Sabre and American Express' Space Bank reservation systems, plus a \$3,000 key-to-cassette CRT data entry terminal (see *Communications Clinic*, this issue) . . . New from **GTE Information Systems**, the IS/1514 key-to-disk data communi-



Omron Model 8025 has "Variable IQ."

cation system, consisting of a 64K by 16-bit, 750-nanosecond processor and four to 32 key-to-disk stations. \$30,850 or \$700/mo. incl. maint. Also new: the IS/7800 series of four intelligent video terminals, including a brokerage terminal for GTE's information service. All are IBM S/360- and S/370-compatible

. . . For less than \$1,000 in OEM quantities, the **Lear Siegler ADM-1** CRT terminal offers 960-character display and compact size. The 45-pound



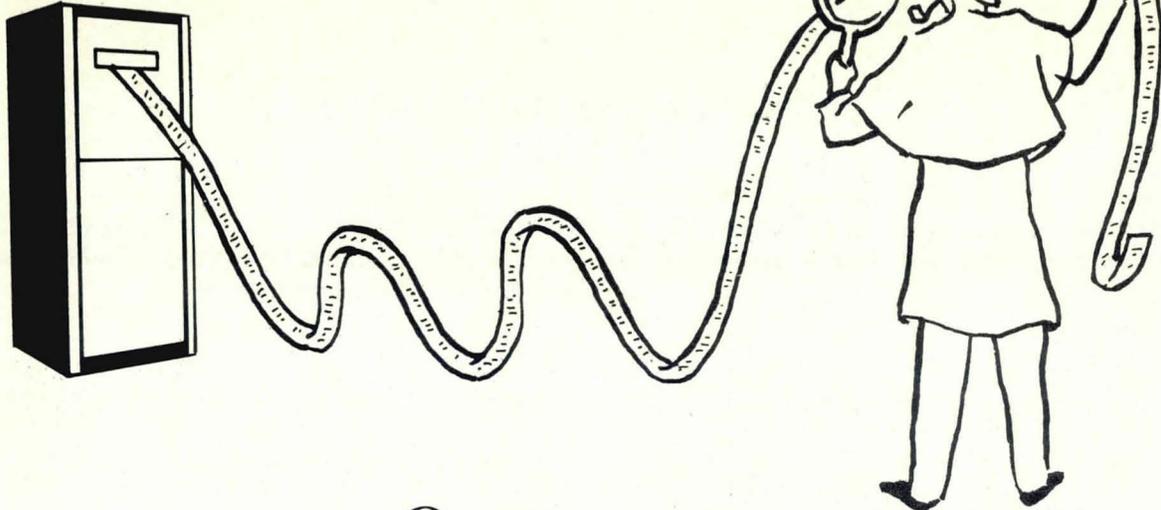
Compact, lightweight Lear Siegler Terminal

terminal sells for \$1,500 in singles . . . At the NCC, **Omron Systems** of Sunnyvale, Cal., introduced its Model 8025, an ROM-programmable, intelligent CRT terminal with "Variable IQ" — a wide variety of optional micro-programmed capabilities. The basic unit is \$2,350 . . . **Sugarman Laboratories** is alive and well in Plainview, N.Y., selling the Super 4000 series of CRT terminals over the nameplate of **Ontel Corp.** . . . **Pertex Corp.**'s (Los Angeles) feature at the NCC was its new DT1300 remote batch terminal, which sells for \$24,500 or \$450 per month with send/receive terminal, key-to-tape data entry, printer, and paper tape reader. A card reader is optional. The DT1300 sends and receives at speeds from 200 to 9600 baud, handles ASCII of EBCDIC, and is IBM HASP-compatible . . . Also at NCC, **Potter Instrument** (Melville, N.Y.) unveiled its DDS8505 Diskette Data Station, an intelligent key-to-disk terminal; DD4740 Diskette Drive (\$650 each in quantity), an 18-pound, single-disk unit with a 3-megabit capacity; and two impact printers, the 180-lpm LP6150 (\$2,450) and the 420-lpm LP6350 (\$3,465), both prices for quantities of 1,000. The DDS8505 Data Station is Potter's first entry in its new system 85 data entry series . . . **Sycor's** (Ann Arbor, Mich.) new Model 250 series of 3270-compatible intelligent CRT terminals consists of a control and up to 32 terminals, each of which contains 8K bytes of ROM and 6K bytes of user-programmable memory. Sycor also introduced three new dual-tractor printers for use with the 250 . . . Billed as the first line of general-purpose CRT terminals to offer 132 characters on a single row of text, **SYS Computer Corp.**'s (Hackensack, N.J.) new series displays up to 30 such lines of data, operates at speeds up to 9600 baud.

**KEEPING UP WITH FCC 260** — DMW Telecommunications Corp. (Ann Arbor, Mich.) lost no time in reacting to AT&T's proposed split rate structure for private line service. (MODERN DATA: May 1973). In its new network optimizer program, DMW has made provision for Bell's "high-density, low-density" rate structure, allowing the user to cost-configure point-to-point or multipoint networks under the current and proposed FCC 260 tariffs. The Hi-D Lo-D network optimizer also takes into consideration multidrop lines, half-duplex vs. full-duplex circuits and multiple (code 5000) circuits. To simplify user data entry, DMW has prestored the geographical coordinates of all 370 Hi-D rate centers noted in AT&T's proposed tariff. The program itself is written in Fortran IV and sells (batch version) for \$1675 plus an installation charge. Delivery is 20 days ARO. DMW is also offering consulting services based on the program, and expects to offer an interactive version of the network optimizer later.

**COMMUNICATIONS KITS** — For \$6,000 per satellite, Hewlett-Packard's new Model 91701A/B Distributed Systems Package is a hardware/software kit that connects remote data acquisition or process control processors to a central, multiprogrammed Real Time Executive. Both the RTE and the satellite systems are based on H-P's 2100S computer. Connections are via dedicated cables up to two miles (91701A) or common carrier lines (91701B). Data Transfer over dedicated cable is up to 1 megabit/sec; over carrier circuits, 1200 baud asynchronous and 10,800 baud synchronous.

**STAR** — The Control Systems Division of Applied Data Research has received approval from the Rural Electrification Administration of the U.S. Dept. of Agriculture(!) for field trial of its System for Telephone Administrative Response/Toll Ticketing and Routing System (STAR/TTRS) at an independent telephone company. Billed as the first system of its kind within the independent telephone industry, STAR/TTRS will perform automatic ticketing for all station-to-station toll calls, plus trunk routing.



## Q HOW ARE ERRORS DETECTED?

**A** Errors created during data transmission by degradation or momentary loss of signal are detected through the transmission of redundant information.

The simplest form of redundancy is to add a bit to a character which makes the number of 0 or 1 bits in that character regularly even or odd (Fig. 1, bottom). However, errors are often produced by bursts of noise which this character parity check will not detect.

The longitudinal record check (LRC) is less susceptible to error bursts. It is really a parity check of all the first bits of the characters, the second bits of the characters, and so on, to include the character parity bits themselves (Fig. 1, right). The LRC, combined with character parity, provides moderately effective error detection at minimal cost and may be used for both asynchronous or synchronous data transmission.

The cyclic redundancy check (CRC) uses a special calculation method to develop a series of redundant bits for a block of bits containing many characters (Fig. 2). The calcu-

lation method can be varied, depending upon the type of errors expected: random, burst, or some combination.

Although many systems use some form of CRC, IBM standardized specific CRC calculations for 6- and 8-bit characters. IBM's CRCs are transmitted as part of the Binary Synchronous line procedure in transparent mode and are 12 and 16 bits in length. A CRC is less susceptible to error bursts and also more efficient than a combined parity check and LRC. However, the cost to implement a CRC is greater.

The CRC can be increased in size to provide more redundancy and, therefore, to increase the probability of detecting an error. If increased enough, a CRC can be used to correct as well as detect errors and therefore becomes a forward error correcting code. This method is used only when block retransmission is not adequate, since it may reduce the real data transmission rate by as much as 50%. The cost is considerably more than the simpler CRC calculation.

Other forms of error detection have been developed, including the simple scheme of counting all the 1 bits in a

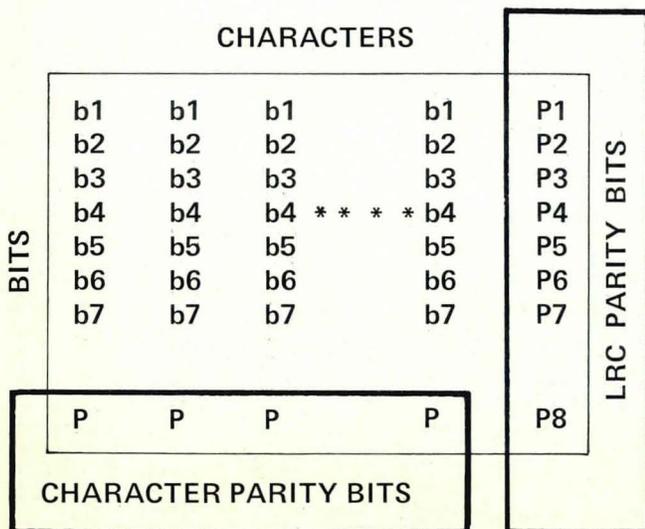


Fig. 1 — Character Parity and Longitudinal Record Check (LRC).

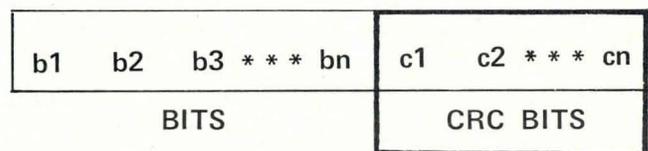


Fig. 2 — Cyclic Redundancy Check (CRC).

block and transmitting this binary sum with the block. Another uses an LRC which checks the first bit of the first character, the second bit of the second character, and so on, to the eighth bit of the eighth character (for an 8-bit character) and continues with the first bit of the ninth character until the end of the block.

Of all the methods available, the character parity and LRC are the most common. The CRC is increasing in use as its implementation cost is reduced. ▲

Gary Audin is a director of system projects for Informatics Inc., River Edge, N.J., and is a regular contributor to this column.

# What Hath Babbage Wrought

## A TEST FOR SYSTEMS ANALYSTS

**INSTRUCTIONS:** Read each question carefully. Answer all questions. Time limit: 4 hours. Begin immediately.

**HISTORY:** Describe the history of the papacy from its origins to the present day, concentrating especially, but not exclusively, on its social, political, economic, religious, and philosophical impact on Europe, Asia, America, and Africa. Be brief, concise, and specific.

**MEDICINE:** You have been provided with a razor blade, a piece of gauze, and a bottle of Scotch. Remove your appendix. Do not suture until your work has been inspected. You have fifteen minutes.

**PUBLIC SPEAKING:** 2500 riot-crazed aborigines are storming the classroom. Calm them. You may use any ancient language except Latin or Greek.

**BIOLOGY:** Create Life, Estimate the differences in subsequent human culture if this form of life had developed 500 million years earlier, with special attention to its probable effect on the English parliamentary system. Prove your thesis.

**MUSIC:** Write a piano concerto. Orchestrate and perform it with flute and drum. You will find a piano under your seat.

**PSYCHOLOGY:** Based on your knowledge of their works, evaluate the emotional stability, degree of adjustment, and repressed frustrations of each of the following: Alexander of Aphrodisias, Rameses II, Gregory of Nicaia, Hammurabi. Support your evaluation with quotations from each man's work, making appropriate references. It is not necessary to translate.

**SOCIOLOGY:** Estimate the sociological problems which might accompany the end of the world. Construct an experiment to test your theory.

**ENGINEERING:** The disassembled parts of a high-powered rifle have been placed on your desk. You will also find an instruction manual, printed in Swahili. In 10 minutes a hungry Bengal tiger will be admitted to the room. Take whatever action you feel appropriate. Be prepared to justify your decision.

**ECONOMICS:** Develop a realistic plan for refinancing the national debt. Trace the possible effects of your plan in the following areas: Cubism, the Donatist controversy, the wave theory of light. Outline a method for preventing these effects. Criticize this method from all possible points of view. Point out the deficiencies in your point of view, as demonstrated in your answer to the last question.

**POLITICAL SCIENCE:** There is a red telephone on the desk beside you. Start World War III. Report at length on its socio-political effects if any.

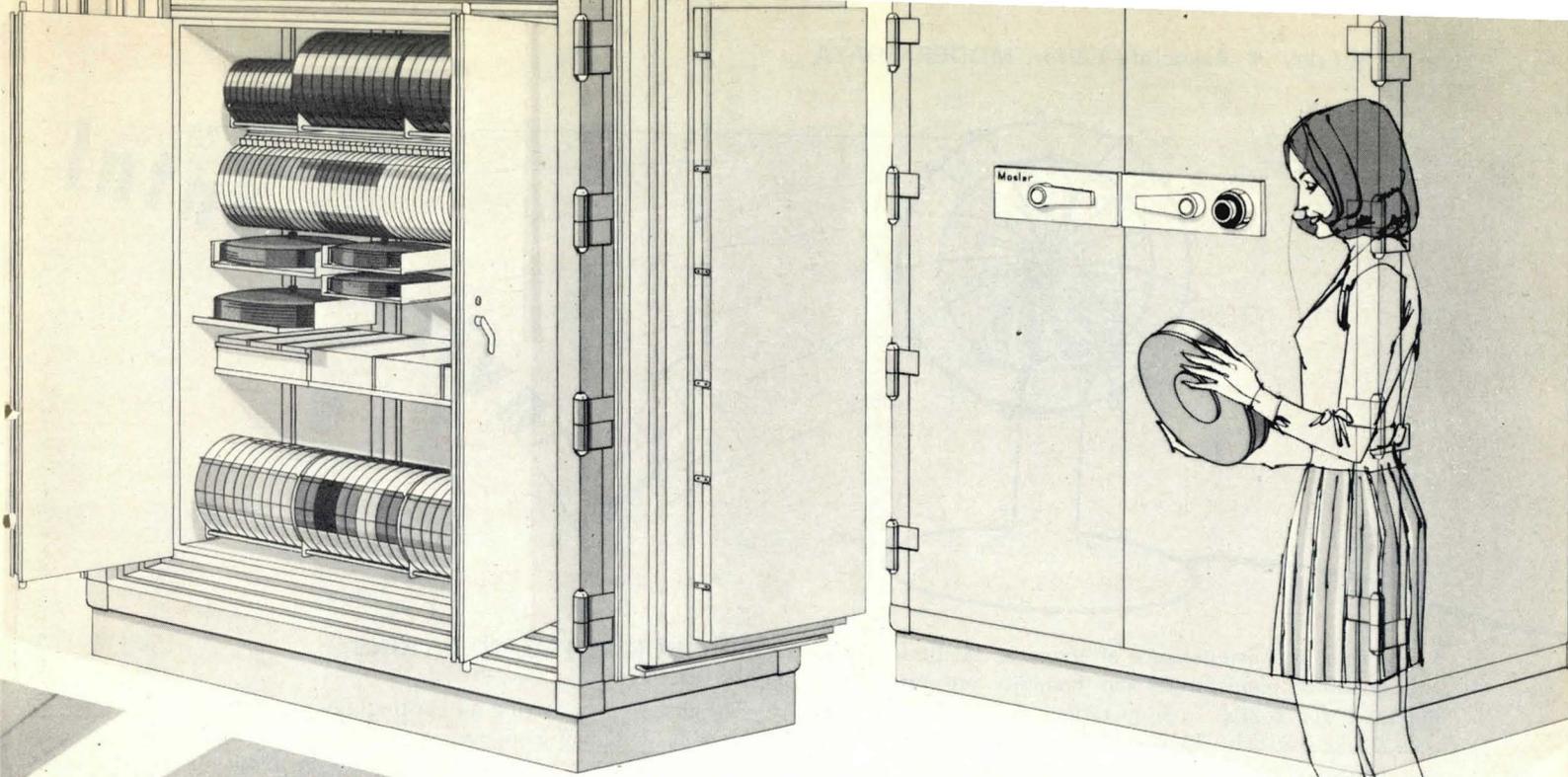
**EPISTEMOLOGY:** Take a position for or against truth. Prove the validity of your stand.

**PHYSICS:** Explain the nature of matter. Include in your answer an evaluation of the impact of the development of mathematics on science.

**PHILOSOPHY:** Sketch the development of human thought, estimate its significance. Compare with the development of any other kind of thought.

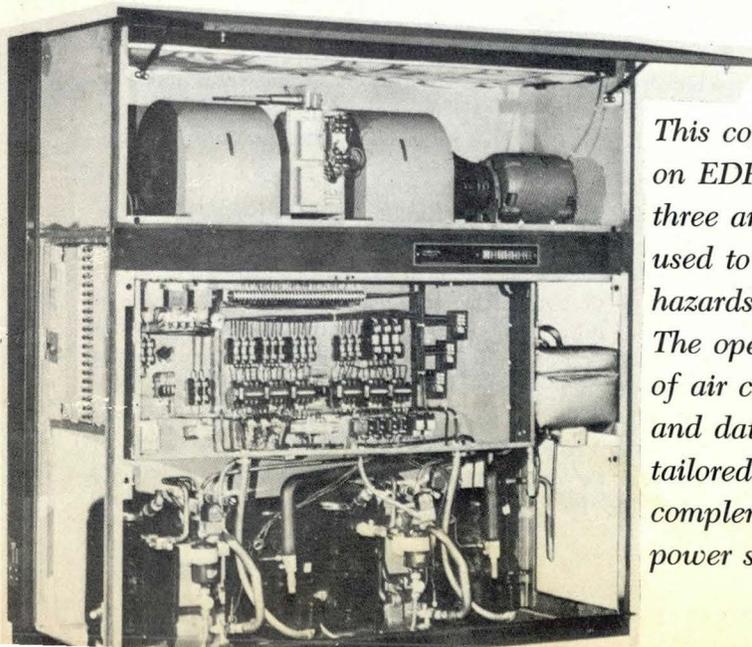
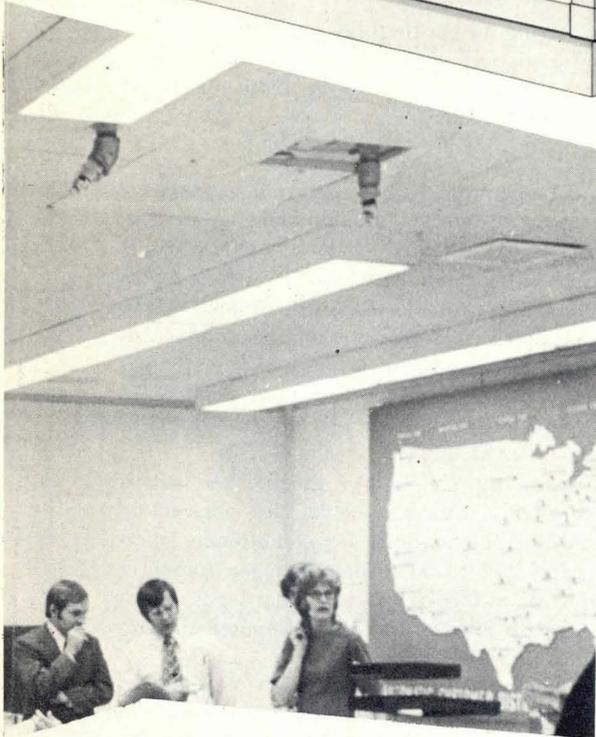
**GENERAL KNOWLEDGE:** Describe in detail. Be objective and specific.

Various versions of this "examination" have been submitted to MODERN DATA since 1971 by at least a half-dozen WHBW enthusiasts. It has appeared in *Contact*, a publication of United Computing Systems, Inc., and in the Kansas City DPMA Newsletter.

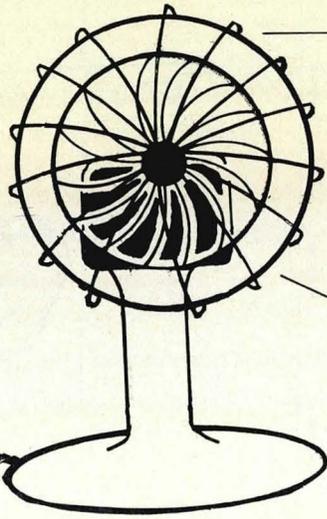


# COMPUTER FACILITY SUPPORT EQUIPMENT AND SYSTEMS

Part 2 — Environmental Control  
Fire Protection & Security Systems



*This concluding part of Modern Data's Profile on EDP facility support hardware consists of three articles covering equipment and systems used to protect the computer room from the hazards of heat, humidity, fire, and sabotage. The operation, applications, and manufacturers of air conditioning, fire suppression and detection, and data and access security products tailored to computer site needs are discussed, complementing last month's survey on power support equipment.*



# Environmental

The control and maintenance of computer facilities at precise levels of temperature and humidity are prime prerequisites for trouble-free operation. Although the many spec sheets issued by EDP equipment manufacturers claim that hardware may function at temperatures ranging from 50° to 95°F and a relative humidity (RH) of 20% to 90%, actual computer room site-requirements for the major mainframes are much more stringent. A computer "comfort index" of 72°F ±2° and an RH level of 50% ±5% is the norm. Deviations above or below these critical values are bound to cause malfunctions in system operations.

## ENVIRONMENTAL PROBLEMS

Afflictions which plague many computer installations with inadequate or improperly-designed environmental conditioning systems involve the following:

**Poor Temperature Control & Air Distribution** — Most computer equipment is cooled internally by air drawn in from floor-level vents. Cooling air is forced past heat producing circuitry or components, heated, and then discharged upwards towards the ceiling. Improper distribution or delivery of cooling air to the computer intake vent, or an overall lack of cooling system capacity, results in higher operating temperatures and increased component failure.

**High Relative Humidity Levels** — Moisture-laden air with an RH in excess of 80% corrodes electrical contacts, causing equipment malfunction or total failure. High humidity levels can also effect the operation of paper-handling EDP devices (card/paper tape readers and punches, OCR readers, printers). Paper expands in excessive RH environments, resulting in an increased incidence of card jams, forms misfeeds, etc.

**Low Relative Humidity Levels** — Static electricity associated with low RH levels effects the operation of magnetic tape or disk, and paper-handling peripherals. Static discharge disrupts read-write operations for tapes and disks, and the presence of static charges on paper surfaces brings on jams or misfeeds due to paper sticking.

## ENVIRONMENTAL SOLUTIONS

The first step in solving an existing environmental problem — or in designing a support system for a new EDP facility — is to isolate the computer room from external heat/humidity sources and sinks.

**Site Selection and Preparation** — The preferred location for a computer room is in an interior building area free of windows and adjacent to conditioned office or factory space. Where an external site location is mandatory (exposure to an outside building wall or to adjacent unconditioned areas), windows should be partitioned-over or thermopane glass installed. Doors that access outdoor or unconditioned areas should be gasketed. Double-door configurations should also be considered where traffic in and out of the computer room is high.

The computer room site should be insulated and vapor-proofed. Vapor-proofing is a must, even for sites adjacent to conditioned areas. Building or office air conditioning operates at RH ranges of 20% to 30%; maintaining a computer room at 50% RH with an inadequate vapor barrier is almost impossible — even with an over-capacity computer air conditioning unit.

Fresh air input (makeup air) for ventilation of computer facilities should be filtered to remove dust particles. For large installations — those requiring over 200 CFM of ventilation or over 7000 square feet in area — or smaller facilities fed from an unconditioned area, a separate makeup air system is required. This system filters, heats/cool, and controls the humidity of ventilation air to rough tolerances, not necessarily equal to those required by the computer room.

**Packaged Computer Air/Environmental Conditioners** — Simple comfort air conditioning units or systems built for human consumers cannot meet the critical conditioning requirements of computer equipment. Besides differences in relative humidity levels (20% to 30% RH for humans versus 45% to 55% for computers), other variations in conditioning are encountered. A typical office, 1000 square feet in area, requires from 2.5 to 6.5 tons of conditioning; an equal size computer room needs from 10 to 20 tons. Likewise, cool air circulation for this same office area is at rates of 1000 to 2500 CFM; the computer facility would require from 4000

# Control

to 10,000 CFM. Most computer facilities also experience periodic changes in equipment placement, brought about by system expansion or site relocation. The air conditioning system must, therefore, be flexible enough to allow for such rearrangements of processing equipment with a minimum expenditure of time, labor, and money.

Packaged air/environmental air conditioning systems have been designed to meet the varied needs of computer operations. These packaged systems come complete with internal cooling, heating, and humidification modules, and sensitive, fast response controls to maintain temperature and RH within critical computer limits. They are configured with high efficiency air filters and fan assemblies which ensure the flow of clean conditioned air in the computer room. Packaged units are mobile. They can be moved within an existing site or to a new location. They are also very flexible when employed with raised floor computer installations. Using the raised floor area as a plenum, packaged conditioners can deliver cool air directly to floor-level equipment intake vents via strategically placed and adjustable floor grill panels. New equipment arrangements can be easily accommodated by simply moving grill panels.

Packaged computer room conditioners come in capacities that allow the dedication of individual units to the separate components of an EDP system. This modularity provides a means of eliminating temperature and humidity "hot" spots that may exist in a large computer room, especially sites supplied by ceiling cool air ducts. Operating (electric power) costs will be reduced since only those conditioners servicing an active or heat-producing room area are providing cooling; other units will be on idle status. Modularity also provides for cooling system redundancy. A computer facility requiring 20-tons of conditioning may be supported by three 10-ton units; continuous operation is ensured even if one of the conditioners is out of service. Finally, the availability of packaged systems rated at capacities lower than 10-tons allows the economical conditioning of minicomputer-based or small computer systems; cooling power can be configured to the needs of the small system user.

## COOLING LOADS

Table 1 presents the cooling load factors to be considered when calculating the needs of a computer facility. When the computer room is located in an interior area surrounded by conditioned space, only those factors relating to lighting, personnel, makeup air ventilation and computer equipment need be considered. Depending on the type of packaged conditioning system employed (air-, water-, glycol- or chilled water-cooled) and system operational levels, one ton of air conditioning capacity equals from 11,000 to 14,000 BTU/hr. Literature available from the manufacturers of packaged air conditioning systems — listed in Table 2 — provides more complete details on conditioner capacities and their application in the computer room.

TABLE 1  
COOLING LOAD CALCULATION GUIDE\*

| Unit/Component  | BTU per Hour Load  |
|---|--|
| <b>Exterior Wall Areas</b><br>excluding windows                   | 5 to 11 BTU/hr per square foot dependent on exposure to sun            |
| <b>Thermopane Window Areas</b><br>clear glass-no protection       | 27 to 77 BTU/hr per square foot dependent on exposure to sun           |
| <b>Thermopane Window Areas</b><br>glass with shades, blinds, tint | 21 to 51 BTU/hr per square foot dependent on exposure to sun           |
| <b>Roof Areas</b><br>with ceiling underneath                      | 4 to 7 BTU/hr per square foot dependent on insulation in roof          |
| <b>Interior Wall Areas</b><br>exposed to unconditioned areas      | 8 to 14 BTU/hr per square foot dependent on partition material         |
| <b>Ceiling Areas</b><br>exposed to unconditioned areas            | 4 BTU/hr per square foot   |
| <b>Floor Areas</b><br>exposed to unconditioned areas              | 5 to 9 BTU/hr per square foot dependent on office/factory environment  |
| <b>Lighting</b>   | 3.4 BTU/hr per watt  |
| <b>Personnel</b>  | 500 BTU/hr per person  |
| <b>Fresh Air Ventilation</b><br>@ 15CPM per person                | 340 to 825 BTU/hr per person dependent on conditioning of incoming air |
| <b>Computer &amp; Peripheral Equip</b>                            | 3.4 BTU/hr per watt  |
| <b>Growth &amp; Safety Factor</b>                                 | 30% of Total BTU/hr calculated   |
| <b>Total Cooling Load</b>   | 130% of Total BTU/hr calculated  |
| <b>Minimum Sensible Cooling</b>                                   | 85% of Total Cooling Load  |

\*condensed from information provided by Blazer Corp.

TABLE 2  
COMPUTER ROOM ENVIRONMENTAL  
CONDITIONERS

*For detailed information on packaged air/environmental conditioning systems designed specifically for computer facilities, and on the design and application of such systems, consult the following listing and circle the appropriate number on the Reader Inquiry Card.*

|   |     |
|---|-----|
| AC Manufacturing Co., Cherry Hill, N.J. ....        | 100 |
| (5/8/11/16/20-ton units)                            |     |
| Airflow Co., Gaithersburg, Md. ....                 | 101 |
| (5/7½/10/15/20-ton units)                           |     |
| Blazer Corp., East Rutherford, N.J. ....            | 102 |
| (3½/4/5/6/7/8/10/15/20-ton units)                   |     |
| Contempo Engineering Co., Los Angeles, Cal. ....    | 103 |
| (5/7½/10/15/20-ton units)                           |     |
| NL Floating Floors, Inc., Toledo, Ohio. ....        | 104 |
| (3/5/7½/10/15/20-ton units)                         |     |
| Liebert Corp., Columbus, Ohio. ....                 | 105 |
| (3/5/6/8/10/15/20-ton units)                        |     |
| Liskey Aluminum, Inc., Baltimore, Md. ....          | 106 |
| (3/5/7½/10/15/20-ton units)                         |     |
| Pomona Air, Inc., Pomona, Cal. ....                 | 107 |
| (5/8/11/16/21-ton units)                            |     |
| Weber Technical Products, Grand Rapids, Mich. ....  | 108 |
| (5/7½/10/15/20-ton units)                           |     |
| Westinghouse/Industrial AC Div., Staunton, Va. .... | 109 |
| (7½/10/15-ton units)                                |     |

---

## INTRODUCTION

Since the end of World War II, and particularly during the last decade, the need for advanced, sophisticated fire protection techniques has accelerated rapidly. One thousand square feet of today's automated industrial or data processing equipment can have dollar values equivalent to one hundred thousand square feet of yesterday's belt and pulley plants. Electronic systems, presently the heart of data processing and telecommunications operations, are rapidly assuming a major role in commercial, manufacturing, and warehousing functions. Data Processing managers and plant security personnel are constantly faced with the problem of preserving these vital and vulnerable links in their operations. Many manufacturers and utilities have even invested in a complete standby capacity which include contractual agreements to use outside computer facilities and the complete duplication of tapes and other source media for storage at remote sites. Such contingency plans may be essential; but if a disaster should occur, these plans could be costly in affecting a return to normal operation.

Although the frequency of incidence is low, insurance underwriters recognize fire as the greatest single cause of a maximum foreseeable loss. Electronic equipment can be replaced and stored data can be duplicated in time, *but business interruption caused by a fire could be the beginning of the end for a small company.* Even larger firms could experience severe losses from manufacturing downtime; lost customer goodwill; additional expenses incurred in renting or securing facilities — usually on an overtime basis.

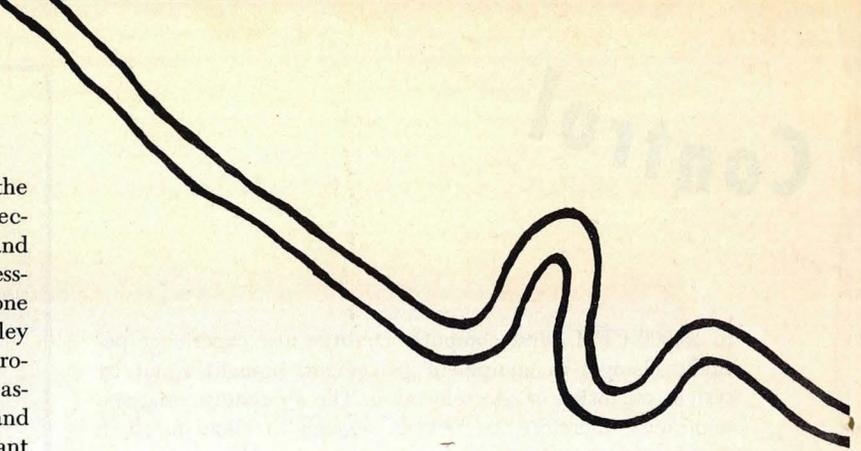
---

## PROTECTION OF HIGH VALUE DENSITY AREAS

A drastic change in the traditional guidelines for the design of fire protection systems is necessary. Characterized as **High Value Density**, electronic equipment can be worth considerably more than the room or building that houses them. An effective means of minimizing equipment loss and, of even greater importance, eliminating downtime must be provided. Fire protection systems must be capable of:

- ▶ *Detecting a fire at its incipient stage;*
- ▶ *Providing early warning or alarm to enable personnel to attempt hand extinguishment;*
- ▶ *Automatic (or manual) releasing of extinguishing agent when hand extinguishment fails or when the protected areas are unattended;*
- ▶ *Utilizing an extinguishing agent that provides rapid extinguishment of the fire, that will not damage electronic equipment, and that is safe for people;*
- ▶ *Providing additional functions, such as signaling the local fire department, shutting down equipment, closing fire dampers — all on an automatic basis.*

In the past, sprinkler systems have provided the main line of defense. Local building and fire codes and insurance companies have dictated that these systems be used for extinguishing building materials and paper products fires. A valve



in the sprinkler head releases the water when high temperature (160°-180°F) melts a fusible link. But before a ceiling temperature of 160°F is reached, a fire could be well advanced and cause considerable damage. In addition, if the fire occurs within equipment, water can not readily find its way into the cabinet. Although water will not generally cause permanent damage to electronic equipment, a thorough drying must be accomplished before repowering. Conductive sediments in some local water supplies can also cause problems by inducing additional short circuit paths.

Water will extinguish or contain the fire, but the time required for "clean-up" should be seriously considered by data processing managers when evaluating possible fire protection systems.

Total flooding systems using a gas as the extinguishing agent are ideal for electronic equipment and stored media. The gas rapidly disperses into all areas of the protected environment. There is no residual damage and no permanent damage to the equipment from gaseous extinguishing agents. Unless there has been fire damage to the equipment, immediate start-up is possible.

Until recently only carbon dioxide (CO<sub>2</sub>) was available as a gaseous extinguishing agent. But the disadvantage of CO<sub>2</sub> was its danger to personnel. In the concentrations required to extinguish a fire, CO<sub>2</sub> can suffocate a person. A delay in agent discharge is, therefore, required to permit the safe evacuation of personnel from the area. This delay in extinguishment can cause additional fire damage to equipment and facilities.



**Joseph P. Gillis** holds the position of Systems Engineering Manager, Protection Systems Div., at Fenwal Inc., Ashland, Mass. He joined Fenwal in 1957 as project engineer responsible for the design and testing of protection system components, and later was responsible for the operation of Fenwal's Fire/Explosion Research Facility. Mr. Gillis received a BS in Physics from Boston College, and is a member of American Society for Testing and Materials (ASTM) and the Combustion Institute.

Joseph P. Gillis • Systems Engineering Mgr., FENWAL INC.

# Fire Protection

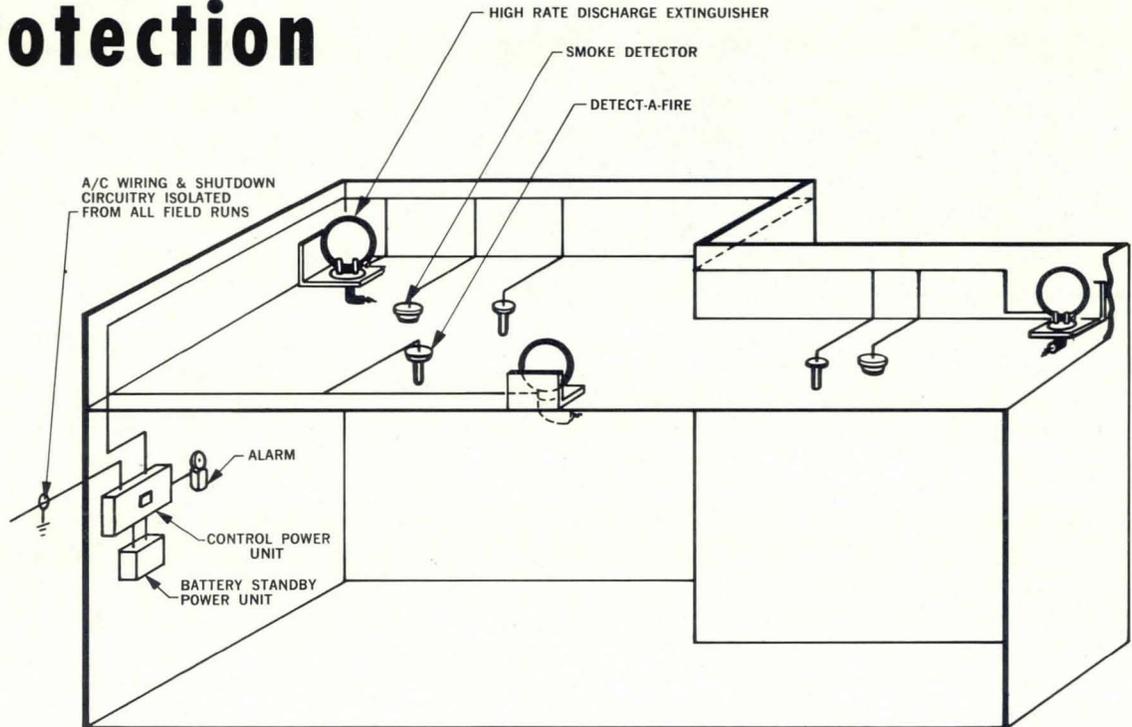


Fig. 1 — Typical Halon Fire Suppression System

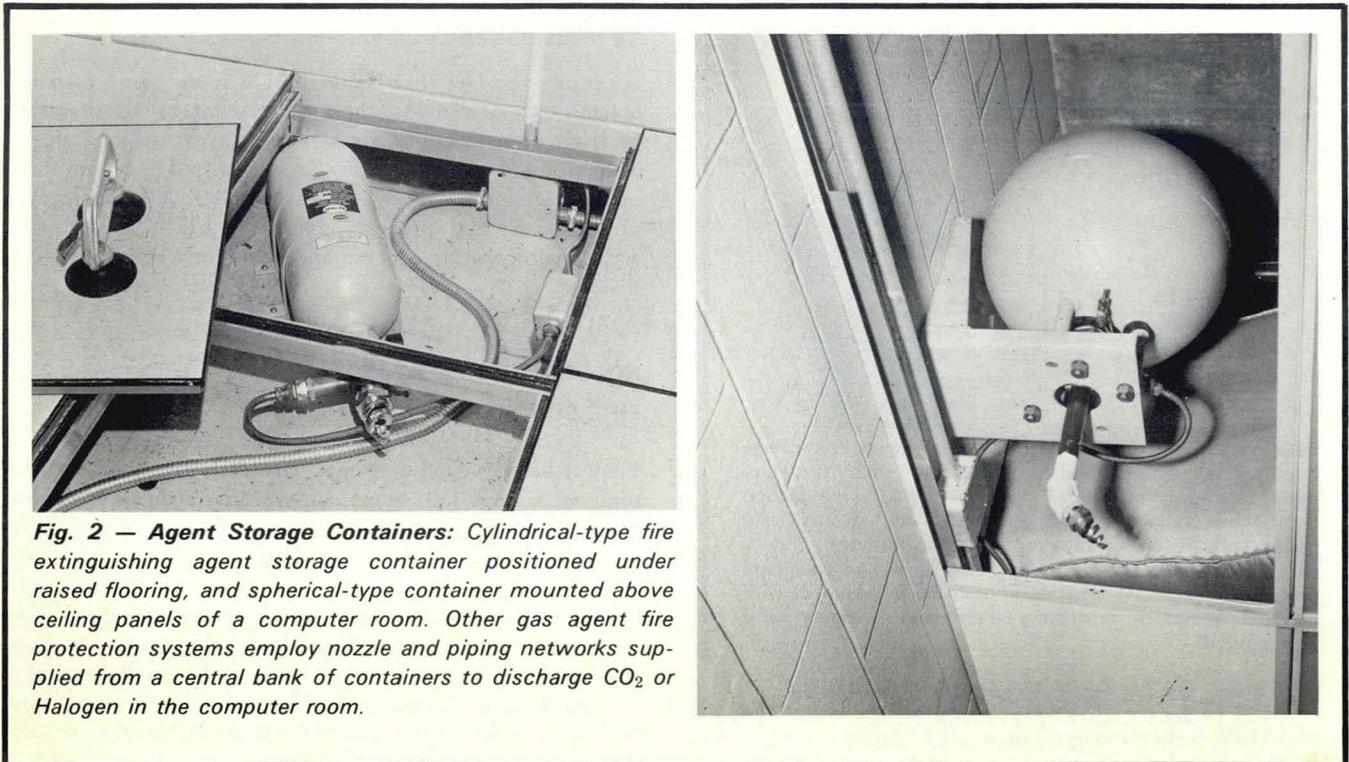
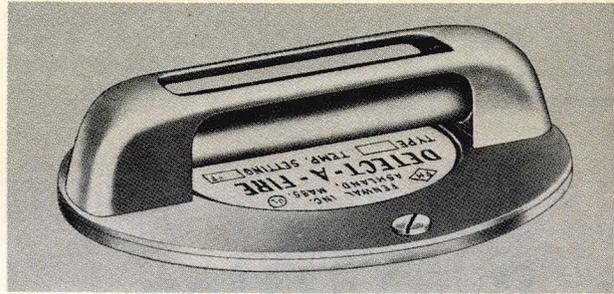
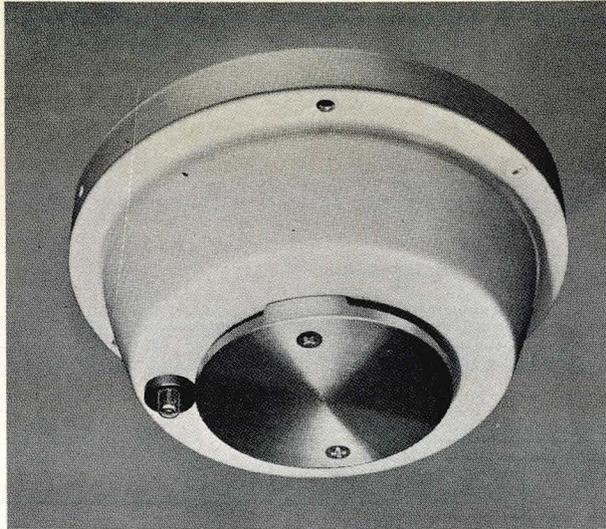


Fig. 2 — Agent Storage Containers: Cylindrical-type fire extinguishing agent storage container positioned under raised flooring, and spherical-type container mounted above ceiling panels of a computer room. Other gas agent fire protection systems employ nozzle and piping networks supplied from a central bank of containers to discharge CO<sub>2</sub> or Halogen in the computer room.



**Fig. 3 — Fire & Smoke Detectors:** Detectors strategically positioned around the computer room or in processor equipment are tied into a central alarm and extinguisher control system. Preset to detect critical levels of heat, smoke or combustion products, or open flames, the detectors provide a pre-alarm for low-level fires or heat conditions, or activate extinguisher systems when serious fire conditions are present.

Just three years ago, in May, 1970, the National Fire Protection Association (NFPA) issued a new standard (12A) officially recognizing Halon 1301 as an extinguishing agent, setting forth recommendations for its application. Since then both Factory Mutual and Underwriter Laboratories have tested and approved fire suppression equipment designed specifically for use with Halon 1301. Here was a gaseous ex-

tinguishing agent that was ideal for High Value Density areas. Unlike CO<sub>2</sub>, Halon 1301 does not extinguish a fire by oxygen displacement; it produces a chemical "chain-breaking" reaction on the combustion process itself. It is a colorless, odorless, electrically non-conductive gas that is safe for people.

A summary of the properties of Halon 1301 clearly illustrates its advantages over other extinguishing agents.

*Most effective agent known* — concentrations of 5% or less by volume will control or extinguish fires involving all common combustibles;

*Non-toxic* — can be discharged into areas occupied by personnel;

*Electrically non-conductive* — electronic equipment can function normally during and after extinguishment;

*Non-damaging to electronic equipment;*

*No residue/no clean-up downtime.*

Despite the fact that Halon 1301 is more costly than water and CO<sub>2</sub>, it provides the means for total damage control to High Value Density areas. Fire damage, water damage, clean-up, and numerous other factors are additive. An automatic fire suppression system using Halon 1301 can provide protection against property damage, business interruption, additional operating expense and, least recoverable, lost customers.

**AUTOMATIC HALON 1301  
FIRE SUPPRESSION SYSTEMS**

Fenwal has designed and installed nearly two thousand Automatic Halon 1301 Fire Suppression Systems. Approximately two-thirds of these systems are protecting High Value Density electronic equipment areas.

Establishing a sound protection systems design philosophy for each application is mandatory. Optimum detection of an alarm condition is key to the entire follow-on fire suppression sequence. An analysis of each particular hazard must be made. Considerations include the recognition of a potentially serious fire at the precise moment it reaches the danger stage, and the signaling of a pre-alarm for the existence

**COMPUTER ERRORS  
CAUSED BY VOLTAGE PROBLEMS !!**

**POWERGUARD**

Leases for only  
**\$76.85/mo.**

...CALL  
LINDA  
Collect!  
(305)  
563-8885

Data Processing errors are often caused by power line voltage fluctuations. PowerGuard continuously monitors any out-of-tolerance conditions down to 0.1 millisecond duration...sounding a warning when one occurs, and permanently recording the amplitude and duration. Simply plug PowerGuard into the same power outlet as your data processing system. It's that easy! Join the hundreds of EDP facilities presently protecting their data integrity with PowerGuard!

**DATA RESEARCH CORPORATION**  
2601 E. OAKLAND PARK BLVD.,  
FORT LAUDERDALE, FLA. 33306

CIRCLE NO. 23 ON INQUIRY CARD

# MINICOMPUTER MARKET SURVEY

**NOW AVAILABLE  
AT \$60**

*(50% off original price  
while limited supply lasts)*

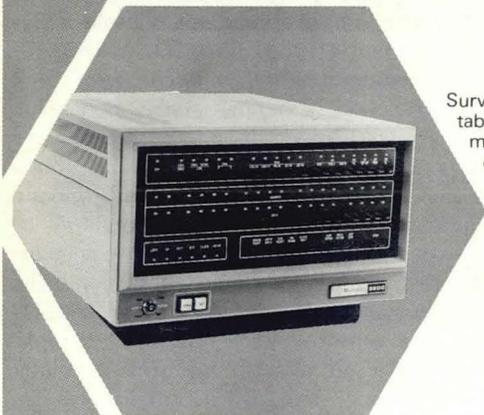
**NOW AVAILABLE  
AT \$60**

*(50% off original price  
while limited supply lasts)*

The results of  
MODERN DATA's annual  
survey of the minicomputer  
market are now available in a  
special research report.

Survey replies from 5,000 participants representing 3,200 minicomputer buyer/user organizations are tabulated and analyzed in this unique report. The respondents reported plans to order a total of 23,000 minicomputers plus an assortment of 41,000 miniperipherals this year. Included among the 45 pages of charts and tables are...

- \* Share-of-market figures for the major minicomputer suppliers
- \* Current installation figures by model number
- \* Projection of sales for the top suppliers for 1973
- \* List of suppliers being considered for sole source procurements and the number of mainframes to be purchased
- \* Distribution of minicomputers by industry sector, application, OEM/end user mix, and geographic location



**NEW...** IN THIS YEAR'S REPORT - - - A SPECIAL SECTION ON MINIPERIPHERALS

The survey participants indicated the types, quantities, and vendors being considered for their 1973 peripheral product needs. Forecasts of 1973 orders along with share-of-market percentages for the major peripheral manufacturers are presented for the following products:

- \* Cassette/cartridge tape transports
- \* CRT data terminals
- \* Add-on main memories
- \* Line printers
- \* Disk drives
- \* Teleprinters

The industry experienced a 74% increase in worldwide minicomputer installations in 1972, and the survey projections show another 75% increase coming this year. This annual survey effort represents the most comprehensive assessment of the mushrooming minicomputer market.

## MODERN DATA

3 Lockland Ave.  
Framingham, Mass. 01701  
(617) 872-4824

**Order your personal copy of this important report today.**

It offers invaluable insights for marketing managers, investors, peripheral suppliers, and component vendors. Price per copy is ~~\$120~~ **\$60** including U.S. postage.

MODERN DATA 3 LOCKLAND AVE  
FRAMINGHAM, MASS. 01701

Please enter my order for \_\_\_\_\_ copies of the 1973  
MINICOMPUTER MARKET SURVEY at ~~\$120~~ per copy  
including U.S. postage. **\$60**

Payment enclosed

Bill me

Purchase Order Number \_\_\_\_\_

Name \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

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

## PREVENTING SMOKE AT PHILIP MORRIS

Three million dollars worth of computers and peripheral equipment at the Philip Morris Central EDP and Business Data Center in suburban Richmond, Va., now is protected from fire by a total flooding system charged with nearly a half-ton of duPont's Halon 1301 extinguishant. Representing one of the most sophisticated fire detection and suppression systems developed for the data processing industry, the Philip Morris unit was designed and installed by Acoustics, Inc., of Charlotte, N.C., with equipment and engineering services provided by Fenwal.

The system uses ionization detectors for pre-alarm smoke detection and thermal detectors to activate and discharge the Halon 1301 extinguishant. Both operate through a visual annunciator panel which not only pinpoints the location of the fire but transmits an alarm signal automatically to off-plant guard services.

The double detection systems is important from an economic standpoint. It prevents discharge of the relatively expensive, but highly effective, Halon 1301 in a situation where the fire is so small it can be controlled with a hand extinguisher, or where the temperature rise might be due to some cause other than a fire. The thermal detector is a rate-compensated type which activates the Halon discharge system only if temperatures exceed 140°F. Temperature increases that might occur if the air conditioning system became inoperative on a hot day will not trip the extinguishant system.

The computer center, which operates 24-hours a day, five days a week, handles daily business transactions which Philip Morris officials estimate result in annual operating revenues in excess of \$1-billion. It went into operation in 1964, but until last fall the computer room was protected from fire only by manually-operated CO<sub>2</sub> extinguishers and a light beam system which, when interrupted, triggered an audible alarm and transmitted a signal to an ADT office in Richmond. ADT then called a Richmond city fire station about three miles away — a five- to six-minute run to the computer center.

The Halon 1301 extinguishing system grew out of a need to install a raised floor in the computer room to eliminate the hazard created by densely-packed cables in trenches under the floor and to provide better access to the complex wiring and circuitry serving the electronic equipment. This resulted in a complete review of hazard protection for the entire computer operations area.

of a lesser fire or overheat condition to allow on-site personnel to take corrective action. Once detection has been accomplished, the commitment of the system to high-speed agent release becomes important. Extensive testing by Fenwal, E.I. duPont (mfrs. of Halon 1301) and others has shown that agent effectiveness is increased and the degree of decomposition decreased as discharge time is reduced. Evidence of this was confirmed when the NFPA standard was amended in May, 1971 to improve discharge time to 10 seconds. Originally the standard allowed 30 seconds for discharge time.

The following approach is typical when designing a fire protection system for electronic equipment areas.

Acoustics, Inc., a broad-based firm offering safety partitioning, air conditioning, noise control, and fire protection system installation services, was awarded the contract for the new system.

An important factor in the choice of the Halon system was that it required only a 5% concentration to extinguish fire, allowing plenty of oxygen for human survival. This meant extra protection for both equipment and the employees in the area since the agent could be discharged immediately upon detection of a serious fire.

CO<sub>2</sub>, which could also be used in a total flooding system, can be discharged safely only after all personnel have evacuated the area because the concentration required does not leave enough oxygen for human survival. And a water system or dry powder was of questionable value because of the possibility that more damage to delicate electronic equipment might result than by the fire itself.

Acoustics Inc. designed the Halon 1301 system around Fenwal equipment, with 25 detection points in the six-room computer complex. The computer room itself, a 72-by-40-foot room containing an IBM 360/20, a 360/40, and a 360/50, is monitored at 16 different points and protected by six 98-pound spherical Halon containers above the ceiling and two 33-pound floor-mounted spheres serving under-the-floor nozzles. Three sensors monitor the data processing room, which is protected by two 84-pound spheres of extinguishant. The tape library is monitored by two sensors with a single 87-pound sphere. Two sensors and a 33-pound sphere protect the engineering room. The transformer room and staff office are protected by one 41-pound sphere with one sensor in each room. All 25 positions are shown visually on a scale layout annunciator panel so that the location of a tripped sensor can be pinpointed immediately. When a sensor is activated it also trips an extremely loud "high-low tone" warning horn.

Since computer operations could not be discontinued to permit normal installation of the raised floor and Halon 1301 extinguishing system, Acoustics did most of their work on weekends when the Operations Center was closed, constructing a new floor 6½ inches above the original one, and reinstalling the computers. Lift-up floor panels allowed the installation of detector circuits, extinguishant lines and discharge nozzles, and reroute computer circuits. The entire system was installed, tested, and operative with no loss of computer time or break in operations.

- *Pre-Alarm combustion products (ionization detectors).*
- *Extinguishing agent release by rate-compensated thermal detectors or cross-zoned product of combustion detectors. Discharge time to be 5 seconds (10 seconds max).*
- *Agent concentration of 5% by volume based on total flooding. This concentration includes main room, sub-floor, and volume above false ceiling if this is plenum or part of recirculated air.*
- *Provide ancillary functions, such as local and/or remote fire alarms; programmed process shutdown; close fire dampers, etc.*

Automatic fire suppression systems are designed to take full advantage of the excellent fire extinguishing capabilities

Tables 1 and 2 present listings of the manufacturers of fire protection or detection products. Informative literature on the need, operation, and application of fire prevention systems may be obtained by referencing these tables and using the Reader Inquiry Card. In addition, the following special reports, case studies, and publications on computer room fire protection systems are available from insurance or industry associations.

**Protection Of Electronic Computer/Data Processing Equipment** — NFPA No. 75; **Carbon Dioxide Extinguishing Agent Systems** — NFPA No. 12, and **Halogenated Extinguishing Agent Systems** — NFPA No. 12A, all available from the National Fire Protection Association, 60 Batterymarch Street, Boston, Mass. 02110.

**Recommended Good Practice For The Protection Of Electronic Data Processing And Computer-Controlled Industrial Processes**, available from the Factory Insurance Association, Hartford, Chicago, and San Francisco.

**Halon 1301 Computer Fire Test Program**, available from E.I. du Pont/Freon Products Division, Wilmington, Del. 19898

**Extinguishment Of Fires In Electronic Computer Rooms with Halon 1301**, available from Underwriters Laboratories, Northbrook, Illinois.

of Halon 1301. Highly effective detection devices are combined with specially-designed components for high-speed agent discharge. Individual agent storage containers are located in, or adjacent to, the area to be protected. Little or no piping is required and system reliability is higher. Rapid discharge is assured, hence the fastest possible extinguishment. This minimizes fire damage and insures minimal buildup of decomposition products.

Flexibility is an additional benefit that can be derived from Halon systems that employ a modular approach. If future plans require a change in location of the electronic equipment, protection system components can be easily removed and relocated. If the protected area is to be enlarged, detection devices and agent storage containers are simply added to the existing protection system. Likewise,

TABLE 1

**FIRE SUPPRESSION/PROTECTION SYSTEMS**

*For additional information on the operation or application of gas-extinguisher fire protection systems, reference the following listing and circle the appropriate number on the Reader Inquiry Card.*

|  |     |
|--|-----|
| The Ansul Co., Marinette, Wisc. ....                     | 110 |
| (CO <sub>2</sub> & Halon systems)                        |     |
| Chemtron Corp., Chicago, Ill. ....                       | 111 |
| (CO <sub>2</sub> & Halon systems)                        |     |
| Fenwal Inc./Protection Systems Div., Ashland, Mass. .... | 112 |
| (Halon systems)  |     |
| Walter Kidde & Co., Belville, N.J. ....                  | 113 |
| (CO <sub>2</sub> & Halon systems)                        |     |
| Norris Industries, Newark, N.J. ....                     | 114 |
| (Halon systems)  |     |
| Safety First Products Corp., Elmsford, N.Y. ....         | 115 |
| (Halon systems)  |     |
| Star Sprinkler/Noxfire Div., Philadelphia, Pa. ....      | 116 |
| (Halon sprinkler units)                                  |     |

TABLE 2

**SMOKE/FIRE DETECTION & ALARM PRODUCTS**

*The EDPer interested in only a passive, first-line-of-defense-solution to fire protection via detection systems, or in employing a more sensitive alarm system with an existing suppression system, can obtain details on smoke/fire detection products by utilizing the following listing and the Reader Inquiry Card. Note that the manufacturers of fire suppression/protection systems cited in Table 1 also configure complete detection/alarm controls with their own equipment.*

|   |     |
|---|-----|
| Alarm Products Int., Inc., Long Island City, N.Y. ....  | 117 |
| (smoke detectors)                                       |     |
| Alpha-Larm/Hochiki America, Hawaiian Gardens, Cal. .... | 118 |
| (smoke/fire detectors & alarm systems)                  |     |
| Benedict Electronics, Inc., Schenectady, N.Y. ....      | 119 |
| (gas/smoke/fire detectors & alarm systems)              |     |
| BRK Electronics, Inc., Aurora, Ill. ....                | 120 |
| (gas/smoke/fire detectors & alarm systems)              |     |
| Dectron Security Systems, Inc., Sag Harbor, N.Y. ....   | 121 |
| (smoke/fire alarm systems)                              |     |
| Monaco Enterprises, Inc., Spokane, Wash. ....           | 122 |
| (smoke/fire alarm systems)                              |     |
| Mosler Safe Co., Hamilton, Ohio ....                    | 123 |
| (smoke/fire alarm systems)                              |     |
| Pyrotronics, Cedar Knolls, N.J. ....                    | 124 |
| (computer room gas/smoke/fire detection systems)        |     |

small systems or minicomputer facilities may also be accommodated by a modular system.

**SUMMARY**

Both the technology and the tools for the design of an effective system truly to minimize fire loss in electronic equipment are available. As with anything innovative, there is an uphill struggle to achieve general acceptance. A major obstacle has been the inherent inertia of the fire protection industry itself. Acceptance of concept and use of Halon 1301 is accelerating as field experience is gained. The future promises significant strides in meeting the requirements of the data processing manager and of plant security personnel. — Total Damage Control for High Density Areas. ▲



# Security

John A. Murphy • Associate Editor, MODERN DATA

The broadest interpretation of total security for a computer facility encompasses both the control of access to data contained in the processor, and the protection of the computer physical plant from environmental, act of God, or human induced hazards. This concluding section of MD's Product Profile on Computer Facility Support Equipment and Systems covers hardware or equipment used to limit access to data and the computer room.

## DATA SECURITY

Present software controls for data security employ simple routines to check user or terminal ID codes, or more complex user-classification or data protect multilevel access tables to limit access to programs and data files. Since all security routines and tables reside in the operating system, the OS itself must be secure from unauthorized access. The security of most — if not all — mainframe-manufacturer-supplied OS systems can be compromised by a determined and knowledgeable systems programmer. A number of mainframe producers and users are, therefore, studying hardware/software means to optimize data security.

Hardware devices for data security applications are available. They take the form of cryptographic encoders/decoders that are attached to I/O

ports or data transmission terminals. The key to the operation of these "Bondish" devices is their ability to "scramble" data before transmission or storage, and to "unscramble" it after reception or retrieval. Cypher code combinations and random sequence generation lengths are so great that the probability of breaking the encoded message is almost nil. Such devices ensure the integrity of data transmitted or stored, but do not, by themselves, prohibit unauthorized access to, and the inadvertent or intentional destruction of, stored files.

## PHYSICAL PLANT SECURITY

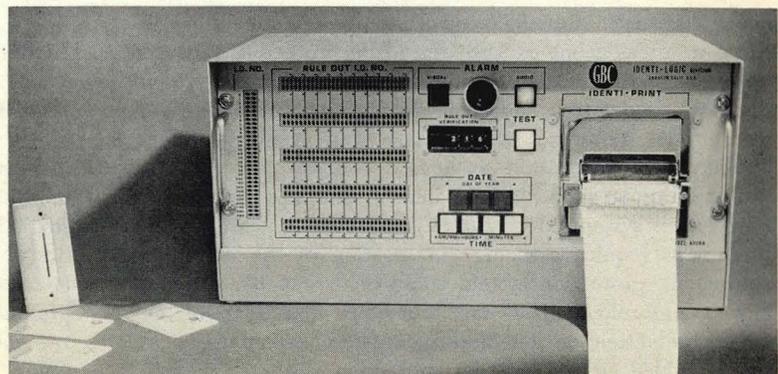
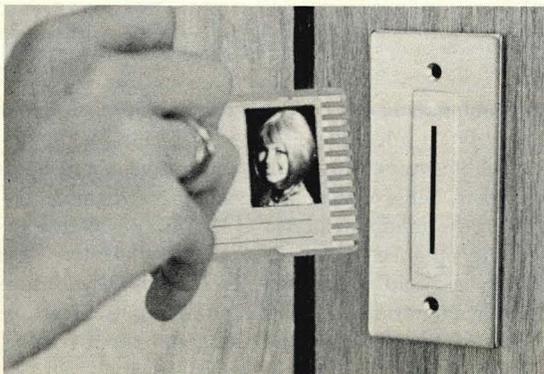
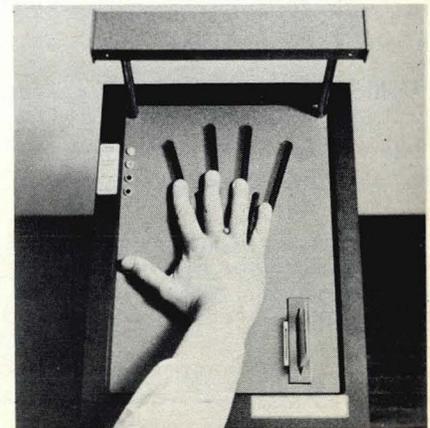
Topics previously discussed (Power Support Systems in last month's issue, and Environmental Control and Fire Protection Systems in other sections of this Profile) relate to the overall security of a computer physical plant site. The remainder of this article will therefore touch upon equipment used to control access to the computer room and other factors to be considered for total computer security.

Access to a computer room can be controlled by a variety of methods. The simplest to implement involves the installation of special combination- or card-activated locks on computer room doors. If — or when — an individual is discharged, combinations are

either changed, the individual's card retrieved, or new cards issued to prevent future entry by a disgruntled ex-employee.

Next in sophistication — and cost — are keypad-combination, and card or keypad-card access control devices with internal memory and logic capabilities. These devices assign a unique ID code/combination to each employee. Some may also employ ID procedures based on the hand contour, fingerprint, or voice characteristics of the individual. An ex-employee's code or card can, therefore, be voided without the need to issue new combinations or cards to remaining personnel.

Finally, centrally controlled, multiple entry point systems are available for large EDP facility or total building/office access security. These sys-



**TABLE 1  
SECURITY PRODUCTS**

*For details on security hardware, equipment, or systems used to control access to computer data or facilities, use the following listing and the Reader Inquiry Card.*

**Data Cypher Encoders/Decoders**

|  |     |
|--|-----|
| Com/Tech Systems, Inc., Richmond Hill, N.Y.....              | 125 |
| Crypto Industries, San Diego, Cal. ....                      | 126 |
| Datotek, Inc., Dallas, Texas .....                           | 127 |
| Ground/Data Corp., Ft. Lauderdale, Fla.....                  | 128 |
| ITT/Data Equipment & Systems Div., East Rutherford, N.J..... | 129 |

**Access Control Devices & Systems**

|  |     |
|--|-----|
| American Multiplex Systems, Inc., Anaheim, Cal.....      | 130 |
| (access control & alarm systems)                         |     |
| C & S Security Devices, Inc., Olathe, Kansas.....        | 131 |
| (keypad combination lock)                                |     |
| Cardkey Systems, Chatsworth, Cal. ....                   | 132 |
| (access control systems)                                 |     |
| Datalock Electronics Corp., Sacramento, Cal. ....        | 133 |
| (keypad combination lock)                                |     |
| Damon/Sentracon, Westwood, Mass. ....                    | 134 |
| (access control & alarm systems)                         |     |
| Detex Corp., Chicago, Ill. ....                          | 135 |
| (access control & alarm systems)                         |     |
| Diebold, Inc., Canton, Ohio.....                         | 136 |
| (access control & alarm systems)                         |     |
| Eaton/Security Products & Systems, Cleveland, Ohio ..... | 137 |
| (access control & alarm systems)                         |     |
| General Binding Corp., Northbrook, Ill. ....             | 138 |
| (access control & alarm systems)                         |     |
| Holobeam, Inc., Paramus, N.J.....                        | 139 |
| (access control systems)                                 |     |
| Identimation, Northvale, N.J. ....                       | 140 |
| (hand-contour ID access control systems)                 |     |
| KMS Security Systems, Roseville, Mich.....               | 141 |
| (fingerprint ID access control systems)                  |     |
| Locknetics/Sichertron Corp., Bristol, Conn.....          | 142 |
| (access control systems)                                 |     |
| Mosler Safe Co., Hamilton, Ohio .....                    | 143 |
| (access control system)                                  |     |
| Notifier Corp., Lincoln, Neb.....                        | 144 |
| (access control & alarm systems)                         |     |
| Panasonic, New York, N.Y. ....                           | 145 |
| (card-keypad ID terminals)                               |     |
| Preso-Matic Lock Co., Lyons, Ill.....                    | 146 |
| (keypad combination lock)                                |     |
| Rusco Electronic Systems, Pasadena, Cal.....             | 147 |
| (access control & alarm systems)                         |     |
| Sargent & Greenleaf, Inc., Rochester, N.Y.....           | 148 |
| (keypad combination lock)                                |     |
| Sescoa, Scottsdale, Ariz. ....                           | 149 |
| (access control & alarm systems)                         |     |
| Simplex Security Systems, Collinsville, Ct. ....         | 150 |
| (pushbutton combination lock)                            |     |
| Threshold Technology, Inc., Cinnaminson, N.J.....        | 151 |
| (voice recognition ID access control system)             |     |
| Union Security Systems Corp., Plattsburg, N.Y. ....      | 152 |
| (pushbutton combination lock)                            |     |

**Fire Proof Safes & Vaults**

|  |     |
|--|-----|
| Bally Case & Cooler, Inc., Bally, Pa.....      | 153 |
| Diebold, Inc., Canton, Ohio.....               | 154 |
| Mosler Safe Co., Hamilton, Ohio .....          | 155 |
| Schwab Safe Co., Lafayette, Ind.....           | 156 |
| Sperry Rand/Victor Systems, Blue Bell, Pa..... | 157 |
| Wright Line, Worcester, Mass.....              | 158 |

tems provide multi-level, "need-to-access" coding in addition to unique personnel codes, and can also monitor and log "time-in/time-out" attendance. Other features that may be configured into such security systems include TV-monitored area and entry surveillance, intruder, and fire alarm capabilities.

**OTHER SECURITY ASPECTS**

Other factors should be considered when securing a computer facility. The computer room should be located in an interior building area (also recommended for environmental control) as free as possible from "fish-bowl" type window partitioning. If windows are needed for corporate image cosmetics (yes Virginia, we have a computer!), they should be shatterproof, even for interior site locations. In locales subject to floods, the computer facility should be located in upper floors or in buildings that are at above-flood stage levels. Tape, disk, or source card decks should be stored in fire proof safes or vaults that are completely closed when not attended. ▲

**ACCESS  
CONTROL  
SYSTEMS  
SURVEY**

Just completed thorough survey of all available equipment including how-it-works and how to choose the right system for your application.

Survey includes.....  
pushbutton . . . microfilm  
. . . card . . . hand geometry  
. . . fingerprint

*For more information on how to obtain your copy of this informative survey, see ad on page 15.*

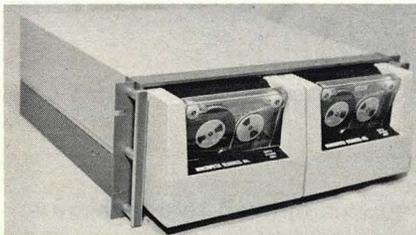
# NEW PRODUCTS



## TELEPRINTER PROJECTOR

The 2510T Teleprinter Projector allows the projection of hard copy printer output onto screens of up to 18' x 18' in area. The terminal accessory is compatible with a variety of teleprinters, including the IBM 2741, TTY 33, and Datel 30, and can be used as a communications aid in briefing sessions, conferences, seminars or lectures, and MIS or stock quotation environments. The 2510T causes teleprinter I/O copy to be printed directly onto mylar film which is automatically advanced over a transparency lens for screen projection. *I.P. Sharp Assoc., Ogdensburg, N.Y.*

Circle No. 281 on Inquiry Card



## MINICOMPUTER TAPE STORAGE

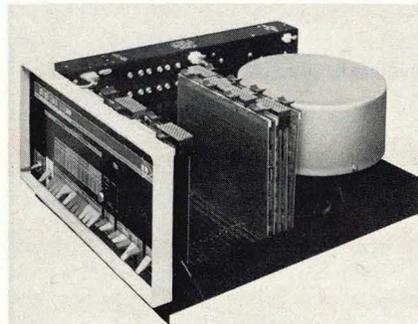
The Data Store 6000 is a complete 3M-type magnetic tape cartridge storage system that plugs directly into the minicomputer data bus. The system provides up to 2.8Mbytes of storage per tape with a transfer rate of 6K to 24Kbytes per second. Other features include a 90 ips block search speed, fixed or variable block lengths, random block data access, and programmed data transfer on an 8-bit, 12-bit, or 16-bit word basis. End-user price of a single-drive system with controller, interface, power supply, cables, and software is \$3,600; a 4-drive system is priced at \$7,250. *Minicomputer Resources, Inc., Tampa, Fla.*

Circle No. 292 on Inquiry Card

## TTY-COMPATIBLE CRT TERMINAL

Designed for both end users and OEMs who desire CRT display capabilities for Teletype operations, the Hazeltine 1000 Video Display Terminal provides a 960 character screen, full alphanumeric keyboard, and 9600 bps communications at a single-unit price of \$1,790. The unit also offers half-/full-duplex transmission, parity generation and checking, and RS-232-C interfacing. Options include upper/lower case display, answerback, 202C interfacing, and an auxiliary RS-232 interface for printer, cassette, or other peripherals. *Hazeltine Corp., Greenlawn, N.Y.*

Circle No. 273 on Inquiry Card



## PDP-8 DRUM STORAGE

Designed for use with DEC PDP-8/e, -8/F, and -8/M minicomputers, the Datum Model 5100 is a self-contained, modular, word-addressable head-per-track drum storage system that comes complete with drive, controller, and all interconnecting hardware. The 5100 provides from 262K to 1.05M words of storage, accessible in an average time of 16.9 millise. Data transfers may vary in length from one to 4056 words; contiguous transfers spiraling across data tracks are handled automatically. The drum system is a direct replacement for DEC's RF08/RS08 disk and controller, and operates via a three-cycle data-break facility that is built into the 5100 controller. Basic 262K modules mount within PDP-8/e and -8/F enclosures with no need for mechanical modifications. Model 5100 controllers can handle up to four 262K modules, expansion drums, and power supplies being supplied in a separate chassis. Base price for the Model 5100 Drum Storage System is \$6,750. *Datum, Inc., Anaheim, Cal.*

Circle No. 294 on Inquiry Card



## INTELLIGENT DISPLAY TERMINAL

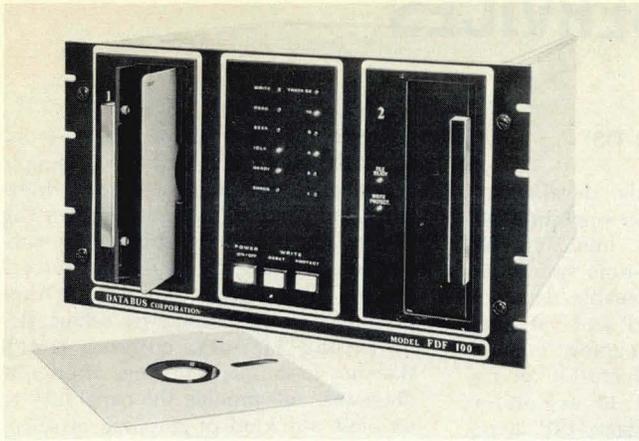
Incorporating a built-in MOS microprocessor, the Omron Model 8025 CRT display terminal uses a data bus organization to directly address up to 16K of ROM and/or RAM memory. The basic 8025 terminal features a 15-inch diagonal, 1920-character CRT, acoustic feedback, ASCII keyboard, protected fields, and a RS-232-C interface. The terminal can operate in either half- or full-duplex at switch-selectable speeds up to 9600 baud. Options include special function keys, custom keyboard arrangements, foreign character sets, a 4-function math program, and interfaces for cassette, printer, card reader, and other peripherals. Base price for the Model 8025 is \$2,350. *Omron Systems, Inc., Sunnyvale, Cal.*

Circle No. 286 on Inquiry Card

## MEDIUM-SCALE COMPUTER

Expanding their family of 24-bit computers, Datacraft has introduced the Slash 4, a 750 nanosecond processor for scientific and real-time applications. A basic configuration with 24 Kbytes of memory, parity, hardware multiply-divide-square root, four external priority interrupts, five registers, an 8-bit I/O channel, and basic software is priced at \$19,000. A hardware floating point processor, offering double precision floating point arithmetic (39-bit mantissa plus 8-bit exponent), is available as an option. A typical Slash 4 system with a 74 Kbyte CPU, hardware floating point, 11 Mbyte disk, 200 LPM printer, card reader, TTY, and supporting software goes for under \$85,000. *Datacraft, Ft. Lauderdale, Fla.*

Circle No. 275 on Inquiry Card



### MINICOMPUTER FLOPPY DISK STORAGE

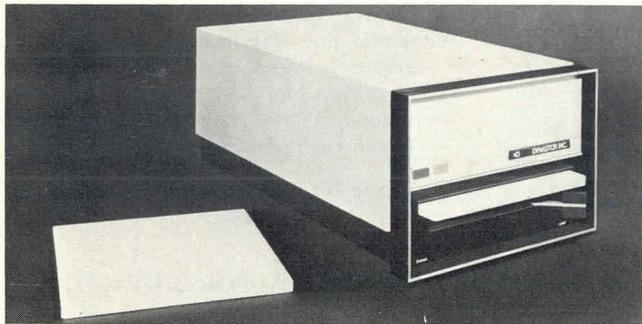
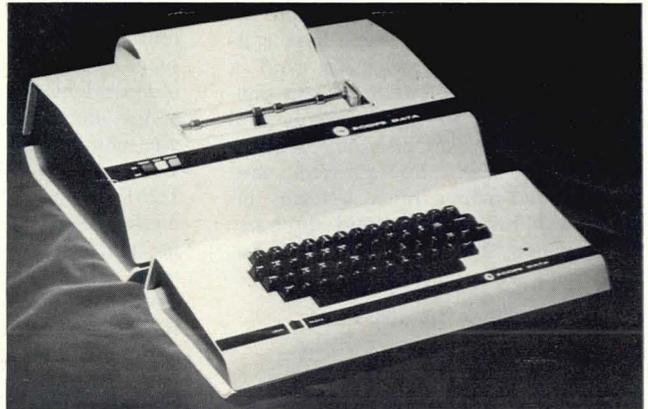
The FDF 100 flexible (floppy) disk file and controller is compatible with PDP-8, PDP-11, and Nova series mini-computers. Offering per disk capacities of 262 Kbytes, the system may be expanded in one drive (disk) increments to 1.05 Mbytes on a daisy-chain basis. Data transfer is 250 Kbps on a DMA or I/O port interface. The system comes with driver and diagnostics software, interface for a particular mini, controller and formatter, and is compatible with mini-maker supplied DOS software. *Databus Corp., Westbury, N.Y.*

Circle No. 319 on Inquiry Card

### TELEPRINTER TERMINAL

The Series 200 teleprinter operates at speeds up to 240 cps, using an electrostatic 7 x 9 matrix print mechanism. Printing format provides up to 80 characters per line from a 96-character set. The 200 can be configured in RO or key input models, and plug-in modularity allows easy terminal enhancement or maintenance. Standard features include paper-out signal and alarm, adjustable margin, print density control, and push button paper advance. Switch-selectable data rates start at 75 baud. *Scope Data Inc., Orlando, Fla.*

Circle No. 310 on Inquiry Card



### "FLEXIBLE" DISK DRIVE

The Series FX 300 "Flexible" disk drive is designed to provide the same features of larger, flying-head type disk cartridge drives with the storage capacities and prices of cassettes or contact floppy disks. The Model 30, basic drive in the FX 300 line, is available with 64-track, 32, 16, or 8 sectors per track formats, and can store up to 2.2 Mbits. Drive characteristics include an average latency time of 8.3 millisecond, an average move time of 300 millisecond, and a transfer rate of 2.54 Mbits/sec. Storage media consists of a completely enclosed, flexible mylar disk cartridge. A two-drive (disk) configuration, the Model 40, and a TTL/DTL-compatible mini-controller, the FAD, are also available. Pricing for the FX 300 series in OEM quantities is \$600 for the basic drive with servo and read/write electronics, and \$7.00 per cartridge. *Dynastor, Inc., Boulder, Colo.*

Circle No. 291 on Inquiry Card

## SOFTWARE PACKAGES AND PACKAGED COMPUTER SERVICES MARKET FORECAST

This new Frost & Sullivan report states the software package and packaged computer service market, \$770 million in 1972, will hit \$1.5 billion in 1975 and pass \$2 billion in 1982. The two market areas are now the fastest growing segments of the computer industry.

The report includes market trends and forecasts through 1982 for eighteen software packages and eight packaged services. Two thousand users and suppliers of software packages were surveyed regarding the future use of software packages.

**Price \$395.** Send your check, or we will bill you. For free descriptive literature plus a detailed table of contents contact:



**FROST & SULLIVAN, INC.**  
106 Fulton Street  
New York, N. Y. 10038  
(212) 233-1080

# NEW SOFTWARE AND SERVICES

## CIP/2200 MINICOMPUTER OS

CiMOS 22 is a disk-based, interactive operating system designed for CIP/2200 minicomputer users. By means of the Job Control Language, a user may create, delete, modify and catalog files, and load, execute, or cancel programs. Files may consist of source programs, data, or libraries of relocatable object programs. Processors supplied with this initial release of CiMOS 22 include a relocatable assembler, a linkage editor which permits overlay structures, a text editor for creating or modifying source files, a library maintenance processor, and a system generator. CiMOS 22 I/O control is designed to support sequential and random files on disk plus sequential files on TTYs, line printers, card readers, and paper tape. Utilities include disk initialization and directory maintenance, file copy and file list. *Cincinnati Milacron, Lebanon, Ohio.*

Circle No. 346 on Inquiry Card

## 3270 NETWORK DESIGN

Berglund Associates have announced a design system for communications networks based on IBM's 3270 display system or independent-supplied equivalents. Termed as Planet70, the system includes a discrete event simulator; a multipoint, polled network synthesizer; and various auxiliary programs such as a response time distribution curve plotter. Simulator logic is based on standard 3270 line discipline, and is useful in specifying display and printer requirements, modems, and line loading. Simulation results are used with the synthesizer to obtain network layouts and comparative cost-performance values for the various approaches to system design and response performance. Since the programs operate from user-generated traffic profiles, they can also be used for assessing new application requirements. This same feature enables prediction of cost savings where an intelligent 3270 equivalent can be used to reduce line transaction rates. Supplied for access via a nationwide timeshare service, the system allows for interactive design between the analyst and the programs. Installation fee is \$2,500, including user training and a post-installation consulting allowance. *Berglund Associates, Inc., Moorestown, New Jersey.*

Circle No. 348 on Inquiry Card

## SINGLE-USER PDP-11 OS

DEC has announced the development of a low-cost, single-user operating system for their PDP-11 minicomputer. Called RT-11, the real-time system has library functions that enable data and programs to be stored and retrieved from tape. System programs include: Edit, a text editor; Macro-11, an upward-compatible PDP-11 assembler; ODT, an on-line debugger; PIP, a peripheral interchange program; Link, a linker and overlay builder; and, optionally, Basic/RT-11, a Basic compiler extension. The RT-11 monitor performs synchronous or asynchronous, device-independent I/O. The resident portion of the monitor includes the system device handler, console terminal handler, and system tables, and requires only 1.25K of memory. The system can mask the unique characteristics of a particular I/O device, so that programs may use a single, coded routine to drive any supported peripheral. RT-11 is designed around a contiguous file structure that admits fast throughput and easy directory manipulation. Mass storage device layout is standardized, consistent with the system's capability for device-independent I/O. RT-11 operating system is available through license for \$750. *Digital Equipment Corp., Maynard, Mass.*

Circle No. 350 on Inquiry Card

## PLOTTING PROGRAM SERVICE

A National Drafting Library Network for high-power graphics programs, available to digital plotter users on a timesharing basis, has been introduced by Adrec, in cooperation with Xynetics. Adrec offers a broad range of programs for civil engineering, circuit design, scientific, and management data graphics. The programs are stored on an IBM 370/155 computer and can be accessed over phone lines by using a Xynetics Remote Job Entry (RJE) drafting system. The RJE system allows users to load program cards at their installations and to use the full power of the large timeshared IBM 370 to process the program data and produce output directly on the user's Xynetics plotter. The Adrec library provides RJE users with a full range of graphics software for a simple usage fee. At present, the library includes civil engineering programs to draw topographic maps, 3D views, exposures, sections, slopes, watershed, and cut-and-fill

analysis. Programs are available — using standard COGO output and simple commands — to produce finished drawings for entire projects including streets, rights of way, utility lines, subdivision maps, and perspectives for environmental impact analysis. Other programs produce isometric schematics of piping layouts, convert rough sketches to finished drawings of circuits diagrams, and provide the capability to do most any kind of graphing of scientific and management data. *Xynetics Inc., Canoga Park, Cal.*

Circle No. 342 on Inquiry Card

## PDP-11 2780 EMULATOR

The ORI 2780 emulator interfaces with standard DEC DOS, providing complete compatibility with DOS device-independent file structures, and can be implemented on PDP-11/10 through PDP-11/45 minicomputers. All standard 2780 functions are available, including multiple record transmission; horizontal tab; EBCDIC character set; transparent or non-transparent modes; automatic blank suppression on input; 80, 120, 132, or 144 character print lines; and card punching. The emulator also eliminates the need for DEC cyclic-redundancy-check hardware. A dynamic line stabilization routine which adjusts a line settling and transmission algorithm for noisy, transient line conditions is also included. *Oregon Research Institute, Eugene, Ore.*

Circle No. 349 on Inquiry Card

## AED SYSTEM FOR UNIVAC 1108

SofTech has introduced a Univac 1108 version of AED, a systems programming language. AED consists of a compiler, various libraries, and support programs, and facilitates modular programming for the construction of large software systems. The system is especially applicable to situations where design evolution or enhancements are anticipated, or where the programs must be portable from one computer make to another. AED is also used as a development language for mini-computer program development on a large CPU and cross-compiled for use on the target mini. Univac 1108 AED may be purchased for \$15,000. *SofTech, Waltham, Mass.*

Circle No. 353 on Inquiry Card

# NEW LITERATURE

## OEM MINICOMPUTERS

Interested in an under \$1,000 mini-computer? A new brochure from Computer Automation chronicles the story of their Naked Mini/LSI, a full-scale 16-biter priced at \$990 in OEM quantities of 200. In addition to the evolutionary history of the Naked Mini/LSI, the brochure covers in detail the performance and hardware features of the processor and its companion fully-clothed brother, the Alpha/LSI, including descriptions of supporting Real-Time Executive, Operating System, Conversational Assembler, and Basic compiler software. *Computer Automation, Inc., Irvine, Cal.*

Circle No. 370 on Inquiry Card

## FIXED HEAD DISK STORAGE

Complete specifications are available on the Fastrack 3 family of high capacity, high speed head-per-track disk memories. Designed for real-time, virtual memory or other fast access, short swap time applications, Fastrack 3's are available with capacities of 15.4, 23, 46, or 92.2 Mbits, access times of 8.4 or 5 millisecond, and data transfer rates of 7.2 or 12 MHz, bit-serial. *Pacific Micronetics, Inc., San Diego, Cal.*

Circle No. 374 on Inquiry Card

## SYSTEMS PROGRAMMING

A guide to the applications of systems software to high performance computer operations, relating the needs of EDPers in the design of operating systems, compilers, real-time systems, and data management systems, is available from CSC. Other subjects covered include minicomputer software and hardware/software evaluation. *Computer Sciences Corp., Los Angeles, Cal.*

Circle No. 398 on Inquiry Card

## REAL-TIME PROCESSING

Solutions to problems in the world of real-time processing are outlined in a bulletin on SEL's 85/86 32-bit systems. *Systems Engineering Labs, Ft. Lauderdale, Fla.*

Circle No. 372 on Inquiry Card

## CRT TERMINALS

A short form catalog is available on Ann Arbor's 15 standard Series 200 CRT display controllers, free-standing keyboards, and video monitors. Controllers described include parallel and serial RO types in character addressable, cursor addressable, and burst load configurations; and cursor addressable serial KSR types. *Ann Arbor Terminals, Ann Arbor, Mich.*

Circle No. 394 on Inquiry Card

## SCIENTIFIC/MEDICAL PROGRAMMING GUIDE

A self-learning text describes the use of Nutran, a Fortran-like conversational language for scientific and medical data acquisition and analysis. Nutran is applicable to any commercial or industrial problem requiring a minicomputer and a simple language for performing computations and large volume data I/O. Available on a letterhead request basis from: *Nuclear Data Inc., P.O.B. 451, Palatine, Ill. 60067.*

## SOLID STATE MEMORY

AMS has released a data sheet on their line of Basic Storage Unit (BSU) semiconductor PC card memory modules. The BSUs come in 1 Kword increments up to 4K, and in word sizes of up to 18-bits, with 300 nanosec access and 350 nanosec cycle times. *Advanced Memory Systems, Sunnyvale, Cal.*

Circle No. 383 on Inquiry Card

## MINICOMPUTER PRINTER/PLOTTER

An answer to minicomputer users' needs for print/plot capabilities is discussed in a new release from Gould Data Systems. The Gould 5000, an electrostatic printer/plotter that features such characteristics as a 1200 LPM print rate, a 132-character line, and a plotting resolution of 100 dots/inch vertically and horizontally, is reviewed in a product folder. Also covered are printing and plotting software packages for minicomputer application. *Gould Data Systems, Newton, Mass.*

Circle No. 371 on Inquiry Card

## WE SUPPLY MORE THAN DATA

## WE SUPPLY INFORMATION

Each of our reports has been designed not just to present facts but to offer a methodology of how to use these facts to implement an efficient and economical data processing system. We haven't covered all the significant problem areas yet but we are getting there!

- Data Entry  
Data Entry Today  
Optical Readers Today
- EDP Evaluation  
EDP Facility Evaluator
- EDP Planning  
Forecast 80: Data Processing
- EDP Current Awareness  
Monthly EDP In-Depth Reports
- Time Sharing  
Time Sharing Directory  
Time Sharing Packages —  
Management Information Systems and  
Banking and Finance
- Data Processing Training Seminars

We haven't enough space to describe each publication. Drop us a note or circle the appropriate number on the inquiry card and we will send you our brochure in return mail with a copy of *The Computer Family Tree*, an illustrated growth of computer systems, as our gift for your inquiry. You can't lose!

Management Information Corp.  
140 Barclay Center  
Cherry Hill, New Jersey 08034  
609-428-1020



Circle No. 399 On Inquiry Card

## NEW LITERATURE

### CONSULTING & MANAGEMENT SERVICES

Brandon Applied Systems has issued a series of one-page summaries outlining their EDP consulting and management services. Brandon's capabilities include program conversion, system conversion, and system updating; the evaluation or planning data processing systems; formulation of standards for system development, programming, operations, and documentation; resource management and planning; and training and educational consulting. *Brandon Applied Systems, Inc., New York, N.Y.*

Circle No. 378 on Inquiry Card

### DAA USER'S GUIDE

The guide for terminal users describes the technical requirements and ordering procedures for specifying proper Data Access Arrangements. *Western Union Data Services, Mahwah, N.J.*

Circle No. 381 on Inquiry Card

### WORD PROCESSING SYSTEM

A series of brochures are available detailing the characteristics and applications of Documate, a minicomputer-based text input, formatting, edit, and word processing system. *Index Systems/Documate, Cambridge, Mass.*

Circle No. 379 on Inquiry Card

### DATA COMMUNICATIONS PRODUCTS

A short form catalog covers the salient features of Syntech's line of Bell-compatible modems, higher speed modems, TDM multiplexers, and error rate test sets. *Syntech Corp., Rockville, Md.*

Circle No. 391 on Inquiry Card

### CRT DISPLAY TERMINAL

A condensed spec sheet on the Vistar/GT interactive display terminal is available. The Vistar/GT offers an 80-character by 24-line screen, RS-232-C and current loop interfaces, and eleven switch-selectable data rates of from 75 to 18,000 bps. *Infoton Incorporated, Burlington, Mass.*

Circle No. 386 on Inquiry Card

### GRAPHICS SYSTEM

Digitizer, graphic display, plotter, processor and software products configured into DSI's Sketch-Prep Automated Graphics Information System are discussed and illustrated in a new brochure. *Dimensional Systems, Inc., Lexington, Mass.*

Circle No. 368 on Inquiry Card

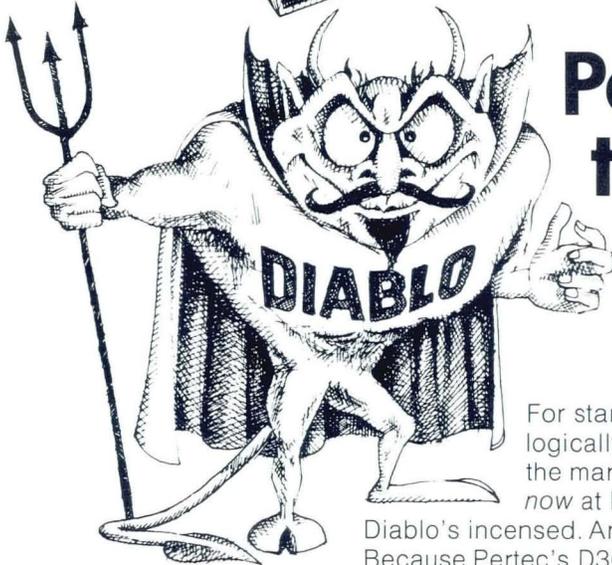
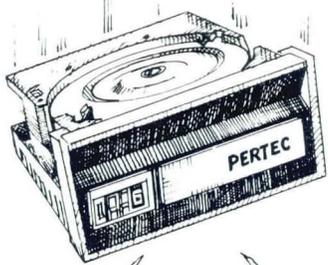
### SYSTEM 3 MEMORY

A data sheet covers the Mod 10+, replacement/expansion main memory for IBM System 3 model 10 mainframes. The Mod 10+ is available in expansions of 8K to 48K, and is fully compatible with IBM hardware/software. *Fabri-Tek Inc., Minneapolis, Minn.*

Circle No. 382 on Inquiry Card

## INDEX TO ADVERTISERS

|  |                        |
|--|------------------------|
| AIRFLOW CO. ....   | 36                     |
| AVTEL CORP.<br>AN AIRTRONICS SUBSIDIARY.....                       | 19                     |
| BERGLUND ASSOCIATES, INC.....                                      | 14                     |
| CALIFORNIA COMPUTER PRODUCTS, INC.....                             | 1                      |
| CINCINNATI MILACRON<br>PROCESS CONTROLS DIV.....                   | 9                      |
| DATA RESEARCH CORP.....  | 46                     |
| DIGITAL EQUIPMENT CORP.....  | 28, 29                 |
| ELECTRONIC ASSOCIATES, INC.....                                    | 2                      |
| FROST & SULLIVAN, INC.....   | 53                     |
| GTE INFORMATION SYSTEMS.....                                       | 22, 23                 |
| GENERAL DATACOMM INDUSTRIES, INC.....                              | 10                     |
| GOULD INC.<br>DATA SYSTEMS DIV.....                                | Cover 2                |
| HAZELTINE CORP.....  | Cover 4                |
| HUGHES AIRCRAFT CO.<br>INDUSTRIAL PRODUCTS DIV.....                | 11                     |
| INTERNATIONAL DATA SCIENCES, INC. .Tab card between Cover & Page 1 |                        |
| MANAGEMENT INFORMATION CORP.....                                   | 55                     |
| MODERN DATA.....   | 12, 13, 15, 32, 35, 47 |
| NIXDORF COMPUTER, INC.....   | 33                     |
| PERTEC CORP.<br>PERIPHERAL EQUIPMENT DIV.....                      | Cover 3                |
| SPECTRON CORP.....   | 5                      |
| SUMMIT INTERNATIONAL CORP.....                                     | 27                     |
| SYCOR INC.....   | 6, 7                   |
| TEKTRONIX<br>INFORMATION DISPLAY DIV.....                          | 25                     |
| TELE-DYNAMICS<br>DIV. OF AMBAC.....                                | 21                     |
| UNITED VIDEO INC.....  | 4                      |
| WRIGHT LINE.....   | 17                     |



# Pertec's out to beat the devil at his own game.

For starters we've developed the most technologically advanced and complete disk drives on the market. They're available and deliverable now at Pertec.

Diablo's incensed. And for good reasons.

Because Pertec's D3000 disk drives are available in top and front loading versions, plug-compatible, and identical in interface and size (8 $\frac{3}{4}$ " x 26"). Both offer 35 msec access time, margin testing, a choice of electronic or mechanical sectoring, an optional fixed platter. And a built-in power supply—all within the drive and identical in both configurations.

And you get the same assistance in design, development and maintenance of your system with our disk drives as you do with our tape drives . . . Factory training for your service people. Back-up by a service and support network spanning 30 U.S. cities and 20 foreign countries.

All at surprisingly low prices.

Pertec is serious about satisfying your disk drive requirements, and we're proving it.

Find out more. Call us collect in the area nearest you: Boston (617) 890-6230; Chicago (312) 696-2460; Los Angeles (213) 996-1333; London (Reading) 582-115. Or write us at 9600 Irondale Avenue, Chatsworth, California 91311.



The best values in computer peripherals come from

## PERTEC

Already the world's largest independent manufacturer of tape transports.

# 7,000 Installations in the U.S. alone!

**What better testimony to the superior performance,  
reliability, and recognized value of  
the 'Hazeltine 2000' computer terminal.**

Hazeltine has won acceptance as the Leader in teletypewriter-compatible video display terminals because Hazeltine delivers a good deal *more* than equipment alone.

Hazeltine provides a worldwide sales and service organization, technical assistance through a customer support staff of Applications Engineers, a production capability to meet the needs of the largest customers, and a choice of flexible financial arrangements.

**When you consider the Terminal  
— consider the Company!**

## Hazeltine Corporation

Computer Peripheral Equipment Greenlawn, N.Y. 11740 (516) 549-8800

EAST NEW YORK (212) 586-1970 □ BOSTON (617) 588-8700  
EDISON, N.J. (201) 828-5678 □ PHILADELPHIA (215) 676-4348  
PITTSBURGH (412) 343-4449 □ WASHINGTON, D.C. (703) 979-5500

MIDWEST MINNEAPOLIS (612) 854-6555 □ CHICAGO (312) 986-1414

CLEVELAND (216) 752-1030 □ DETROIT (313) 355-3510

SOUTH DALLAS (214) 233-7776 □ ATLANTA (404) 252-2045

GREENSBORO, N.C. (919) 272-5444 □ HOUSTON (713) 783-1760

ORLANDO (305) 423-1201

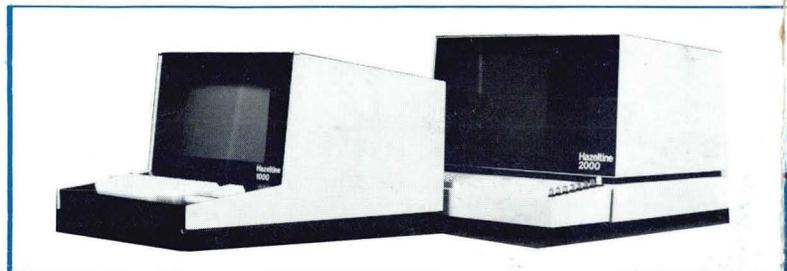
WEST SAN FRANCISCO (415) 398-0686 □ DENVER (303) 770-6330

LOS ANGELES (213) 553-1811 □ SEATTLE (206) 242-0505

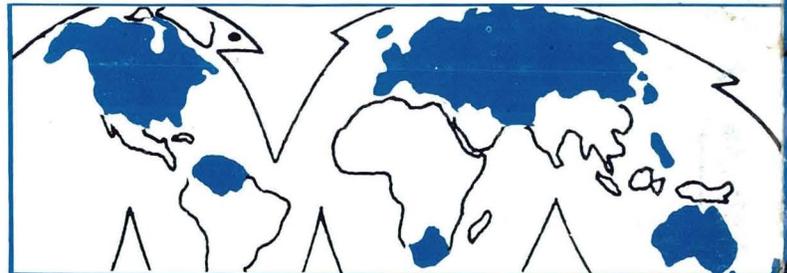
**CIRCLE NO. 22 ON INQUIRY CARD**



New 100,000 sq. ft. manufacturing facility dedicated to Industrial Products.



New 'Hazeltine 1000' joins the 'Hazeltine 2000' in establishing value standards for computer terminals.



Marketing and Service Organization provides customer assistance and technical support in principal cities throughout the world.

