



# DEC

PROFESSIONAL

- Quick DCL debugging
- Doubling your PRO 350 memory
- DEC's new FPA for the J-11

Studio with Plaster Head, 1925 (summer) by Pablo Picasso



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# EMULEX TALKS DEC

19

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*The CS23 communications UNIBUS DHU11 compatible multiplexer offers 32 terminal lines having three times higher throughput than DEC. That's twice as many as DEC's DHU11 at half the cost per line. And it features 33% power savings at maximum configuration.*

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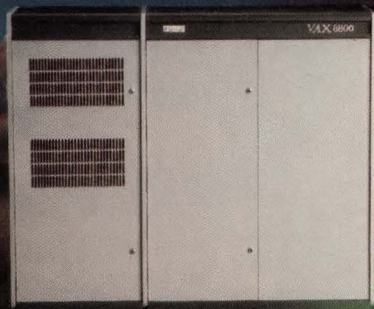
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# FINALLY, A MICRO-TO-MAINFRAME PIPELINE THAT LETS YOU PLAY WITH A FULL DEC.



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### FREEDOM'S JUST ANOTHER WAY OF SAYING RAF

RAF combines the capabilities of your PC with those offered by DEC mainframes setting a new standard for all communications products. The RAF approach: Allow PC users to remain PC users.

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RAF provides you with the freedom to access actual DEC mainframe files directly from the PC programs you use today. Even MS-DOS commands can manipulate remote files. Imagine having the freedom to back up your PC onto the mainframe with a standard COPY command.

### THE FREEDOM TO ACCESS REMOTE COMPUTERS

What's more, RAF provides you with other freedoms. Like automatic access to remote computers through a scripting mechanism that allows you to define each step of an automatic login. Or if you prefer, a complete VT100 terminal emulator unlike any other software system. Enjoy the freedom to instantly jump from a PC program to your DEC mainframe as a VT100 terminal and return to your PC exactly as you left it.

### THE FREEDOM TO USE MAINFRAME POWER DIRECTLY FROM PC PROGRAMS.

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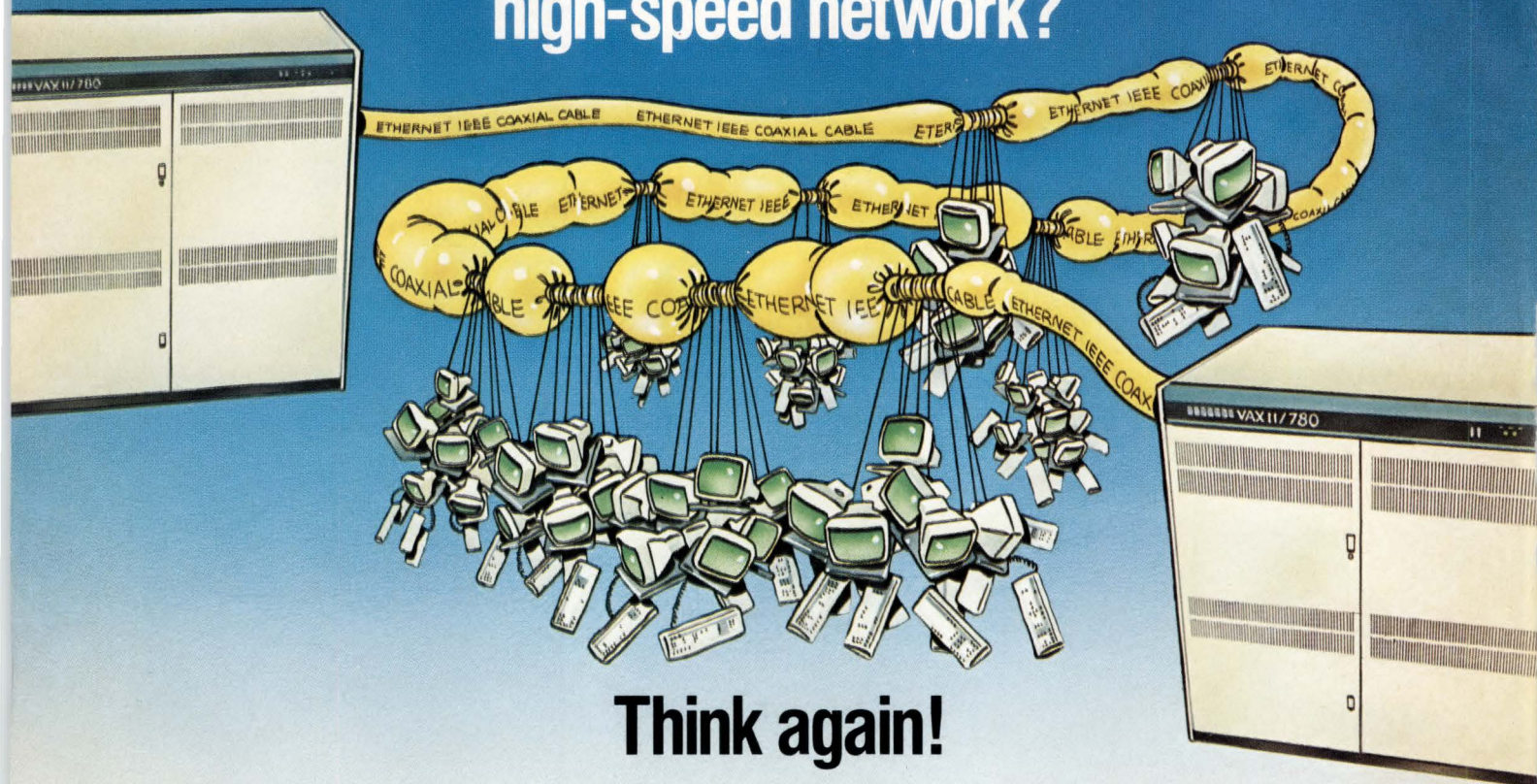
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# Thinking of tying low-speed terminals onto a high-speed network?



## Think again!

A high-speed LAN is ideal for file transfer, distributed processing and CPU-to-CPU communications. But using it for terminal traffic can cause problems.

### You may be tying up bandwidth.

Low-speed terminal traffic on a high-speed network can rob bandwidth where it's needed most. That means slow file transfers and sluggish response for all network users. The protocol overhead required for a terminal to send small data packets across an Ethernet® link can mean that only 10% of the 10 Mbps bandwidth is available.

By connecting your terminals through an Equinox® Data PBX and connecting your computers together with Ethernet, your LAN runs at top efficiency. An Equinox Data PBX dedicates a full 12 Mbps to terminal data traffic. More than 1300 devices can run continuous 9600 bps data at the same time, providing the best possible response through the network.

**You'll tie up about \$500 per terminal.** When you consider the cost of Ethernet Terminal Servers, Taps, and

Cable, Ethernet can cost between \$300 and \$800 per terminal. An equivalent solution using an Equinox Data PBX with our 8-channel Terminal Servers and twisted pair wiring is about \$100 per terminal.

### You could tie up your computer.

Some Ethernet LANs handle terminal switching by running special software in your computer. So adding terminal traffic means your computer spends more time running the network and less time running applications. An Equinox Data PBX requires no special

software and handles all terminal network processing without disturbing the host. It even allows you to monitor the network load and provides additional security for access control.

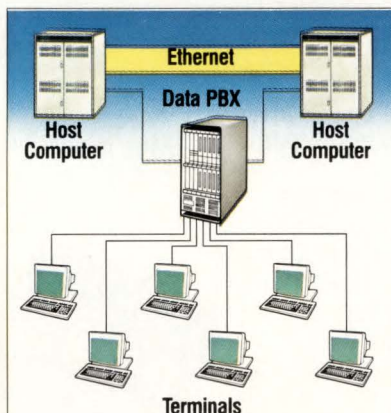
### We won't tie you down.

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# C CONTENTS

SEPTEMBER 1986

VOL. 5, NO. 9

## EDUCATION

### 30 A 'SPECIAL' EVENT *by Don Weyel*

Edinboro University of Pennsylvania — with a little help from DEC — pressed a network into service, trained volunteers in the use of Videotex and hosted the 29th National Wheelchair Games, all in three weeks.

page 30

### 38 MASTER THE KEYBOARD *by Mary Jane Sunkel*

Students at Northwest Missouri State University learn touch typing on a VAX 11/780, and eliminate the old "hunt and peck" approach for good.

### 44 LEARNING TO LEARN *by Al Cini*

What technical teaching needs are some student activists.

## FEATURES

### 48 SOFTWARE: SCRIBE *by Bruce Feldman*

Document Production Software.

### 56 PCs: PRO 350 MEMORY EXPANSION *by Bruce M. Eteson*

How to double your memory and free an option slot at the same time.

### 60 VAX: VAX's TEXT PROCESSING UTILITY *by Mike Rechtman*

And TECO begot VTEDIT, while KED begot EDT, and EDT begot EDT Version 2.0 and everyone started writing EDTINI.EDT files. And then along came TPU . . .

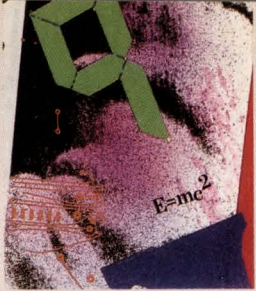
### 68 VAX: EASY SCREEN FORMATTING *by Thomas Bilodeau*

Here's a way to simplify screen design for B+2 programmers.

*Continued on page 6.*

#### ON THE COVER:

Pablo Picasso.  
Studio with Plaster Head.  
1925 (summer).  
Oil on canvas, 38 $\frac{7}{8}$ "x51 $\frac{7}{8}$ ".  
Collection, The Museum of  
Modern Art, New York.  
Purchase.  
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The Museum of Modern  
Art, New York.



# CONTENTS

Continued from page 5

## 72 **RT-11: MACRO-11** by Jeff Corbett

Calling MACRO-11 from CTS-300 DIBOL.

## 78 **HARDWARE: VT200 SERIES** by Eliezer May

Gateway to the computer — Part 1.

## 84 **HARDWARE: THE FALCO 5220** by Victor J. Chorney

A DEC VT220/100/52 emulator with numerous technical capabilities.

## 88 **DBMS: LAZER** by Dave Mallery

A full DBMS in the classic sense.

## 94 **DEC NEWS: VAX 8550, 8700 UNVEILED** by Linda DiBiasio

Latest BI-based products reaffirm DEC's commitment to 'closed' architecture.

## 96 **RSX: A WORTHY TOOL** by Ed Judge

SDT: A new symbolic debugging tool.

# DEPARTMENTS

### From the Lab

by Dave Mallery

We Test the New J-11 Floating Point Accelerator...106

### Resource Executive

by Ralph Stamerjohn

DECUS: Go Where the Action Is ..... 108

### Let's C Now

by Rex Jaeschke

Enumerations and the Comma Operator.... 116

### Networking

by Bill Hancock

Paying for Experience?..... 124

### RSX Clinic

by James McGlinchey..... 132

### DCL Dialogue

by Kevin G. Barkes

Quick and Dirty DCL Debugging ..... 136

### The Back End

by John C. Dvorak

Dear NCC, Get Your Act Together!..... 178

### Publisher

..... 12

### Editorial

..... 16

### Letters

..... 18

### Dateline DEC

..... 22

### ARISTALK

..... 140

### Computer Bookshelf

..... 146

### Marketplace

..... 148

### Product Showcase

..... 172

### Classified

..... 174

Advertisers Index ..... 176



page 48



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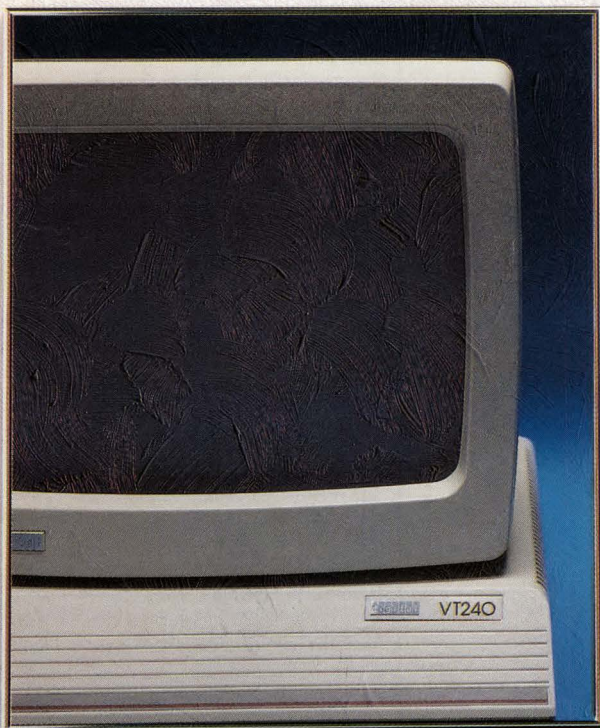
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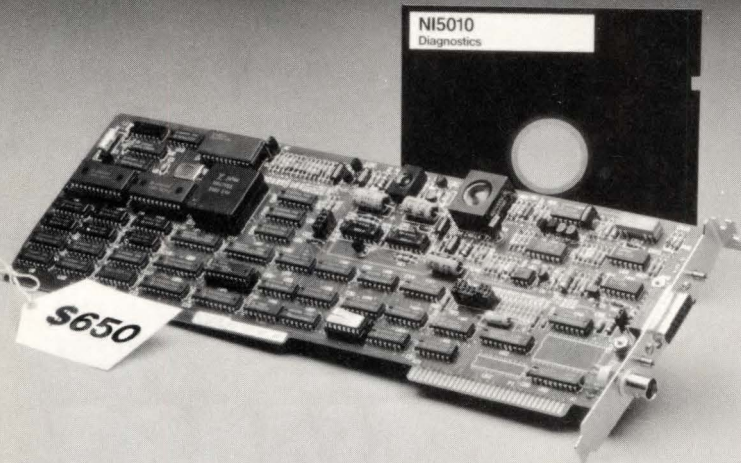


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**SC7003**—Switch selectable to run 11/780/785, operates transparently with UNIX BSD 4.2, ULTRIX-32, and VMS; also features a large 16K buffer.

## **VAX 8600/8650**

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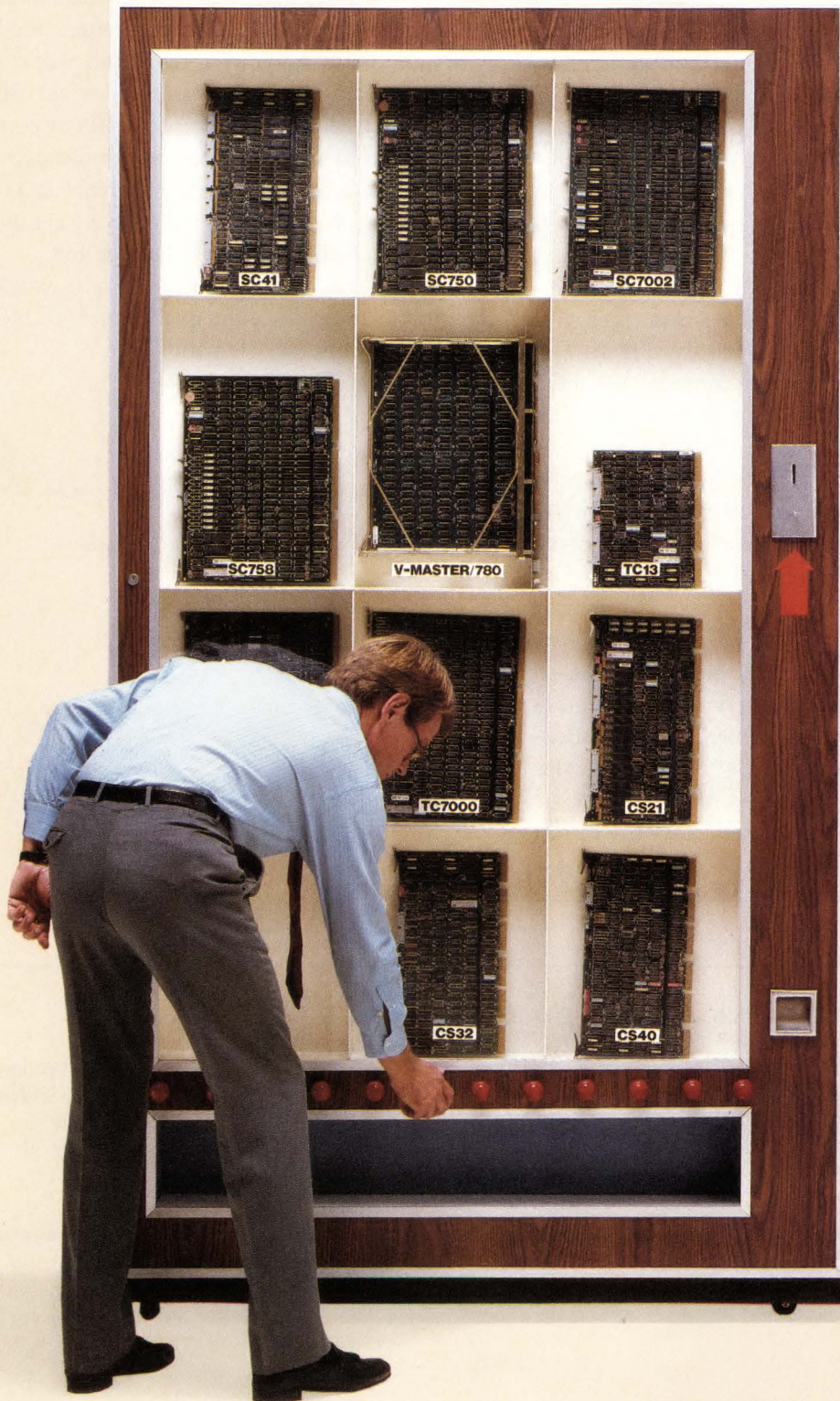


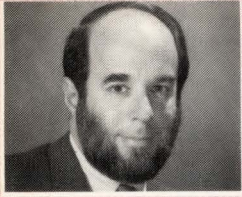
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# THE EMULEX VAX ALTERNATIVE





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**Carl Marbach**

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*DEC PROFESSIONAL* is your technical, professional journal concentrating on articles that teach you about hardware and software. Hopefully our articles stimulate you to think about how the concepts presented can be applied to your own jobs and how they can improve your current applications.

Many of our articles are written by our own professional staff members who have had extensive experience with DEC computers and the general purpose computer field, but a significant number of articles also comes from the user community of which you are a part. It is the collective experience of these people that helps us to bring the timely, important and coherent editorial to you. After you have labored over a tricky communications network, or built an intertwined set of applications, think of us — all the other DEC specialists who would love to have the benefit of your experience.

We operate several DEC computers, not only to run the business of the magazine, but also for the purpose of testing and using the hardware and software we write about.

I am often asked, "What is your editorial policy?" or sometimes, "How do you position *DEC*

I have been using DEC computers for almost 20 years and I still enjoy logging in and working on each of our systems. There is much more I could tell you about what we have here, including how all our computers are available from any terminal in our building, or how we have one cable sending multiple terminal data to the computer room, or what new software we are using — but that's what you read this magazine for.

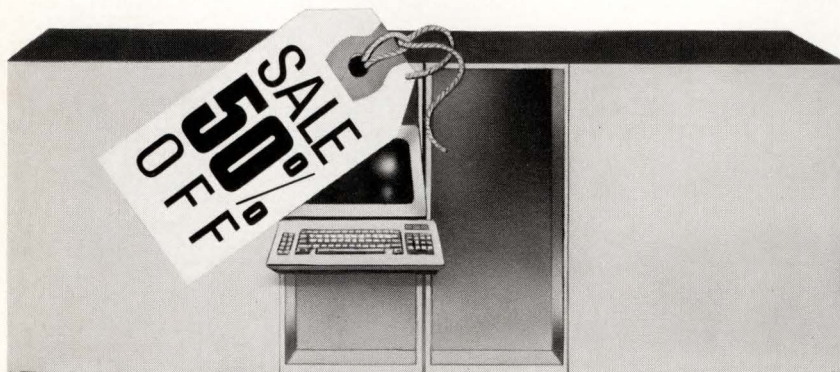
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Publisher

VAX 11/750	8 MB of memory	900-MB Disk	1600/6250 Tape	
MICROVAX II	13 MB of memory	700-MB Disk	TK50 tape/RX50 floppy	
MICROVAX I	4 MB of memory	40-MB Disk	RX50 Floppy	Many Rainbows
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PDP-11/40	1 MB of memory	160-MB Disk	800/1600 tape	DECmate II
PDP-11/73	4 MB of memory	450-MB Disk	800/1600 tape	DECmate III
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V5 applies artificial intelligence to SQL query optimization. For example, few DBMSs can optimize the query "Select accounts 90-days overdue and accounts over \$10,000." But only ORACLE can optimize "Select accounts 90-days overdue or accounts over \$10,000."

### □ REASON #2: ARRAY PROCESSING OPTIMIZES ACCESS TO LARGE SETS OF DATA.

Relational DBMSs have always dealt with **logical** sets of data. But they manipulated only one **physical** record at a time. V5 eliminates overhead by physically delivering arrays of hundreds, even thousands, of records at a time.

### □ REASON #3: PARALLEL-PROCESSING OPTIMIZES COMPUTER RESOURCE USAGE.

V5 is 100% re-entrant shared code, and ORACLE's parallel-processing architecture fully exploits modern dyadic and quadratic processors from IBM, and other multi-processing computers such as those from DEC and Stratus. So ORACLE uses all the MIPS in parallel-processor configurations.

### □ REASON #4: MULTI-TABLE CLUSTERING OPTIMIZES JOINS.

ORACLE stores data from different tables on the same physical disk page. This technique—called *multi-table clustering*—permits you to access data from multiple tables in one disk read operation. Clustering improves ORACLE performance on all multi-table operations, such as join queries, update transactions, etc.

### □ REASON #5: HIGH-SPEED RELATIONAL SORT FACILITY OPTIMIZES DATA AGGREGATION

Ad hoc relational queries frequently request that data be grouped, ordered or otherwise sorted. V5's internal sort facility performs aggregation and elimination early, faster than previously thought possible.

### □ REASON #6: EFFICIENT ROW-LEVEL LOCKING OPTIMIZES TRANSACTION THRUPUT.

Row-level locking and a read-consistency model optimizes ORACLE V5 transaction concurrency. For the first time, high transaction thuput is achieved by a fully relational DBMS.

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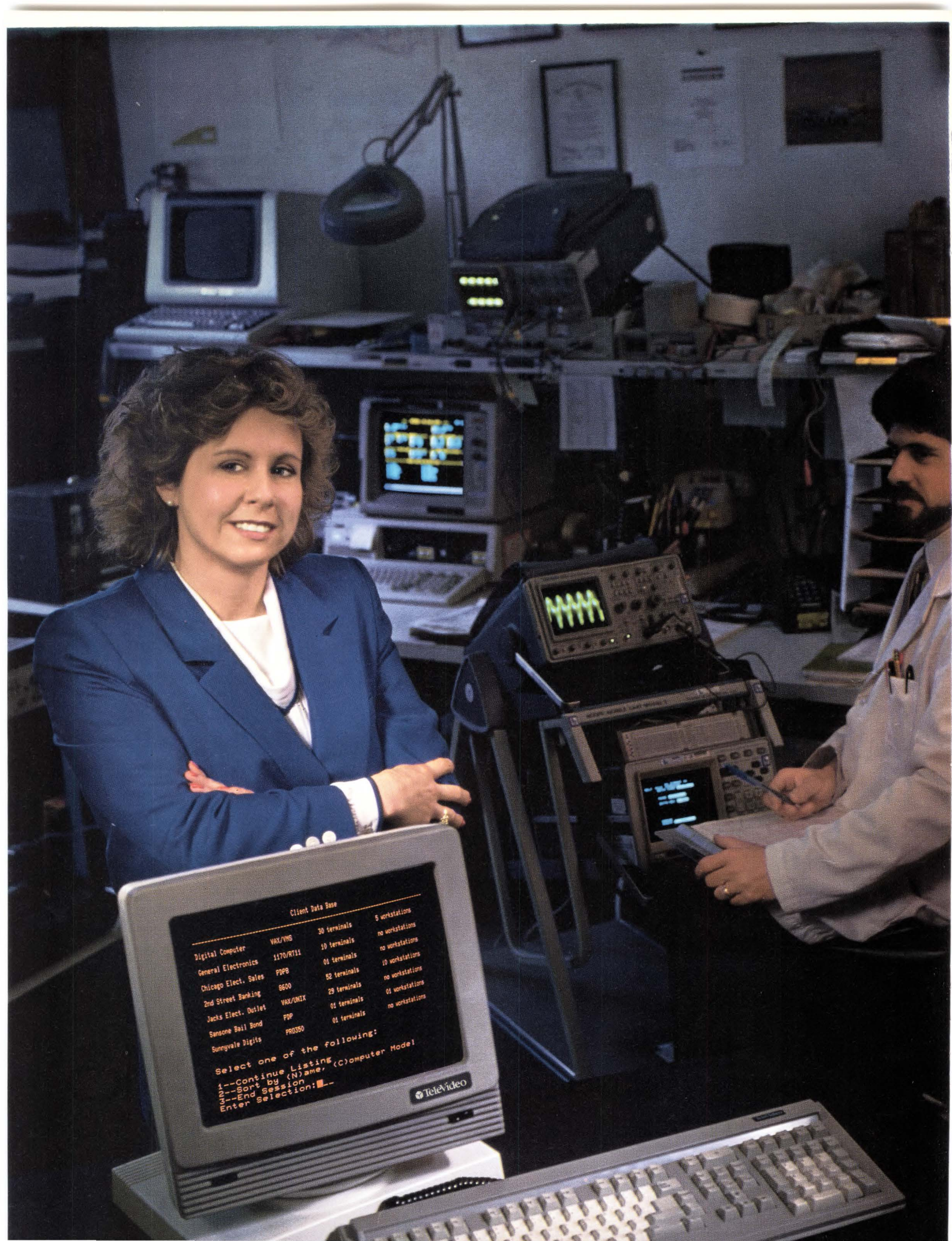
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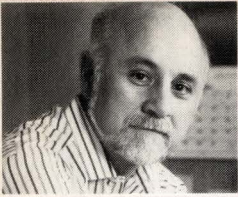
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## EDITORIAL

**Dave Mallery**

# Hail!

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There was a terse news item in the trade press reporting the announcement by the Navy of Admiral Grace Hopper's retirement.

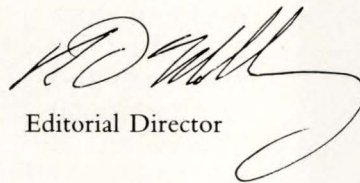
I don't know the circumstances or the timing. My entire being wants to spring to attention and salute this most inspiring leader of men and women.

To hear her speak was a life-shaping experience. Never to have heard her, a tragedy. I have stood, in tears, as she told four or five thousand people that the greatest privilege of her life was to serve as an officer in the United States Navy.

Many will recount her contributions to our industry in its early years, many will recall her legendary nanoseconds.

I can only tell you that this wonderful woman taught me leadership and duty.

Ad multos annos, Admiral!



Editorial Director



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## "Introducing the first Preview Terminal for Laser Printers."

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"And the Preview Printing System is geared for growth. That's why Barry Ferris, our V.P. of Software Development is busy working on new software extensions. And if Barry's working on it, you know you can depend on versatility far into the future.

"Get a good look at what our Preview Terminal can do for you, write for a complete information package to P.O. Box 261580, San Diego, CA 92121, or call **619-587-0787.**"

Sonny Burkett  
VP Marketing  
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## LETTERS

### NO SCREENS

In your May issue there is a review of *GW-BASIC* that gave a great deal of information about this program. Unfortunately, the article failed to mention one very important fact: It is unable to print out graphic screens. I bought *GW-BASIC* about eight months ago and I am pleased with the product. However, the ability to create pictures is nice, but the ability to get hard copy would be even better. Anybody considering the purchase of *GW-BASIC* should be aware of this problem.

*Alec Greenfield  
Rochester, New York*

### KUDOS

Congratulations on your (our) fourth anniversary! I have just finished reading the July issue and am absolutely astounded. The time and effort spent by the staff in implementing the new design has been worth every frustration and expenditure — you have turned a great magazine into a work of art. I am sure there is something in this single issue for anyone who has even the remotest interest in the DEC world.

I have been noticing the appearance of John Dvorak's name in the "Letters" section with increasing frequency. Make sure his section continues to appear; I don't always like or agree with his observations, but I sure love to read "The Back End." Again, thanks for all the time, effort, energy, and care spent in *DEC PRO*'s new look — this reader appreciates it. It will almost be painful to wait for the next issue.

*Roman E. Gillen  
Truckee, California*

Address letters to the editor to the *DEC PROFESSIONAL* magazine, P. O. Box 503, Spring House, PA 19477-0503. Letters should include the writer's full name, address and daytime telephone number. Letters may be edited for purposes of clarity or space.

I want to compliment you on the new look of the magazine (July '86). There were great columns by Stamerjohn, Hancock, and McGlinchey, and our VMS group liked the Hastings article.

*Chris Thorn  
New York City, New York*

### NEW ISN'T BETTER

I note that one of your competitors recently changed format to the new and wonderful "tabloid" to better deal with the urgent issues of the day. I find the new format inconvenient, etc. Please don't follow their lead.

*Jack Berger  
Minneapolis, Minnesota*

*Don't worry. We have no intention of changing our format. DEC PROFESSIONAL magazine is in its fifth year of providing informative, in-depth technical articles, and the*

*best in related services to our readers. We will continue to publish in the easy-to-read, easy-to-save format that enables our readers to refer to us again and again.*

### IDRIVE UPDATE

Thank you for continuing to print articles on the Rainbow, including the two on IBM PC-compatible diskette drives in the July issue. However, contrary to what was implied by author N. Jay Bassin ("Suitable Solutions' IDRIVE"), it is possible and relatively straightforward to transfer data on diskette in both directions between an IBM PC and a Rainbow running MS-DOS without investing in expensive add-on hardware.

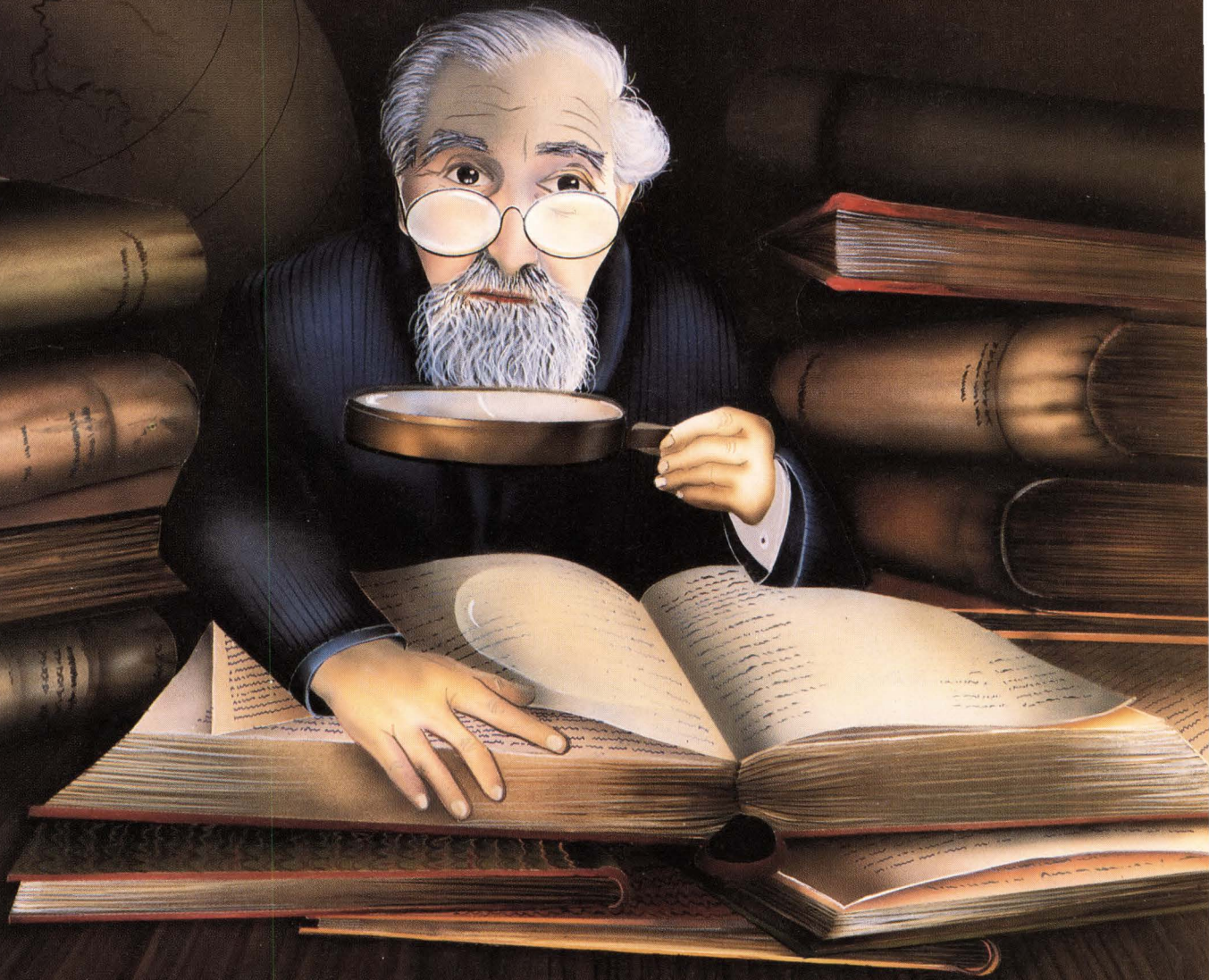
As the article points out, transferring files from the PC to the Rainbow is easy: format the diskette *single-sided* on the PC via:

FORMAT/1

and copy the files you wish to transfer onto the diskette. The diskette may then be read directly under MS-DOS on the Rainbow simply by inserting it into the drive; the operating system automatically recognizes the diskette as an IBM-style diskette and acts accordingly.

Where Mr. Bassin erred is that the Rainbow can also write single-sided IBM diskettes under MS-DOS to transfer files from the Rainbow to the IBM PC. The one catch is that the FORMAT program on the Rainbow will not format an IBM-style diskette. To do this you need a program such as MDG's Media Master (\$98 list price). This program must run under CP/M where it has direct access to the Z80, which controls the RX-50 drive. The Z80 controls the drive under MS-DOS, too, but indirectly

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# STATUS

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through the operating system; it is not accessible from a user-written program. You need only format the diskettes under CP/M (I usually do several at once); they may then be written and read transparently under MS-DOS using COPY or whatever.

For the latter to work reliably you must start with either brand new diskettes or diskettes that have been bulk-erased. I use a bulk tape eraser which retails for about \$15 at Radio Shack. Diskettes created in this manner also can be written by the IBM PC to transfer files back to the Rainbow. However, once the diskette has been written on by the PC it may not be used to transfer new files from the Rainbow to the PC without first bulk-erasing and reformatting it.

I have been using this method reliably for over two years. While the hardware products described in your article are superior since they can read and write *double-sided* diskettes, the above scheme works just fine for occasional file transfer.

*Bryan Higgins  
Berkeley, California*

## DATATRIEVE REVISITED

I must commend Robin C. Johnson for her excellent job of describing DATATRIEVE (July 1986). It is extremely difficult to completely characterize a product like DATATRIEVE which has so many features and is so complex.

Johnson reported, "DATATRIEVE does not allow more than one level of hierarchy in a domain." This is incorrect and over-simplified.

There are two types of hierarchies within a domain — FIXED OCCURS and VARIABLE OCCURS.

FIXED OCCURS clauses are allowed within other FIXED clauses to any level of nesting. The following record definition illustrates the point.

```
DEFINE RECORD TEST__RECORD
  USING
01 TEST__REC.
  03 FIELD1 PIC X.
  03 LIST1 OCCURS 3 TIMES.
```

```
05 LIST1__FIELD1 PIC X.
05 LIST2 OCCURS 2 TIMES.
07 LIST2__FIELD2 PIC X.
;
DTR> DEFINE FILE FOR TEST;
DTR> READY TEST WRITE
DTR> STORE TEST
Enter FIELD1: A
Enter LIST1__FIELD1: B
Enter LIST2__FIELD2: C
Enter LIST2__FIELD2: D
Enter LIST1__FIELD1: E
Enter LIST2__FIELD2: F
Enter LIST2__FIELD2: G
Enter LIST1__FIELD1: H
Enter LIST2__FIELD2: I
Enter LIST2__FIELD2: J
DTR> PRINT TEST
```

	LIST1	LIST2
FIELD1	FIELD1	FIELD2
A	B	C
		D
	E	F
		G
	H	I
		J

And FIXED OCCURS are allowed within VARIABLE OCCURS clauses. An example of this is as follows:

```
DEFINE RECORD TEST__RECORD
  USING
01 TEST__REC.
  03 FIELD1 PIC X.
  03 ENTRIES__IN__LIST PIC 9.
  03 LIST1 OCCURS 0 TO 9 TIMES
  DEPENDING ON ENTRIES__
  IN__LIST.
  05 LIST1__FIELD1 PIC X.
  05 LIST2 OCCURS 2 TIMES.
  07 LIST2__FIELD2 PIC X.
```

```
;
DTR> DEFINE FILE FOR TEST;
DTR> READY TEST WRITE
DTR> STORE TEST
Enter FIELD1: 1
Enter ENTRIES__IN__LIST: 3
Enter LIST1__FIELD1: 2
Enter LIST2__FIELD2: 3
Enter LIST2__FIELD2: 4
Enter LIST1__FIELD1: 5
```

*Continued on page 147.*

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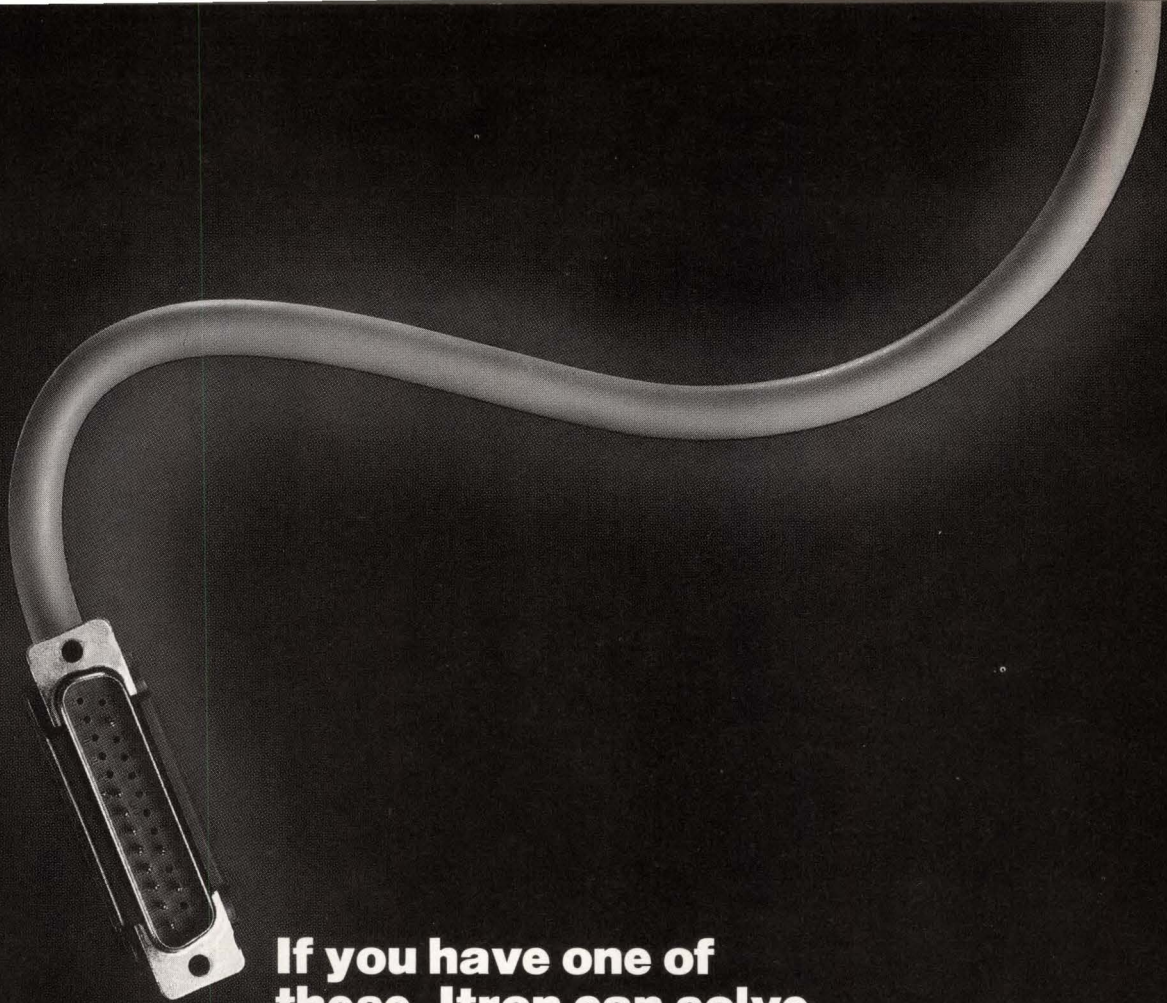
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## VAX: Big Machine On Campus

*Survey Ranks VAX As Most Popular Computer At U.S. and Canadian Business Schools*

A survey of 241 collegiate schools of business established that VAX is the most popular computer owned by the respondents. Additionally, more than 50 percent of those surveyed either have use of a VAX owned by the university as a whole, or actually own their own VAX. (The "Second Annual UCLA Survey of Business School Computer Usage," conducted by UCLA's Computers and Information Systems Research Program at the Graduate School of Management.)

This is significant in several respects: First, the high price/performance ratio and reasonable maintenance costs of the VAX series of computers enables more institutions to own their own hardware. Second, VAX is meeting the needs of a wide cross-section of institutions in terms of size, type of curriculum and aspirations for growth. The prevalence of the VAX among many of the nation's most prestigious business schools, like the University of Pennsylvania

(Wharton), University of Chicago, Stanford, and Cornell, creates a community of users able to share data and ideas easily and at relatively low cost. This helps to accelerate the growth of knowledge in economics and business.

Also of significance is the prevalence of VAXs in the business world, which creates a bridge between academia and the private sector, enabling students entering the job market to bring with them familiarity and experience with the VAX and the extensive list of software applications that run on it.

Respondents cite the VAX's well-developed libraries of programming utilities and systems, flexibility and ease of use for novice students and systems programmers alike, and the high computing-capacity-per-dollar ratio. Among other advantages for these schools in owning a VAX are the "building block" architecture permitting easy system growth as demand increases, through clusters and

networks, and a fine development environment for institutions seeking to develop their own applications and interfaces. The VAX's ability to communicate with the computers of other vendors also permits interfacing with the university's administrative computers for purposes of reporting administrative data for record-keeping and budgeting.

It is clear that the VAX will continue to lead the pack in the business school environment for teaching, research and administration.

## RSM Enhances Network Management

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DEC has introduced new distributed system management software that makes managing a network of MICROVAX II systems and VAXstation II workstations almost as easy as managing a single system.

With DEC's Remote System Manager (RSM) software, a central system manager can efficiently perform tasks such as installing software, providing software updates, and making backup copies of files — freeing users from performing sys-

## Sandy Krueger Named Conference Chairman

*New York To Host Both Conferences*

Expoconsul International, Inc., has announced that Sandy Krueger, a member of the Management Council of DECUS, will serve as Conference Chairman of two conferences for computer users.

Krueger will direct the DEXPO East '86 conference,

designed to serve Digital Equipment computer users, as well as The Microcomputer Graphics Conference for users of microcomputer-based graphics systems. Both conferences will be held in conjunction with exhibitions and will take place December 17-19, 1986, at New York City's Javits Convention Center.

tem management duties at each separate, distributed system.

RSM supports at least five MICROVAX II systems, to as many as 40 VAXstation II workstations; the number and combination of systems supported varies with the size, power, and storage of the server. Server software is priced at \$1,500 for the MICROVAX II, \$2,500 for the VAX-11/78x, \$3,900 for the VAX 8200 and 8300, \$5,000 for the VAX 86X0 and \$7,500 for the VAX 8800. Client software is priced at \$300 for the VAXstation II and VAXstation II/GPX workstations, and at \$900 for MICROVAX II systems.

## **PAT Creates Showstopping Packages**

### *PDP-11, TSX-Plus Earn Applause*

**T**he theatre's expression of good luck is "Break a leg." But when the leading actress for a sold-out performance took a late-afternoon spill, San Francisco's American Conservatory Theatre (ACT) needed more than luck to ward off a potential deluge of unhappy subscribers.

Fortunately, ACT had invested in The Patron System, a menu-driven turnkey computer system developed by Performing Arts Technology (PAT) of Berkeley, California. The system tracks subscriber databases and manages marketing information for theater companies. Within an hour of the acci-

## **San Francisco To Host Fall DECUS Symposium**

*Theme To Be 'The Network Is The System'*

**T**he Fall '86 U.S. DECUS Symposium, highlighting the theme "The Network Is The System," will be held October 6-10, 1986, at the Moscone Center in San Francisco, California. Pre-Symposium activities begin on Sunday, October 5, with full-day seminars being offered by the DECUS Special Interest Groups (SIGs) and Digital's Educational Services Group.

SIGs have joined

together to sponsor a group of sessions focusing on "The Network Is The System" theme, because the challenges related to building effective distributed networks are wide-ranging and effect all aspects of our technology. Topics addressed cover the range of novice to advanced levels of expertise and are technical and managerial in nature.

The session schedule appears in the Fall '86 Sym-

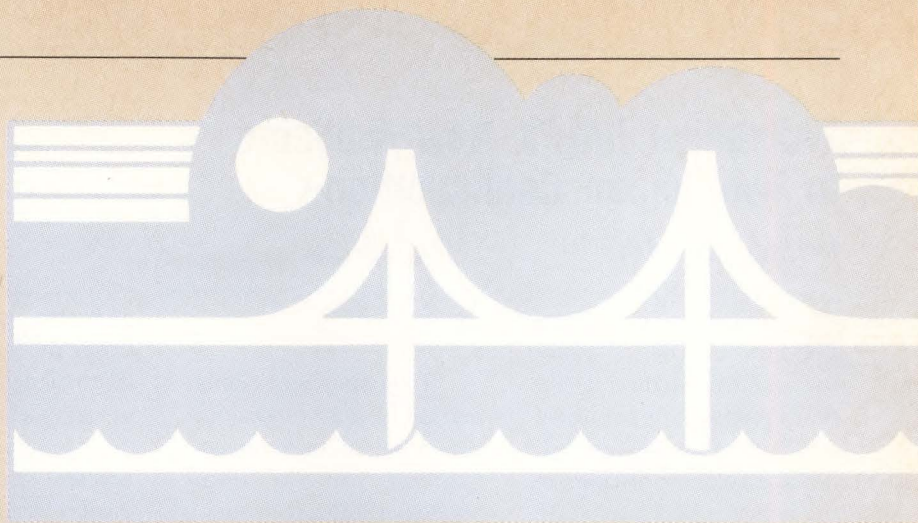
dent at ACT, the Patron System had printed a list of all subscribers holding tickets to the performance, and operators staged a phone blitz to advise members of the change in venue.

Theater companies nationwide, including the prestigious Shubert Organization of New York, have purchased the PAT system, which uses the multiuser,

multitasking TSX-Plus operating system from S&H Computer Systems of Nashville, Tennessee. The system runs on a DEC PDP-11/73.

Using TSX-Plus running S&H's COBOL-Plus compiler with RT-SORT disk sort utility, designers at PAT can create a custom-tailored, full-featured system including subscription, fundraising, marketing lists and demographics, word pro-

cessing, accounting (AP, GL, Payroll) and box office statistics applications in as little as two months. PAT was founded in 1977 to provide computerized lighting systems to theaters. In 1979 the company recognized the vast potential market for computerized business systems for the arts.



## VAXstation II/GPX Now Available In Two-Screen Configuration

*Priced At \$48,700*

**A** two-screen configuration of DEC's highly successful VAXstation II/GPX workstation, providing UNIX users the lowest cost, 8-plane, color workstation in the industry on a "per seat" basis, is now available.

The VAXstation II/GPX workstation, announced in January, is a high-performance, color graphics workstation that is based on the MICROVAX II computer and DEC's custom VLSI graphics

coprocessor. It is priced at \$39,950.

The two-screen configuration of this workstation, consisting of two consoles running on a single MICROVAX II processor, is priced at \$48,700.

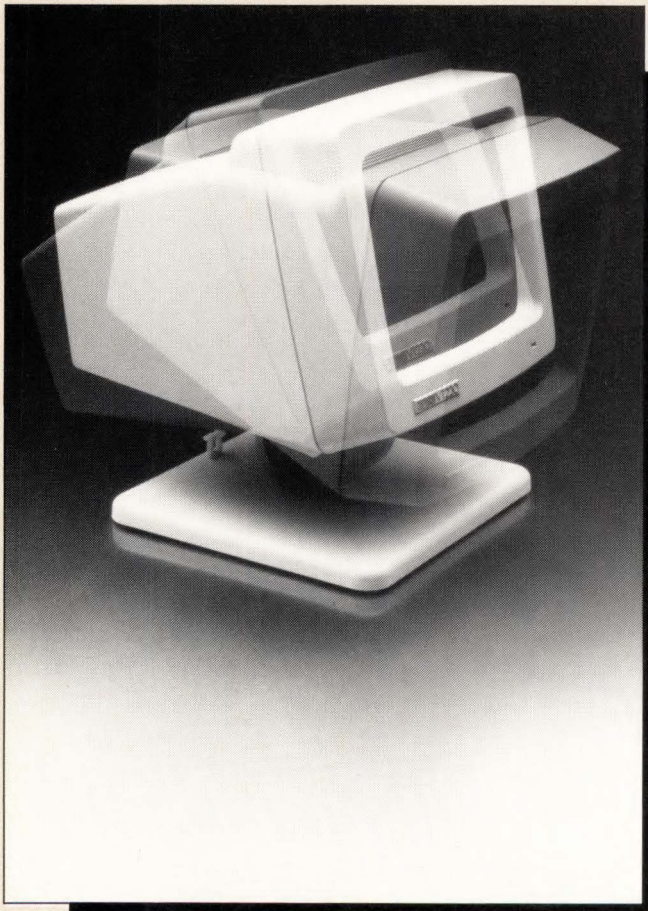
The new configuration can be utilized by two independent users or in dual display mode, providing a single user with two graphics displays. In the two-user version, each user gets a

dedicated graphics coprocessor and window manager, thus maintaining a high level of graphics performance. The graphics coprocessor accesses and executes a display list in system virtual memory without the direct involvement of the MICROVAX CPU. This architectural feature provides a high degree of parallel processing.

Furthermore, processing power can be distributed

between the MICROVAX CPU and larger VAX systems — such as the new VAX 8800 computer — using the networked-based X-Window System.

Upgrades of single-user VAXstation II/GPXs, VAXstation IIs, and MICROVAX II systems to the two-screen version of the VAXstation II/GPX workstation also will be available. These upgrades are priced at \$14,450 per additional screen.



*The Tilt/Swivel Base for PC and VT200 terminals.*

## New Accessories Unveiled For VT200 Family

*Designed To Reduce Discomfort*

**D**EC has unveiled two video monitor accessories specifically designed to accommodate the terminal user and reduce back, neck and eye strain that often accompany hours of terminal use.

The VT220 Motorized Stand is a full sized, automatic stand with a manually height-adjustable keyboard table, and front-locking foot casters. Monitor height is electronically controlled with a switch at the base of the stand, allowing the user to adjust the monitor for optimal comfort.

The Tilt/Swivel Base for

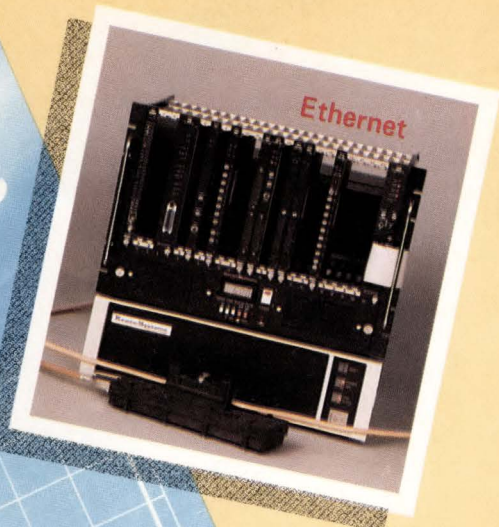
PC and VT200 terminals is specifically designed for the terminal user who is working from a desk or limited space environment. This allows the user to adjust the terminal up, down and sideways.

For more information on these products, refer to the DECdirect Plus Q1 Full Line Catalog available from DEC, or call 1-800-258-1710 for assistance.





MicroVAX II



Ethernet

## Meet CAMAC . . .

### the DEC-compatible standard for data acquisition and control

For fifteen years, we at KSC have been supplying DEC users in laboratories, plants, and R&D facilities with practical CAMAC hardware and software tools for automation. The reason is simple. CAMAC, the international standard for Computer Automated Measurement And Control provides modular real-time data acquisition and control solutions that can be implemented a step at a time.

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**full standardization.** CAMAC is specified by the ANSI/IEEE Standards 583, 595, 596, 675, 683, 726, and 758.

**open-end architecture.** With CAMAC, you can start as small as you like, expand when and how you want.

**multicomputer support.** CAMAC interfaces to a whole range of LSI-11, PDP-11, VAX-11, and MicroVAX II computers via compatible bus adapters and drivers.

**high data rates.** DMA interfaces provide transfer rates up to 348,000 data bytes per second.

**versatile process I/O.** Choose your process interface modules from our unsurpassed selection, including *A/D and D/A converters, signal multiplexers, stepping motor controllers, event counters, input gates, output registers, display generators, and transient recorders.*

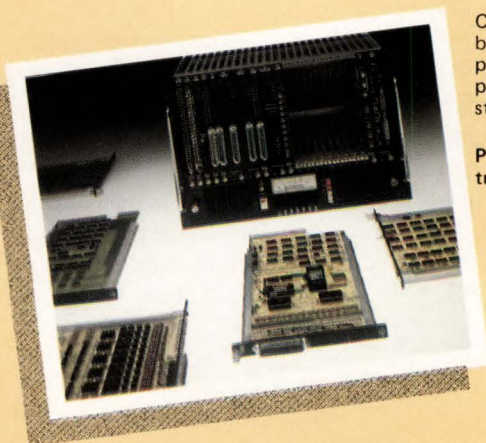
**powerful distributed systems.** The CAMAC serial highway provides peak block rates up to 3 million data bytes per second over fiber optic or twisted pair cable to as many as 62 remote stations.

**supporting software.** We provide PC/DBS, our menu-driven Process Control/Data Base System as well as the

CAMAC handlers and software drivers for your DEC-based system.

**field proven system design.** Our CAMAC installations operate worldwide in such major facilities as *Boeing, Digital Equipment Corporation, Nalco Chemical, Kimberly-Clark, NASA, Bell Labs, Martin Marietta, DuPont, General Electric, TRW, CERN, KEK, TRIUMF*, as well as most DOE/DOD research facilities.

Join the growing list of DEC users who are discovering and specifying our CAMAC tools for their system development. Call us today and see for yourself how CAMAC and KSC can meet your data acquisition and control needs both now and in the future.



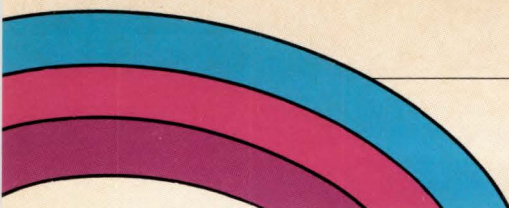
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## Northeastern U Granted 20 Rainbows

*Journalism Students To Learn  
Modern Newsroom Techniques*

The Northeastern University Department of Journalism recently announced a grant of Rainbow personal computers from DEC. The grant was made in memory of Mary-Alice King Parsons, a Northeastern journalism graduate and DEC employee who edited several company publications during her career at DEC.

The 20 Rainbows and

printers will be used in news writing courses as part of the core offering for undergraduate and graduate journalism majors. Each of the 350 journalism majors will use the personal computers to write and edit news stories, and become familiar with the word processing writing techniques and editing capabilities available in modern newsrooms.

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## Increased Capacity, Lower-Priced Memory Available For MICROVAX II, VAXstations

*Prices Reduced On 2-MB, 4-MB Boards*

DEC has announced both a new 8-MB memory board and new pricing structures for memory on the MICROVAX II and members of its VAXstation family of workstations.

By using the new higher-density, 8-MB memory board, users can expand the MICROVAX II computer systems and VAXstations built on the MICROVAX II to 16 MB. This enables the systems to support larger and growing applications and increase performance in virtual memory environments. The new memory board maintains all the features of DEC's previous

MICROVAX II memory boards, while achieving the double density capacity through ZIP (Zigzag Inline Package) dynamic RAM (Random Access Memory) chips. The new 8-MB board is priced at \$5,000 and is available 30 days after receipt of order.

Concurrently, prices on both the 2-MB and 4-MB boards have been reduced 50 percent from \$5,000 and \$7,000 to \$2,500 and \$3,500, respectively.

## Research Shows VAX Migration

*89% To Use VMS*

DEC PROFESSIONAL research shows that many of you plan to migrate to a VAX in the near future. Of those seriously considering the VAX, 89 percent will use VMS, six percent will use ULTRIX, six percent will use UNIX, three percent will use VAX/ELN, and three percent plan to use other operating systems.

We also learned that your new VAXs primarily will use a combination of

DEC and non-DEC peripherals, memory and service. Only 31 percent of you will use all DEC peripherals, compared to 61 percent all mixed and two percent all non-DEC. All DEC memory and service is more common with 44 and 56 percent respectively. Forty-nine percent of you will use IBM-PCs or compatibles as terminals.

Speaking of IBM, 50 percent of your firms utilize non-DEC "mainframe" computers, and of the applications that will come from that mainframe, 12 percent will migrate from an IBM operating system.

---

## New Appointments At DEC

*Three Senior VPs Named*

Recent promotions at DEC include the naming of three new senior vice presidents, two new directors for Digital Service Industry Marketing, and a new corporate consulting engineer.

The three new senior vice presidents are as follows:

Winston R. Hindle, Jr., was promoted to vice president of Corporate Operations and is responsible for a number of Corporate Staff functions, including Information Systems, Quality, Purchasing, Planning, Marketing Communications, and Public Relations.

John J. Shields is responsible for Digital's Sales & Services, International, and Industry/Channels Marketing organizations.

John F. Smith is responsible for Digital's Engineering, Manufacturing and Product Marketing organizations, which include 26,000 Manufacturing employees in 10 countries and engineering product development and R&D facilities in Europe, Asia and the U.S.

Anthony G. Lauck was appointed corporate consulting engineer and will be responsible for the company's architecture and advanced development efforts in distributed systems.

In the Service Industry Marketing division, Robert Farquhar was named director of Media Industry Marketing and Claude A. Thomas was named director of the Financial Industry Marketing, both based in Merrimack, New Hampshire.



# How To Hang On Terminals Without Getting Hung Up.

Don't send a host-to-host network to do a terminal network's job!

A lot of manufacturers will tell you that a "network is a network"—but while contention-type networks may be appropriate for the long interactive file transfers of host-to-host communications, they can be more of a problem than a solution for high-volume terminal communications. In fact, when large numbers of terminals are clamoring for network access, the software and collision overhead can become so overwhelming that it can cause a dramatic slowdown—or even crash the whole network.

So give your terminals what they deserve—a non-contention network without the software overhead associated with long packet communications, but with the *true* flexibility to put terminals and printers wherever you need them. With the complete support of T-1, RS-422 and fiber optics for remote networking. With access to multiple hosts—PC resource sharing—real ease of use.

*Because when the question is terminal networking, the answer is ABLE.*

## **ATTACH—the True Terminal Network**

ATTACH is a multihost terminal network which supports from 8 to over 15,000 ports (at 128 terminal lines per subsystem), all of which can be connected to any host by a single composite cable. ATTACH is compatible with all DEC host operating systems and, with its Magic Key, allows single-stroke, no-menu switching.

## **MUX MASTER™ — 128 Terminals with a Single Cable**

Get rid of the sea of terminal cables with MUX MASTER, a multi-drop distributed multiplexer system, which supports up to 128 connections

through a high-speed composite link on any UNIBUS or Q-BUS computer. MUX MASTER LS allows PCs to share resources as well as access a central host, while the new MUX MASTER LP gives you control of parallel high-performance line printers where you need them.

## **Communication Boards Boost MicroVAX II Productivity**

And when your Q-BUS computer needs a throughput boost, turn to ABLE for the largest offering of asynchronous connections to Q-BUS on the market. Ask for QDHU, QHV, and QHV Plus—all at a very low cost per line. So hang on terminals without getting hung up. Call ABLE

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From an individual board to a 15,000-line system—ABLE meets communications network requirements.





**Winner of 1986  
Digital Review  
Target Award**

# Camintonn: The Best Collection of DEC-Compatible

Whether you need to enhance your DEC computer's performance with quality memory products or communications interfaces, Camintonn offers the solution.

## **First and the Best in MicroVAX II™ Memory Expansion**

*Add Up To 16 Megabytes Of Memory With Our CMX-830.* Offering up to 8 Megabytes of memory on a single quad card, Camintonn's CMX-830 provides

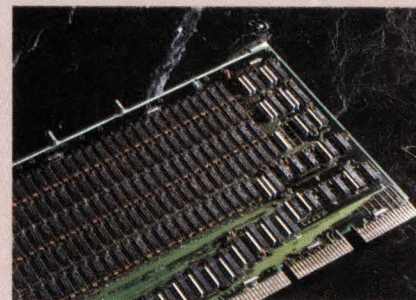
absolute enhancement by allowing the installation of two cards for a total of 16 Megabytes of memory — you won't find this capability with any DEC card.

Densely designed using high-speed 256K RAMs and state-of-the-art technology developed by Camintonn, the CMX-830 provides the most cost-effective per megabyte solution to your memory requirements while saving power and precious slot space without sacrificing performance.

Fully hardware and software compatible with the MicroVAX II protocol, our CMX-830 provides parity generation and checking for a full 32 bit data bus.

*4 Megabytes Of Memory On A Quad, Camintonn's CMX-630.* Our CMX-630 features high-speed 256K RAM technology and 32 data bit plus 4 parity bit data organization for up to 4 Megabytes of memory on a single quad card. Providing complete hardware and software compatibility with DEC MicroVAX II systems, the CMX-630 is available in 1 Megabyte, 2 Megabyte or 4 Megabyte configurations.

**Quality Memory Products For Your VAX 11-750/730™ Computers**  
*CMX-750/730, Our 1 Megabyte Dynamic Memory Module.* Designed to operate in your DEC VAX 11/750-CA



or modified 11/750 and VAX 11/730 computer systems, Camintonn's CMX-750/730 provides up to 8 Megabytes of memory on the 11/750 and up to 5 Megabytes on the 11/730. Completely compatible with DEC hardware and software, the CMX-750/730 features an on-line/off-line switch, LED and spare RAM for easy service and maintenance.

**High Performance Communications For MicroVAX II and Q-Bus™**  
*Camintonn's CM-DHV11: 8 Full-Duplex Async Serial Lines On One Dual Card.* Three to four times faster than the competition, our CM-DHV11 is a space and power saving dual height DMA multiplexer utilizing high-speed microprocessor-based architecture for excellent reliability, compact size and high performance. It provides full modem support on all lines, with RS-232-C and RS-423-A interface standard. RS-422 interface support (data only)

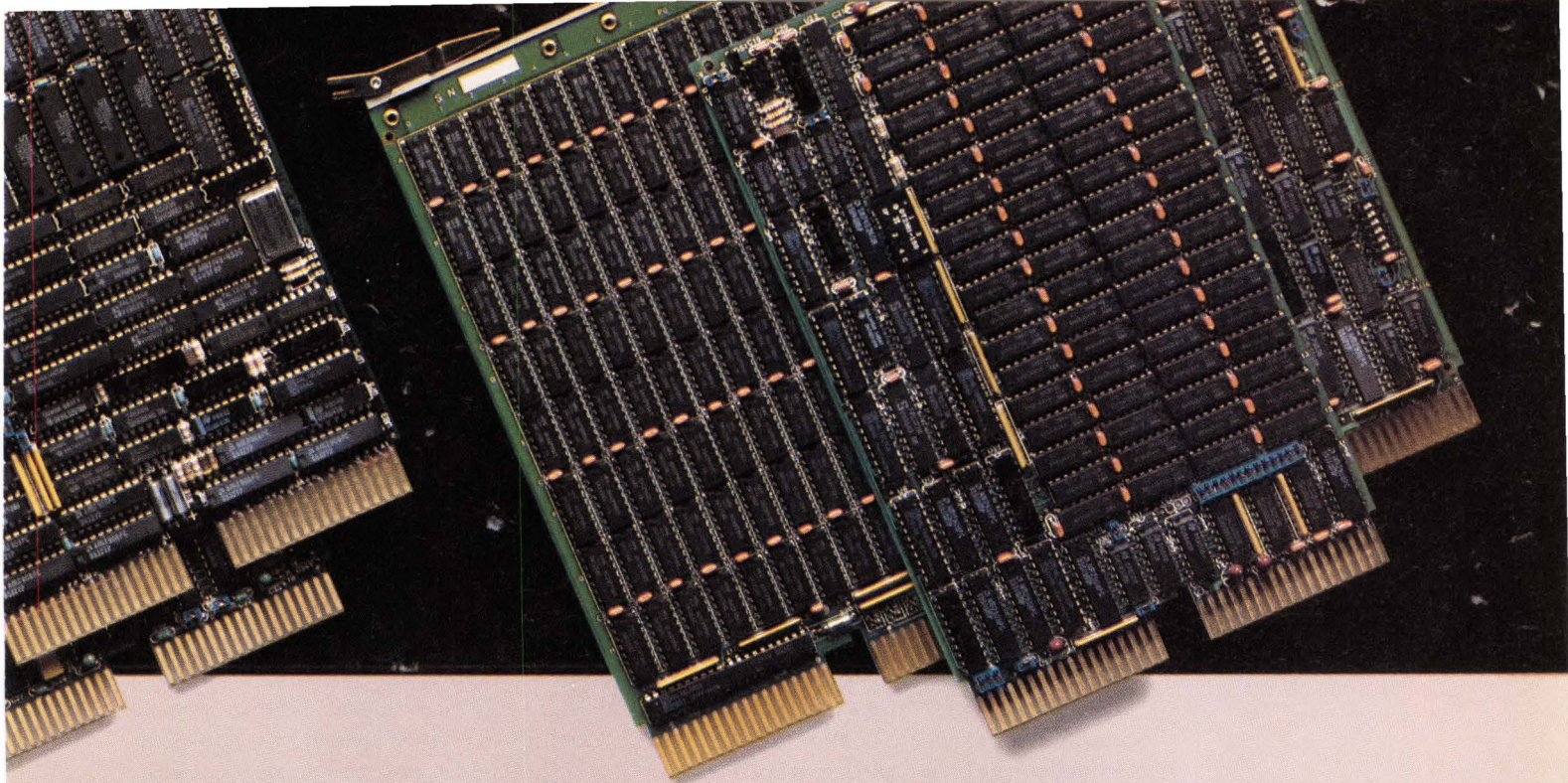
### NEW PRODUCTS

#### **16-Channel Quad Multiplexer for the MicroVAX II**

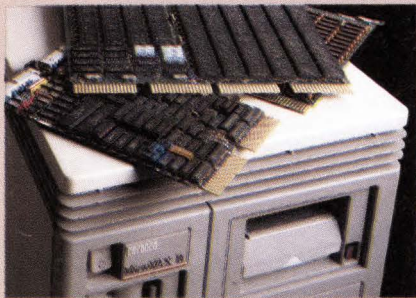
*Our CM-DHV16 incorporates 16 channel, full duplex asynchronous DMA multiplexing on a single quad-height card. It features full modem control on all 16 lines, an additional console port and selectable DMA or Program I/O formats.*

#### **New Multifunction Module for All Q-Bus Systems**

*The CM-MXV11-B dual-height, multifunction module offers two serial ports, I/O mapping, bootable select to all devices, realtime clock/calendar with battery-backup and line-time clock.*



# Flexible Memory and Communications Solutions.



is available on 4 of the lines with our optional cable kit.

Camintonn's CM-DHV11 plugs directly into any standard Q-Bus backplane slot, and is fully hardware and software compatible with DEC's DHV11 product.

**CM-DLV11-J: Our 4-Line Serial Port Card.** An LSI-11™ bus-compatible interface module, the CM-DLV11-J provides 4 asynchronous serial lines which can be independently configured for RS-422, RS-423 or RS-232-C signal compatibility. Baud rate, number of data bits and stop bits, and parity are switch selectable on a per line basis. Of course, it's fully DEC compatible.

## A Full Line of Q-Bus Memory Modules

**256KB to 4 Megabyte Memory Modules, Choose Camintonn's CMV Series.** Here's up to 2 Megabytes of memory on a dual card or up to 4 on a quad. All configurations sup-

port Block-Mode for efficient DMA transfers with 22-bit addressing standard, and include on-board CSR for full parity implementation and parity generation/checking per byte for data integrity.

### Camintonn: Quality, Delivery, Competitive Pricing

When you buy Camintonn products, you're not just getting competitive prices. You're also purchasing a worldwide reputation for service and product dependability. Our extensive quality control and burn-in procedures ensure your product satisfaction. You'll enjoy product availability and quick delivery. And Camintonn memory products come with a full 5 year warranty, while our communications products are covered

for one year. We also provide a 24-hour board replacement program.

For more information on any of Camintonn's fine products call **1-800-843-8336**, in California **(714) 553-0247**. Or complete and mail the coupon below to: Camintonn, an AST Research Company, 2121 Alton Avenue, Irvine, CA 92714-4992.

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| <input type="checkbox"/> CM-DHV11 (8-line)   | <input type="checkbox"/> CMX-630 (4MB) | <b>Q-Bus Memory Products:</b>                   |
| <input type="checkbox"/> CM-DLV11-J (4-line) | <b>Q-Bus Multifunction Products:</b>   | <input type="checkbox"/> CMV Series (up to 4MB) |
|  | <input type="checkbox"/> CM-MXV11-B    |   |

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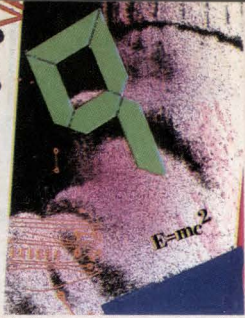
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## EDUCATION

# A 'SPECIAL' EVENT

By Don Weyel

**Edinboro University of Pennsylvania — with a little help from DEC — pressed a network into service, trained volunteers in the use of Videotex, and hosted the 29th National Wheelchair Games, all in three weeks.**

Many organizations, large and small, sponsor special events where public attendance is expected to be brisk. During these events, rapid dissemination of late-breaking announcements, athletic scores, schedules, and notices usually is a must. Computerized information networks are an ideal solution, but at first glance seem very expensive; not to mention intimidating to create and maintain.

That was the exact situation confronting Edinboro University of Pennsylvania when DEC offered our Center for Computer Services a "loaner" copy of Videotex V1.1 (VAX VTX) for use during the 29th National Wheelchair Games. As often is the case with events of this nature, other commercial and public concerns also wanted to help, so we were faced with an offer that was difficult to ignore.

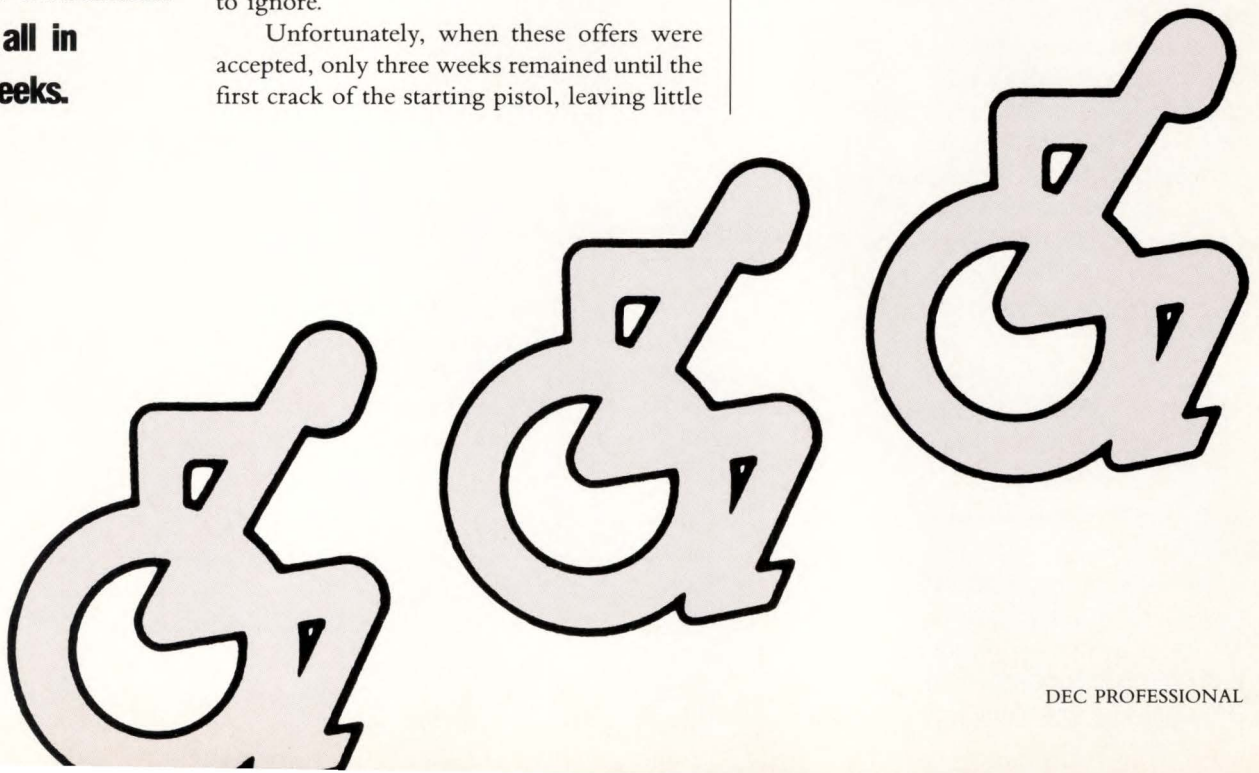
Unfortunately, when these offers were accepted, only three weeks remained until the first crack of the starting pistol, leaving little

time for comprehensive planning. Even worse, we had never used Videotex, so there were no "experts" to provide council or condolences.

The Center cautiously approached the Games' organizers with "an idea that *might* work." The organizers enthusiastically agreed that a computer network would augment their plans for manually posting scores. After lots of hedging and precautionary advice not to "get your hopes up," we began our preparations, flying blind, and with fingers crossed.

### In the Beginning . . .

After doing some crash research into Videotex, and placing several nervous calls to the people at DEC, we decided that the software would be DEC's problem. It was their "loaner," and they had graciously agreed to provide all necessary interfaces. That still left



us with plenty of worries about network layout, communications, equipment security, and the actual execution of the information distribution system.

AT EDINBORO UNIVERSITY of Pennsylvania we have a VAX 11/785 with 8 MB of memory, which was the meat of the system. DEC loaned us VT101 terminals and Rixon R212A modems using the Bell 212A protocol and running at 1200 baud. We quickly decided to position the terminals and modems in the reception areas

going to be enormous, with hundreds of athletes participating in dozens of heats, quarterfinals, semifinals and finals.

To keep our small staff from being swamped, we limited our Videotex displays to the times and locations of events, several static displays of on- and off-campus housing and restaurants, and the names of all competitors for each class of event. The competitor listings eventually were replaced with the final results of each event as they became available.

DEC created a sophisticated Videotex

The program allowed our data entry volunteers to simply select the desired event and category, then enter the names of the initial list of competitors, or final results.

of three residence halls and in the Student Union, where most of the participants and spectators would congregate. (See Figure 1.)

We connected each modem directly to the communications port on the VT101, and used the standard phone line to dial into our VAX's 10 existing dial-up lines. We placed one modem at each of the four terminal sites.

Each terminal was positioned next to an existing telephone, and since modular jacks were not available, the modems were physically wired into the body of the phones (See Figure 2.) As a result, the phones could be used for data communications or emergency voice calls. It was a very simplistic set-up — no fancy hardware or communications techniques, but, then, none really was needed.

Data entry was the next major concern. We had several volunteers, but not enough to cover the full schedule, since events were to take place during a four-day, 15-hour-per-day period. Also, our volunteers were computer literate, but not "Videotex literate," and we didn't have the expertise to provide in-depth training. The information flow obviously was

interface that catered to our lack of Videotex literacy. The program allowed our data entry volunteers to simply select the desired event and category, then enter the names of the initial list of competitors, or final results, eliminating the standard Videotex requirement to manually manipulate "pages" of data. This permitted extremely fast access to the menus and, as long as we didn't make mistakes, lessened the need for an army of volunteers. To further improve efficiency, data entry operations were scheduled around the densest hours of the schedule. We assumed (correctly, for once) that game results and Videotex use would be slow during early morning and late evening hours.

QUICKLY TRANSMITTING the results from the playing fields and natatoriums to the data entry operators was crucial. The organizers already had established a courier system whereby volunteers would run copies of game results to key areas on campus. We dove-tailed into their system by adding our data stops to each courier's route. This served the dual purpose of eliminating excess communication links to on-the-scene volunteers, and providing a centralized area where systems people quickly could deal with the inevitable last-

minute confusion. It also left us frighteningly dependent on a volunteer courier system. If it failed, we would have a complex transmittal system with no data to transmit.

Terminal sites were the object of our worst fears; security is the most obvious problem. How do you protect expensive equipment in public meeting areas that won't be continually staffed by volunteers? The university has had limited success with devices that bolt terminals to tables, and we didn't have time to buy more in any case. However, previous employment with an electronic security firm taught me that the *appearance* of security is 90 percent of the battle. So we clearly labeled each terminal with the insignia of the same firm, gave it credit for providing "electronic security" on the "Thanks to ..." sheet placed next to each terminal, and hung dummy (but ominous-looking) wires from the rear of each device, including the modems. (See Figure 2.)

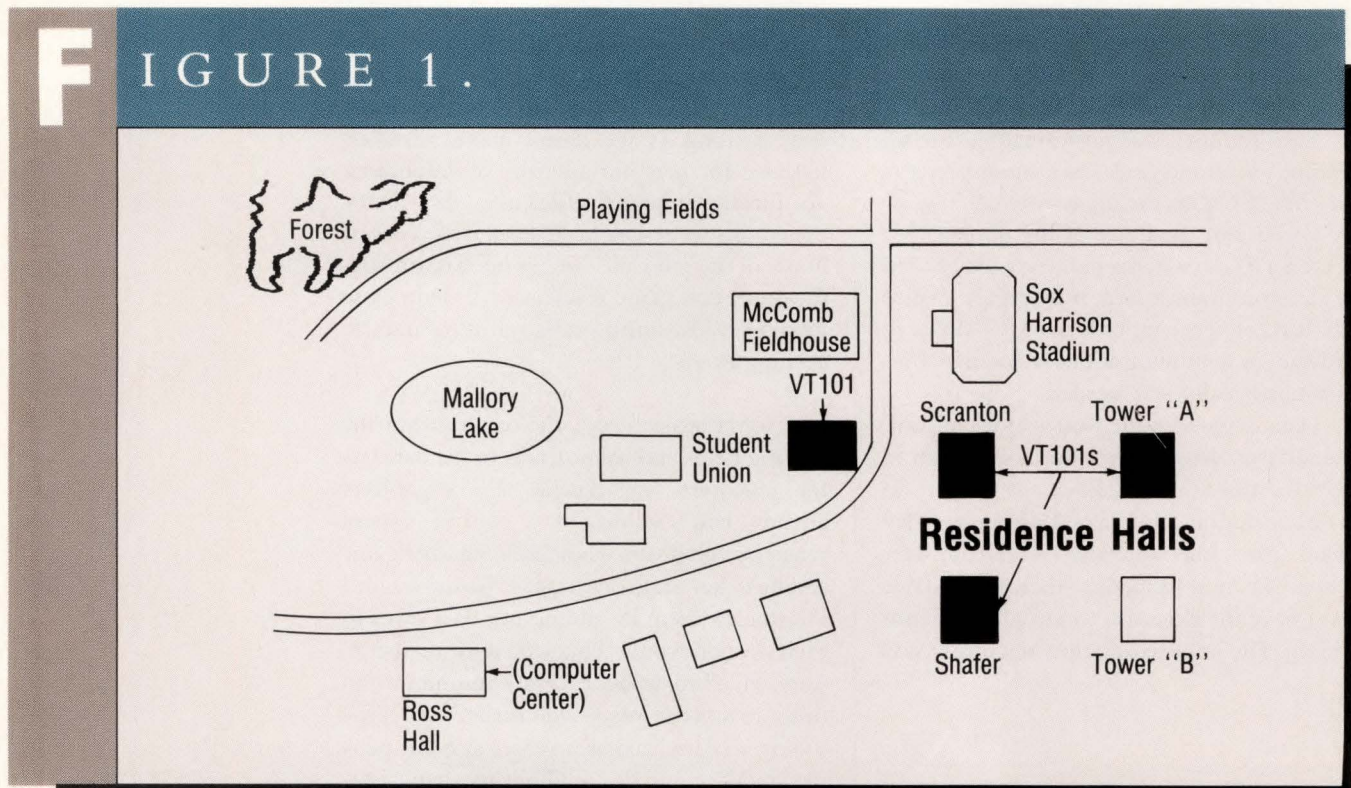
Sheer numbers of people also provide some security, and the frequent, unscheduled appearance of volunteers was a considerable deterrent. Still, we dismantled and stored each

Terminal sites were the object of our worst fears; security is the most obvious problem.

terminal in a locked closet late each evening, especially when the traffic flow subsided. We also took the precaution of notifying our insurance company of this arrangement to protect ourselves from the dedicated thief, against whom there is almost no fool-proof defense.

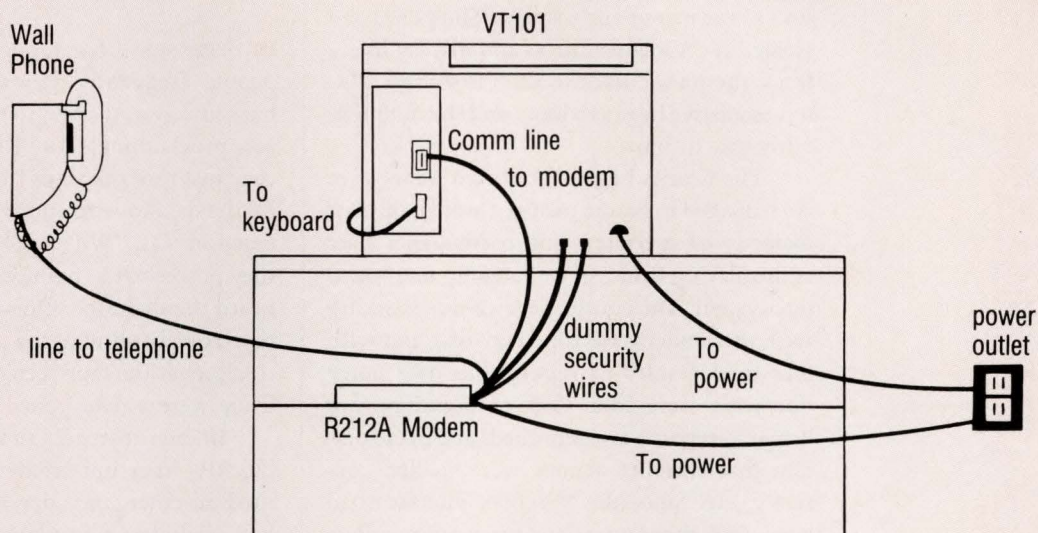
As previously mentioned, communications from our VAX-11/785 to the four terminal sites were handled by dial-up modems. These were of some concern during the planning

*Key terminal location sites. The drawing, although not to scale, is a fairly accurate picture of the geographical relationship between the key buildings. The air distance from the Computer Center to the playing fields is approximately one-half mile.*





**F** I G U R E 2 .



phase, since we knew they were highly susceptible to line noise, especially during wet or windy weather. Ours is an unpredictable climate, so we prepared for the worst and scheduled volunteers to “do rounds” of the terminal sites roughly every half hour.

The modems at the terminal sites were initialized to auto-dial and login with one keystroke, and the special Games account was captive. After login, Videotex was invoked automatically and the main menu was displayed instantly. We hoped that, in the event of loss of signal, the volunteers simply could hit one key and be back on-line in seconds. Our regular dial-up users were warned well in advance that four inbound lines would be “down,” so we wouldn’t have to worry about contending for ports.

Last, DEC ensured that use of the terminal keyboard to page through displays would be as simple as humanly possible. Keyboard numeric keys were used to select the desired menus or to display (keyPAD numerics are preprogrammed function keys in Videotex). The PF1 key was used to page backward to the

main menu. To further reduce the chance of error, we placed a thin cardboard template over all other keypad keys (except ENTER, which was used like RETURN), effectively “disabling” them. All other keyboard keys were not recognized, so 99 percent of the errors were “trapped.” In the event a user still was confused by the on-screen (and separate on-line) help messages, we placed a one-page instruction sheet attached to a cardboard backing, next to the terminal.

### Reality

We felt fairly confident as the Games drew near. Alas, experience is a harsh teacher. On the eve of the opening ceremonies, the organizers provided the finalized list of entrants for each event. To our horror, we discovered that many more events had been added and several had been cancelled. Also, classification of the entrants within each event was substantially more complex than origin-

*VT101 terminal site configuration. A rear view of the VT101s as they were configured during the Games. Note the “dummy security wires” leading from the rear of the terminal to the rear of the modem.*

ally planned. For instance, instead of just paraplegic or quadriplegic entrants, there were several categories of each for many of the events. The combination of "event shuffling" and "category fixing" required a *major* revision of the menus and displays. Since DEC had created the Videotex menu and display interfaces, the phone lines to the Pittsburgh DEC representative began to hum, and the midnight oil began to burn.

The Games began about two hours after we managed to fix the menus. Luckily, the vast majority of spectators and participants were at the playing fields, so we carefully fine-tuned our system. The courier service was working well, the modems remained on-line, and with few final results to report, the data entry operators were idle. Out of boredom, we began to report a few semifinals and made certain that entrants' names were spelled correctly, etc. Since the Videotex interface had been structured to allow for near-mindless data entry, edits were complicated and difficult to effect. We taught the operators to double check all entries before pressing RETURN.

Suddenly, after an entire season of unnaturally balmy weather, the wind and rains came. And came. And came. The modems began to drop out and eventually had total seizures. We often revived them by cutting,

then restoring, their power. Occasionally, due to their "intelligence," the mysterious bit-pattern causing their deaths was still stored. We returned them to the original supplier (the phone company) for a proper burial.

IN DEFENSE OF the modems, we found that people frequently ignored the cardboard-backed signs attached to the telephone handsets proclaiming, "DO NOT USE!!!" Usually, they just tore the signs off. When confronted by the data tone from the modems, their first reaction was, "What's that funny noise?" and they proceeded to bounce the cradle until they heard the dial tone. One frustrated volunteer taped one handset to the phone housing, only to discover the tape torn to pieces a day later! They were a determined lot.

In one instance, though, the ability to quickly interrupt modem use paid off. A medical emergency developed in a residence hall, and after a few bangs on the cradle, an aide was able to successfully place a call. That made all of the previous problems worthwhile.

We did benefit from these difficulties. We discovered that the "public" is not as computer illiterate as often is imagined. At times, when a modem would drop out, an unknown stranger(s) would force it into Hayes-mode which displays no prompt. Subsequently, a confused volunteer doing rounds would discover the "down" modem (now without a prompt) and consider it dead. After wild modem-switching sessions and heated conversations with the phone company, we began to catch on.

Indeed, as time went on, we discovered that a vast storehouse of knowledge exists "out there," and some malfunctions were deduced as being deliberate. During one round, I was amazed to see an anonymous staffer successfully perform a manual login to the "secret" Games account. When asked how he learned the username and password, he described playing with the modem's internal displays after noise had caused a carrier drop! On the other hand, there also exists an overwhelming willingness to debug problems, and many a volunteer discovered an athlete or spectator doing their best to "fix it."

Then, the courier system faltered and

## The Games

The National Wheelchair Games are held each summer at different sites throughout the nation that bid for this privilege. The organizations involved, many of them educational institutions, provide their full resources, including volunteers, dormitories, food service and athletic training facilities. In honor of last year's Games, Edinboro University of Pennsylvania installed a \$1 million track for the event which now is used for other athletic events as well.

The Games are a reward to athletes throughout the nation who have trained hard for the opportunity to compete head to head in their sports. The athletes involved participate in sports that test their physical prowess, motivate their achievement, provide a vehicle for contact with others with similar interests, and help them to realize their athletic potential. The next wheelchair athletic event this year is The Pan American Wheelchair Games, to be held in Aguadilla, Puerto Rico, in November 1986.

died. For no apparent reason, the data flow just stopped. Calls to headquarters elicited perplexed responses; no one knew what was wrong. In desperation, we went looking for the information, and found it flowing through the university's Sports Information department. Eventually, after several emergency discussions with the director of Sports Information, we arranged for delivery of the needed data in return for screen dumps of the final-results displays. *That* system worked beautifully; even the local newspaper wanted access to the output.

Sports Information department. The logical spot to position data entry operators, or to send your own couriers, is there. We chose to send our own couriers (often the data entry people), thereby maintaining a centralized computer office which was invaluable for coping with computer-related problems. Although it appears redundant, this system was wonderful. It greatly reduced the time lag between score compilation and posting on Videotex, often to within an hour. It also gave us much needed control over the data flow, and we always knew where the couriers were.

...this system was wonderful. It greatly reduced the time lag between score compilation and posting on Videotex, often to within an hour.

Meanwhile, "the public" discovered our network. DEC included an accounting log of the number of information requests, which was beginning to rocket off the scale. In the late afternoons and early evenings, a virtual sea of spectators and participants could be spotted huddled around the terminal in the student union. At the cessation of the games, we had responded to over 15,000 requests for information.

### **If Only . . .**

Overall, we were pleased with the outcome of our first attempt. Personally, I wouldn't shrink from the responsibility of doing it all over again, but I would do certain things differently.

First, both human and physical data communications would be "firmed up." The mysterious disappearance of the courier system was rivaled only by the consistent problems with the modems and phone lines. As for the couriers, we *think* they were given other responsibilities as the weather began to compress the original schedules and, in general, cause havoc. However, in events such as these, results and announcements eventually flow toward one particular location; in our case, the

We intentionally avoided positioning data entry operators at the various game sites, although initially it was tempting. We never regretted the decision. The advantage of "instantaneous" results being flashed on computer screens does not outweigh the disadvantages of a complex communications and control system, problems with staffing umpteen data entry terminals, and the fact that raw scores often are translated into results at a central facility anyway.

THE SOLUTION to physical data communications is not as simple. If you aren't spread out over 500 acres of campus as we are, then running dedicated lines is a possibility. Better, modern modems with sophisticated line-conditioning is a worthwhile gamble. I think, next time, we would opt for grouping the terminals in one or two locations, temporarily leasing a few dedicated lines, and begging for "loaner" multiplexers.

Adopting that approach has many advantages. First, commercial concerns often are more than accommodating during special events. It makes for good "corporate citizen-

ship," good public relations, and good business. DEC and the phone company were very gracious throughout, and I have little doubt that DEC (or any other socially conscious firm) would have provided us with multiplexers, had we asked for them.

Second, the terminals in the residence halls attracted only a fraction of the attention received by the single terminal in the Student Union. True, the residence hall terminals experienced the most frequent line failures, but that alone doesn't explain the logarithmic differences in use. Traffic there was just light; the Student Union and gymnasium were the sites with all the activity. Although we didn't position terminals in the gym since scores were manually posted there, we would do so in the future, and eliminate or greatly reduce the manual postings. The information request rate from the student center terminal easily would have justified positioning four terminals in that area alone. I'm sure terminals near the gym would have generated as much interest.

Equally as important, the gym and stu-

dent union constantly were staffed whenever the buildings were unlocked. After a few days, the "untrained" staff were experts in solving communications problems and answering questions, not to mention having been a perpetual security force. We eventually cut the Student Union from our rounds after informally discussing the situation with its staff.

### In the End . . .

Many of you may be wondering if all this is worth it. It is. The technology is still fairly new, but expanding exponentially. A Videotex network driven by a MicroVAX II not only would be portable, it would be powerful. As with any other "new thing," it takes time and practice to attain proficiency. Once such a system is perfected and incorporated into the special event planning structure, it would be a sleek, nearly invisible performer.

*Don Weyel is coordinator for research and education at the Center for Computer Services, Edinboro University of Pennsylvania.*



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### OPEN UP WINDOWS AND MORE

Raster operators allow a terminal to store rectangular groups of pixels, or rasters, in local video memory. The simple ability to move rasters quickly on and off the

screen opens a world of possibilities.

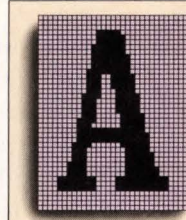
GraphOn's raster operators support window management, allowing the terminal to "remember" the contents of overlapping windows. Whatever portion of the screen is covered by a window is simply copied and stored off screen until that part of the window is "uncovered."

In the same way, pop-up and pull-down menus can be downloaded from the host and stored in the terminal. When the menu is used, raster operators copy a block of the screen,

move it off screen, and move the menu onto the screen in its place. When you're through with the menu, the stored area of the screen is brought back in just one video cycle—or 1/60 of a second.

### WHAT YOU SEE IS WHAT YOU GET

Raster operators also allow you to download special character fonts from the host to the terminal's memory, from where they can be called to the screen at any time. With the capability of using various type styles and sizes, you can see exactly what a page will look like before it's printed—



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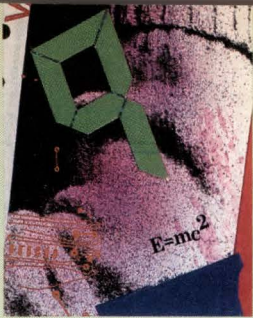
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**EDUCATION**

# M MASTER THE KEYBOARD

By **Mary Jane Sunkel**

**Students at Northwest Missouri State University learn touch typing on a VAX 11/780, and eliminate the old "hunt and peck" approach for good.**

Anyone who uses a computer terminal appreciates the need for a touch system on the keyboard. Most computers can respond faster than most users can type, and students who "hunt and peck" become impatient and frustrated.

At Northwest Missouri State University, we have developed a program that teaches a touch system on an interactive basis using VT100 terminals connected to a VAX 11/780. Through the use of this program, a tedious learning situation can be fun for both the teacher and the student. The immediate feedback and evaluation from the computer have made this a popular approach for both students and teachers.

The distinction we make between keyboarding and touch keyboarding is as follows:

**KEYBOARDING:** Striking keys on a standard keyboard that results in letters/symbols/numbers appearing on a screen or typed/printed page.

**TOUCH KEYBOARDING:** Using a skill where the same fingers consistently strike particular keys; thus, the mind sends a message to the fingers and the fingers respond. The fingers "know" where the keys are and do not have to "hunt" for them.

This article briefly will explain our approach and the advantages of using an interactive system for helping students master a touch keyboarding skill.

THE PROGRAM GREW from an idea I had as a result of increased demand for a beginning typing course which we did not offer. The

course was designed primarily for business education and office administration students, but we knew that part of our demand came from management data processing majors who had not taken typing in high school. However, touch system is valuable for students in all academic disciplines who wish to improve their keyboarding efficiency. In addition to the beginning class, we also have used the program for individual instruction and for remedial practice by our advanced typewriting students.

Keyboarding course goals include helping students to develop a basic touch skill competency, proper keyboarding techniques, and good work habits through the use of a variety of source materials. Since this is the first experience many of the students have had with a computer, they also learn something about data entry and acquire a knowledge of computer terminology and basic machine functions.

In addition, they gain experience in editing files, communicating with a computer by responding to prompts and commands, and setting software switches that affect their work.

Production is measured as it is in typing (five characters = a word), and our production objective is a minimum skill of 30 gross words-per-minute with a maximum of two stroking errors-per-minute. Numerical and alphabetic keying skill is developed with exer-

cises that include practice on the auxiliary numeric keypad as well as the top-row numbers.

Keyboarding is taught as a semester course and meets three times a week for 15 weeks. The class is scheduled at 8:00 a.m. because that is the least busy time for the computer and allows the students to have the best response time.

Northwest has an enrollment of about 5,000 students and a distributed network of terminals. The keyboarding program originally was written for a PDP-11/70 but was rewritten for a VAX-11/780 about three years ago. The class meets in a new library which has a computer lab with 24 VT100s. (The VT100 keyboard arrangement is preferred for a beginner). Students then can use any of about 60 video terminals available at various places on campus for additional practice.

ALL STUDENTS "SIGN IN" to the same account. The first thing displayed is a Message-of-the-Day (MOD) which contains the directions for that day's practice. The MOD can be changed by the teacher and also is used to inform the class about assignments, special instructions, words of encouragement, etc.

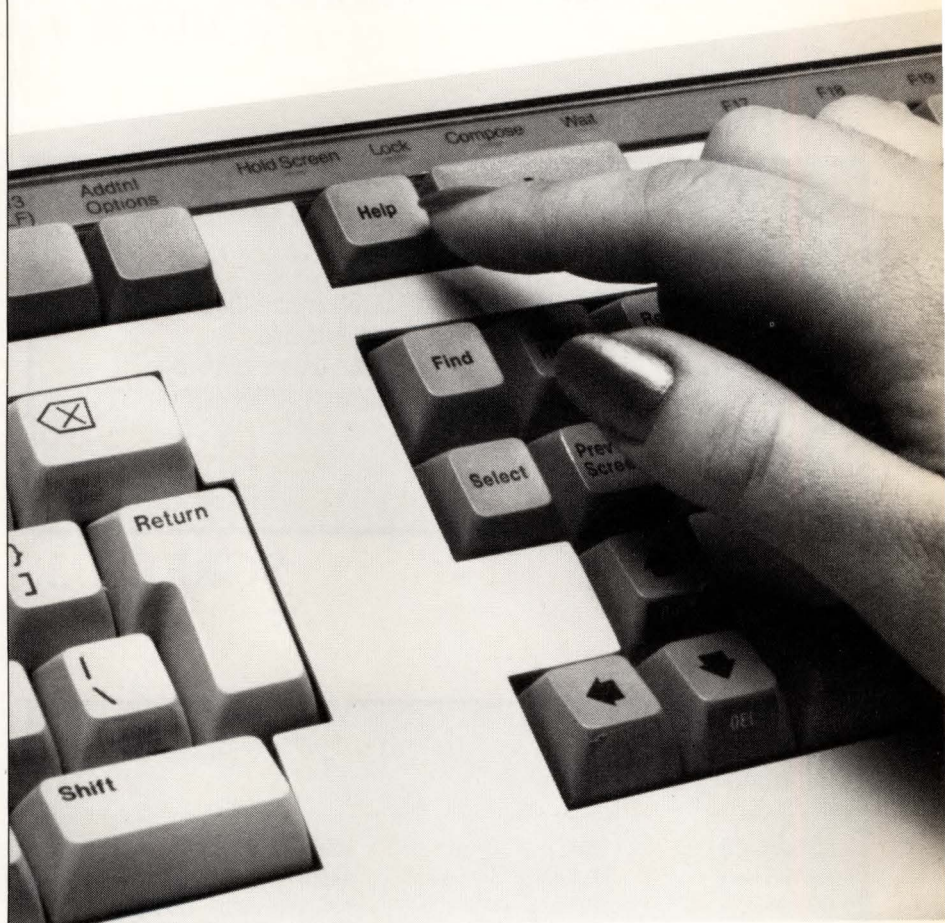
Several levels of programs with different levels of complexity are available. As skill is developed, students use other accounts and are directed by more advanced programs. Students learn a great deal about data entry as well as keyboarding because if they don't follow directions specifically, things won't work.

Although groups of students work in the same account, each student must enter an access code that allows access to his/her file only. Access codes periodically are changed; eight different combinations of the student's student number, name, and key number are possible. After reading the MOD, a student is asked to enter his/her access code. Students learn to respond to a screen prompt and follow an example to enter these three items in the proper format.

The program runs from a menu. The first menu (Screen 1) offers four choices:

1. Messages, instructions, or assignments can be displayed.
2. The student's file of summaries can be displayed.
3. A lesson can be chosen.
4. The student can exit the program.

Students learn a great deal about data entry as well as keyboarding . . .



The first choice allows a student to repeat the MOD to review the directions; the summaries will be discussed a little later. Item number 3 allows a student to proceed with a lesson.

A beginning student (striving to develop accuracy and control) needs extra practice when errors are made; therefore, before starting a lesson, he can turn on a "retype" switch which forces the rekeying of any line that con-

MENU#= 0

- 1 DISPLAY MESSAGES, INSTRUCTIONS, or ASSIGNMENTS
- 2 DISPLAY your FILE of SUMMARIES
- 3 GET LSN
- 4 EXIT

## SCREEN 1.

MENU#=1

- 1 Type WITH the TEXT and TYPED LINE displayed on the terminal
- 2 Type WITH ONLY the TEXT displayed on the terminal
- 3 Type WITH ONLY the TYPED LINE displayed on the terminal
- 4 Type WITHOUT TEXT or TYPED LINE displayed on the terminal
- 5 GET LSN
- 6 EXIT

## SCREEN 2.

SUMMARY: Doe, John

LSN#= 15	TIME= 185	#WORDS= 96.4
#PASS= 1	MODE#= 1	#ERR WORDS= 4
RSw#=0	FLAG#= 0	%C WORDS= 95.9
01:45 PM	11Dec-84	SPEED= 25.2

MENU#= 2

- 1 MAKE ANOTHER PASS (same MODE#, RSw#; combined summary)
- 2 STORE above SUMMARY
- 3 GET LSN
- 4 EXIT

## SCREEN 3.

tains errors. Later, when a student is attempting to increase keying speed, the "retype" switch is turned off and the student proceeds through a lesson without retyping error lines.

The program gives the teacher a great deal of control over the procedures a student must use. Switches can be locked to force students to follow a certain routine such as retyping lines with errors. Flags can be set to check if entire lines are skipped or if less than a specified percentage of a line is keyed. Speed or accuracy goals (or some combination of both) can be specified by setting flags that will check to determine whether the input meets the goals set for particular lessons. If not, the student cannot store summary results of a lesson until the goals are met. The teacher also can add or change lessons or "lock" certain lessons which may be used for tests at a desired time.

After selecting a lesson, the student has a choice of four keying modes from a second menu (Screen 2). The beginner types with both the lesson text and typed input appearing on the screen. After acquiring an initial skill and trying to develop more confidence, a student may type with only the text, or without either the text or typed line displayed. When concentrating on entering text from printed source material, the student may type with just the input appearing on the screen. Regardless of which mode is used, the program compares input with a lesson in a master file and checks stroke-for-stroke the accuracy of the input.

Students are timed as they key each lesson. As each lesson is completed, the percentage of accuracy is calculated automatically and a summary of the performance is displayed (Screen 3). The student then has the choice of (1) making another pass through the same lesson, (2) storing the summary, (3) going to another lesson, or (4) exiting the program.

If the student chooses to store the summary, the program checks to see if any flags have been raised that would prevent storage or if any goals set by the teacher have been attained. After a summary is stored, the first menu again is displayed for the student to make the next choice.

Although each student has access to summaries, only the teacher can view the summaries of all students. In addition to the lesson number, number of words typed, number of errors, percent of accuracy and other informa-



## We have been very satisfied with a classroom approach...

tion about modes used and switch settings, the summaries display the date and time each lesson was completed, allowing the teacher to check if a lesson was completed by a deadline.

Advanced versions of the program and variations within the basic program allow a great deal of flexibility in setting goals. We have been very satisfied with a classroom approach and feel that goals have been achieved. The students have indicated that they like this approach and that there is a sufficient variety of keying experiences to keep them from getting bored.

In writing the programs, Dr. Cooper has taken advantage of system characteristics to make the programs run efficiently and as quickly as possible. Immediate response is needed when students are being timed, and he has attempted to avoid interrupts or slow-downs at crucial points in the exercises. Lessons are created in a separate account and then moved to the working account. In the higher levels of programs, students work in one account and the summaries are stored in another which lets those programs run faster.

REMEMBERING THAT the majority of the students in our class are non-computer oriented when they start, we feel that the advantages of our approach are as follows:

1. The typist is active in the learning process.
2. Learning goals can be adjusted to individual needs.
3. Self-pacing provides for different rates of learning.
4. Students progress through the lessons step-by-step.
5. The lessons build on and reinforce previous lessons.

6. Instant feedback and evaluation is received.
7. The ease of using the system results in a positive attitude.
8. The tedium and monotony of practice-and-more-practice is relieved to some extent by the computerization itself.
9. Students learn to interpret and respond to prompts and commands.
10. Students gain experience in data entry and working with controlled files.

From the teacher's point of view, some of the advantages are:

1. The lesson text can be adjusted or new text can be entered.
2. Lessons can be locked and unlocked for testing purposes.
3. The Message-of-the-Day can be changed for more interaction with the students.
4. Entry to the course is controlled by the teacher who enters identification codes.
5. Switches can be set to force the student to retype for practice or type through a lesson for speed-building.
6. Flags can be set to check for minimum accuracy and speed requirements.
7. Flags check for lines or parts of lines omitted.
8. The burden of paper grading is avoided.
9. Production (speed) and percent of accuracy are determined by the computer; thus, the teacher is not tied to a stop watch and may give more individual assistance to students.
10. Grading is consistent and accurate.
11. Summary (performance) data is stored and can be retrieved whenever the teacher is ready to look at it or print it.
12. The wide variety of options available allows the course to be adapted to many situations and student abilities.

---

*Mary Jane Sunkel is chairman of Office Administration/Business Education at Northwest Missouri State University, Maryville, Missouri.*

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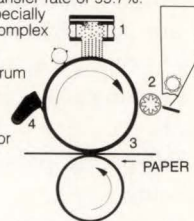
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## EDUCATION

# L EARNING TO LEARN

By Al Cini

### Technical Teaching Needs Some Student Activists.

New product releases, new programming languages, database management systems, transaction processing monitors — change is clearly the essence of our business. Indoctrinating new technicians and keeping our experienced programmers, designers and analysts tuned into the DP state of the art is one of our most important responsibilities, but will a dollar spent teaching somebody something necessarily return a dollar's worth of learning?

Consider our industry's typical approach to technical training: Students gather in a room and a teacher arrives at 9:00 a.m. The teacher projects a succession of overhead transparencies against a screen and begins reading them to the students, breaking for coffee at 10:30. At the teacher's direction, the students introduce themselves to each other, explaining why they came to the class and what they hope to get from it. A few minutes later, back to the transparencies. Break for lunch at 12, one or two breaks in the afternoon, then home or back to the hotel room. If there are enough terminals, maybe they'll spend some time working a lab problem. If there's only one terminal, they'll gather 'round like cub scouts at a campfire as the instructor demonstrates a technical step or two.

A question and some cross-talk occasionally will break the routine, and sometimes — but not very often — the teacher will wander from the lesson plan and briefly pursue one of these points in a tangent discussion.

Eventually, the students review the training experience by completing an opinion form.

Was the instructor interesting? Was the room comfortable? Were the materials complete and accurate?

This is the state of the art in technical training.

We can send someone to a training course for a week, but does he come back changed in any way? If we'd freed up his schedule for a few days and given him access to manuals and a machine, could he have directed this change for himself?

SEVERAL OPERANT FACTORS determine the outcome of a training transaction, including the instructor, the topic, the materials, and — oh yes — the student. Our industry pays the lion's share of its attention to everything except the student's role in technical teaching, and this misplaced emphasis wastes lots of time and money.

First of all, you can't teach anybody anything. Unless somebody invents some sort of BI bus for brains, it will never be possible for a "teacher" to transfer the material in his cerebral cortex directly to a "student." A teacher's job is to arrange the classroom circumstances to facilitate the real stuff of education: learning. In the learning transaction, the student's role is active and the teacher's role is passive.

Second, most DP training is redundant and unnecessary. Properly motivated students, left alone with the necessary documentation and equipment, can learn more efficiently, effectively and quickly than they can in a classroom.

Finally, DP instructors who've never really applied the methods or tools that they're

## It takes more than an ability to read overheads or manuals . . .

supposed to teach simply shouldn't be teaching. It takes more than an ability to read overheads or manuals to lead an effective technical course.

Most organizations view technical training as a process their people have to be exposed to regularly, something like dipping dogs for fleas. Management doesn't necessarily know what to expect from it, and usually doesn't know what questions to ask to evaluate its success, but training is a necessary cost of doing business and people must routinely be exposed to it or they go stale or something.

What our industry really needs is some kind of Hartz Mountain 90-day Tools and Techniques Collar.

Consider a typical situation. An organization consists of four programmers and a manager who've spent the last three years writing an accounting package using VAX BASIC, RMS and FMS. Just as they're about to "go live," they're told by management that the company is making a heavy investment in VAX Information Architecture products and sees some real advantage in VIA standardization.

BASIC is out, COBOL is in. Exit RMS, enter Rdb. Forget FMS, start thinking TDMS and ACMS.

AFTER SOME ANGUISH, the manager finally accepts, and begins to plan for, this change in direction. A call or memo to the training coordinator requests "training in VAX COBOL, TDMS, ACMS, and Rdb for four people, ASAP." The training coordinator, knowing nothing of the people, the products, or the application, begins sifting through course catalogs and assembling a schedule. There's an Rdb course in San Francisco next week, but an expense ban against travel to the West Coast. There's an ACMS course scheduled for Washington, D.C., next month; okay for the travel budget, but the prerequisite TDMS

course was taught last week. There's another TDMS course running next week, but its in Los Angeles. Do we take Rdb and ACMS before or after TDMS?

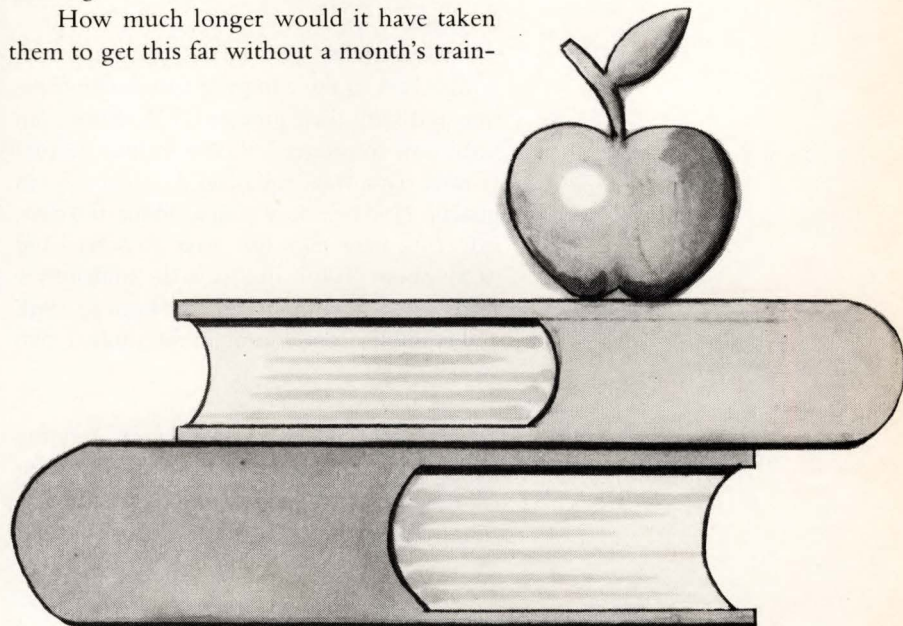
After a protracted flurry of memos, phone calls, and alternately scribbled and crossed out calendar notations, four people are scheduled into 16 weeks of training: one week each of VAX COBOL, TDMS, Rdb and ACMS.

The VAX COBOL class includes an introduction to DEC's COBOL language, a discussion of programming, a review of COBOL language features, a review of VAX Information Architecture and the Common Data Dictionary, and the afternoon is spent doing assignments in a lab.

The Rdb course includes an introduction to DEC's Rdb/VMS product, a discussion of programming, a review of Rdb/VMS language features, a review of VAX Information Architecture and the Common Data Dictionary, and the afternoon is spent doing assignments in a lab.

The TDMS and ACMS courses follow suit and, after a couple of months, the four return to their jobs with 10 pounds of notes and hand-outs each. They log in, start to build something, and it immediately fails with routine syntax or command errors. They rifle through their notes, struggle with the product documentation, and a week or two later they've got the beginnings of a prototype running.

How much longer would it have taken them to get this far without a month's train-



## The days of mindlessly slotting people into five-day product training classes are numbered, and these largely cost-ineffective maneuvers gradually are being replaced . . .

ing? Surprisingly, not much. Maybe only a week or two.

The important things to know about these products are the kinds of applications they're really suited for, the standards and conventions you need to adopt to use them effectively, their limitations and bottlenecks. Odds are the training covered them only superficially or not at all. The course probably focused on the unimportant things — syntax and grammar — but the students forgot them and had to look them up in the manuals all over again when they got back.

What about the Student Opinion Forms? The Rdb class was interesting, and the teacher was a riot. The TDMS course was dull, but lab was useful. The students in the COBOL course asked a lot of elementary questions. The teacher in the ACMS course didn't even know what the product did.

Do any of these opinions bear heavily on the amount of learning that took place? Probably not.

Competent VAX BASIC programmers, with access to the compiler and documentation and with their phones off the hook, can learn how to program in VAX COBOL in two or three days. FMS-experienced technicians can pick up TDMS on their own in about two days. Rdb/VMS may take five days to learn, and ACMS about 10, but afterward the students are ready to use them, not to come back to work and stumble around in them for another two weeks.

YOU'LL GET THE MOST from your training dollars by developing a responsibility for learning in the students themselves. At review time, when you sit down to formalize your

employees' objectives and goals, you should encourage them to plan what they need to learn to be effective in the assignments you've given them.

Does this mean that training is out? In the traditional sense, yes. The days of mindlessly slotting people into five-day product training classes are numbered, and these largely cost-ineffective maneuvers gradually are being replaced by shorter, much more intensive, custom-tailored training, conducted under experienced leadership.

Encourage the students to learn how to use products from the manuals. Give them a machine to work on and clear their calendars, and get out of their way for awhile. If available, assign a more senior or experienced employee to answer questions for them. If not, retain a consultant to serve as a learning resource for a week or two. Let them develop and refine a few sample applications, then call the consultant back in to review their work. Suggest some advanced training, seminars on advanced techniques, and they'll let you know if they think it's needed.

Self-paced instruction courses are okay, but watch out. They often lag months or years behind the latest releases of the products they purport to teach, and there's nothing more depressing than watching someone dozing in front of a videotape monitor while a disembodied announcer irrelevantly drones away.

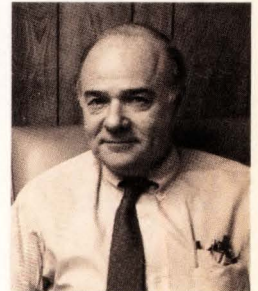
Students who direct their own learning learn more quickly and retain it longer, at a much lower cost. Their class assignments are actual prototypes of the work they plan to do when the training is complete, instead of sterile modules from non-specific order processing or payroll systems. When they ultimately do attend advanced training classes, they're prepared to ask advanced questions and learn advanced techniques without stumbling over elementary product syntax and grammar.

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**SOFTWARE**

# S CRIBE

By Bruce Feldman

## Document Production Software.

*Scribe* is a document formatter — that part of a “word processing” system that views the text created in a file, figures out how to display it on pages the way you want, and sends it to the printer. But to call this software *only* part of a word processing system would be an understatement.

The software is written in BLISS, native to the DEC -10, -20, and VAX. Automatically translated versions are available for UNIX-based systems; for non-UNIX systems there are, C, PL/1 and Ada versions, and interfaces with all text editors. It is a completely command-driven program utilizing no menus or mouses. Commands must be embedded within the text — in the file to be processed, for the most part. A specific imbedded command achieves a specific result in the printout. As such, you must become familiar with those commands necessary to produce the desired results. The *Pocket Reference* supplied with the software contains those most often used, and the rest are fully itemized in the *User Manual*.

This product has a host of features beyond the scope of most word processors. This can be both a plus and a minus. On the negative side, you must learn two sets of commands to create and format text, whereas most word processors at least strive for a similar ergonomic logic between the creation, editing and formatting stages. *Scribe* assumes a working familiarity with at least one ASCII-based editor, like TPU, EMACS or EDT, or a word processor with a capability to create ASCII

files, like MASS-11. On the positive side, you need not adapt to any one specific editor.

To produce an ordinary draft created with an ASCII-based editor, it is necessary merely to enter “Scribe” (with VAX/VMS) or similar command, and specify the input file to be formatted. *Scribe* will process it according to the program defaults (alterable by the user); you then send the file to the default output device.

It also is possible to specify a different device at the keyboard. The program creates a finished file; then, you enter a DCL (in VMS) or similar command from the operating system to direct it to the desired device, or by adding command qualifiers like /FILE to the end of the input file name. Other qualifiers are available for generating a word count, vocabulary file, draft, a paged file, a keep file (to tell *Scribe* not to delete temporary processing files), or for directing the output to various devices. There also is a qualifier to eliminate the display of error messages, and another to abbreviate them.

For recognition by *Scribe*, the text file usually is given a .MSS extension. It also must contain the appropriate commands imbedded within, unless the default results are sufficient. Commands begin with the “@” sign to distinguish them from text. The syntax, with a few exceptions, is as follows: @ followed by the command name, the inside delimiter, the text or notation to be affected, and the outside delimiter.

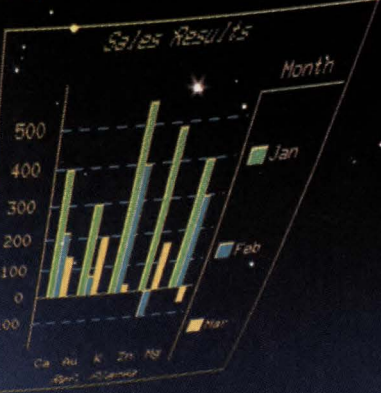
The core of the software is its “Database,” a collection of readable and changeable text files that contain a wealth of information used by the program, including style parameters, definitions of document types and attributes,



[Col: 3 Row: 7] N (F0) 220  
 Copy Modify Edit Format Default Store Print Window Option Tools Graph Help Quit  
 Call 20/20 subsystems

\*\*\*\*\* CONSOLIDATED SUMMARY \*\*\*\*\*

Scenario	Jan	Feb	Mar	Apr	May
Division 1....	500	280	400	300	550
Division 2....	300	100	220	70	400
Division 3....	160	500	140	200	30
Total	960	880	780	570	980



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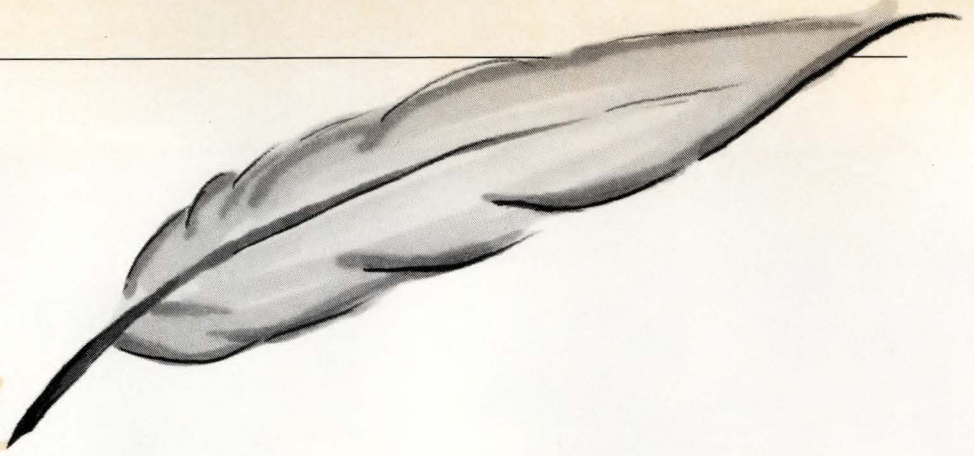
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# Scribe



output device characteristics, fonts and typefaces, and other goodies. Unilogic recommends that a database administrator (DBA) be deputized at each site to customize the template library to the needs of the group. For a DBA who knows his way around, *Scribe* is a veritable toolbox (toy chest?) of techniques for individualizing and creating formats for virtually any type of text or notation.

The accessibility of the Database is certainly an advantage; however, it also can wreak havoc on an organization when more than one user starts changing things. Unilogic is careful to warn against allowing anyone but the DBA to mess around in there. Fortunately, the Database can be write-protected. The DBA approach also allows everyone in the organization to benefit from the alterations, shortcuts and unique formats generated by skilled on-site *Scribe* fiends.

*Scribe* supports the merging of text with special symbols, fonts, characters, notation, and graphics. The spatial representation of mathematical equations and other expressions is possible in a variety of printed output, resulting in a near typeset appearance. The insertion of such notation into text is performed by the use of environment com-

mands — essentially, groups of more limited commands — for the display of certain types of text, like verse, quotations, lists, tables, as well as two types of mathematics environments. Therefore, cutting and pasting of most types of notation into text from different files is unnecessary.

Producing mathematical expressions requires the use of other subroutine or macro-like constructs called forms. The math environments are tricky in that they differ from text environments by the use of special spacing rules; so, for aesthetic purposes, you must indicate explicitly where mandatory spaces are to be, or else they will be handled by the default parameters. There are commands included to produce special characters not in the ASCII set but commonly seen in math expressions, like capital script letters.

In order to incorporate extensive use of mathematical symbology, *Scribe* must be directed with a single command to read its special mathematics library file located in the Database. Structures that are font or output device-dependent also are defined there. As with many of the features available with *Scribe*, the results are only as good as the capability of the output device and the skill of the user in manipulating the software.

Graphics are accommodated by setting aside sufficient space on the page through imbedded commands, and then pasting-in the figure or table produced by external graphics software, or by directing the program to read-in a file containing it. *Scribe*, now, also produces

tables and boxes. (Again, the inclusion of graphics with text is device-dependent.) *Scribe* automatically assigns the figure a number and generates a list of tables and figures as part of the document's table of contents. Using a caption command, the program also will include the figure number automatically and, by specifying, place the caption above or below the figure or table.

Through a system of commands and counters, the software automatically numbers pages, multilevel sections, theorems, footnotes, figures and tables, and produces an index and table of contents. Cross-referencing of key words or sections also is possible through a system of tagging these items.

With *Scribe*, it is possible to add original commands to a specific manuscript file, overriding the Database, in order to achieve results not provided by resident commands. Also, it is possible to modify specific definitions to suit a different set of requirements. There are several types of user-defined features, including macros, command strings, environments, and counters. Additionally, document types can be added and/or altered fairly readily.

To fashion text, the program uses concentric groups of information. At one level are *document types*, referring to major collections of characteristics. To produce qualities within virtually any document type, *environments* are used.

*Attributes* are groups of characteristics that form environments. Specific attributes can be added/deleted from any of the larger entities to customize to your needs.

### Best Footnote Forward

*Scribe* is at its best in the production of manuals, reports, catalogues, and lengthy documents that make use of the storage capacity of minis and mainframes. With this program's extensive repertoire of text movers and shakers, it is possible to obtain desired results without having to make many compromises. Success does, however, take time and persistence, at least in the beginning.

To save as much time and effort as possible in formatting text, the software offers a variety of templates or command packages, or "document types" as Unilogic calls them, for most purposes. There are 12 basic document types with an additional six that essentially are variations on the others. Each site can configure its own defaults. Document types include:

1. Article (two formats)
2. Brochure
3. Guide — a kind of handbook format
4. Letter (two formats)
5. Manual (two formats)
6. Military standard 837A — for contractors and proposal writers
7. Reference card
8. Report (two formats)
9. Slides — for making overhead projector slides using extra large type (two formats)
10. Text (two formats)
11. Thesis
12. Bibliography, which offers 20 different bibliographic reference formats to choose from(!) — including the standard official formats of several professional societies.

The list of document types includes two defaults for no-frills text, for in-house distribution or draft purposes:

one that indents and double-spaces, and the other for straight vanilla text. Novice users easily can learn these basic formats within minutes. Don't see anything you like? Just ask. Unilogic often creates document types for the unique requirements of clients, and shares those

developed by *Scribe* aficionados at other sites. But, one of the advantages of using the stock configurations is that each is completely portable to all sites running *Scribe*, and when you call Unilogic because of a problem, they know what you're talking about.

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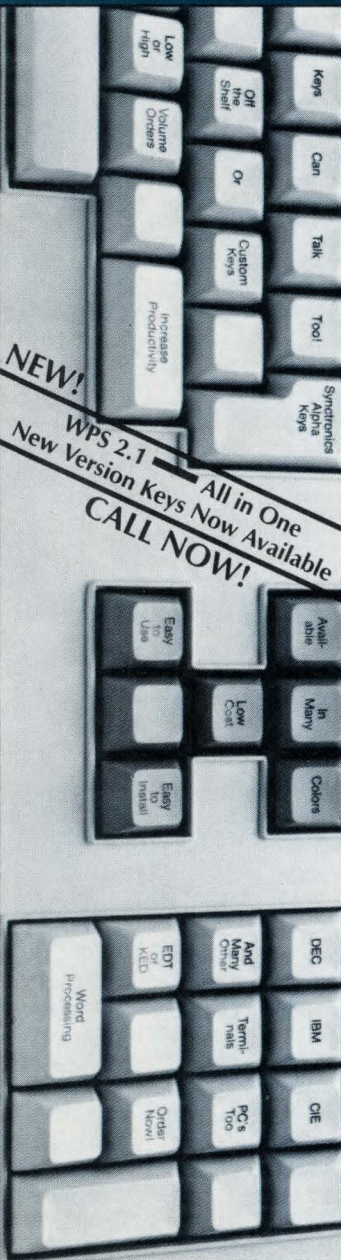
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The lengthy list of stock document types makes the creation of new ones easier by its mere existence. This is because the alteration of existing document types to suit individual tastes often is faster than starting from scratch.

For producing lengthy manuscripts, *Scribe* offers several techniques. You can break the manuscript into several bite-size files in which to work, and then chain the parts together as one at the end of the writing process. Or, just format and print the parts of a large document separately to review drafts or experiment with different formats, and then process separately, without changing all of the parts simultaneously. Also, it is possible to generate automatically an outline of the manuscript to show and to help digest its structure and cross-reference organization.

The software can be directed to search for different Database and bibliography files for different sections of a manuscript. This is useful for lengthy inserts in a document, long digressions and examples, and for lists and the like that may benefit from widely varying styles of presentation. The word count and vocabulary analyzer also are helpful for text length submission requirements and for vocabulary building and variety. The latter contains all words used in a document by frequency of use and alphabetical order.

*Scribe* has the capability of formatting manuscripts for printout on a large selection of line printers, photocomposers, and laser devices. Unilogic boasts support for more laser printers than any other software. Of course, most of you just need it for yours, so it pays to check. The program also can produce color text in documents, as long as the printer can comply.

### The .ERR of Our Ways

There are three classes of messages provided by *Scribe*. *Warnings* calls your attention to possible problem areas in the text that, nonetheless, are not fatal. *Errors* are flaws in the appearance of the text that also will not abort a job, but that usually demand attention. Finally,

*Serious Errors* indicate operating system, Database file or hardware error, or, a rare manuscript error serious enough to confound the software into submission.

During the processing phase, *Scribe* informs you of the processing sequence. As the program proceeds through a document, it also informs of any problems incurred along the way. First announced is the input file being processed and whether it is part of a larger document, then the output device, and then the document type. Subfiles, the index, table of contents, bibliography and citation list all are acknowledged.

*Scribe* prints to the screen each page and section number as it is processed. Finally, a summary of errors found and a list of the files produced is reported. The program creates an error log (.err) file when errors are found. It's possible to disable the screen reporting of error messages through a command line option.

There are some errors that are fatal and immediately will halt processing, as in operating system errors, missing entries in the database, or hardware limitations. Most errors, though, are the "human" type found in manuscripts, and include fields with missing delimiters, missing text or commands, wrong commands for the desired results, contradictory commands, etc. The *User Manual* contains a detailed explanation of error messages, although the screen display usually is enough to light the bulb.

### Hyphenetically Speaking

*Scribe* supports several different methods of hyphenation. For automatic hyphenation, a modified Knuth-Liang hyphenation algorithm with exact-case matching and an exception dictionary is used. Only words consisting entirely of lowercase letters are hyphenated algorithmically with this option. A similar

option ignores capital letters.

Two options exist for exact hyphenation dictionary matching: One ignores capitals, the other doesn't. *Scribe* also will produce an .err file with a list of words that the program "wanted" to hyphenate but didn't, at the user's option. And finally, of course, all hyphenation can be deactivated.

In each hyphenation mode, the software recognizes "text hyphens," those used in constructions like "happy-go-lucky." Words you want to be hyphenated only at certain points, or words not to be hyphenated at all, may be specified as such through commands imbedded within the manuscript.

*Scribe* also will produce a hyphenation decision .hyd file which is a listing of every hyphenation decision made, in order of occurrence. Included are where the word actually was broken, what hyphenation mode was in effect at the time, all possible hyphenation points for each word, and where the word occurred in the text file! Sorry, a detailed analysis of word origin by geographical area and language group is not available . . . yet!

The lexicon (.lex) file, containing the alphabetical and frequency lists of all words, also can include all hyphenation points for each word according to the hyphenation method selected. This is useful in judging the effectiveness of the hyphenation dictionary or algorithm used.

Ways to limit the size of blank spaces as a result of hyphenation, and rules for sentence, line, paragraph and page breaks also are selectable.

### Widows and Orphans

"Widows" (the final line of one page appearing on a fresh page by its lonesome), and orphans (the first line of a paragraph appearing alone at the bottom of a page), are handled by three options: One forces widows or orphans to appear at the expense of the bottom (top) margin; another prints a warning message so that the writer can change

the text, but takes no action; and a third choice does both. The default ignores widows or orphans.

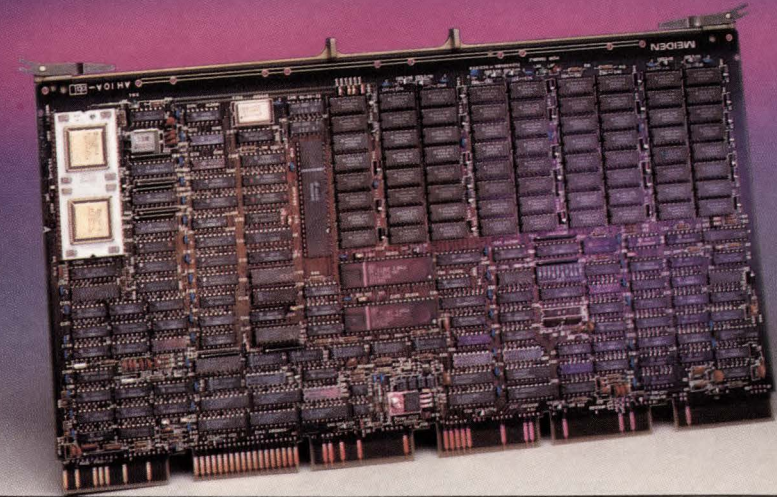
### Binder Bounty

The documentation basically is referential in nature, with the chapters se-

quenced from the simple to the complex. This should aid experienced users who easily can find subjects to reference, without forcing them to wade through explanatory material. Unilogic apparently relies on its on-site training sessions to get the novice in the swim, but


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not every user-pool chooses this approach. A trained DBA can bridge that gap. The manual does include several "before" and "after" sequences to aid the uninitiated; however, these may not be sufficient for those accustomed to friendlier menu-driven programs with on-line help.

*Scribe* is not a difficult program to use on a skeleton level, but it is to ob-

To help, *Scribe* allows you to scan the file at the terminal *as* it will be printed, but *before* it actually is. It then is possible to figure out what you did wrong, retreat to your file, invoke your text editor and try again, before being buried under piles of prospective book marks and scratch paper.

Experience inevitably develops a mental image of what the finished result

student at Carnegie Mellon, who later won the Admiral Grace Murray Hopper Award, for creating *Scribe*. The award is presented annually by the Association for Computing Machinery for the most significant contribution to the computer industry by an individual under age 30. Unilogic was formed in 1979 to market and distribute the software.

While under development, the program was used almost exclusively at educational institutions like Carnegie Mellon, with large systems. During its initial years on the market, the breakdown became 40 percent educational institutions, and 60 percent commercial users. Current sales reportedly are running 80 percent commercial and 20 percent educational.

Unilogic has staked out its territory in the scientific workstation and medium to large mainframe environments. However, an IBM RT/PC version will be available shortly, and one for the MICROVAX is available now. *Scribe* leaves off where hardware-dedicated composition systems begin.

One of the stated objectives of the software is the forming of a hard distinction between the task of writing or creating, and the separate deed of designing or formatting. Once this bifurcation is made, *Scribe's* competition narrows to manageable size and, of course, it compares favorably.

But the operational reason for separating these functions is by no means clear at a time when the thrust of the industry is toward unifying similar activities. Versatility is no longer a synonym for limited features.

Additionally, no matter how firmly this distinction is made, many individuals thinking about the purchase of *Scribe* still will be comparing it to word processing software. They will ask, "What does *Scribe* offer me that a good word processor does not?" Once, the answer would have been, "Plenty." Now, however, that's questionable. *Scribe* is not going to replace a state-of-

## The program was designed to make formatting easy for the uninitiated, as long as their needs fall within the parameters of its templates.

tain full advantage. Beyond the bare bones basic production of standard text, be prepared to spend a lot of time with your nose in the book; there is no getting around it. It's a lot like creating a program: You often have to let it run before you know what's wrong, then it's back to the drawing boards.

The difficulty is in the ergonomics. Since basically you take a completed text file and process it through *Scribe*, there is no immediate feedback from the software when a wrong imbedded command is used while you're still in a position to do something about it.

When you finish the text file, you imbed the necessary commands, send the formatted file to an output device, cross your fingers and wait by the bucket for your perfectly formatted output, or by the terminal for your error messages. No matter how carefully you digest the manual or pay attention at the training sessions, expect more of the latter than the former, at least for awhile.

will look like for every command. This significantly cuts down on time back at the drawing board. But until those mental circuits are formed, there are a lot of surprises.

The program was designed to make formatting easy for the uninitiated, as long as their needs fall within the parameters of its templates. It also is relatively easy to make minor changes without investing a huge amount of time, but, still, that requires knowledge of the system, which itself takes time. Customer service at Unilogic is available for phone inquiries.

Because *Scribe* is a text formatter, it offers the possible advantage of taking this chore from the writer, thereby freeing his time for more constructive endeavors. The theory is that the writer spends less time in revising for purposes of format and more time on the content of the manuscript. Of course, this assumes there is someone else to do the editing and formatting, otherwise, no time is gained.

### The Roots

*Scribe* is not a new program. It was developed in the late 1970s by Dr. Brian Reid, then a computer science graduate

the-art word processor for typing letters, writing articles, essays and memoranda, or even for the creation of many types of lengthy manuscripts, although it certainly *can* and, in fact, *is* used successfully for these purposes. Most of the latest crop of word processing programs simply are easier to use than *Scribe* for these applications.

There are many individuals, however, who like to retain a high and direct degree of interactive control over their documents. They place a high value on the ability to make global changes without stopping at each occurrence within the text, as some word processors would require, for example. Additionally, they value knowing precisely what command alterations cause precisely what result in a document, and how. The range of such actions clearly is one of this program's strengths. For these individuals, *Scribe* may better be compared to programs like *DECpage* or *T<sub>E</sub>X*, rather than to general word-processing software.

Another, is *Scribe's* impressive list of document types for specialized uses. This really could fit the bill for certain users. A potential purchaser should ask, however, whether the trade-off in time needed to use the program is worth *Scribe's* extensive list of sophisticated features. For many, the answer could be, "Yes."

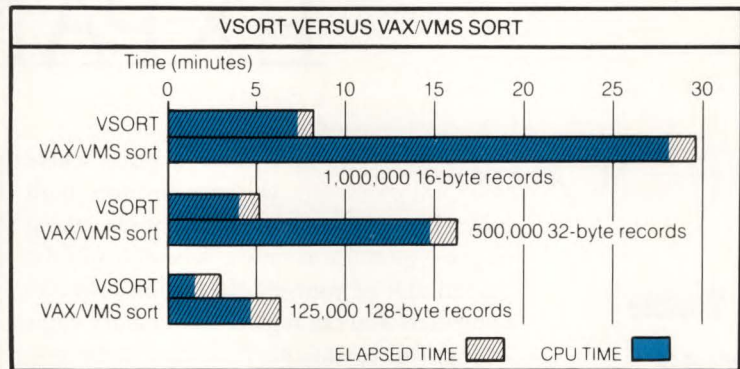
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# P RO 350 MEMORY EXPANSION

By Bruce M. Eteson

## How To Double Your Memory And Free An Option Slot At The Same Time.

I know a place where you can do more with less, where you can remove half of something to give you twice as much. Where? Inside the system unit of your 512-KB Professional 350 computer! You can replace the memory chips in your PRO to multiply their capacity by four. This will allow you to have one megabyte of memory and free an option slot by removing the 256-KB memory option card that came with your PRO.

I became convinced that this expansion would be possible while I was researching my PRO to fix a bad memory chip. Although it may be possible to do an expansion on the 256-KB option card, this article considers only the two memory cards mounted on the main circuit board. We can only wonder why DEC doesn't offer this expansion as an option for the PRO.

Before I describe how this miracle is performed, I'll mention a few problems that DEC had the foresight to solve when the PRO was just a twinkle in its corporate eye. DEC's design decisions made the PRO a little more expensive, but prevented the memory design from becoming obsolete when 256-Kbit dynamic random-access memory (RAM) chips became commonplace and attractive alternatives to 64-Kbit chips. Three areas in particular could have caused major headaches:

### 1. Addressing

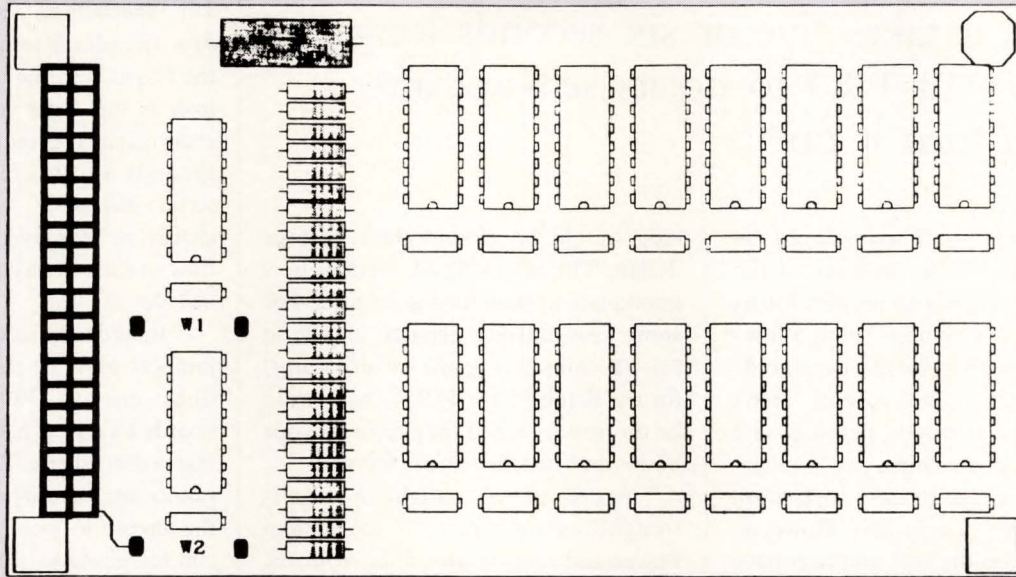
The 256K chips require nine address lines,

one more than the 64K chips need. Since these chips have only 16 pins, the full address is split into two equal parts using what is known as a two-to-one multiplexer. Two parts, nine bits each for a 256K chip and eight for a 64K chip, are sent to the chip one after the other. They are known as the row and column addresses. DEC's PRO 350 design has nine address lines in the system-unit circuits that connect to the two memory daughterboards and, in turn, have all nine address lines in their printed circuits. Finally, the 2:1 multiplexer in the system unit handles the 18 inputs and nine outputs needed for the 256K chips. The result? Since memory is addressed (one 16-bit word at a time; 16 chips in parallel), each daughterboard can hold up to 512 KB.

### 2. Memory Refresh

The memory chips are a variety known as dynamic RAM. The addressing circuits for the chips must be exercised frequently to prevent data loss as tiny electrical charges in the chips leak away. The refresh of all the bits in two rows takes place when a row address is imparted to the chip. This happens when a row is addressed for a read or write, but if a program somewhere else in memory is being executed, it may be too long between refreshes. To overcome data loss in this situation, the PRO 350 contains circuitry that exercises the row addresses of the memory chips at a regular rate. Because the refresh takes place on two rows at a time, the counter that generates the addresses only need be seven bits for 64K



**F****FIGURE 1.**

RAMs. The 256K chips need eight, but tolerate being refreshed half as often. DEC's foresight gave the PRO a refresh counter that generates an eight-bit count.

### 3. Mapping

Most of us are familiar with the software end of memory management. Registers are loaded with the "upper" bits of the memory addresses to be accessed, then 16-bit "virtual" addresses are added to them to generate the 22-bit addresses used by the PRO. But, these 22-bit addresses have to be allocated to chips that accept only 16 or 18 bits. What's needed is logic circuitry to enable "banks" of memory. The upper bits of the 22-bit address can be used to select a bank. But how can the system tell if a daughterboard has 128 KB or 512 KB? In the PRO's case, DEC provided a pin on the daughterboard connector for a logic signal. Not only that, but DEC also built the mapping logic to respond properly to the signal. You can have any combination of daughterboards with 128 KB or 512 KB!

THE MODIFICATION of the daughterboards is quite simple if you have a good soldering iron and some experience in removing the solder

from ICs inserted in plated-through holes. You should perform this modification only if you are experienced in electronic service and safety methods. If you don't have such experience, you should work with a qualified technician. You can get by with the following tools and supplies:

1. Soldering Iron — A thermostatically controlled, fine-tipped, pencil-type iron will be best.
2. Desoldering Wick — This is fine braided wire impregnated with flux. Five or 10 feet will be enough. Most solder suckers will have trouble pulling enough solder from some of the holes, especially the ones to the power buses. Note that after wicking or sucking the solder from a hole, the IC lead often still will be stuck to the side of the hole by a thin file of solder. To free the lead, heat it and push it away from the wall of the hole with the soldering iron.
3. Solder — Use a fine size. Solder flow is sometimes better if a light coat of liquid flux is brushed on, but a good rosin-core electronic solder usually will be adequate.

*PRO-350 Daughterboard.*

## After making the change you'll notice that it takes five or six seconds longer for your PRO to do its self-test after you turn it on.

4. DIP Sockets — These should be 16-pin, low-profile sockets. Each daughterboard needs 16 sockets for its memory chips. I've been using a low-reliability type that doesn't have gold-plated contacts. The sockets aren't necessary, but after you desolder and remove a few of the chips, you'll understand why it's nice to have sockets on the board when a chip fails. However, sockets increase the cost and may have occasional contact problems caused by corrosion.

5. Chip Puller — This is a tool like a pair of tweezers that has inward flanges at the tips. The flanges go under the ends of the chip being removed so you can pull it up and out of the board. If you try to pry out the chip with a screwdriver, you risk breaking the little capacitor next to the chip. When desoldered properly, the chips should pull out easily.

6. Flux Remover — Removing flux residue makes the job look professional. Use a fairly stiff brush — an old toothbrush is just fine — to completely eliminate the flux, then rinse. Avoid breathing the vapor or letting the liquid touch your skin.

7. 256K RAM Chips — Use a 41256-15 or equivalent. The -15 indicates a maximum access time of 150 ns. Some manufacturers use entirely different part numbers and speed codes, so don't panic if the dealer sends you chips with other numbers on them. The chips I used were NEC D41256C-15 parts. Be careful about the price you pay. The unit price for a

chip should be around three or four dollars. The ads in *BYTE* seem to be a good place to shop for a good price. For some reason DEC persists in selling 256-KB chips sets (eight or nine chips) for the Rainbow for \$695! That would be too much even if they came to your house and installed them for you!

Access to the daughterboards is straightforward. Turn off the system power and remove all cables from the system unit. Release the two catches — one on each end — that hold the cover. Lift the cover clear and set it aside. Disconnect the disk drive power cords from the power supply box, the hard disk cables from the card connectors in the option card box, and the floppy disk cable from the top of the floppy drive. Press the retaining clip at the bottom center of each disk drive and slide the drive out half way. Unscrew the three knurled screws at the bottom rear of the drive trays — they hold the drive tray part to the option card box. Finally, slide the system board, with option card box attached, back out of the system unit box. The power connector at the rear must be disconnected as the board is pulled out.

All this will expose the daughterboards, which easily can be removed from their stand-offs. Assembly is the reverse of the removal process.

Figure 1 shows approximately the component layout of a daughterboard. Note the position of the notch in each of the memory chips. The new chips must be installed in the same orientation. Be patient and take your time in removing the old chips. Don't overheat the board — you could damage it. Also,

don't remove the two chips closest to the card connector.

The chips are sensitive to electrostatic voltages. It helps to do this work on a sheet of grounded aluminum foil, especially in winter when the air is dry. The idea is to have you, the chips, the board, and the tip of the soldering iron at the same voltage. Connecting everything to ground works best. The grounds usually are done with a large series resistance to allow the static charge to leak away, but prevent the flow of dangerous currents from sources like the AC line.

In addition to the new chips, two jumpers must be installed at the positions marked "W1 and "W2." The boards I've seen have "W1" and "W2" marked on them. Three of the contact points appear only as circular pads on the top of the board. The fourth has circuit foil going to it from under the connector. The W1 jumper is for the ninth address bit and connects pin 32 on the connector with pin 1 on each of the memory chips. The W2 jumper connects pin 39 of the connector to ground to indicate that 512 KB are present on the board. If bare wire is used for the jumpers, it mustn't make contact with any other parts of the circuit.

After making the change you'll notice that it takes five or six seconds longer for your PRO to do its self-test after you turn it on. An added benefit of this change is that you can work around a memory fault. P/OS won't load if there's a memory fault or if there's less than 512K in the machine. With only 512K you're dead in the water until the memory is fixed. If a fault appears after you have the extra memory, you can remove the guilty card and keep working.

*Bruce M. Eteson is an engineering supervisor in C3I Systems at Singer-Kearfott, Wayne, New Jersey.*

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# VAX's TEXT PROCESSING UTILITY

By Mike Rechtman

**And TECO begot VTEDIT, while KED begot EDT, and EDT begot EDT Version 2.0 and everyone started writing EDTINI.EDT files. And then along came TPU . . .**

Meda-Yehuda is a data processing center, located on Kibbutz Tzor'a, near Jerusalem in Israel. We provide DP services for about 30 other Kibbutzim and associated factories, hotels, etc. At present we run RSTS version 8 on a PDP 11/70 and VMS version 4.2 on a 730.

In 1982, the *RSTS PROFESSIONAL* (Volume 4, Number 1) published a copy of a suggested standard for EDT initialization files, which we immediately adopted. We removed some of the definitions, and added others to provide for handling of Hebrew text — written from right to left. (The VT100 and some equivalent terminals have a right-to-left screen option, but the EDT screen handler doesn't cope.) We have been using the same initialization file ever since, except for some minor changes, under both RSTS and VMS, to such effect that some of our programmers think that GOLD-I (defined in EDTINI) is an intrinsic EDT command.

A couple of weeks ago, we got the boxes labeled VMS Version 4.2. Before actually installing the new software, we came across the *VAX TPU Manual*. TPU seemed to have lots of stuff that we've been wanting for a long time; for example, the "LEARN" command, which, if anyone out there remembers KED, was one of that editor's strongest commands.

Our options at that point seemed to be:

1. Ignore the whole thing, and carry on with EDT, or,

2. Make a changeover to TPU, and use the EVE interface, which seemed to include most of the new goodies, but would mean learning a whole new way of editing, or,

3. Change over to TPU, with the EDT interface, but use the options given to customize the interface so that we wouldn't lose all our home-brewed goodies.

The *VAX TPU Manual* gives detailed explanations of how to add options to a given interface. Also, within the manual, every TPU function (called in TPU parlance "BUILT-IN Procedure") is not only well documented, but is generally accompanied by an example. We decided to take the plunge and build our own EDT-emulator startup file. We ended up using quite a few of the examples from the manual in our additions to the EDT interface, as many of them seemed likely to become useful. Other procedures (e.g., to implement the "LEARN" command) were copied from the EVE interface, or based on procedures taken from the EDT or EVE interface files. A positive side effect was that we are now far more aware of the possibilities latent in TPU procedures. The results of our efforts are given in Program 1.

If you plan to write your own interface file, or amend the one given here or one of the examples in the manual, you would do well to follow the *VAX TPU Manual's* advice, and read the TPU sources in SYSS\$LIBRARY—EDTSECINI.TPU, which holds the commands for the EDT emulator; EVESECINI.TPU, which holds the commands for the EVE editor; and DEBUG.TPU, which can be used as an

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# F

## FIGURE 1.

### EDT\_TPU.HLP : Add to TPUHELP.HLP under KEYPAD

- |   |  |
|---|--|
| <p>3 F7, GOLD_CTRL_W<br/>Toggles screen width between 80 and 132 characters.<br/>Activated by F7 or GOLD-CONTROL-W.</p> <p>3 F8, GOLD_RET<br/>Takes the current line and reverses it. If the text is shorter than 72 characters, moves the right-most character into the 72nd position.<br/>Called by GOLD-RETURN or F8.</p> <p>3 F9, GOLD_L<br/>Start a 'LEARN' command sequence.<br/>Activated by GOLD-L or F9.</p> <p>3 CTRL_R<br/>Activate a 'LEARN'ed command sequence.<br/>Called by CONTROL-R.</p> <p>3 GOLD_F12, GOLD_BACKSPACE<br/>This procedure extracts a 'SELECT'ed range and reverses it left-to-right (useful for Hebrew . . . )<br/>Activated by GOLD-BACKSPACE or GOLD-F12.</p> <p>3 F14, CTRL_A<br/>Toggle INSERT - OVERSTRIKE states.<br/>Called by CONTROL-A (As at DCL command level).</p> | <p>3 F17, GOLD_I<br/>Procedure to read a file into a buffer.<br/>Activated by function F17 or GOLD-I.</p> <p>3 F18, GOLD_S<br/>Gives the user a list of buffers and included files.<br/>Activated by GOLD-S or F18.</p> <p>3 F19, GOLD_B<br/>Procedure to switch context to another buffer.<br/>Activated by GOLD-B or F19.</p> <p>3 F20, GOLD_M<br/>Procedure to return to MAIN buffer.<br/>Activated by GOLD-M or F20.</p> <p>3 GOLD_UP<br/>Move 21 lines (1 page) up.</p> <p>3 GOLD_DOWN<br/>Move 21 lines (1 page) down.</p> <p>3 DO<br/>Works like GOLD-7 (COMMAND) in EDT.</p> |
|---|--|

initialization file under either editor when debugging your own procedures. There is a problem when printing either of the first two files, as they contain control characters (Form-feed, Vertical tabs, etc.) which wreak havoc on an attempt to make a hard copy. However, a three-line BASIC program (Input line, handle Control-characters, and Print) soon will give you a readable copy.

All in all, our efforts at writing our EDT emulator customizing file took two of us the better part of one day. Compare this to the time spent adding our Hebrew-handling features to the original EDTINI file, which took quite a lot more, though spread over a couple of weeks.

A customizing file, once written, should be kept in your default directory for a running-in period, possibly under the name TPUINI.TPU. When TPU finds a file by this name, the file is used as a default initializing command file. However, the procedure TPU\$LOCAL\_INIT (more later) will *not* be performed automatically and, if needed, you will have to call it explicitly by TPU command. An alternate startup file may be used by adding the switch "/COMMAND=FILE.NAME" to the TPU startup call.

For example, in order to debug a TPU procedure written in TRYOUT.TPU, the startup command would be:

```
EDIT/TPU/SECTION = SYSS$LIBRARY:
EDTSECINI/COMMAND = SYSS$
LIBRARY:DEBUG TRYOUT.TPU
```

This could be made more convenient by defining:

```
EDT := = EDTI/TPU/SECTION =
SYSS$LIBRARY:EDTSECINI
```

Once your customizing file is fully debugged, and you want to add it to the permanent version of your TPU interface (e.g., for EDT, EDTSECINI.TPU), you should proceed as follows, assuming "EDT" is defined as above:

```
EDT/COMMAND = OUR__INITIALIZER.FILE
```

And once in the editor, type GOLD-KP7 to get the "TPU command" prompt. The reply to this prompt is:

```
SAVE "[SOME.WHERE]EDT__EMULATOR"
```

(Choose your directory and filename; I suggest *not* using SYSS\$LIBRARY.)

After which you should exit the editor. Now redefine:

```
EDT := = EDIT/TPU/SECTION =
[SOME.WHERE]EDT__EMULATOR
```

The procedures from OUR\_\_INITIALIZER.FILE are now included in the global section from which TPU reads its startup commands and procedure definitions. If there is a procedure named TPU\$LOCAL\_INIT, it will be performed automatically at every startup. This procedure could set up values for screen width, facility name (the "FACILITY" part of system messages), etc. This procedure should be the only one you

# PROGRAM 1.

## EDT.TPU : EDT emulator startup file :

```
! TPU Procedure file. To be used together with the TPU
! EDT emulator (EDTSECINI).
! Note : word delimiters have been changed in
! SYSSLIBRARY:EDTSECINI.TPU : '":'?,[]! added .
!
!+
! PROCEDURES
! *****
!-
! This procedure is the local initializer.
! It will always be performed upon entering TPU, (if it is in a .GDL file,
! as it is called by TPU$INIT PROCEDURE .
! Any necessary global variables should be handled here, rather than by
! editing SYSSLIBRARY:EDTSECINI.TPU .
!
PROCEDURE TPU$LOCAL_INIT
! This procedure is invoked to initialize the editing session.
!
! Change word-delimiter set to include punctuation marks etc. :
! Use ASCII(N) to allow easy printing of <HT>,<LF>,<VT>,<FF>,<CR>
EDT$X_WORD := " , ; ' ? ( ) [ ] ! * + " * ASCII(9) +
              ASCII(10) + ASCII(11) + ASCII(12) + ASCII(13);
!
! Change to the name of your choice :
SET(FACILITY_NAME, "TPU/EDT");
!
! Use a bell on all messages :
SET(BELL, ALL, ON);
!
! Initialize a Timeout message :
SET(TIMER, ON, "Working...");
!
! Set wrap at 80, and check for first <SP> after column 80 :
EDT$X_WRAP_POSITION := 80-2;
DEFINE_KEY("EDT$WRAP_WORD", KEY_NAME(" ")); ! Space
! Note: In the interests of efficiency, the above two lines
! should be commented out if not needed - every time you type a space,
! a procedure is called. The same could be achieved by using the
! line-mode command 'SET WRAP NN' when necessary.
!
TPU$LOCAL_INIT := 2; ! Dummy...
ENDPROCEDURE
!
PROCEDURE EDT_INCLUDE
! Procedure to read a file into a buffer.
! Activated by function F17 or GOLD-I.
!
LOCAL OLD_BUFFER,
      NEW_BUFFER,
      BUFFER_PTR,
      TO_BUFFER,
      INPUT_FILE;
ON_ERROR
IF ERROR = TPU$DUPBUFNAM
THEN OLD_BUFFER := EDT$FIND_BUFFER(TO_BUFFER);
      ! Use a pre-defined EDT function to get the
      ! buffer's index, or zero if nonexistent.
      MAP(MAIN_WINDOW, OLD_BUFFER);
      POSITION(OLD_BUFFER);
      READ_FILE(INPUT_FILE);
      BUFFER_PTR := GET_INFO(BUFFERS, 'LAST');
      SET(NO_WRITE, BUFFER_PTR, ON);
      SET(EOB_TEXT, BUFFER_PTR, '[End of '+TO_BUFFER+']');
!
      ENDIF;
      ABORT;
!
ENDON_ERROR;
INPUT_FILE := READ_LINE("Input file : ");
IF INPUT_FILE = ""
THEN MESSAGE("No input file specified");
      ABORT;
!
ENDIF;
TO_BUFFER := READ_LINE("Into buffer : ");
IF TO_BUFFER <> ""
THEN NEW_BUFFER := CREATE_BUFFER(TO_BUFFER);
      MAP(MAIN_WINDOW, NEW_BUFFER);
      POSITION(NEW_BUFFER);
      !
      ! Do not copy this buffer back out when EXITing :
      SET(NO_WRITE, NEW_BUFFER, ON);
      SET(EOB_TEXT, NEW_BUFFER, '[End of '+TO_BUFFER+']');
!
      ENDIF;
      READ_FILE(INPUT_FILE);
ENDPROCEDURE;
!
PROCEDURE EDT_BUFFERS
! Procedure to switch context to another buffer.
! Activated by GOLD-B or F19
!
LOCAL BUFFER_PTR,
      CREATE_VARIABLE_STRING,
      TERM_CHAR,
      BUFFER_NAME ;
      BUFFER_NAME := READ_LINE("Buffer name :");
      IF (BUFFER_NAME = EDT$X_EMPTY)
      THEN MESSAGE("No buffer specified");
      RETURN;
      ENDIF;
      ! If it exists just map to it.
      BUFFER_PTR := EDT$FIND_BUFFER(BUFFER_NAME);
      IF BUFFER_PTR = 0
      ! The next few lines copied from EDTSECINI.TPU
      !
      THEN EDT$X_MAKE_BUF_VAR := BUFFER_NAME;
      CREATE_VARIABLE_STRING :=
        EDT$X_MAKE_BUF_VAR +
        " BUFFER := CREATE_BUFFER(EDT$X_MAKE_BUF_VAR)";
      EXECUTE(CREATE_VARIABLE_STRING);
      ! Now get the pointer back, we know it is the last buffer
      ! in the list.
      BUFFER_PTR := GET_INFO(BUFFERS, 'LAST');
      SET(NO_WRITE, BUFFER_PTR, ON);
      SET(EOB_TEXT, BUFFER_PTR, '[End of '+BUFFER_NAME+']');
!
      ENDIF;
      MAP(CURRENT_WINDOW, BUFFER_PTR);
ENDPROCEDURE;
!
PROCEDURE EDT_SHOW_BUFFERS
! Give the user a list of buffers and included files.
! Activated by GOLD-S or F18
! This procedure copied from the line mode 'SHOW BUFFERS'
! emulation procedure.
!
POS := CURRENT_WINDOW;
CUR_BUF := CURRENT_BUFFER;
ERASE(SHOW_BUFFER);
POSITION(SHOW_BUFFER);
COPY_TEXT(' Buffer Name Lines File');
SPLIT_LINE;
COPY_TEXT('-----');
SPLIT_LINE;
BUF := GET_INFO(BUFFERS, 'FIRST');
LOOP
EXITIF BUF = 0;
IF (BUF = CUR_BUF)
THEN COPY_TEXT(' ');
      ELSE COPY_TEXT(' ');
      ENDIF;
      COPY_TEXT(GET_INFO(BUF, 'NAME'));
      COPY_TEXT(' ');
      ! INSERT A TAB
      COPY_TEXT(STR(GET_INFO(BUF, 'RECORD_COUNT')));
      COPY_TEXT(' ');
      ! INSERT A TAB
      COPY_TEXT(GET_INFO(BUF, 'FILE_NAME'));
      SPLIT_LINE;
      BUF := GET_INFO(BUFFERS, 'NEXT');
ENDLOOP;
SET(STATUS_LINE, INFO_WINDOW, REVERSE, ' ');
SET(WIDTH, INFO_WINDOW, GET_INFO(SCREEN, 'WIDTH'));
MAP(INFO_WINDOW, SHOW_BUFFER);
UPDATE(INFO_WINDOW);
BUF := READ_LINE('Press RETURN to continue.', 1);
SET(STATUS_LINE,
      INFO_WINDOW, EDT$X_INFO_STATS_VIDEO,
      'Press CTRL-F to remove INFO_WINDOW and resume editing');
UNMAP(INFO_WINDOW);
POSITION(POS);
ENDPROCEDURE;
!
PROCEDURE EDT_SET_WIDTH
! Toggles screen width between 80 and 132 characters.
! Activated by F7 or GOLD-CONTROL-W
!
LOCAL SCR_WIDTH, WIDTH_VAL;
! Get our present screen width :
SCR_WIDTH := GET_INFO(CURRENT_WINDOW, 'WIDTH');
! ... and toggle it :
IF SCR_WIDTH = 80
THEN WIDTH_VAL := 132;
      ELSE WIDTH_VAL := 80;
      ENDIF;
      SET(WIDTH, MAIN_WINDOW, WIDTH_VAL);
      SET(WIDTH, MESSAGE_WINDOW, WIDTH_VAL);
      IF EDT$X_WRAP_POSITION <> 0 ! If wrap is set
      THEN EDT$X_WRAP_POSITION := WIDTH_VAL-2; ! Set wrap at width-2
      ENDIF;
ENDPROCEDURE;
!
PROCEDURE EDT_GO_MAIN
! Procedure to return to MAIN buffer.
! activated by GOLD-M or F20.
!
LOCAL MAIN_IDX;
MAIN_IDX := EDT$FIND_BUFFER('MAIN');
MAP(CURRENT_WINDOW, MAIN_IDX);
ENDPROCEDURE;
!
PROCEDURE EDT_ENGLISH_HEBREW
!
```

Continued . . .

# Call it the computergraphics freedom machine

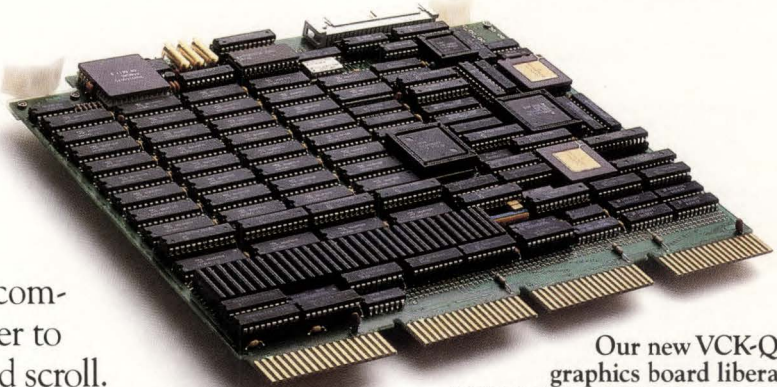
Take the load off your host CPU in both Q-bus and Unibus DEC computers with our new VCK-Q/U tightly coupled combined graphics controller and single board computer. Our new quad height board gives you a stand-alone 68010-based computer and an advanced CRT controller to do graphics primitives, zoom, pan and scroll.

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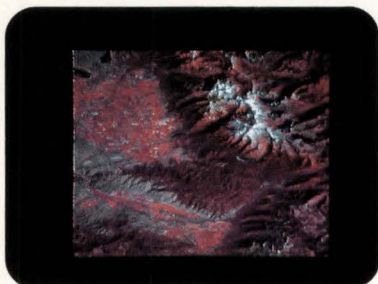
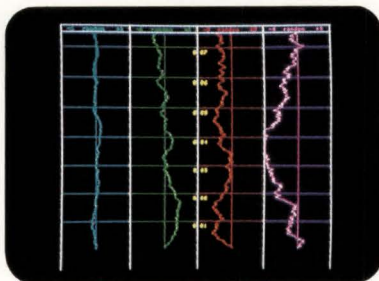
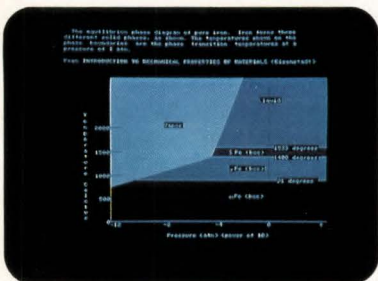
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Our microcomputer has a 9.8 MHz 68010 CPU and a 68881 FPU with access to all other on-board devices including 1 MB each of system and video RAM, two video overlay memories, and 64 KB of EPROM or RAM.



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write that duplicates an existing procedure's name. All procedures on EDTSECINI.TPU have names starting "EDT\$". The procedures in the initializer file EDT.TPU, have names starting "EDT\_". See Program 1.

You may want to add online help for your home-baked procedures. You can do this by extracting a text file from SYSSHELP:TPUHELP by means of the command:

```
LIBRARY/HELP/EXTRACT=*/  
OUTPUT=MY__TEXT.FILE SYSS  
HELP:TPUHELP
```

and then editing the resulting text file with any text editor and rebuilding SYSSHELP:TPUHELP.HLB with the command:

```
LIBRARY/HELP/CREATE SYSSHELP:  
TPUHELP MY__TEXT.FILE
```

(For help on Help-file text structure, try the LIBRARY utility manual.)

As an example of creating a TPU procedure, Program 2 will count how many words there are between our present position, and the end of our current buffer. I have defined a

"word" as a string of letters starting from a non-alphabetic character, and extending until the next non-alphabetic character.

To try this procedure, or anything of your own invention, enter the EDT emulation and type in the commands of whatever procedure you wish to run. By means of GOLD-KP7 you get the "TPU Command" prompt. Reply "COMPILE(MAIN\_BUFFER)" (if Main\_Buffer is where you've entered your procedure). Hopefully, nothing will happen, which means that the compilation has gone off smoothly. To activate your procedure, type GOLD-KP7 again, and this time reply to "TPU Command" with the name of your procedure (whatever word you entered immediately following the keyword "Procedure" in the first line).

Copy this startup file, or start your own. Take the opportunity to find out what TPU can do for you, with whatever different problems you have. You'll learn more than you expected!

*Mike Rechtman contributes from Kibbutz Tzor'a, Meda Yehuda, Israel.*

## PROGRAM 1 . . . continued

```
! Takes the current line and reverses it. If the text is  
! shorter than 72 characters, moves the right-most character  
! into the 72nd position.  
! Called by GOLD-RETURN or F8.  
!  
LOCAL I, ENG_LINE, HEB_LINE, STR_LEN;  
! Erase the current line, but save it in ENG_LINE  
!  
ENG_LINE := ERASE_LINE;  
I := 1;  
HEB_LINE := "";  
STR_LEN := LENGTH(ENG_LINE);  
! P/Tck the text up backward, one char. at a time :  
!  
LOOP  
HEB_LINE := SUBSTR(ENG_LINE, I, 1) + HEB_LINE;  
I := I + 1;  
EXITIF I > STR_LEN;  
ENDLOOP;  
LOOP  
EXITIF LENGTH(HEB_LINE) >= 72;  
HEB_LINE := ' ' + HEB_LINE;  
ENDLOOP;  
SPLIT LINE; ! Start a new line  
MOVE VERTICAL(-1); ! Backup to where we were  
COPY TEXT(HEB_LINE); ! Write out reversed line  
SPLIT LINE;  
ENDPROCEDURE;  
!  
PROCEDURE EDT_LEARN  
!  
! Start a 'LEARN' command sequence.  
! Activated by GOLD-L or F9.  
! This procedure, and the following ( EDT_REMEMBER ) were  
! copied with minor changes from EVESECINI.TPU.  
!  
MESSAGE(  
"Press keystrokes to be learned. " +  
" Press CTRL/R to remember these keystrokes.");  
!  
! Learn, but allow the user to input different answers to  
! READ_LINE questions :  
LEARN_BEGIN (NO_EXACT);  
!  
ENDPROCEDURE;  
!  
!  
PROCEDURE EDT_REMEMBER  
!  
! Activate a 'LEARN'ed command sequence.  
! Called by CONTROL-R  
!  
LOCAL LEARN_SEQUENCE, ! LEARN sequence returned by END_LEARN builtin.  
LEARN_KEY, ! Keyword for key to bind sequence to.  
TMP_KEY;
```

```
ON_ERROR  
IF ERROR = TPU$ NOTLEARNING  
THEN MESSAGE ("Nothing to remember");  
RETURN;  
ELSE IF ERROR = TPU$ RECURLEARN  
THEN MESSAGE ("Recursive learn sequence");  
RETURN;  
ENDIF;  
ENDON_ERROR;  
!  
! End the LEARN command started with a GOLD-L :  
LEARN_SEQUENCE := LEARN_END;  
!  
! Define a key, and bind the LEARNed sequence to it :  
LEARN_KEY :=  
READ LINE ("Press the key you want to use to do what was just learned: ", 1);  
LEARN_KEY := LAST KEY;  
! RETURN gets you out without redefining a key  
IF LEARN_KEY = RET KEY  
THEN MESSAGE ("Key sequence not remembered");  
RETURN;  
ENDIF;  
DEFINE KEY (LEARN_SEQUENCE, LEARN_KEY, "SEQUENCE");  
ENDPROCEDURE;  
!  
PROCEDURE EDT_CONVERT_HEBREW  
!  
! This procedure extracts a 'SELECT'ed range and reverses  
! it left-to-right (useful for Hebrew...)  
! Activated by GOLD-BACKSPACE or GOLD-F12.  
!  
LOCAL TEMP_POSITION,  
CONV_BUFFER,  
I, ENG_LINE, HEB_LINE, STR_LEN;  
EDT$SELECT RANGE;  
IF EDT$X_SELECT_RANGE < 0  
! See that there is a working buffer; create one if there isn't  
!  
THEN CONV_BUFFER := EDT$FIND_BUFFER ("CONVERT_TO_HEBREW_BUFFER");  
IF CONV_BUFFER = 0  
THEN CONV_BUFFER :=  
CREATE_BUFFER ("CONVERT_TO_HEBREW_BUFFER");  
SET (NO_WRITE, CONV_BUFFER, ON);  
ENDIF;  
TEMP_POSITION := MARK (NONE);  
ERASE (CONV_BUFFER);  
! Collect the 'SELECT' range  
POSITION (CONV_BUFFER);  
SPLIT LINE;  
MOVE VERTICAL(-1);  
MOVE TEXT (EDT$X_SELECT_RANGE);  
ENG_LINE := ERASE_LINE;  
I := 1;
```

# COGNOS WORLD

VAX EDITION

PUBLISHED FOR THE INTERNATIONAL COMMUNITY OF COGNOS SOFTWARE USERS

FALL 1986

## CROWN-ZELLERBACH BUYS 5000TH COPY OF POWERHOUSE

Crown-Zellerbach, one of the world's largest paper manufacturing companies — with annual sales of \$3.1 billion, has purchased the 5000th copy of POWERHOUSE from Cognos.

**Most Widely Installed 4GL**  
POWERHOUSE continues to be the world's most widely installed product of its type on mainframes or minicomputers.\*

According to Bill Breen, Cognos' senior vice president, operations, the sale of the 5000th copy of POWERHOUSE represents a landmark in the mid-range computer market. "No other product from an independent software vendor has achieved this level of market acceptance."

### Fortune 500 Company

Crown-Zellerbach, a division of the James River Corporation, ranks 128 in the Fortune 500. They will install POWERHOUSE on six recently purchased Digital Equipment Corporation minicomputers

— a VAX 8600 and five VAX 8500s — at its paper mill's San Francisco headquarters.

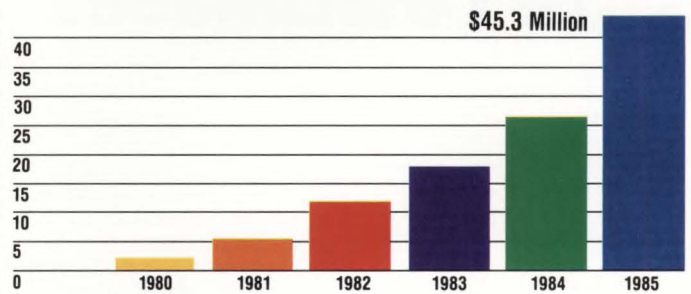
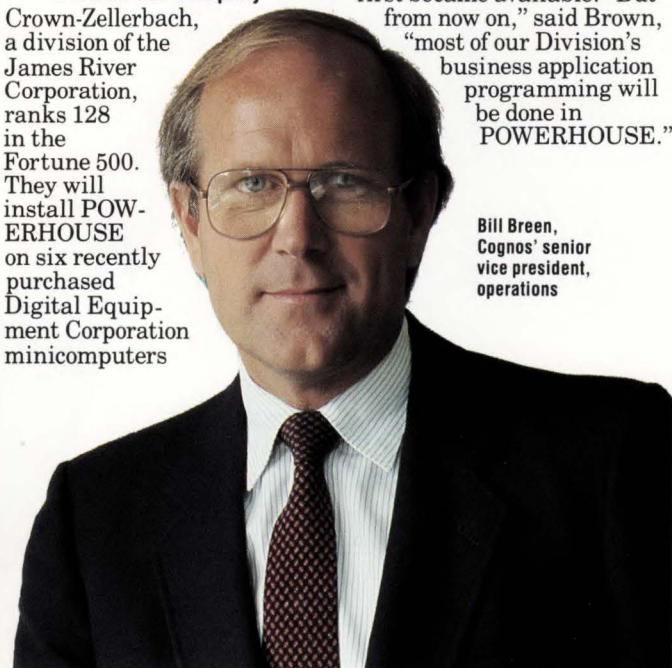
### Best Product Best Service

"We performed a detailed evaluation of many fourth generation languages about a year and a half ago," said Crown-Zellerbach MIS director, Communications Paper west, Richard Brown, "and selected POWERHOUSE after benchmark testing was conducted in-house, and a prototype was built by Cognos personnel under our supervision."

### POWERHOUSE From Now On

Brown characterized the move to POWERHOUSE as "a significant directional change." Crown-Zellerbach had used the third generation language, COBOL, since it first became available. "But from now on," said Brown, "most of our Division's business application programming will be done in POWERHOUSE."

Bill Breen,  
Cognos' senior  
vice president,  
operations



POWERHOUSE sales up 51% — see page 4

## POWERHOUSE ON VAX UPS PERFORMANCE

More efficient CPU usage, improved VAX® integration, and a PhD to CDD translating capability highlight the new release of POWERHOUSE®, version 4.04.

### VAX Integration

"We've capitalized on performance improvements in the VAX/VMS™ operating system to make POWERHOUSE more CPU efficient" said Ron Nordin, Cognos' vice president, Digital products. "We've also made POWERHOUSE much friendlier to the VAX user, while building more functionality into the language."

### CPU Performance

POWERHOUSE 4.04 takes advantage of a major CPU performance enhancement in the sort utility of VAX/VMS version 4.0. SORT functions in QUIZ and QTP have been re-designed to deliver corresponding CPU performance.

### On-line Help

Higher VAX integration for POWERHOUSE 4.04 has been achieved with an on-line help facility, function key and numeric keypad support, partial segmented key support for the RMS segmented key feature, VMSDATE and VMSTimeStamp item types, and a CDD Generator that translates POWERHOUSE Dictionary definitions into CDD statements.

### CDD Generator

The CDD generator makes data maintained by POWERHOUSE applications available to DATATRIEVE users. It also allows applications written in third generation languages, such as COBOL, to gain access to POWERHOUSE data definitions through the CDD.

### 4.04 Features

"Combined, these new 4.04 features make POWERHOUSE the most VAX-compatible fourth generation development language on the market," according to Nordin. "For example, our on-line help facility works through the HELP system provided by VAX/VMS to give users fast access to a series of help descriptions for each statement, option, or procedure within the POWERHOUSE components."

### Increased Functionality

POWERHOUSE 4.04 also provides increased functionality. In the POWERHOUSE Dictionary, VAX users can now specify a Backup option that automatically copies a version of an existing dictionary for data protection.

### Numerous Improvements

"Our programming team has incorporated functionality improvements too numerous to

continued on page 4

\*Source: Datasources, 1st Quarter, 1986; Digital Consulting Associates, Fall, 1985; Computerworld, March 31, 1986

# AIRFONE TAKES OFF WITH POWERHOUSE

There's no longer any reason for frequent business travelers to feel out of touch while they're in the air. Using POWERHOUSE and Digital's VAX systems, Airfone makes it possible to keep in touch... even if you're not touching the ground.

## Western Union Partner

Voted as one of the top ten products of the year by Fortune magazine in 1985, Airfone can now be found on over 300 commercial jetliners. Airfone Incorporated of Oak Brook, Illinois, a joint venture of Goeken Communications and Western Union Corporation, developed Airfone to meet the information needs of business travellers who now make up 60% of the world's 320 million jet passenger population.

Inserting a credit card activates the Airfone. Once the credit card is inserted, the passenger can release a cordless telephone and dial the call. The call signal is transmitted to ground stations via radio waves, and is then patched into commercial telephone networks anywhere in the world.

## Operational Data Analyzed

While the call is in progress, credit card billing information is gathered and sent to Airfone's Central VAX Computer Center. Operational data, along with billing data, is collected to analyze the performance of the air and ground hardware and software components.

## POWERHOUSE Chosen

To turn operational performance data into meaningful

management reports, Jon Orewiler, Airfone's manager of systems/programming, chose POWERHOUSE.

## Brought Reports In-House

"Previously, we depended on an outside service bureau to produce our reports, which was very costly," said Orewiler. A flexible development package was needed that would allow Airfone to bring the service bureau reporting system in-house quickly and easily, as well as fit in with their existing hardware. Orewiler's DP shop has one Digital Equipment Corporation VAX 11/730, and two VAX 11/750s. The 11/750s are currently linked via DECNET, but are scheduled for migration into a full Cluster environment. POWERHOUSE provides an intelligent interface to the VAX RMS file management and VMS operating system. This interface enables users unfamiliar with these systems to use POWERHOUSE immediately, and also allows POWERHOUSE to use files created and maintained by third generation programming languages in a VAX environment.

## POWERHOUSE Compatibility

Without this built-in flexibility and compatibility, Orewiler would not have been able to fit POWERHOUSE applications onto Airfone's existing COBOL applications. Airfone runs POWERHOUSE programs as external subroutines from COBOL and uses existing programs to produce the raw data for the POWERHOUSE report writer.

## Up-to-the-minute Reports

Using POWERHOUSE, Orewiler also plans to give Airfone's service technicians,

located in remote sites across the U.S., more complete, up-to-the-minute reports.

## Further 4GL Plans

The service technicians access the Central Computer Center through modems and telephone lines that connect their portable PCs with the Center's VAX 11/750s. The connection is currently used to provide screen reports that outline daily assignments for Airfone field maintenance crews. In the future, several reporting subsystems will receive repair and equipment maintenance data from the field personnel via data entry screens developed with POWERHOUSE.

## Vital Functions Analyzed

The Airfone network also relies heavily upon the daily monitoring of operational, repair, and maintenance data to analyze performance mea-

surements. POWERHOUSE will be used in the analysis of call traffic by integrating such databases as capacity planning, usage studies, and projected call traffic volumes.

## Best Available Technology

"This kind of planning is critical to maintain the high standards set for Airfone's total customer service," said Orewiler, "and we need the best available technology to develop these systems quickly and efficiently, without excessive staff expansions."

## POWERHOUSE Helps Objectives

Orewiler plans to use POWERHOUSE to enhance his maintenance subsystems by integrating them with a material tracking system. These systems further support Airfone's objective: to equip the world's entire commercial fleet of airplanes with Airfone.



Airfone gives 320 million jet passengers the chance to do something they've never done before: make a call from 30,000 feet in the air, while travelling at 600 mph.

# VAX MARKET EMBRACES DEVELOPMENT CENTER

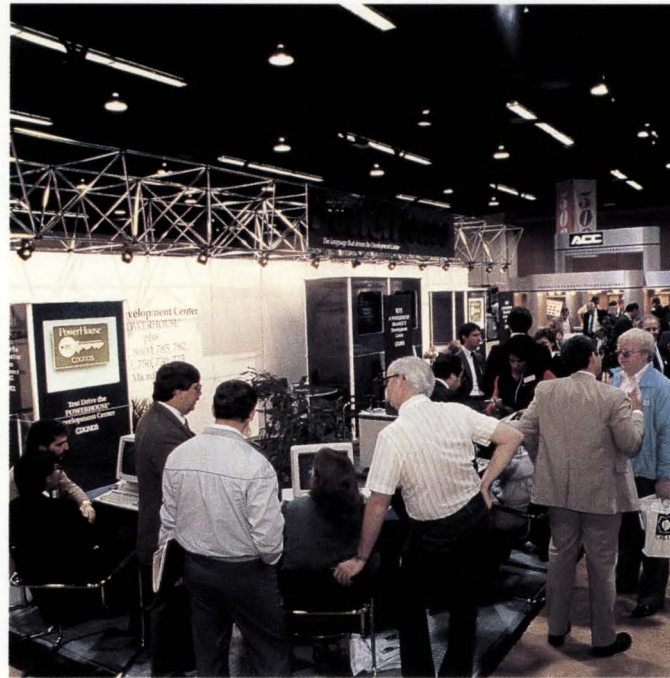
One year after its introduction, the POWERHOUSE Development Center has gained widespread acceptance by commercial VAX users for their application development.

## Using POWERHOUSE

Cognos formally introduced the Development Center concept to the commercial VAX market at the 1985 DEXPO WEST conference in Anaheim, California. "Over the past year we have seen more and more VAX system owners using POWERHOUSE to meet their needs in developing commercial applications," said Ron Nordin, Cognos' vice president, Digital products.

## MIS Control

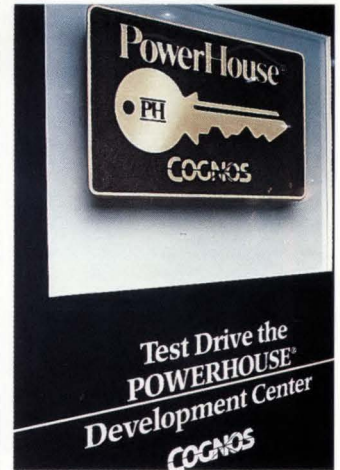
In the POWERHOUSE Development Center, MIS retains control of file definition, creation and updating, including security and integrity of data. End users, however, can easily access their data for reporting purposes without jeopardizing the integrity of the database. POWERHOUSE lets MIS off-load a high percentage of end-user reporting require-



ments onto the end users themselves. End users have more flexibility in determining when they get their information, while productivity of MIS personnel is improved.

## More Specific Solutions

The widespread use of POWERHOUSE has been instrumental in popularizing the concept of a Development Center for more responsive appli-



This key is the symbol for test driving POWERHOUSE on the VAX family of computers.

Visitors to the Cognos "Test Drive" booth experience Development Center power first-hand.

cation development by MIS professionals. Using prototyping, end-user participation in the development process is increased. Prototyping is an iterative process that lets MIS build an application, end users respond to it, so changes can be easily made before it is finalized. "The result is a more specific solution to the end user's needs, in less time, with less frustration," according to Nordin.

## Appreciate Benefit

"As more and more VAX systems are used for commercial purposes, users are beginning to appreciate the benefit of POWERHOUSE as the solution to meeting their application development needs," said Nordin. "Acceptance by commercial VAX users has been overwhelming. It seems that MIS people intuitively understand the concept behind the Development Center, and the benefit they receive by focusing on this concept."

## Integrated Solution

POWERHOUSE, as a Development Center language, offers productivity, flexibility, and efficiency. In the Digital VAX environment, POWERHOUSE is a totally integrated solution that meets the needs of the MIS professional and the end user.

# COGNOS ON THE MOVE

The growth of Cognos' worldwide operation continues with the opening of new corporate offices in Germany, France, The Netherlands, and expanded offices in the United Kingdom and Canada.

## 150% Sales Increase

"Annual POWERHOUSE sales are increasing at a rate of over 150% in Europe," said Jim Cluchey, Cognos' general manager, European operations. "The opening of a Cognos subsidiary in Frankfurt, Germany; The Hague; The Netherlands; and an additional office in Lyon, France, reflects our commitment to our new customers."

John Purdon, general manager of Cognos' U.K. operations, has experienced similar sales growth in England. This growth has necessitated a move from Ascot to larger offices in Bracknell.



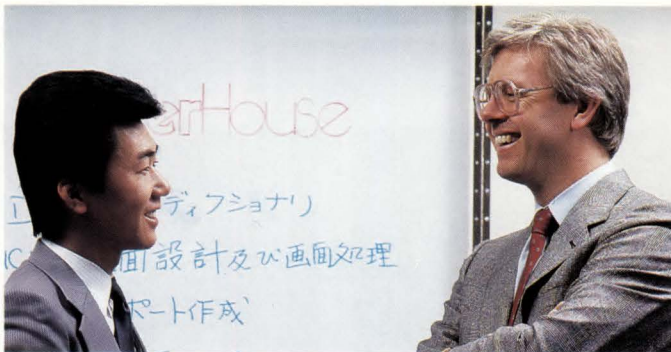
The Cognos Corporation headquarters is the focal point for its network of 36 offices worldwide.

## New World H.Q.

The European announcements follow another office opening in Calgary, Canada, and the unveiling of Cognos' world headquarters building.

## 36 Offices

Cognos' headquarters is home to 360 marketing, development, sales support, and operations staff, and is the base for 36 Cognos offices in eight countries.



A representative from SET Co. Ltd and Cognos exchange technical information during a two-week training session on POWERHOUSE.

## POWERHOUSE LAUNCHED IN JAPAN ON VAX

POWERHOUSE will be available on VAX in Japan, with the endorsement of Digital Equipment Corporation's Japanese subsidiary, NIHON Digital.

### Marketing Agreement Signed

Cognos has signed a marketing agreement with SET Co. Limited, a leading supplier of applications software on VAX minicomputers in Japan, who is cooperating with NIHON Digital to introduce POWERHOUSE to the Japanese market.

### Technical Exchange

As part of the agreement, Hideaki Matsuzawa, SET's director, systems engineering division, educational department; and Tetsuya Ohara, the firm's engineer, systems engineering division, came from Tokyo to visit Cognos' world corporate headquarters. The executives spent two weeks learning POWERHOUSE and exchanging technical information.

### Excellent Opportunity

"Matsuzawa and Ohara's two

weeks' training was an excellent opportunity to develop an acquaintance with technical personnel from SET. The visit represents only a small part of the substantial investment SET is making in bringing POWERHOUSE to Japan," according to Barry Grace, Cognos' manager, offshore operations. "In addition to receiving training at Cognos, SET is translating POWERHOUSE manuals and is initiating sales efforts with key clients in Japan," said Ron Nordin, Cognos' vice president, Digital products.

### Japanese Product Launch

Grace added, "Cognos has worked closely with NIHON Digital and SET to develop a joint strategy for launching POWERHOUSE on VAX in Japan. SET demonstrated POWERHOUSE at the Tokyo COMDEX show last March, and together we're planning a formal Japanese product launch this fall."

For more information on Cognos products call: 800-272-0068 (in Massachusetts call: 800-235-1202) or contact any of our Regional offices:  
 Eastern Region — Boston: 617-535-7350  
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# COGNOS GROWS 51%

For the sixth straight year, Cognos has posted revenue growth of more than 40%, with total revenues of \$45.3 million Cdn — a 51% increase over the previous 12-month period. Earnings per share increased 80%, from \$.10 per share in 1985 to \$.18 in 1986. This latest growth ranks Cognos in the top 25 computer software companies in the world.\*

### POWERHOUSE in 49 Countries

"This revenue momentum reflects the international market demand for POWERHOUSE," stated Cognos' chief executive officer, Michael Potter. "With more than 5000 installations in 49 countries, we have the most successful fourth generation language in its class."

### Worldwide Market Demand

POWERHOUSE is now sold from 36 Cognos offices in the United States, Canada, the United Kingdom, France, Germany, The Netherlands, Hong Kong, and Australia. POWERHOUSE is also taught in more than 96 academic institutions.

### POWERHOUSE Meets MIS Needs

"MIS professionals in many of the world's leading corporations depend on POWERHOUSE to develop their production applications faster than ever before, and at the same time provide reporting capability to their end-users," said Potter. "POWERHOUSE is unique in its ability to meet the needs of both data processing professionals and the end-user community."

### Out-performed Projections

Don Gibbs, senior vice president, finance at Cognos, emphasized that 1986 corporate performance improved substantially at a time when many computer companies were caught in the 1985 U.S. computer industry slump. "Even though the slump extended into the fourth quarter of our 1986 fiscal year, we out-performed sales and revenue projections," said Gibbs.

### Service Commitment

A significant reason for Cognos' success is attributable to Cognos' commitment to service in new and existing markets. Bill Breen, senior vice president, operations, points out that Cognos field techni-

cal staff providing education, design assistance, and 'pre' and 'post' sales support more than tripled in fiscal year '86. "There has also been a four-fold increase in the number of Cognos quality assurance staff," said Breen. "And the central technical support area has greatly increased its level of service — particularly in the area of Telesupport. Some 20,000 Telesupport calls were placed in fiscal year 1986, compared to 17,200 in the previous 12-month period."

### 100% Market Increase

Even with all of the new corporate developments and performance milestones, "Cognos still has a huge challenge in world software markets," said Potter. "Because of new hardware introductions at the high end and low end of our market, Cognos has a range of customers that was not even available a year ago. Overall, the target market for POWERHOUSE — measured by the current installed base of compatible hardware — has increased by almost 100% in the last 12 months."

\*Source: June 1986 edition of Software News

continued from page 1

## POWERHOUSE ON VAX UPS PERFORMANCE

mention in POWERHOUSE 4.04," said Nordin. "The best way to find out about them is to demo the new POWERHOUSE."

### New Documentation

Accompanying the new release of POWERHOUSE on VAX is a new pocket guide, reference card, primer and manual supplement, as well as a function key template that will make POWERHOUSE commands easier to execute on Digital's VT series of terminals.

POWERHOUSE is a registered trademark of Cognos.

VAX is a registered trademark of Digital Equipment Corporation. VMS is a trademark of Digital Equipment Corporation.

# PROGRAM 1 . . . continued

```

HEB_LINE := "";
STR_LEN := LENGTH(ENG_LINE);
! Back up along the text, one character at a time.
LOOP
    HEB_LINE := SUBSTR(ENG_LINE, I, 1) + HEB_LINE;
    I := I + 1;
    EXITIF I > STR_LEN;
ENDLOOP;
POSITION(TEMP_POSITION);
MOVE TEXT(HEB_LINE);
EDT$X SELECT_RANGE:=0;
MESSAGE("No Select Active");
ELSE
    ENDIF;
ENDPROCEDURE;
!
PROCEDURE EDT_INS_OVER
!
! Toggle INSERT - OVERSTRIKE states.
! called by CONTROL-A (As at DCL command level)
! This means that CTRL-A no longer handles TABS !!
!
LOCAL INS_OVER_STATE;
INS_OVER_STATE := GET_INFO(CURRENT_BUFFER, "MODE");
IF INS_OVER_STATE = INSERT
    THEN SET(OVERSTRIKE, CURRENT_BUFFER);
    MESSAGE("You changed to OVERSTRIKE mode");
ELSE
    SET(INSERT, CURRENT_BUFFER);
    MESSAGE("You changed to INSERT mode");
ENDIF;
ENDPROCEDURE;
!
PROCEDURE EDT_SPAWN
! This procedure executes the SPAWN command
! using GOLD-F20 or GOLD-D key.
! Example :
! GOLD-D
! DCL Command : SHOW SYSTEM
! .....
! {Return to editor}
!
LOCAL SP_COM;
SP_COM := READ_LINE("DCL command : ");
IF SP_COM = ""
    THEN MESSAGE(
        "Going to DCL level. Return to editor by LOGOUT command");
ENDIF;
SPAWN(SP_COM);
ENDPROCEDURE;
!
PROCEDURE EDT_WRITE
! This procedure writes a buffer to a file
! If you do not specify any buffer then the current buffer is written
! Activated by GOLD-F17 or GOLD-TAB
! This used to be called by GOLD-D (Logically...) We had to make the
! change due to local problems connected with Hebrew text.
!
LOCAL OUT_FILE,
    OUT_BUFFER,
    FROM_BUFFER;
MESSAGE("");
MESSAGE("");
OUT_FILE := READ_LINE("Output file name : ");
IF OUT_FILE = ""
    THEN MESSAGE("No file name specified.");
    ABORT;
ENDIF;
FROM_BUFFER := READ_LINE("From buffer : ");
IF FROM_BUFFER = ""
    THEN OUT_BUFFER := CURRENT_BUFFER;
ELSE
    OUT_BUFFER := EDT$FIND_BUFFER(FROM_BUFFER);

```

```

IF OUT_BUFFER = 0
    THEN MESSAGE("That buffer do not exist.");
    ABORT;
ENDIF;
ENDIF;
WRITE FILE(OUT_BUFFER, OUT_FILE);
ENDPROCEDURE;
!
! Allow EX and EXI as abbreviations for EXIT :
PROCEDURE EX EXIT; ENDPROCEDURE;
PROCEDURE EXI EXIT; ENDPROCEDURE;
!
!+
! KEY NAMES
! *****
! KEY_NAME is a BUILT-IN procedure used to allow regular keys to
! be defined as functions, or GOLD added to VT200 function keys.
!
!-
GOLD_B := KEY_NAME('B', SHIFT_KEY);
GOLD_D := KEY_NAME('D', SHIFT_KEY);
GOLD_I := KEY_NAME('I', SHIFT_KEY);
GOLD_L := KEY_NAME('L', SHIFT_KEY);
GOLD_M := KEY_NAME('M', SHIFT_KEY);
GOLD_S := KEY_NAME('S', SHIFT_KEY);
GOLD_RET := KEY_NAME(RET_KEY, SHIFT_KEY);
GOLD_UP := KEY_NAME(UP, SHIFT_KEY);
GOLD_DOWN := KEY_NAME(DOWN, SHIFT_KEY);
GOLD_BACKSPACE := KEY_NAME(CTRL_H_KEY, SHIFT_KEY);
GOLD_CTRL_I := KEY_NAME(CTRL_I_KEY, SHIFT_KEY);
GOLD_CTRL_W := KEY_NAME(CTRL_W_KEY, SHIFT_KEY);
GOLD_F12 := KEY_NAME(F12, SHIFT_KEY);
GOLD_F17 := KEY_NAME(F17, SHIFT_KEY);
GOLD_F20 := KEY_NAME(F20, SHIFT_KEY);
!+
! KEY DEFINITIONS
! *****
! Each key definition consists of three parameters :
! 1) The text of the invoked command or procedure name.
! 2) The key's name.
! 3) Text by which the HELP routine will identify the key.
!
!-
DEFINE_KEY("EDT ENGLISH HEBREW", GOLD_RET, "HEBREW TYPING");
DEFINE_KEY("EDT ENGLISH HEBREW", F8, "HEBREW TYPING");
DEFINE_KEY("EDT SET WIDTH", F7, "SCREEN WIDTH");
DEFINE_KEY("EDT SET WIDTH", GOLD_CTRL_W, "SCREEN WIDTH");
DEFINE_KEY("EDT $COMMAND", DO, "DO");
DEFINE_KEY("EDT INCLUDE", F17, "INCLUDE FILE");
DEFINE_KEY("EDT INCLUDE", GOLD_I, "INCLUDE FILE");
DEFINE_KEY("EDT SHOW BUFFERS", F18, "SHOW BUFFERS");
DEFINE_KEY("EDT SHOW BUFFERS", GOLD_S, "SHOW BUFFERS");
DEFINE_KEY("EDT BUFFERS", F19, "SWITCH BUFFERS");
DEFINE_KEY("EDT BUFFERS", GOLD_B, "SWITCH BUFFERS");
DEFINE_KEY("EDT GO MAIN", F20, "SWITCH MAIN");
DEFINE_KEY("EDT GO MAIN", GOLD_M, "SWITCH MAIN");
DEFINE_KEY("EDT LEARN", F9, "LEARN START");
DEFINE_KEY("EDT LEARN", GOLD_L, "LEARN START");
DEFINE_KEY("EDT REMEMBER", CTRL_R_KEY, "LEARN END");
DEFINE_KEY("MOVE VERTICAL(21)", GOLD_DOWN, "PAGE DOWN");
DEFINE_KEY("MOVE VERTICAL(-21)", GOLD_UP, "PAGE UP");
DEFINE_KEY("EDT CONVERT HEBREW", GOLD_F12, "CONVERT HEBREW");
DEFINE_KEY("EDT CONVERT HEBREW", GOLD_BACKSPACE, "CONVERT HEBREW");
DEFINE_KEY("EDT INS_OVER", F14, "OVERSTRIKE INSERT");
DEFINE_KEY("EDT INS_OVER", CTRL_A_KEY, "OVERSTRIKE_INSERT");
DEFINE_KEY("EDT SPAWN", GOLD_F20, "SPAWN");
DEFINE_KEY("EDT SPAWN", GOLD_D, "SPAWN");
DEFINE_KEY("EDT WRITE", GOLD_F17, "WRITE FILE");
DEFINE_KEY("EDT WRITE", GOLD_CTRL_I, "WRITE FILE");

```

# PROGRAM 2.

```

PROCEDURE COUNT_WORD ! Keyword 'Procedure' and its name
ON ERROR
    MESSAGE(" ** Found " + STR(XXX) + " words. ");
    ABORT;
! We'll get to the error routine at the end of the
! search; actually, I should check for
! ERROR = TPU$ STRNOTFOUND (Guess what THAT means)
! or ERROR = TPU$ENDOFBUF
ENDON_ERROR;
!
PAT:=SPAN("ABCDEFGHIJKLMNQRSTUUVWXYZ");
! SPAN i.e., Look for as many contiguous characters
! from this pattern as you can find.
XXX := 0;
! Initialize our counter.
!
LOOP
    SSS := SEARCH( PAT, FORWARD, NO_EXACT );
    ! Search (forwards) for an alphabetical string

```

```

EXITIF SSS = 0;
! SSS = 0 if we haven't found anything.
! Note the difference between '=' and ':='
XXX := XXX+1;
! Increment count - We found a word.
POSITION( END_OF( SSS ) );
! Move the active position to the end of the range
! we've just found.
! (Note the use of nested Built-In procedures.)
MOVE_HORIZONTAL(1);
! And move to the first position beyond (either a
! non-alphabetic character, or End-of-Buffer.
ENDLOOP;
! Loop again...
MESSAGE(" Found " + STR(XXX) + " words. ");
! This line is a dummy - we'll always exit by the
! error routine.
ENDPROCEDURE;
! Another Keyword...

```



VAX

# EASY SCREEN FORMATTING

By Thomas Bilodeau

**Here's a way to  
simplify screen  
design for B+2  
programmers.**

Coding escape sequences for screen formatting is difficult and time consuming. While version 2 of BASIC + 2 offers some help by providing 13 predefined constants such as BEL to ring the bell, BS for back spacing, FF for a form feed, etc., these constants don't help with cursor positioning and other often used sequences.

After trying several alternatives, I hit upon the following method for defining my own constants to represent escape sequences. The strategy is to define simple, easily remembered constants for commonly used escape sequences. To position the cursor on the screen I use Ri;Cj where i = the desired row and j = the column position. For example,

```
PRINT R5;C25;'Customer Name'
```

prints Customer Name at row 5, column 25. I use REV to turn on reverse video and OFF

to turn it off; ANSI sets the terminal to ANSI mode while SCREEN132 pokes the screen to 132 columns.

To define these constants, create a file (I call it SCREEN.B2S) with your favorite editor (see Program 1 for a sample file). Column constants can be defined with the DECLARE STRING CONSTANT statement, but row constants and other easily remembered terms cannot be defined in this way. Every escape sequence begins with the ESC character which is CHR\$(155%). Unfortunately, built-in functions such as CHR\$(155%) cannot be used in DECLARE statements (note that the BP2 predefined constant ESC is equivalent to CHR\$(27%) which only prints \$ on the screen).

Program 1 shows suggested definitions of some commonly used escape sequences while Program 2 lists a short program utilizing some of these constants.

*Thomas Bilodeau is a systems analyst with the Franklin County Board of Mental Retardation and Developmental Disabilities in Columbus, Ohio.*

## PROGRAM 1.

```
!  
! SET UP ESCAPE SEQUENCES FOR SCREEN HANDLING AND CURSOR POSITIONING  
!  
DECLARE STRING CONSTANT C1='1H',C2='2H',C3='3H',C4='4H',&  
C5='5H',C6='6H',C7='7H',C8='8H',&  
C9='9H',C10='10H',C11='11H',C12='12H',&  
C13='13H',C14='14H',C15='15H',C16='16H',&  
C17='17H',C18='18H',C19='19H',C20='20H',&  
C21='21H',C22='22H',C23='23H',C24='24H',&  
C25='25H',C26='26H',C27='27H',C28='28H',&  
C29='29H',C30='30H',C31='31H',C32='32H',&  
C33='33H',C34='34H',C35='35H',C36='36H',&  
C37='37H',C38='38H',C39='39H',C40='40H',&
```



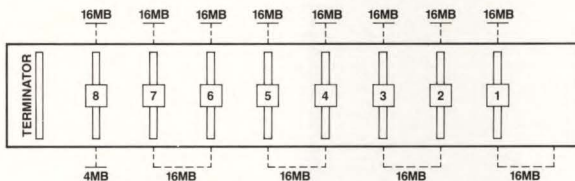
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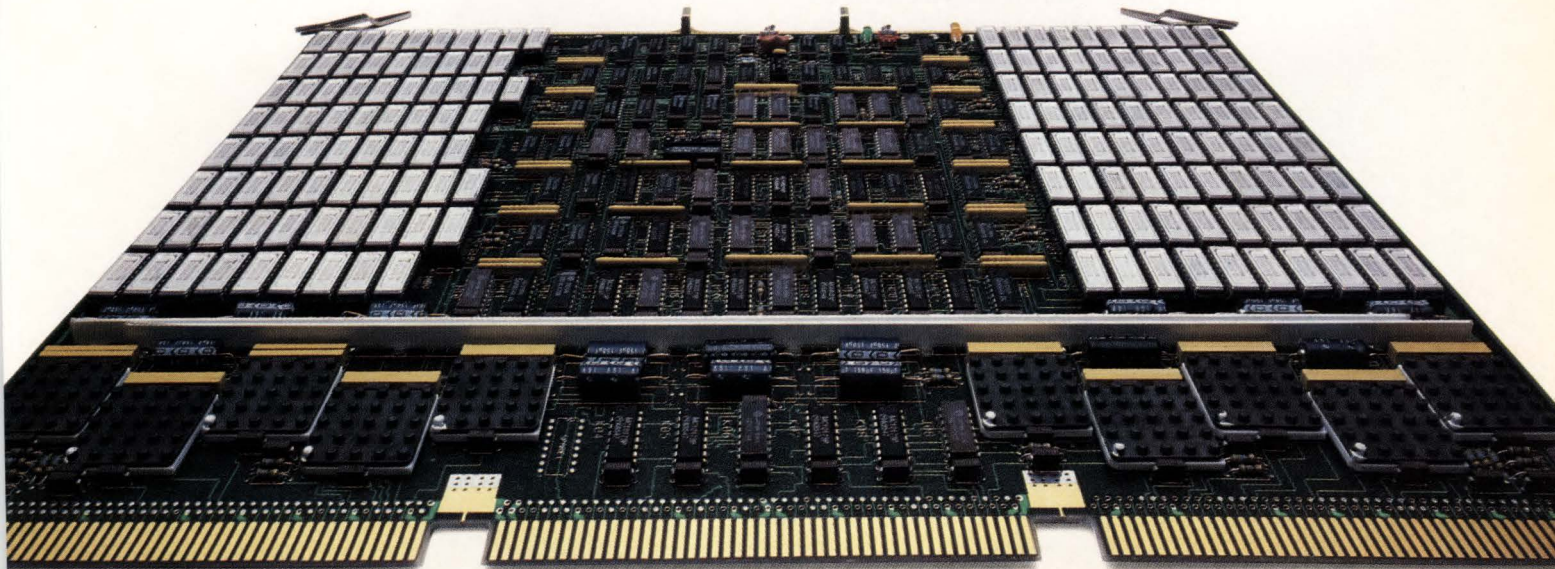
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ENTER 21 ON READER CARD



## PROGRAM 1... continued

```

C41='41H',C42='42H',C43='43H',C44='44H',&
C45='45H',C46='46H',C47='47H',C48='48H',&
C49='49H',C50='50H',C51='51H',C52='52H',&
C53='53H',C54='54H',C55='55H',C56='56H',&
C57='57H',C58='58H',C59='59H',C60='60H',&
C61='61H',C62='62H',C63='63H',C64='64H',&
C65='65H',C66='66H',C67='67H',C68='68H',&
C69='69H',C70='70H',C71='71H',C72='72H',&
C73='73H',C74='74H',C75='75H',C76='76H',&
C77='77H',C78='78H',C79='79H',C80='80H',&

!
DECLARE STRING  ERSL,CLEAR,CLEAR$,ANSI,VT52,SCREEN132,SCREEN80,REV,OFF, &
CUR_DOWN,P,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10,R11,R12,R13, &
R14,R15,R16,R17,R18,R19,R20,R21,R22,R23,R24

!
!
ESC$=CHR$(155%)  ! DEFINE THE ESCAPE CHARACTER
P=ESC$+'['      ! DEFINE THE PREFIX CHARACTER
CLEAR=P+'2J'    ! CLEAR SCREEN
CLEAR$=P+'OJ'   ! CLEAR SCREEN FROM CURSOR POSITION DOWN
REV=P+'7m'      ! REVERSE VIDEO
OFF=P+'Om'      ! REVERSE VIDEO OFF
ANSI=ESC$+'<'  ! SET TO ANSI MODE
VT52=P+'?21'   ! SET TO VT 52 MODE
SCREEN132=P+'3h' ! SET SCREEN TO 132 COLUMNS
SCREEN80=P+'31' ! SET SCREEN TO 80 COLUMNS
R1=P+'1;'      ! ROW ONE
R2=P+'2;'      ! ROW TWO
R3=P+'3;'      ! ROW THREE
R4=P+'4;'      ! ROW FOUR
R5=P+'5;'      ! ROW FIVE
R6=P+'6;'      ! ROW SIX
R7=P+'7;'      ! ROW SEVEN
R8=P+'8;'      ! ROW EIGHT
R9=P+'9;'      ! ROW NINE
R10=P+'10;'    ! ROW TEN
R11=P+'11;'    ! ROW ELEVEN
R12=P+'12;'    ! ROW TWELVE
R13=P+'13;'    ! ROW THIRTEEN
R14=P+'14;'    ! ROW FOURTEEN
R15=P+'15;'    ! ROW FIFTEEN
R16=P+'16;'    ! ROW SIXTEEN
R17=P+'17;'    ! ROW SEVENTEEN
R18=P+'18;'    ! ROW EIGHTEEN
R19=P+'19;'    ! ROW NINETEEN
R20=P+'20;'    ! ROW TWENTY
R21=P+'21;'    ! ROW TWENTY ONE
R22=P+'22;'    ! ROW TWENTY TWO
R23=P+'23;'    ! ROW TWENTY THREE
R24=P+'24;'    ! ROW TWENTY FOUR
!
```

## PROGRAM 2.

```

!
! This program demonstrates user defined
! escape sequences.
!
%INCLUDE 'SCREEN.B2S'
!
PRINT ANSI
PRINT CLEAR
PRINT R10;C15;REV;'The Franklin County Board of Mental Retardation;
PRINT R11;C24;'and Developmental Disabilities';OFF
PRINT BEL;BEL;BEL
PRINT R24;C1;
INPUT A$
!
PRINT CLEAR
!
END
```

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**RT-11**

# M ACRO-11

By Jeff Corbett

## Calling MACRO-11 From CTS-300 DIBOL.

The reasons for wanting to call a MACRO-11 routine from DIBOL probably outnumber DIBOL programmers. In general, MACRO-11 routines are useful when: a) data manipulation at the bit level is desired, b) access to monitor calls is desired, or c) a heavily used routine needs to do its job faster.

### The CTS-300 Calling Environment

The XCALL statement from DIBOL performs a "JSR PC, xxx" instruction which will pass control to the location named. Register four (R4) points to the top of the argument stack. The first word in the argument stack is the number of words used to point to the arguments for this particular XCALL. The remaining words contain two word descriptors to the data, IN REVERSE ORDER (i.e., the last parameter in the list is on top), one word for the address and one for the length in bytes.

Registers zero through three (R0, R1, R2 and R3) may be used as you like; DIBOL does not care about the contents of these registers. R5 must be returned exactly as it was passed to the subroutine. R6 is the system stack pointer and should be used only as such. Anything "pushed" onto the stack must be "popped" off before returning. R4 is the DIBOL stack pointer, therefore R4 must be restored as it was left by the last "pop" of data from the stack, or better yet, never modified

at all. Finally, control should be returned to DIBOL by the "RET" or "RTS PC" instruction.

Your subroutine must be contained in a named CSECT, which is accomplished by issuing the ".CSECT" directive with a name argument. Digital standard routines use the routine name preceded by a dollar sign ("\$"). The entry point to the routine must be a global symbol.

The parameters will be popped from the stack by a series of TRAP instructions. The TRAP instructions that we will be using here are:

1. TRAP 0—This trap performs various services, each requested by placing a different value in R1. The values we will use here are two (2), which makes a data area available for read only, and three (3), which makes a parameter available for read and write access. R4 also must point to the first word after the word count on the argument stack (its original value plus 2). The address of the parameter is returned in R0, the length in bytes in R1. After the trap is performed, R4 has been incremented. When control is returned to DIBOL, the value last placed in R4 during a TRAP 0 must be in R4.

2. TRAP XXX—This TRAP will cause CTS to initiate error handling with "XXX" representing a legal CTS-300 Run-time error value. It is useful for complaining about missing or incorrect arguments. TRAP 6. will cause the program to fail with the "INCORRECT NUMBER OF ARGS" message, TRAP 31. will cause an "ARGUMENT WRONG SIZE" failure.

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**ENTER 33 ON READER CARD**

# PROGRAM 1.

## Sample Macro Subroutine.

```
.TITLE REVRS  Reverses a Character String
.IDENT  /V01.01/
.CSECT  $REVRS
;
.SBTTL  Documentation
;+
;      DIBOL Calling Sequence:
;
;      XCALL REVRS (INPUT, OUTPUT)
;
;-
.SBTTL  Macro Definitions
;
.MACRO  PUSH    REG          ;Save a register on the stack
MOV     REG, -(SP)
.ENDM
;
.MACRO  POP     REG          ;Pop a register from the stack
MOV     (SP)+, REG
.ENDM
;
.MACRO  SAVE05                    ;Save all the working registers
PUSH   R0
PUSH   R1
PUSH   R2
PUSH   R3
PUSH   R4
PUSH   R5
.ENDM
;
.MACRO  REST05                    ;Restore all the working registers
POP    R5
POP    R4
POP    R3
POP    R2
POP    R1
POP    R0
.ENDM
.SBTTL  Reverse the characters in the string
;
REVRS::          ;Must be a global symbol
                 ;(It is what is named in the XCALL)
SAVE05          ;Save the registers
CMP    #4, (R4)+ ;Two arguments?
BEQ    10$      ;Yes, we're fine
TRAP   6        ;No, bomb by generating DIBOL error 06
;+
; Second argument
;-
10$:  MOV    #3, R1          ;Pop R/W
TRAP  0        ;Call monitor
MOV    R4, 2(SP)          ;Stuff new R4 into stack
TST    R0          ;Zero length argument?
BNE    30$      ;No, ok
TRAP  31.       ;Yes, bad argument length, DIBOL error 31
;
30$:  MOV    R1, R3          ;Move address
MOV    R0, R2          ;Move length
;+
; First Argument
;-
MOV    #2, R1          ;Pop R/O
TRAP  0        ;Call monitor
```

I/O routines  
are NOT  
recommended.

All errors generated by a MACRO-11 subroutine must be fatal. If the error you wish to generate is not fatal, you must make it fatal by adding 64. For example, BAD DIGIT may be signaled by executing TRAP 20. + 64.

WITH ALL THIS IN MIND it should be relatively easy to write a simple routine in MACRO-11 to be invoked from DIBOL. The procedure this routine must go through is something like this:

1. Save The Registers—Before we do anything else, put all of the registers on the stack.
2. Check The Number Of Arguments—This is accomplished most simply with a “CMP #<x\*2>, (R4)+”, which also takes care of step 3 (below). Note that the argument count is multiplied by two. If the argument count is not to our liking we can simply TRAP 6. and let CTS take over.
3. Move The Argument Pointer To Our First Descriptor - If the autoincrement mode is used on R4 in the last step, our job is done; otherwise, “ADD #2, R4” will take care of this.
4. Get Our Last Argument—Place the value pertaining to the desired access mode in R1, then TRAP 0. R1 may be checked at this time to see if we are happy with the argument size, then these two registers should be moved out of the way for the next pop.
5. Get The Next Argument—Repeat

*"Ever since he recommended  
that new software,  
Fred's become a real star."*



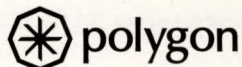
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**ENTER 50 ON READER CARD**

## PROGRAM 1... continued

```
MOV    R4, 2(SP)    ;Stuff new R4 into stack
CMP    R0, R2      ;How do they match up?
BEQ    40$         ;Same size, great!
TRAP   31.         ;Nope, bad info, DIBOL error 31
;+
; Mainline code
;-
40$:   ADD    R2, R3    ;Last byte in output plus one
;
50$:   MOVB   (R1)+, -(R3) ;Copy each byte
      SOB    R0, 50$   ;Until done
;+
; Return to DIBOL
;-
      RESTO5          ;Restore them regies
      RETURN         ;RETURN to DIBOL
;
      .END
```

## PROGRAM 2.

### Sample DIBOL Program.

```
RECORD VARS
      ONE,  A8, 'Before: '
          , A8, 'ABCDEFGH'
          , A8, ' after: '
      TWO,  A8
;
PROC
      OPEN(1,0,'TT:')
      XCALL REVR5( ONE, TWO )
      DISPLAY(1, VARS, 13, 10)
      STOP
```

## PROGRAM 3.

### Sample Compile, Link & Execute.

```
.DIBOL/NOLINE EX
      NO ERRORS DETECTED

.MACRO REVR5

.R LINK
*EX=EX,REVR5,DIBOL/P:400      1(/P:400 not needed before RT11 V5.0)
*.*C

.R EX
Before: ABCDEFGH after: HGFEDCBA

Stop
at line 6 in routine EX
.
```

All errors generated by a MACRO-11 subroutine must be fatal.

the last step as necessary until all arguments have been retrieved.

6. Save R4—Save the current R4 away for return with the other registers.
7. Do Your Stuff—Do whatever you want to do with the data.
8. Restore The Registers—Restore all the registers including the latest R4.
9. Return To DIBOL—Execute a RET instruction and we're finished.

This method for accessing MACRO-11 code from DIBOL has been tested in SUD and TSD for Versions 5, 6, 7 and 8 of CTS-300, and nothing has been destroyed yet. Incidentally, Digital most likely will ignore you should you ask for information on anything presented here. (Of course, that's why you're reading it here first!)

WARNINGS: I/O routines are NOT recommended. This is not to say that I/O cannot be done, but disk I/O is almost verboten, and I have done only terminal I/O (via monitor directives). Code to run under TSD must be PIC (position independent code). Also, under TSD, MACRO-11 routines run to completion, regardless of time (i.e., time slicing will not interrupt a MACRO-11 subroutine, only DIBOL code). So, keep your routines fast or other jobs will get mad at you for hogging the CPU.

*Jeff Corbett is manager of Technical Development at Business Systems, Inc., Greenville, South Carolina.*



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# V T200 SERIES

By Eliezer May

## Gateway to the Computer — Part I.

*Editor's Note: This series of articles will present the*

*VT200 family of terminals — our gateway to the computer. Topics covered in the series will include: basic components, communications, debugging, evolution of the VT series, seven- and eight-bit character and control codes, keyboard functions, and virtually all aspects of host control of the terminal functions. We begin here with Part I, defining the functionality and philosophy of the terminals.*

As the 1990s are approaching, homosapiens without either a terminal or personal computer are rapidly becoming a minority on the brink of extinction. This is a result of technological advances which have miniaturized electronics and slashed costs of integrated circuits. During this process we have seen computers move from the province of an elite group of computer professionals with absolute control over bits and bytes, to the domain of the general populace with little or no knowledge of the delights of Boolean logic. The problem of bridging this gap between the user population and the hardware is the responsibility of the software and computer ergonomic software engineering. The focal point of the software is the user's video display unit.

Today, in all respects, the computer has become an integral and inextricable part of the work environment for programmers. But, accessibility to enormous processing power, large databases, and innumerable applications programs must come into focus at the user's video display unit. The capabilities of this unit

enable us to add the critical factor of human engineering to our software systems. Thus, we can add simplicity and clarity to the use of programs, guiding the user through the learning phase and ultimately bringing increased productivity. The critical measure of success is determined by our ability to make users realize that the computer is not our adversary but the most powerful tool ever invented.

### Basic Components

The VT220 terminal consists of two basic physical components: the main terminal and the keyboard. The VT240 and VT241 terminals also include a control box.

Functionally, the terminals may be divided into the following components:

1. CRT display
2. Keyboard
3. EIA interface
4. 20 milliamper interface
5. Printer Port
6. Video output port
7. Power cable
8. Controlling logic unit

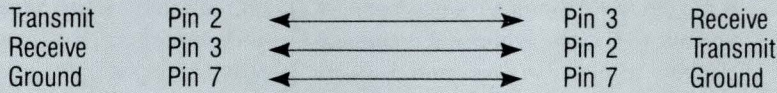
In the VT240 and VT241 terminals, the control box is connected to the monitor via an RGB (red, green, blue) cable. When setting up your 240/241 terminal, remove the paper backing revealing the sticky surface and mount this to the back of the CRT at the positioning protrusion to the right of the red and green connections, with the cable extending downwards. Removing the the cable from the CRT leaves an interlocking strip on the back of the terminal. The complementary strip is on the cable.

Terminal functionality is controlled by the

**F****FIGURE 1.**

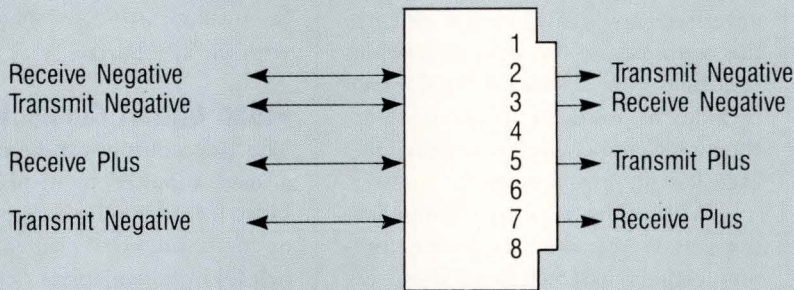
25-Pin Female D Type Connector

25-Pin Female D Type Connector

**F****FIGURE 2.**

Computer

20-mA Connector to Terminal



setup, which is now menu driven. No longer must you refer to manuals or stickers defining the effects of ones and zeroes that are dependent on position in one of several groups. It is as simple as can be. Once satisfied, move to "Save" in the primary menu via cursor arrow and press ENTER. This will now save all the parameters. For a detailed description of setup parameters, see your owner's manual.

### Communications

The terminal can converse with the host computer either through the EIA interface with or without modem control, or through the 20-mA interface. One of my clients found

it convenient to connect terminals to two different computers, one through the EIA connection and the other through the 20-mA connection (provided the host has an appropriate communication controller), and switch between the two systems by changing the communications setup parameter between "EIA Port, DATA Leads Only" and the "20-mA Port".

If you do not use cables (BCC22D-xxD where xx is the length in feet), you can make the direct connection cable to your computer (null modem cable) using telephone wire, two

female 25-pin D-type connectors, and two 25-pin connector housings. The connectors may be purchased at any electronics store. Construct the cable as shown in Figure 1.

Note that pins 2 and 3 are crossed so that the transmit of one end becomes the receive of the other. The cable can now be connected between the distribution panel of your computer and the terminal. If the computer port has modem control, but you wish to connect your terminal directly (e.g., DMF port 0 or 1), you will have to add two jumpers to the connector on the computer side. Connect pin 4 to 5, and 6 to 20. Make sure that the port in the computer is defined to have modem control.

Following this procedure you can connect to all DEC EIA communications distribution panels and most compatibles. Don't forget to mount the housings. It is very important to choose a housing that properly secures the cable so that you do not pull on solder connections.

If you want to make a 20-mA cable, you will need a standard telephone cable (four-wire), a 20-mA connector, and the appropriate connector for the computer distribution panel.

Certain compatible terminals "reuse" pins in the 25-pin connector; however, DEC has decided that this is a violation of the EIA pin standard and separates the connectors. The 20-mA connector can be purchased for around a dollar from AMP or another supplier. The code number is: AMP Mate-N-Lok 8-pin connector 1-480460-0, and the pins are AMP 60618-3. You will need four pins per connector. Viewing the connector with the guide tab on top and facing the cable side (pin side away from you) the pins are numbered one through eight, from left to right. The cable is constructed as illustrated in Figure 2.

See page 64 of the *VT220 Owners Manual* for terminal connections, and the appropriate manual for your 20-mA

distribution panel. Note that distribution panels of other vendors offering 20-mA, while emulating a DEC communication controller, may require additional jumpers on the connector to the distribution panel.

Unfortunately, the terminology is not as consistent for current loop as it is for EIA RS232. Some products connect positive to positive while others connect positive to negative. You may have to consult your vendor or experiment until you get the right connections.

Since it is difficult to extract the pins from certain connectors without the appropriate tools, it is recommended that you make sure of the connections, and then insert pins into the connector. There are communications connection devices that simplify the experimentation through jumpers, and some even have lights to help diagnose the situation. Such devices are not expensive. In experimenting with connections, I have never seen any damage result either to the terminal or the communications controller from mistakes. (This does not include the mistakes of someone erroneously connecting the terminal to a high voltage power source).

With either type of communications, it is necessary to set the communications parameters to those expected by the host computer.

### Printer Port

In the VT200 series, the printer port is now standard. In the VT240/241 it is also bidirectional so that you can use it for input devices such as tablets, as well as printers for output. Once we received 20-mA communications from the host, we then connected the printer port to an IBM PC, and transferred files via Kermit (a communications package available through DECUS). This means that the VT241 can be used as an expensive 20-mA-to-EIA converter or baud rate adapter by setting the communications baud rate to be different from that of the printer port, and using it in controller mode with printer-to-host defined in the setup.

The printer port can be connected

to the external device through a DEC BCC22D cable. If you don't have such a cable but would like to make one, it is constructed according to the diagram in Figure 3.

The printer port of the VT220 can print the screen, scroll a region, or continuously print data received, dependent on the printer setup parameters. This is accomplished by pressing PRINT SCREEN to print the screen image. How faithful the printed replication is depends also on the type of printer. Some of the new ones allow printing of semigraphic symbols. Double high and wide letters are not handled. I have heard that one printer supports bold and underline. They have not yet gotten blink down, but I am sure they are working on it.

The VT240/241 printer facility also allows printing of the bit-map graphics image displayed, and the downline loaded characters. This is accomplished by pushing SHIFT and PRINT SCREEN with the appropriate setup and printer.

### Video Output Connector

The video output can be connected to a slave monitor to display the exact video image, a video projection system, or composite video printer. This is very helpful in presentations that depend on computer-generated screen images. The connection uses a male BNC connector on a 75-Ohm cable connected to the slave system. The communications is RS170 composite video, which results in a monochrome image. The VT240/241 has additional connections for RGB (red, green, and blue) color images.

### Debugging Communications Problems on a Shoestring Budget

A useful tool for diagnosing continuity and proper pin connections of communication lines between the host and ter-



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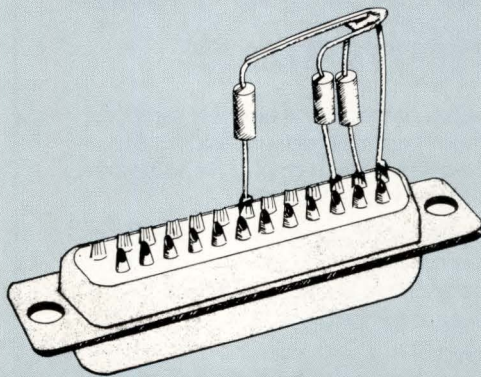
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**F****FIGURE 3.**

9-Pin Female D Type Connector 25-Pin Female D Type Connector

Transmit	Pin 2	←→	Pin 3	Receive
Receive	Pin 3	←→	Pin 2	Transmit
RTS	Pin 4	←→	Pin 5	CTS
DTR	Pin 5	←→	Pin 6	DSR
DSR	Pin 6	←→	Pin 20	DTR
Ground	Pin 7	←→	Pin 7	Ground

**F****FIGURE 4.**

minal can be constructed for a few dollars. You will need resistors of two, three, and seven KiloOhms. Cut the extra wire off of both ends, leaving about three-eighths of an inch on either side. Solder the 2-KiloOhm resistor into pin 2 of a 25-pin D-type male connector; 3 to pin 3, and 7 to pin 7. See Figure 4.

If you have additional pins that you need, acquire the appropriately valued resistors and cut and solder them into the respective pin connections. Now, get a piece of wire and solder it to pin 1, and

then to the other end of each of the resistors that you soldered to the connector. What you have done is to create a test connector that can be connected at the end of a communications line and may test for specific pin continuity against pin 1, using an Ohm meter (simple ones are available for less than \$10), where the value of the reading is the number of the desired pin.

At the terminal end, measure resistance in KiloOhms, trying to determine which is pin 1 (reference). This is done by finding which pin yields values of 2, 3, and 7 when measured against the remaining three wires. If you get 5, 9, or

10, you didn't find the reference pin yet. Once you find it, ascertain that each of the three remaining wires have the appropriate values. If not, you now know which wire is defective and can make the appropriate repairs.

You may wish to reverse 2 and 3 depending on whether the value is to be oriented to the terminal pin position or host pin positions in EIA. Similarly, this connector can be used to quickly guide manufacturing staff in construction of cables. Since I am slightly colorblind, this alleviates the uncertainty in soldering by value instead of by color.

**Display/Interpret Controls**

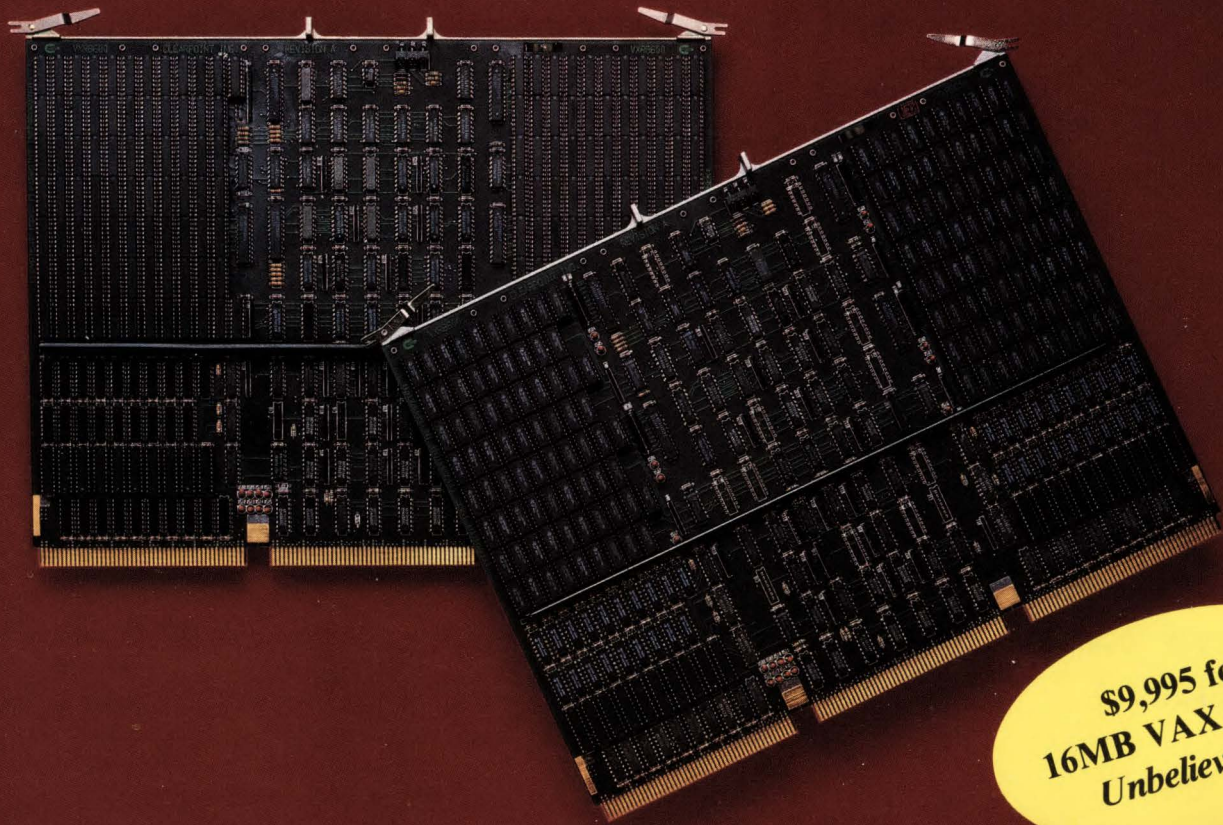
A new feature that is very useful for debugging software and communications problems is "monitor mode." To enter monitor mode, enter setup and change the "Interpret Controls" to "Display Controls." Having done so, all normal and control codes are now displayed. The terminal will not perform cursor addressing, attribute control, or any other function defined by the control codes, but it will allow the user to ascertain that the correct codes were actually received.

In the past, problems of this nature required a communications analyzer which generally was expensive. This feature is now standard in the VT200 series. Normally, the host echoes terminal data but not function key codes, which may be important. But, the user can force all terminal data to be displayed by activating "Local Echo" in the terminal setup parameters. Unfortunately, DEC didn't use the attributes (bold or reverse video) to distinguish between data originating at the terminal, and that of the host, to simplify debugging.

In Part II, we'll look at the evolution of the VT200 and analyze the input control sequences.

*Eliezer May is senior software engineer and manager of Tadiran Systems Division Computer Center, Holon, Israel.*

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**HARDWARE**

# T HE FALCO 5220

By Victor J. Chorney

## A DEC VT220/100/52 Emulator With Numerous Technical Capabilities.

The Falco 5220 is a DEC VT220/100/52, ANSI X3.64 terminal with 512 characters of key memory and two pages of 26-lines-by-132-columns of video memory. It is a 12" (diagonal) terminal in a case that occupies a 13" x 13" x 13" space (though it is not cubical) and sits on a ball pedestal. The pedestal, which has a 24-degree tilt and 120-degree swivel positioning capability, rests on a 13" x 10" x 1½" base. The power switch is a rocker-type located at the right front corner of the base.

The connectors are all at the rear of the base: power, port B/Printer, and port A/Modem. Both ports have female DB-25 connectors.

The characters displayed on the CRT are taller than seen on other terminals. Three different character formats are supported: 25 lines, 10-by-16-character cell; 26 lines, 10-by-15-character cell; 40 lines, 10-by-10-character cell. With such matrices, character resolution is quite clear. Three phosphors — white, green, and amber — are available. The model I tested had the white phosphors and I found that throughout the visible range of brightness (controlled by CTRL/arrow keys as is bell volume), there was remarkably little harshness to the display. A status line is displayed at the top of the display showing, in bold, terminal name and current cursor location (line and column).

A heavy coiled cable connects from the left side of the terminal base (as you're facing it) to the rear of keyboard. I found this arrangement bothersome. When I moved the

keyboard closer to the terminal base, the cable kept getting in the way. The keyboard is rather heavy, so it's not easily pushed around. It measures 20" x 7" with a lift bar to elevate the rear (six degrees). The keys require more pressure than the DEC keyboard and feel somewhat mushy. This last is, quite obviously, a matter of taste.

The function key identifier strip, at the top of the keyboard, is not in a slot, but is molded into the case. This may prove bothersome when using software that makes use of function keys, especially when an identifying strip is supplied.

THE REFERENCE GUIDE is about 80 pages long and is in a 9" high loose-leaf binder. The Table of Contents lists major areas, giving page ranges, rather than just the starting page numbers.

The first section covers unpacking and installation. It also presents a drawing of the terminal with identification of each part. Apparently the keyboard also was to be examined, but, unfortunately, all that appears is the word "Keyboard."

Section II discusses the various Set-up options, defining the terminology and conventions used. The language is clear, though it presumes some level of technical knowledge on the part of the reader. Each setup screen is presented along with a discussion of each option available.

The Appendix shows pin-outs for the two ports, status line information, and control codes (escape sequences).

There is a keyword index at the end of the last section, which is quite useful not only for its presence, but also because each index item



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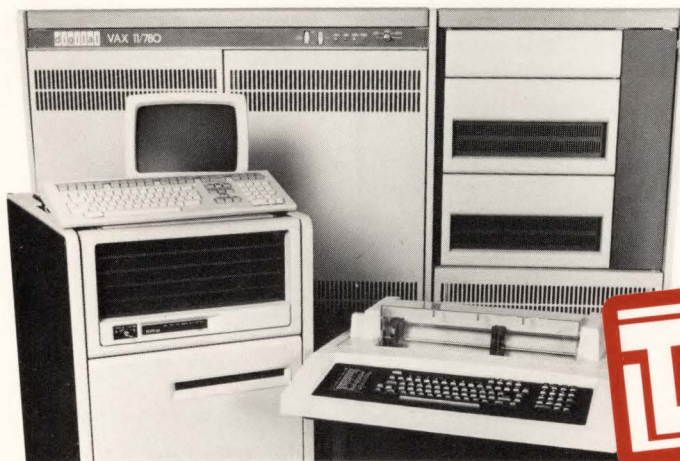
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appears as a centered paragraph heading within the text and thus is easily located.

Each Set-up screen is reproduced in the final portion of the documentation, a redundant effort since, as I said, they already are presented within context.

READ THE MANUAL FIRST so all controls can be identified. The keypad "Enter" key is used to select options within each Set-up screen.

Some keys have been relocated and there is some reorientation required. To point out a few: The Escape key is located above the CTRL key on the left end of the keyboard; the Home/Line-feed key is located below the down arrow key; the Backspace key is located on the right side of the space bar.

Some key sizes are not as significant as they are on the DEC keyboard. Of particular note is that the Enter key (on the keypad) is

#### **Falco 5220 Terminal**

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the same size as the other keys, though it easily could have been larger.

The Falco 5220 is a nicely engineered terminal with a wide range of technical capabilities. The display is especially notable; the clarity of the characters, by virtue of their formatting and the CRT's phosphors, is one of the best I have seen. By contrast, I found the keyboard to fall somewhat short of my expectations. On the whole, however, I'll make the same recommendation that I do with my clients: Try it. Only by getting some actual experience with it can you really make a decision about what's right for you.

---

*Victor J. Chorney is an independent consultant based in Overbrook Hills, Pennsylvania.*

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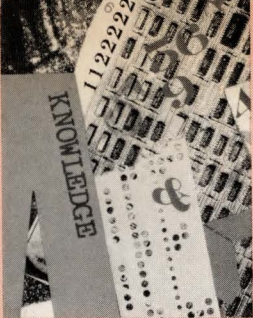
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**DBMS**

# L AZER

By Dave Mallery

## A Full DBMS In The Classic Sense.

*LAZER* is a full DBMS in the classic sense, supports roll back and forth, shadows files, liberates you from the overhead of RMS and does the other things you expect of a DBMS kernel. However, it has a few differences.

It is *not* relational, but rather network. It was modeled on *Total*, an old mainframe standby. Network means that the linkages between data elements are defined in the design and are implemented as linked lists with pointers in the data, rather than using tree structure indices. The primary files in *LAZER* are classic hashed random access with synonym resolution. Hashed files have a single key to the primary file and secondary keys are not directly available.

It is *tiny*. The image that is shared by the users and does all the work is written in MACRO-32 and is about 30 (that's right: 30) blocks long! Compare that with the average 3500-6000-block shared images with the other products.

It is *fast*. Very fast. Simplicity supplies speed.

It lacks many of the whizzy features of the other products. There is no query language. The only interface is via language calls. There is a small suite of utilities but, all in all, the product is austere.

I felt right at home in *LAZER*. I've written many applications on RSTS. Back in 1975, before RSTS supported RMS, if you wanted an access method, you wrote one. *LAZER* is almost exactly what I wrote back then, but it

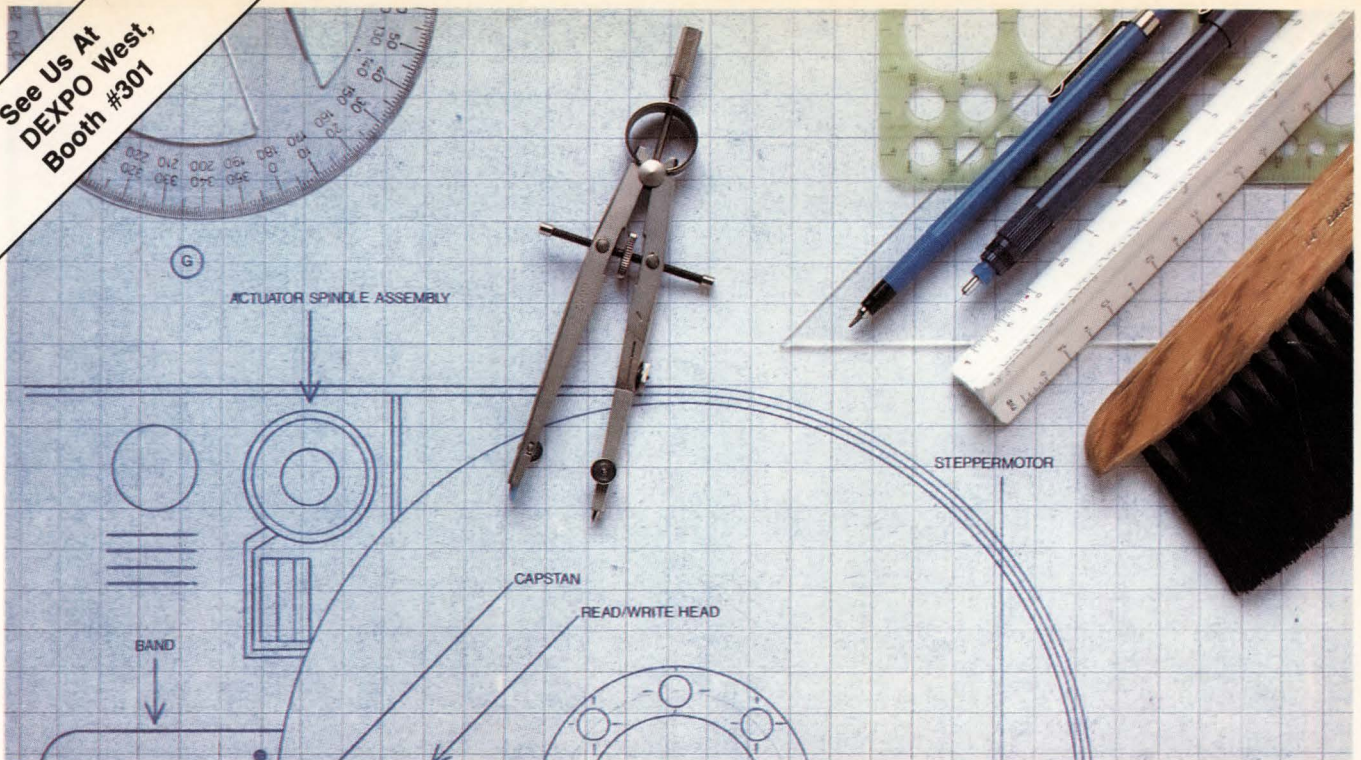
has the huge advantage of being complete, debugged and survivable. After RSTS started to support RMS, you still wrote access methods because you could not afford the overhead created by jamming RMS into a 16-bit address space.

I'd better give a short primer on hashing and linked lists. Hashing applies an algorithm to the key offered by the user and generates a direct disk address from the key. A good algorithm generates very few synonyms and efficiently uses the available space. For the inevitable key that generates the same disk address as another different key, a method must be supplied that points from the synonym block to an alternate. The beauty of hashing is that there is no index and, in most cases, a single disk access to arrive at the data. The problems with hashing are that you must supply the full key because no partials are possible, and sequential access is impossible without a complete ordered list of full keys. There is no index and the location of the data on the disk file is essentially random.

Should alternate keys or partial key lookup be absolutely necessary, you always can fall back on RMS for these services. The only "data" you need in the RMS index file is the full key for the primary data file. We have found that in many real applications, only a very small percentage of the access is by secondary keys. In that case, you reap the benefits of the hashed file's speed during the vast majority of the accesses and pay the RMS premium only infrequently.

Linked lists are implemented by placing a forward and backward pointer in each record and a "root" pair of pointers in some master

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**1**  
As you purge, delete, create, and extend files on your VMS system they become scattered throughout the disk.  $\checkmark 2$

**4**  
one section to another you're doing just what the computer does when it moves the head across a fragmented disk; wasting time.  $\checkmark 5$

**3**  
Imagine that this ad is a disk and that the sections of type are files. As you move your eyes across the page from  $\checkmark 4$

**2**  
This scattering is called fragmentation and it's one of the major causes of poor VAX/VMS system performance.  $\checkmark 3$

**5**  
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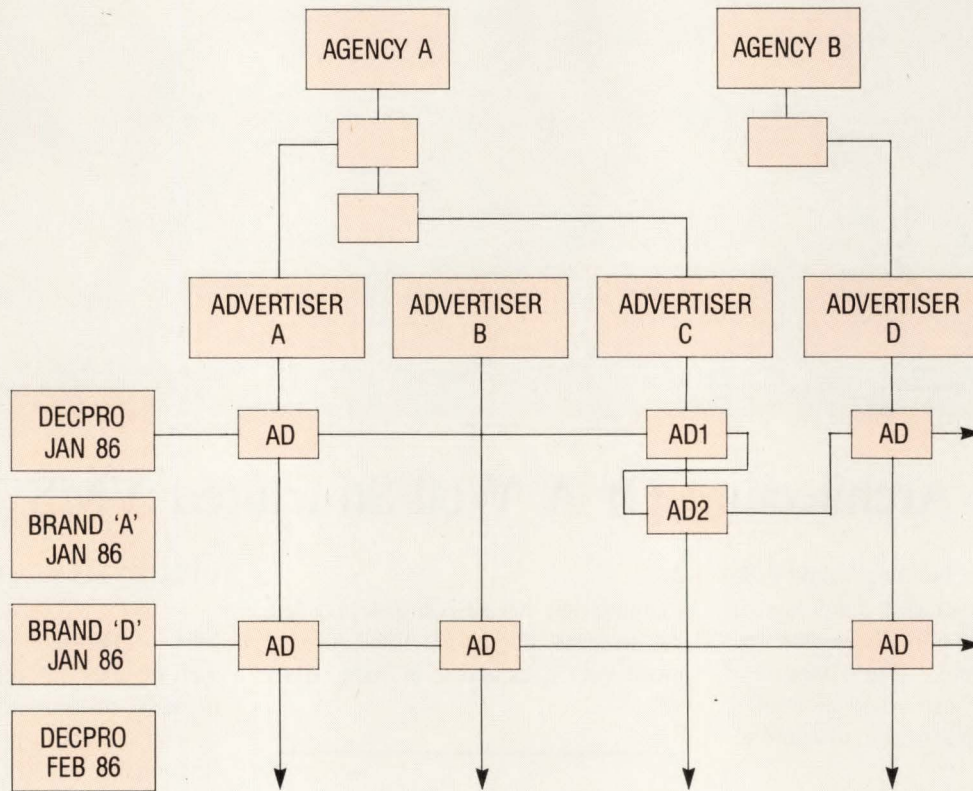
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# F

## FIGURE 1.



record that point to the front and end of the list. Note that all linked lists must be rooted in a primary (hashed) file. You may follow a chain in either direction from any starting point. Should you arrive at a record following one chain, you may depart via another chain. You can insert records at any location in a chain simply by having the pointers adjusted in the records that precede and follow

the new record. Records are removed from a chain by adjusting the pointers in the preceding and following records (or the root). All of these functions are performed by *LAZER* in a secure and reversible manner.

A surprising number of data structures lend themselves to network structure. The technique is very efficient if

the individual sets of linkages are not too long or too volatile. Problems arise in following long linked lists that have been scrambled by excessive activity. Good system design is the watchword.

DATA INTEGRITY always was a problem with home-grown linked lists. People always were doing awful things in the middle of an update and breaking a chain. Systems I wrote in the old days spent an inordinate amount of time

scanning links to insure integrity and rebuilding the links when broken. The beauty of LAZER is that integrity is supplied by the package. All transactions must be "committed" at the end. Any uncommitted transaction is "rolled back" by LAZER automatically.

We decided to test LAZER by prototyping our ad tracking system. This is a system we use to determine our market share. It gets a record for each advertisement placed in the DEC market each month and produces reports. It currently runs using RMS and APTOOLS. The "relations" in the data are implemented by their adjacency in RMS indices.

The first step was to restate the data structure in a network model. (See Figure 1.)

The primary file across the top of the diagram is a master file of all advertisers. These contain links to their agencies (if any). The links are implemented by the use of a link file (a linked list that contains no data, only links).

The left-hand vertical file is an issue master file containing a simple record identifying each specific issue of each magazine we track. The actual advertisement records are on linked lists from both the advertiser records and the issue records. The advertisement file contains both links and data. Following a list down from the advertiser will produce all the ads placed in any magazine by that advertiser, in chronological order. Following an issue across will yield all the content of a specific issue of a specific magazine.

This model is translated into LAZER's Data Definition Language. (See Program 1.)

YOU CAN LEARN about many of LAZER's more robust features by noting the things we opted not to use in this test. The DDL source is compiled by a utility into a form acceptable to the shared image for run-time use. The compilation time is trivial.

Loading the database proceeds as follows: First, the agency file is loaded. This file contains empty list headers that

# The most-requested issues of **THE DEC\* PROFESSIONAL** magazine are now available!



The most popular issues of the best DEC-specific magazine are available from the publisher . . . issues focusing on graphics, peripherals, office automation, microcomputers, word processing, languages, communications, mass storage, financial planning . . . everything you need to know as a DEC user.

For just \$4 each (in Canada, \$5; in all other countries, \$10) you can receive many of the issues you missed, back to September 1982. All the orders must be prepaid.

NOTE: Vol. 5, #1,  
contains Cumulative  
Index through  
November 1985.

**THE DEC\* PROFESSIONAL**  
P.O. Box 503  
Spring House, PA 19477-0503  
(215) 542-7008

will be used to point to any advertisers that the agency may serve. When the advertiser master is loaded, the pointers to the agencies are used to construct the link records that join them to the agency file. This link file serves no purpose except to create the relation and so represents the same kind of overhead as an RMS index.

As the advertisements are loaded, they are placed on the descending chain from the advertiser. Cheating a little, we simply "created" the issue file (the left hand vertical) on the fly, ignoring the error message on redundant adds.

The real beauty of a network structure that is well-designed is that the structure yields the most common reporting formats without any sorting or delay, making rather complex arrangements of data available on the screen with no delay. The only I/O required for the display is the actual I/O involved in getting the data. This is wonderful on very large systems.

The prototype programs we wrote performed well. Loading the file was very simple and very fast. The entire operation was characterized by lack of overhead.

One of the utilities merits special mention. LAZERDBT allows the programmer to issue any DML command (function call) interactively. This is invaluable for both testing and maintaining a database.

### CANALTA DATA

7100-44 Street, S.E.

Calgary, AB Canada T2H 1x2

(403) 236-6100

Price: \$2480 for MicroVAX —

\$13,000 for VAX8800

Environment: VMS 4.0 and later

## PROGRAM 1.

```
*****
*           LAZER DBMS V03-00           *
*           *                           *
*           Sample DDL File             *
*           *                           *
*           Canalta, Calgary, Alberta   *
*****
```

BEGIN-DATA-BASE-GENERATION  
DATA-BASE-NAME=MAINDB

BEGIN-OPTIONS  
PASSWORD=MAINDB  
FUNCTION-LOG=N  
MAXIMUM-HELD-RECORDS=64  
MAXIMUM-TASKS=4  
MAXIMUM-UPDATE-TASKS=2  
SHADOW=N  
SINGLE-TASK=N  
TASK-LOG=Y  
TASK-LOG-IO=2  
SYSTEM-WIDE-DATA-BASE=N  
END-OPTIONS

Password for LAZER Utilities  
No function logging  
Maximum held records per task  
Maximum tasks to sign on concurrently  
Maximum tasks to sign on in update mode  
No shadow recording  
Multi-task database  
Task logging enabled  
Number of I/O buffers for task log file  
Group level database

SHARE-IO  
IOAREA=MAS1=4  
IOAREA=VAR1=4  
END-IO

BEGIN-PRIMARY-DATA-SET  
DATA-SET-NAME=ADVR  
IOAREA=MAS1

Advertiser dataset

PRIMARY-DATA  
ADVRROOT=8/L  
ADVRCTRL=5/C

Synonym chains (2 long words)  
Record key (character string data type)

ADVRLKAD=8/L  
ADVRLKAG=8/L

Link to ADMT (advertisements)  
Link to AGNC (agency pointers)

ADVRDATA=175  
.1. ADVRNAME=30  
.1. ADVRADRS=82  
.2. ADVRADR1=30  
.2. ADVRADR2=30  
.2. ADVRCITY=15  
.2. ADVRSTAT=2  
.2. ADVRZIPP=5

Data elements

.1. ADVRPHON=10  
.1. ADVRAGNC=5  
.1. ADVRTERR=1  
.1. ADVRSMAN=2  
.1. ADVRRNAM=30  
.1. ADVRLSTC=4

Agency

ADV\_REPNAME  
Last contact

.1. \*FILLER\*=11

END-DATA

TOTAL-LOGICAL-RECORDS=2000  
LOGICAL-RECORDS-PER-BLOCK=5  
LOGICAL-RECORD-LENGTH=204  
FILE-SPEC=ADVERTISER.DAT/SECTORS=800

END-PRIMARY-DATA-SET

BEGIN-PRIMARY-DATA-SET  
DATA-SET-NAME=AGNC  
IOAREA=MAS1

Agency dataset

PRIMARY-DATA  
AGNCROOT=8/L  
AGNCCTRL=5/C

Synonym chains (2 long words)  
Record key (character string data type)

AGNCLKAG=8/L

Link to AGAD (agency to advertiser pointers)

AGNCDATA=183/C  
.1. AGNCNAME=30

Data elements

.1. AGNCADRS=82  
.2. AGNCADR1=30  
.2. AGNCADR2=30  
.2. AGNCCTY=15  
.2. AGNCSTAT=2  
.2. AGNCZIPP=5

.1. AGNCPHON=10  
.1. AGNCRNAM=30  
.1. \*FILLER\*=31

END-DATA

TOTAL-LOGICAL-RECORDS=200  
LOGICAL-RECORDS-PER-BLOCK=5  
LOGICAL-RECORD-LENGTH=204  
FILE-SPEC=AGENCY.DAT/SECTORS=80

END-PRIMARY-DATA-SET

BEGIN-PRIMARY-DATA-SET  
DATA-SET-NAME=ISSU  
IOAREA=MAS1

Issue dataset

PRIMARY-DATA  
ISSURROOT=8/L  
ISSUCTRL=6/C

Synonym chains (2 long words)

ISSULKAD=8/L

Link to AGAD (advertisements)

ISSUDATA=10  
.1. ISSUNAME=10

Data elements

END-DATA

TOTAL-LOGICAL-RECORDS=256  
LOGICAL-RECORDS-PER-BLOCK=16  
LOGICAL-RECORD-LENGTH=32  
FILE-SPEC=ISSUE.DAT/SECTORS=16

END-PRIMARY-DATA-SET

BEGIN-RELATED-DATA-SET  
DATA-SET-NAME=ADMT  
IOAREA=VAR1

Advertisements

RELATED-DATA  
ADMTCODE=2  
ADMTADVR=5  
ADVRLKAD=8=ADMTADVR  
ADMTISSU=6  
ISSULKAD=8=ADMTISSU

Record code  
Advertiser master key  
Link from ADVR  
Issue key (mag+ymm)  
Link from ISSU

ADMTBDAT=50

Base data



# PROGRAM 1... continued

```
.1. ADMTSIZC=6
.1. ADMTSIZN=4/G
.1. ADMTCOLR=1/B
.1. ADMTCATY=3
.1. ADMTSUBJ=30
.1. *FILLER*=6
```

```
ADMTRDAT=6                Redefined data
```

```
RECORD-CODE=DP
.1. ADMTPDPT=6
```

```
RECORD-CODE=DR
.1. ADMTRDRT=6
```

```
RECORD-CODE=HC
.1. ADMTHCDT=6
```

END-DATA

```
TOTAL-LOGICAL-RECORDS=8100
LOGICAL-RECORD-LENGTH=85
LOGICAL-RECORDS-PER-BLOCK=6
LOAD-LIMIT=80                Load limit at 80%
CONTROL-INTERVAL=810
FILE-SPEC=ADVMENT.DAT/SECTORS=1350
```

END-RELATED-DATA-SET

```
BEGIN-RELATED-DATA-SET      Agncy to Advertiser pointers
DATA-SET-NAME=AGAD
IOAREA=VAR1                  Buffer VAR1 shared with ADMT
```

```
RELATED-DATA
AGADAGNC=5/C                Agency
```

```
AGNCLKAG=8=AGADAGNC        Link from AGNC
AGADADVR=5/C                Advertiser
ADVRLKAG=8=AGADADVR        Link from AGNC
```

```
AGADDATA=6
.1.*FILLER*=6                Filler for future use
```

END-DATA

```
TOTAL-LOGICAL-RECORDS=2000
LOGICAL-RECORD-LENGTH=32
LOGICAL-RECORDS-PER-BLOCK=16
LOAD-LIMIT=80                Load limit at 80%
CONTROL-INTERVAL=80
FILE-SPEC=AGTOAD.DAT/SECTORS=125
```

END-RELATED-DATA-SET

```
BEGIN-TASK-LOG-DATA-SET
LOG-BLOCKSIZE=1              1024 (1X1024) bytes per block
LOG-BLOCKS=60
FILE-SPEC=TASKLOG.DAT
END-TASK-LOG-DATA-SET
```

```
BEGIN-FUNCTION-LOG-DATA-SET Function log specifications (commented out)
LOG-BLOCKSIZE=1              1024 bytes per block
LOG-BLOCKS=90                90 blocks (180 sectors) in file
FILE-SPEC=FLOG1.DAT          Primary function log file
FILE-SPEC=FLOG2.DAT          Alternate function log file
END-FUNCTION-LOG-DATA-SET
```

END-DATA-BASE-GENERATION

# PROGRAM 2.

*Prototype displays an advertiser and its ad history.*

```
100  DECLARE LONG   L, REC_CNT, BAD_CNT
      DECLARE STRING S

200  !
      ! LAZER stuff.
      !
      MAP (LAZER)  STRING  LZ_FUNC    = 5%,
                      LZ_STAT    = 4%,
                      LZ_DSET    = 4%,
                      LZ_LINK    = 8%,
                      LZ_RRN     = 4%,
                      LZ_KEY     = 8%,
                      LZ_SCHM    = 128%,
                      LZ_ELEM    = 256%,
                      LZ_BUF     = 512%,
                      LZ_ENDP    = 4%,
                      LONG   LZR_STAT

      !
      ! Advertiser record stuff.
      !
      MAP (ADVR)  STRING  ADVR_AREA = 180%,
                      ADVR_CTRL  = 5%,
                      ADVR_NAME  = 30%,
                      ADVR_ADR1  = 30%,
                      ADVR_ADR2  = 30%,
                      ADVR_CITY  = 25%,
                      ADVR_STTE  = 2%,
                      ADVR_ZIP   = 2%,
                      ADVR_PHON  = 10%,
                      ADVR_AGNC  = 5%,
                      ADVR_TERR  = 1%,
                      ADVR_SMAN  = 2%,
                      ADVR_RNAM  = 30%,
                      ADVR_LSCT  = 4%

      !
      ! Advertisement record stuff.
      !
      MAP (ADMT)  STRING  ADMT_AREA = 73%,
                      ADMT_CODE  = 2%,
                      ADMT_ADVR  = 5%,
                      ADMT_ISSU  = 6%,
                      ADMT_SIZC  = 6%,
                      ADMT_SIZN  = 4%,
                      ADMT_COLR  = 1%,
                      ADMT_CATY  = 3%,
                      ADMT_SUBJ  = 30%

900  LZ_FUNC = "SINON"
      LZ_SCHM = "SHOWADMTMAINBDRONLY--ADVRSHRE----ADMTSHRE----END."
      LZ_ENDP = "END."
      CALL DATBAS BY REF (LZ_FUNC, LZ_STAT, LZ_SCHM, LZ_ENDP)
      IF (LZ_STAT <> "*****") THEN
          GOTO 32700

1000 PRINT
      INPUT "Advertiser number"; S
      GOTO 32000 IF (SEG$(S, 1, 1) = "/"*)
```

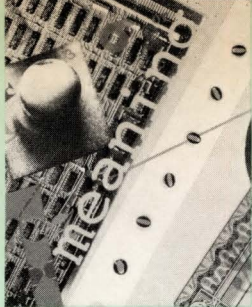
```
!
RSET ADVR_CTRL = "0000" + NUM1$(VAL$(S))
!
LZ_FUNC = "READM"
LZ_DSET = "ADVR"
LZ_ELEM = "ADVRCTRLADVRDATAEND."
LZ_ENDP = "RLSE"
CALL DATBAS BY REF (LZ_FUNC, LZ_STAT, LZ_DSET, ADVR_CTRL,
                    LZ_ELEM, ADVR_AREA, LZ_ENDP) &
IF (LZ_STAT = "*****") THEN
PRINT
PRINT "Name: "; ADVR_NAME
PRINT "Addr: "; ADVR_ADR1
PRINT " "; ADVR_ADR2
PRINT " "; ADVR_CITY; " "; ADVR_STTE; " "; ADVR_ZIP
PRINT
PRINT "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
!
LZ_RRN = "LKAD"
ELSE
IF (LZ_STAT = "MRNF") THEN
PRINT "No such key"
GOTO 1000
ELSE
GOTO 32000

1010 LZ_FUNC = "READV"
      LZ_DSET = "ADMT"
      LZ_ELEM = "ADMTCODEADMTADVRADMTISSUADMTBDATADMTRDATEND."
      LZ_LINK = "ADVRLKAD"
      CALL DATBAS BY REF (LZ_FUNC, LZ_STAT, LZ_DSET, LZ_RRN, &
                          LZ_LINK, ADVR_CTRL, LZ_ELEM,
                          ADMT_AREA, LZ_ENDP) &
IF (LZ_STAT = "*****") THEN
IF (LZ_RRN = "END.") THEN
PRINT "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
PRINT
GOTO 1000
ELSE
PRINT ADMT_ISSU; " "; ADMT_SIZC; " ";
      ADMT_COLR; " "; ADMT_CATY; " "; ADMT_SUBJ
      GOTO 1010
ELSE
GOTO 32000

32000 PRINT LZ_FUNC; " error: "; LZ_STAT
      IF (LZ_STAT <> "*****")
!
      LZ_FUNC = "SINOF"
      LZ_ENDP = "END."
      CALL DATBAS BY REF (LZ_FUNC, LZ_STAT, LZ_SCHM, LZ_ENDP)

32700 IF (LZ_STAT <> "*****") THEN
      PRINT LZ_FUNC; " error: "; LZ_STAT

32767 END
```



**DEC NEWS**

# VAX 8550, 8700 UNVEILED

By Linda DiBiasio

**Latest BI-based products reaffirm DEC's new commitment to 'closed' architecture.**

Digital Equipment Corporation recently announced the latest additions to its family of second generation, high performance VAX computers. The VAX 8550 and VAX 8700 brings to six the number of computers using the new VAXBI (VAX Bus Interface) architecture introduced in January.

The VAX 8550 is packaged in the same cabinet as the 8500, but delivers almost twice the performance. Digital is offering the new 8550 in four packages:

**1. Standalone** — The basic system comes with 20 MB of memory (expandable to 80 MB), a four-port intelligent disk adapter, and a high speed local area network port to Ethernet, VMS and DECnet. This configuration allows users to select the mass storage and terminals required for their applications. A one year warranty is included in the price of \$364,000, and it is available immediately.

**2. VAXcluster Configuration** — This configuration is the same as the standalone system except the mass storage devices are accessed through the VAXcluster port instead of a local disk adapter. The VAXcluster System Building Block is available immediately, and will sell for \$378,000.

**3. Preconfigured System** — Also available now, the preconfigured system includes a disk and tape (90 day warranty on disk and tape only). Priced at \$398,000, the system includes an RA81 456-MB disk drive, a TU81-Plus streaming tape drive and controller, and a DMB32 multifunction communications controller.

**4. Office Configuration** — The ALL-IN-1 System Building Block features Digital's new

memory array and comes packaged with the ALL-IN-1 software. This system, priced at \$441,000, will be available approximately September 1, and can support up to 300 users. It carries a one year, on-site hardware warranty.

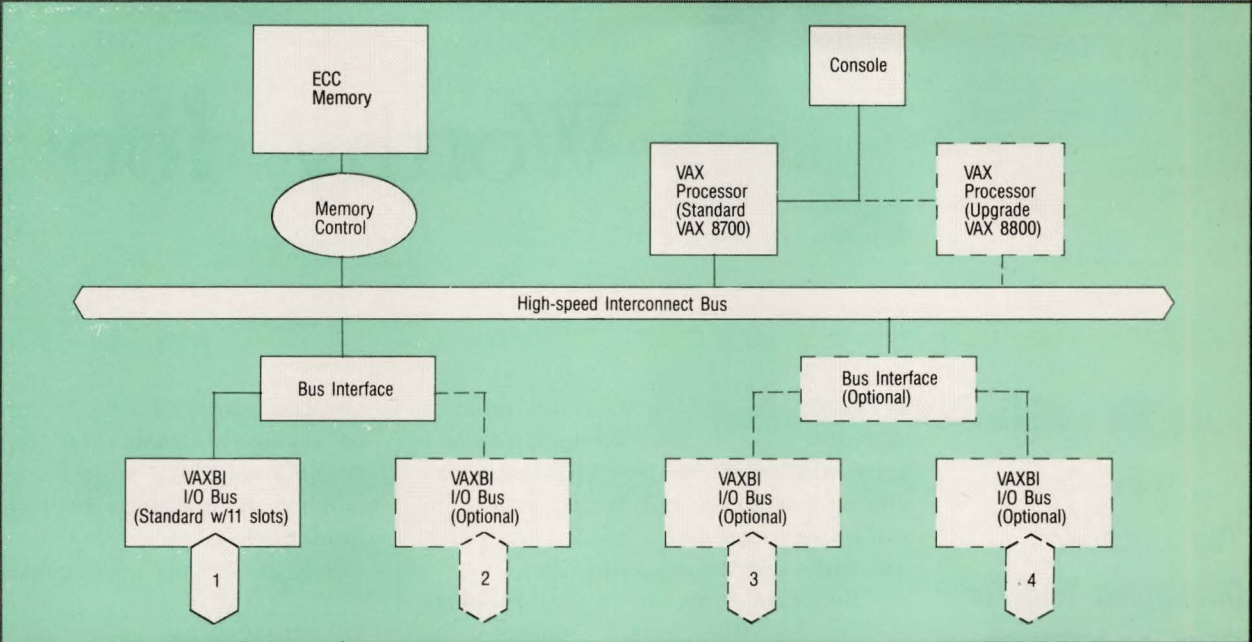
The new 8550, a companion product to the VAX 8500, delivers up to six times the performance of the VAX 11/780 — in one third the space. DEC plans to announce an upgrade for 8500 sites in the near future.

The VAX 8700 is the high performance VAX with large memory and I/O capabilities for all applications. The 8700 delivers the same I/O and has memory capacity equal to the 8800, but has the processor performance of the 8550. It comes in the same cabinet as the 8800, and allows the connection of up to four VAXBI I/O channels for an aggregate bandwidth of up to 30 MB per second of I/O traffic. The 8700 has space for additional slots that can handle up to 128 MB of central memory.

Like the VAX 8550, the new 8700 comes in several configurations. All include 32 MB (expandable to 128 MB) of memory, an intelligent local disk adapter or VAXcluster adapter for access to mass storage devices, a high speed local area network Ethernet adapter, VMS and DECnet licenses, and a one year warranty. Available immediately, prices range from \$433,000 to \$483,000.

In the near future, configurations of the new processors will support ULTRIX-32 and VAXELN, DEC's real-time operating system.

**F** I G U R E 1 .



**Enhancements**

DEC also announced enhancements to its other VAXBI systems, introducing new models of the 8200 and 8300 systems. The new systems incorporate the BI adapters announced with the 8500. The Ethernet port now connects directly to the VAXBI and is twice as fast as the original, which required a UNIBUS. The tape controller, which is faster, also connects directly to the BI. Memory is now twice the density going from 2- to 4-MB arrays. And, the entire 4 MB of memory with controller fits on the same size board as the 2-MB memory. Through the use of double-sided surface mount technology that houses memory chips on both sides of the same board, the customer can have up to 24-MB memory on his system.

There also was some good news for those with VAX 8500 and 8800 systems. A four-fold memory increase — through a new 16-MB array — lets customers configure 8500s with up to 80-MB memory. For 8800 systems, the same 16-MB array allows an expansion of up to 128-MB memory.

**DECserver 200**

The latest enhancement to DEC's local area network product family is the DECserver 200.

Offering the same features as its predecessor, the DECserver 100, the latest model allows direct connection of modems, printers and non-Digital host computers directly to Ethernet. With initial shipments beginning in September, hardware prices begin at \$3,050. The software license is priced at \$50.

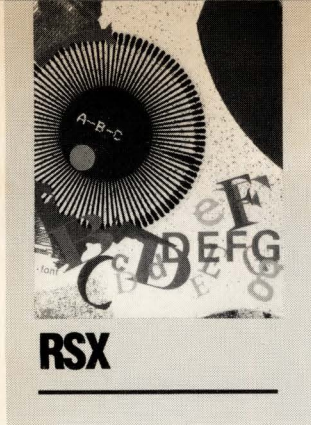
**B.E.S.T.**

Taking the opportunity to promote its new Business Enterprise Solution Training (B.E.S.T.) program, DEC made this latest introduction of products in its VAX family of systems at Boston University, site of the new training program.

This summer, the B.E.S.T. program trained 1,600 members of DEC's North American, European, and Pacific field organization on the university campus. Participating sales representatives and support people from industries such as aerospace, banking, education and electronics, received intensive training from a combination of Digital and independent experts in applications ranging from electronic publishing to mapping and process control.

B.E.S.T. is part of DEC's continuing commitment to learn more about its customers and the fields in which they work. ■

*The VAX 8700 is configured with ECC memory and as many as four VAXBI I/O buses — one is standard, and three more can be added.*



# A Worthy Tool

By Ed Judge

**The Symbolic Debugging Tool For RT-11 And TSX-Plus users is powerful and easy to use.**

I have a real problem with debugging tools: I know what I want, but have a hard time convincing a debugger to *do* what I want. I am still trying to get over a few disasters I have had with other debuggers I tried.

But, then I saw that Digital Software Systems, Inc. (DSSI) makes promises in its literature about the new *Symbolic Debugging Tool for RT-11 and TSX-Plus (SDT)*, which the company claims is much easier to use because it is "symbolic." At least one level of abstraction could be removed from the debugging process if it really did work as stated, freeing up more brain power for problem-solving. I needed something like this.

As the literature describes it, *SDT* is a programmable, interactive, dynamic, symbolic debugging tool for the testing, debugging, composing, and patching programs. That's a lot to promise; I was curious. Debugging tools are notorious for being cryptic utilities that promise to work miracles but often fail to document the proper incantations to make them do what you want. But, DSSI claimed that everything you could do with your favorite debugging tool, and more, you can do with *SDT*.

You also can do it more easily. For instance, you can reference all variables by NAME. The ".SAV" image that's running seems to acquire interpreter-like qualities, all with no loss of real-time speed or abilities. You can examine the value of any variable in your

program in any of the the 18 printout modes by typing VARNAM/. *SDT* supports both GLOBAL and LOCAL variables, including line number and statement label symbols, and handles overlaid programs, all very neatly. The display also is very understandable.

THE *SDT* MANUAL is typeset, and contains lots of examples showing how to use the debugger and its many switches, but nothing about how the debugger should be applied. It describes the commands, switches, and options made available to the user, but is not a text about debugging techniques or general approaches to program problem solving.

I called DSSI and requested a copy of a LOG file of a sample terminal session using one of the fully documented example programs (an even longer example is set to be distributed with future manuals). I made myself a little card of useful commands. It helped, but there still were some confounding problems: *SDT*'s displays did not match the manual's examples.

This was the same problem I had encountered with the other debuggers. Debug statements in the code are, in my opinion, a much easier way to handle the problem.

FIRST, I INSTALLED the files where they belonged. This was simplified by the .COM files present and a 2000-block virtual device to keep them neatly in one place to work on. The debugger and the editor files were on the SY: disk and the rest were in the virtual device SDT.DEV, assigned DK:. From this configuration I proceeded to attempt to learn how to use *SDT*.

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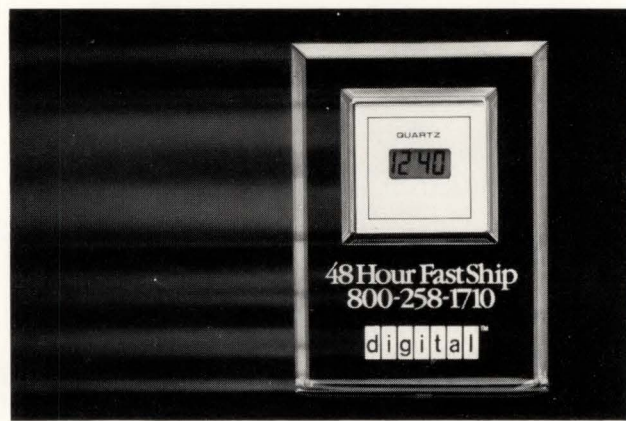
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*SDT* has 16 programmable breakpoints, 18 different display modes (instruction, decimal, octal, rad50, ASCII, etc.), more than 50 commands, of which you only have to know about 12 to function, and a useful built-in HELP facility. Any DEC standard linked language, even in a mixed language environment, can be handled, also when

To use *SDT*, first you must compile the source with certain switches...

overlaid. This debugging tool does it all, but some things just wouldn't work right.

After a call to DSSI, it was pointed out that the FORTRAN examples in the manual all are IN-LINE EIS, and I was using a THREADED code FORTRAN compiler. A warning now accompanies the manual to stay away from FORTRAN THREADED code until you're familiar with the debugger.

This was the source of my examples-not-matching-the-manual problem. I then tried again with a newly generated compiler and things were just as the manual said they would be.

TO USE *SDT*, first you must compile the source with certain switches: LIST and some SHOW options. There are some switches that can cause trouble; they are listed, and the problems are explained in the manual.

Then, you link with the switches DEBUG:SDT, MAP, and TRANSFER. The

FIGURE 1.	
INSTAL.DOC	These installation instructions include a brief description of each file on the distribution medium.
UPDATE.HLP	Documents the significant enhancements of the current release.
SYM.HLP	Online documentation for the SYM and FTSYM Symbol Table Generator and Editor programs.
SYM.SAV	The standard Symbol Table Generator and Editor, SYM.SAV should reside on SY: at all times.
FTSYM.*	An extended version of SYM which includes additional commands to provide you with extended diagnostic information for analyzing symbol table problems.
SDT.HLP	Online documentation for the <i>Symbolic Debugging Tool for RT-11 and TSX-Plus</i> . This file documents both RTSDT and SASDT.
RTSDT.OBJ	This is the <i>SDT</i> itself. RTSDT is the debugger to use for symbolically debugging nearly all application programs. DSSI recommends that you make RTSDT the default <i>SDT</i> by copying RTSDT.OBJ to SY:SDT.OBJ.
SASDT.OBJ	A special version of <i>SDT</i> which provides the console operator with unconditional exclusive system access. SASDT is the debugger to use for symbolically debugging time-critical realtime jobs at the system console.  Note: Either RTSDT.OBJ or SASDT.OBJ must reside on SY: as SY:SDT.OBJ.
MATCH.MAC	This is the source of the MATCH MACRO-11 examples in the <i>SDT User Manual</i> .
PARSE.*	These files reproduce the detailed FORTRAN-IV debugging example shown in APPENDIX-B of the <i>SDT User Manual</i> .
PARSE7.*	These files reproduce the detailed FORTRAN-77 debugging example.
CD.*	This virtual device utility implements a very convenient shorthand method of simultaneously accessing many arbitrary virtual devices and provides an excellent example of realworld debugging. Included here is a commented terminal session log illustrating the building CD.SAV and its symbol table along with a debugging session using <i>SDT</i> .
MAP.*	This file compression and decompression utility program provides even more examples of symbolic debugging with <i>SDT</i> .

*Files distributed with SDT. To install, copy some or all of the files onto your system. Minimally, you should copy SYM.SAV and either RTSDT.OBJ or SASDT.OBJ to SY:.*



## EXAMPLE 1.

```
.QSDTEST
.![SDTEST.COM] - Build a new SDTEST.SAV demonstration program
.1 from source.
.Fortran/List:SDTEST.LST/Show:All/Code:EIS/NoLine SDTEST.FOR
SDTEST
.Link/Map:SDTEST.MAP/Debug:SDT/Transfer SDTEST.OBJ
Transfer symbol? SDT
.
.R SYM
SYM V3.0F (2657) Copyright (C) 1984, 1985, 1986 by DSSI
For help, type HELP

Sym: QSDTEST
Sym: ;[SDTEST.COM]
Sym: ; Build a new symbol table file (SDTEST.SDT) for SDTEST.SAV.
Sym: ; (This command file runs in only 9 seconds on an LSI-11/23
Sym: ; equipped with a hard disk.)
Sym: ;
Sym: ;First, load all GLOBAL symbols from DK:SDTEST.MAP.
Sym: Link ;Process a .MAP file
Link .MAP file: SDTEST.MAP/I:A ;Include ALL symbols

109 Symbols; Room for 403 more symbols

Sym: ;Second, load LOCAL symbols from all modules in DK:SDTEST.LST
Sym: Fortran ;Process a Fortran-IV .LST file
Fortran-IV .LST file: SDTEST.LST/S/G ;Include ALL available symbols

Module: SDTEST

123 Symbols; Room for 389 more symbols

Sym: ;Finally, save the SDTEST symbol table in DK:SDTEST.SDT. This
Sym: ; 8-Block file is the only file SDT will need to reference.
Sym: Save
Write file (default=DK:SYMBOL.SDT): SDTEST.SDT
Written: DK:SDTEST.SDT
Sym: ;
Sym: ;Display the LOCAL symbols in module SDTEST and Exit to KMON.
Sym: Edit
For help, type HELP

Sym Edit: TM ;Display LOCAL symbols
Module: SDTEST ; for module SDTEST

Module: SDTEST 109 thru 122
.L4 43434 .33 43444 .L6 43530 .L8 43540 .44 43542
.L$MN 43600 .L10 43630 .55 43632 .L14 43642 LINE 45122
C 45242 CHR 45246 LEN 45250 I 45252

Sym Edit: Exit ;Exit the symbol table editor

123 Symbols; Room for 389 more symbols

Sym: Exit ;Exit to KMON
```

*Detailed example of building a .SAV file, and its associated symbol table.*

## PROGRAM 1.

```
0001 PROGRAM SDTEST ! SDTEST.FOR is a sample
0002 LOGICAL * 1 CHR,C,LINE(80) ! program to demonstrate
0003 DATA C /'C'/ ! SDT's symbolic nature.

C Demonstration program to read the SDTEST.FOR source file & display
C all the of its comment lines (those starting with a "C").

0004 OPEN(UNIT=1,NAME='DK:SDTEST.FOR',ACCESS='SEQUENTIAL',TYPE='OLD')
0005 33 READ(1,71,END=55) CHR,LEN,LINE ! Read a line of text
0006 IF(CHR.EQ.C) GO TO 44 ! Does it start with "C"?
0008 GO TO 33 ! No - Ignore it
0009 44 TYPE 72, CHR,(LINE(I),I=1,LEN) ! Yes - Display it and
0010 GO TO 33 ! get another line
0011 55 CALL EXIT ! We're done

C Formats
0012 71 FORMAT(A1,Q,80(A1)) ! Format to read a file line
0013 72 FORMAT(A1,80(A1)) ! Format to write a file line
0014 END ! End of program SDTEST
```

*Sample program.*

## EXAMPLE 2.

```
.RUN SDTEST
SDT V3.0F; Copyright (C) 1984, 1985, 1986 by DSSI.
?Cannot find DK:SYMBOL.SDT
*No new symbols loaded.

sdtest\
Loaded symbols from DK:SDTEST.SDT
sdtest0 !Open module SDTEST for access to its
! LOCAL symbols.

sdtest/ JSR R4,$$OTI $$c !Show its first executable instruction,
! a call to initialize the Fortran
SDTEST+4/$DATAP $$St ~I ! Runtime System and define the name of
$DATAP/ SDT ! the main program module (defined as
$DATAP+2/EST $$s ! Radix-50 in $DATAP).

.L4/ MOV #$DATAP+64,R5 !Show the instructions beginning at
.L4+4/ CALL $OSTM ! line 4. This is the OPEN statement.

.L6/ CMPB CHR,C !Display the instructions in lines
.L6+6/ BEQ .44 ! 6 and 8.
.L8/ BR .33 !

.44/ MOV #$DATAP+54,-(SP) !Display the first instruction of the
! statement labeled "44".

200.$1023.ur !Set relative offset limits.
len,.44$b !Set a breakpoint at statement label "44" and
! display the contents of LEN each time the
! breakpoint is encountered.

.55$b !Set a breakpoint at statement label "55".
$$c !Set the current typeout mode to Octal Numeric.
.start$g !Start the user program; a breakpoint will occur when
! a comment line is found in DK:SDTEST.FOR.

$3B>> .44/ MOV #45012,-(SP) LEN/103
!A breakpoint has occurred at label "44" before
! executing the "TYPE" statement. The line length
! in LEN is displayed as octal 103. Next we'll
! display the line length as a decimal number and
! display the text of the line itself.
$f;.67. $$ot !Display the last value shown as a decimal number
! and set the typeout mode to Continuous Ascii.

line/ Demonstration program to read the SDTEST.FOR source file & display

$$c $p !Set the typeout mode to Octal Numeric and
! proceed from this breakpoint.

Demonstration program to read the SDTEST.FOR source file & display

$3B>> .44/ MOV #45012,-(SP) LEN/72 $$b $p
!A breakpoint has occurred at label "44" again.
! Remove all breakpoints & issue a proceed command.

all the of its comment lines (those starting with a "C").
Formats
```

*A short terminal session using Program 1.*

**SDT** is a good debugging tool that creates significant programs out of those with significant bugs.

TRANSFER address can be set later with SIPP if not done initially. This allows *SDT* to take over the user's program when started.

After this, you use the supporting utility SYM, the symbol table editor. SYM asks for the names of the MAP and LIST files, and allows you to massage the tables to your own satisfaction. You can purge empty modules, print out the symbol tables (usually less than a page long), specify first and last modules considered and minimal values for accepting symbols, work from a command file, and other things that become necessary as your familiarity grows and your needs are more specific.

*SDT* is a good debugging tool that creates significant programs out of those with significant bugs. It's easy to use and powerful, and there is a lot of power and flexibility left for growth. As more sophisticated problems occur, *SDT* can handle them.

*Ed Judge is a freelance writer based in Northampton, Massachusetts.*

#### **SDT**

Digital Software Systems, Inc.  
20 Bendix Place  
Lindenhurst, NY 11757  
(516) 225-1154

Price: \$540 binary license  
\$200 annual maintenance  
\$ 99 demo.

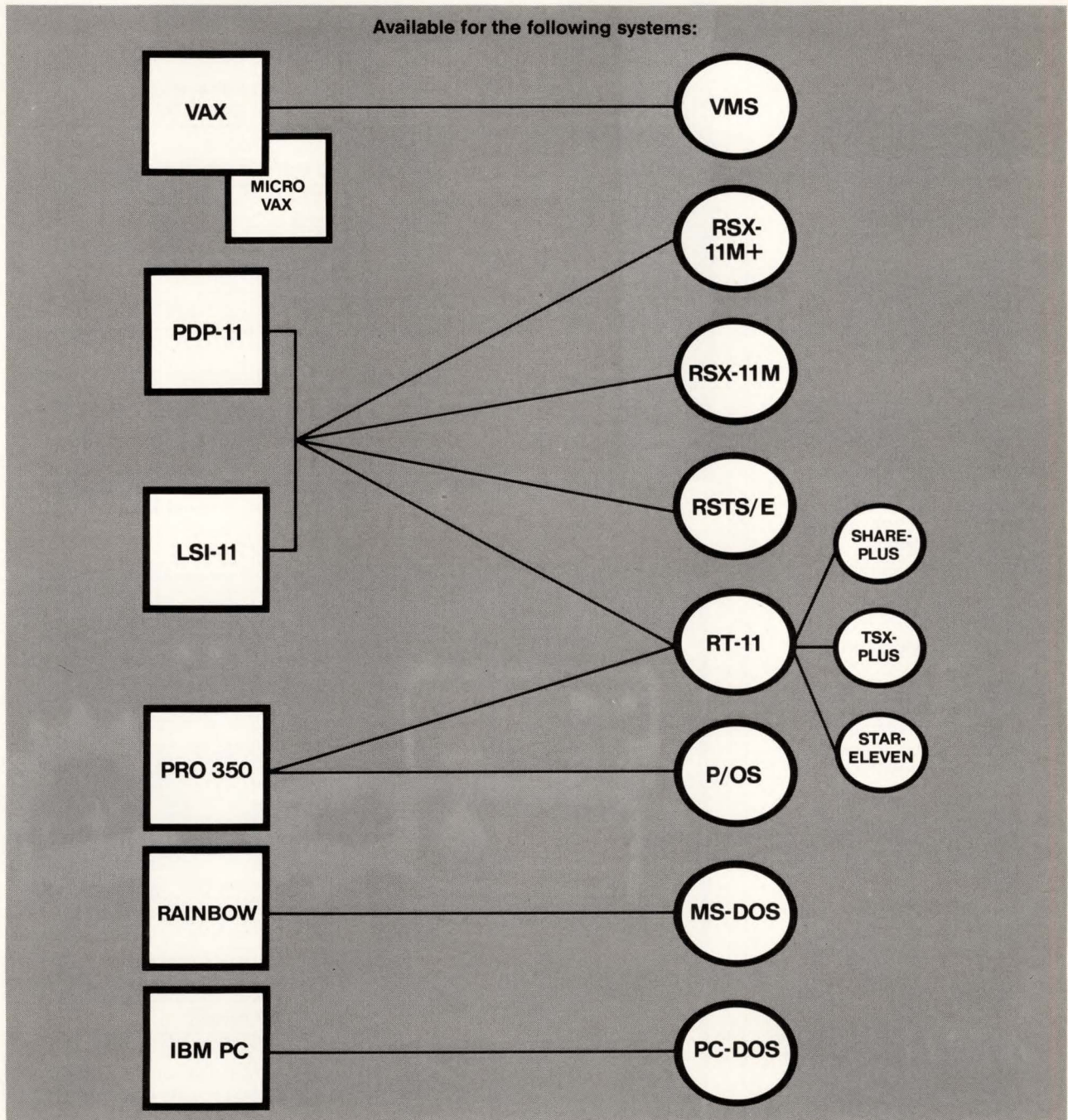
## **F** I G U R E 2 .

e/	Open address "e" and type its contents in the current typeout mode.
;	Retype the currently opened address in the current output mode.
i<Cr>	Modify the open address to be instruction or value "i".
<Lf>	Open the next byte, word, or instruction.
<Bsp>	Open the previous byte, word or instruction (same as Uparrow ">").
<Tab>	Open the byte, word, or instruction pointed to by the last value or address displayed.
\$nS	Set symbolic instruction typeout mode with optional Word-Length and TNZVC displays.
\$A	Set Absolute typeout mode. All values will be displayed as absolute numbers in the current radix.
\$C	Set integer numeric typeout in the current radix.
\$F	Change to Base-10 integer numeric (I*2) typeout mode.
n\$R	Set Relative typeout mode. Addresses and data will be typed relative to defined symbols (this resets \$A mode). The optional argument "n" specifies when to prefix local symbols with a ModuleName__ string indicating the module in which the local symbol is defined.
\$dR	Set the radix for all numeric displays to Radix-d. This radix may range from 2 to 36.
\$T	Set ASCII text output mode. This displays ASCII text a word at a time.
\$OT	Change to Continuous ASCII text typeout mode. This types characters starting at the current address and continuing until a Nul byte is found. Its used for examining long strings.
\$5T	Set Radix-50 typeout mode; display Radix-50 text a word at a time.
e\$nB a,e\$nB	Set breakpoint "n" at address "e" ("n" is optional). Same as above but open address "a" at the time of the breakpoint.

*A partial SDT command summary. Continued on page 104.*

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ENTER 272 ON READER CARD

## FIGURE 2 . . . continued

0\$nB \$\$B	Remove breakpoint "n." Remove all breakpoints.
e\$G	Start executing the user program at address "e." The default "e" is the address in location 40 Octal.
\$X \$\$X i\$X	Single-Step the next instruction. Single-Step (step over) the next subroutine. Execute instruction "i" (does not affect the PC).
\$P n\$P	Proceed from breakpoint. Proceed from breakpoint "n" times (without stopping).
name \ name	Load a new Symbol-Table from a file. Write the current Symbol-Table to a file.
s?	Display the names of all modules containing the symbol "s."
m@	Open module "m" for access to its local symbol table.
>C >Z	Exit <i>SDT</i> (issue. Exit programmed request) to KMON. Exit <i>SDT</i> . If <i>SDT</i> was called, return to caller. Otherwise, Exit to KMON.

Continued from page 102.

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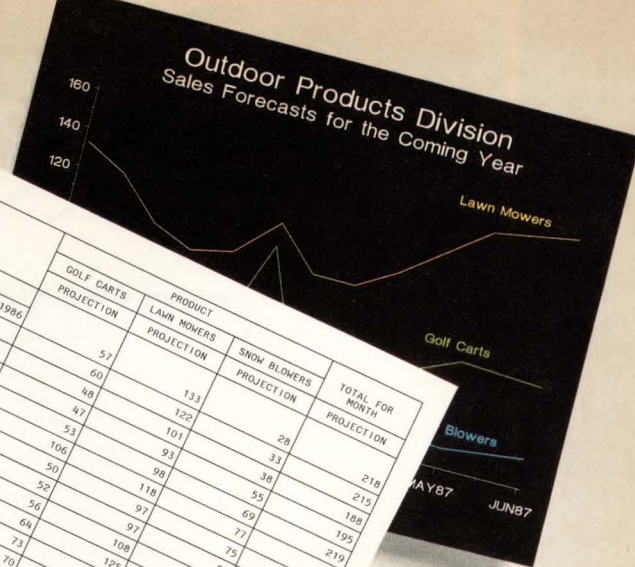
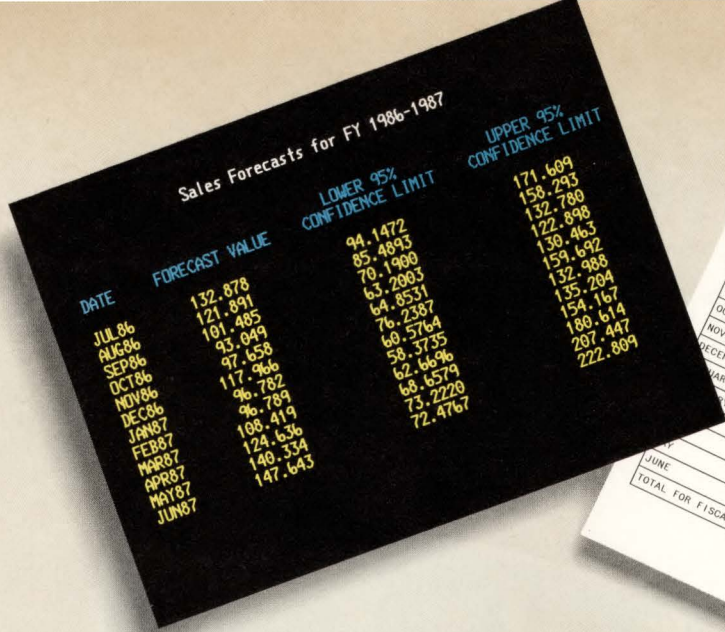
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\* Computer Intelligence, January 1986.

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**FROM  
THE LAB**

**Dave Mallery**

# We Test The New J-11 Floating Point Accelerator

I put the newly modified KDJ-11AA board into service in my lab machine, genning RSTS V9.0. Version 9 has no trouble recognizing the genus and

species of the board, dutifully reporting the existence of the FPA chip.

For comparison purposes, I wrote a nonsense program that was somewhat long on floating point:

```

5      input x..$
10     x., y., z. = 100.
20     for i% = 1% to 10000%
30         i% = i% + 1%
40         y. = x. / x.
50         z. = y. / x. + 1.
60     next i%
70     input x..%
32767 end
    
```

The two input statements were to allow me to do a Control-t and get the CPU time for the core of the program, removing all startup overhead.

Herewith, the results:

15MHZ KDJ-11 with FPA:	7.7 cpu sec (BASIC +) 4.5 cpu sec (compiled via BACMAC)
15MHZ KDJ-11 without FPA:	19.8 cpu sec (BASIC +) 5.6 cpu sec (compiled via BACMAC)
11/70(B) with FPP11-B:	6.2 cpu sec (BASIC +)
11/750 with FP750:	0.47 cpu sec (VAX BASIC)

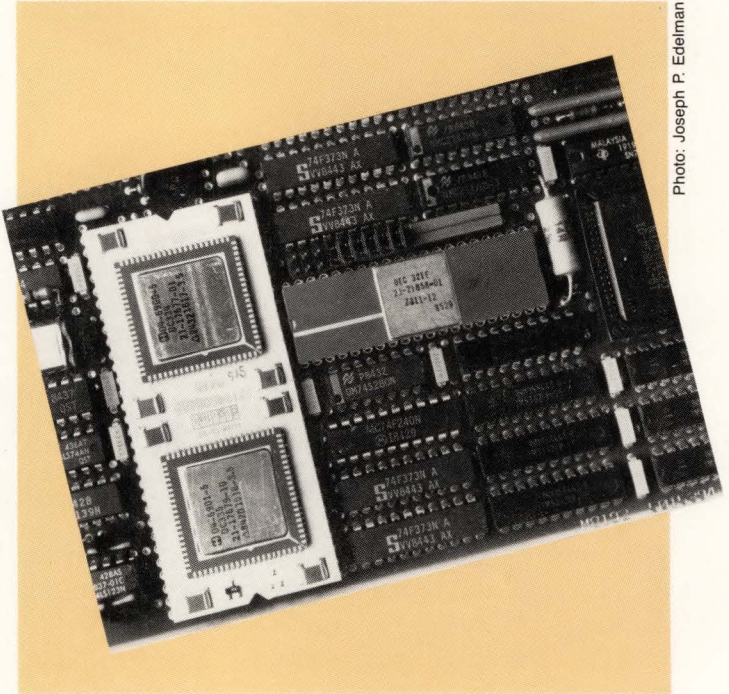


Photo: Joseph P. Edelman

*The floating point accelerator chip occupies the normally empty 40-pin socket perpendicular to the J-11. KDJ11-AA boards must be factory upgraded to AB before the chip will work.*

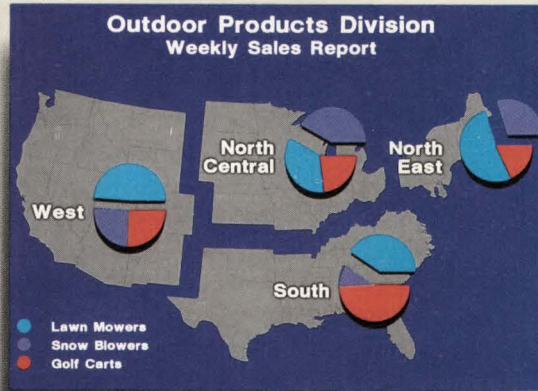
My bottom line: The new FPA chip is a screamer. It makes a large difference for a very small price. Obviously, the above example is somewhat weighted in favor of the FPP. The thing to remember is that almost every commercial application is laced with floating point, and all those little savings add up.

There is a two-step involved in getting your board upgraded. First, you have Warranty Repair in Woburn do a \$50 upgrade from AA to AB. Then, you buy the FPJ-11 chip wherever you can get it, and plug it in.

Note: At publication time, I was unable to get the order number or even confirmation of the above verbal information from DEC P/R. Harass your salesperson. ■

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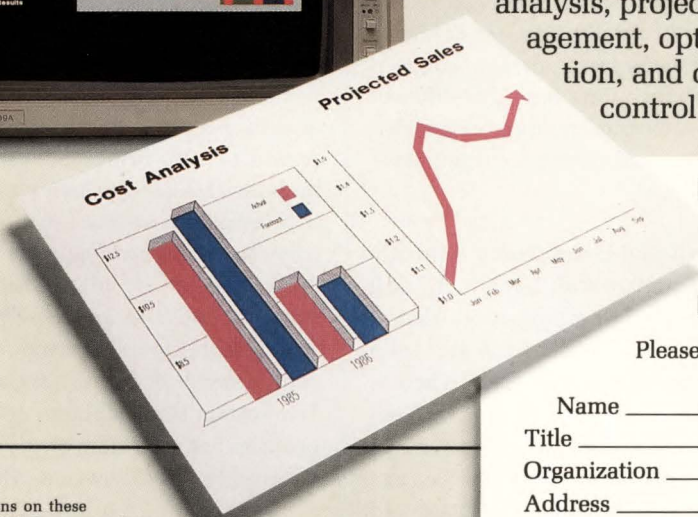
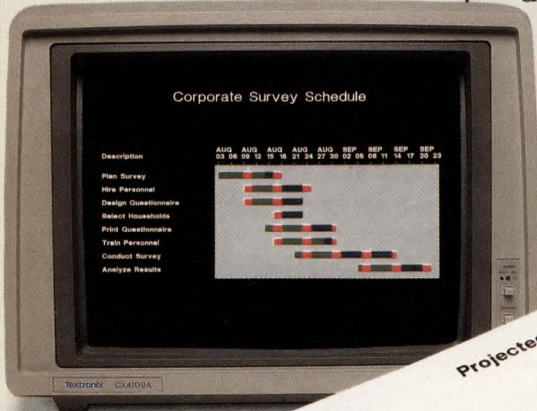
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## RESOURCE EXECUTIVE

Ralph Stamerjohn

# DECUS: Go Where The Action Is

Buried in the back of each Software Dispatch is an invitation to join the Digital Equipment Computer Users Society. Don't overlook an offer to plug into a world-wide network of people with solutions to your problems.

DECUS is split into three independent chapters: United States, Europe, and GIA. The latter includes Australia, Canada, Japan, South America and other parts of the world. Each chapter has its own policies, programs, and administration. This article looks at the U.S. Chapter and how its activities fit into the everyday world of RSX and other Digital Equipment Corporation systems.

DECUS is unexcelled at generating information. In the course of a year, there is almost no relevant topic that won't be covered by either a DECUS symposium session, monthly newsletter article, or public domain software submission. The statistics are staggering: A single national symposium will have 16 parallel sessions running day and night, with over 900 hours of formal sessions scheduled in a five-day period; the monthly newsletter resembles a medium size telephone book; and the latest RSX compilation of public-domain software exceeds 40,000 disk blocks. This collection joins the 20 previous sets collected since 1976. The total collection is now too large for even the largest disk drive.

The main problem you will have with "the exchange of information" is wading through the enormous volume

to find the specific information you seek. DECUS is far better at organizing sessions or collecting software than it is at getting sessions written down on paper or cataloging software submissions. DECUS has the answers; you simply have to learn the tricks on how to find them.

DECUS is organized exactly the way you would expect a society of

DECmates, and Professionals. There are 250 names on our mailing list and a typical monthly meeting draws 25 to 50 attendees.

When the LUG started in 1978, we rotated meeting sites. But in the last couple of years, we have settled on a permanent meeting site: Cory Auditorium at the Washington University School of Medicine is centrally located,

***Decus is unexcelled at generating information. In the course of a year, there is almost no relevant topic that won't be covered . . .***

45,000 programming professionals to be: a matrix of hundreds of groups that defies drawing a simple organization chart. Membership in any particular subgroup is usually a matter of showing up at meetings; leadership comes if you return for a third time. The different groups can be put into three categories: LUGs, SIGs, and national committees.

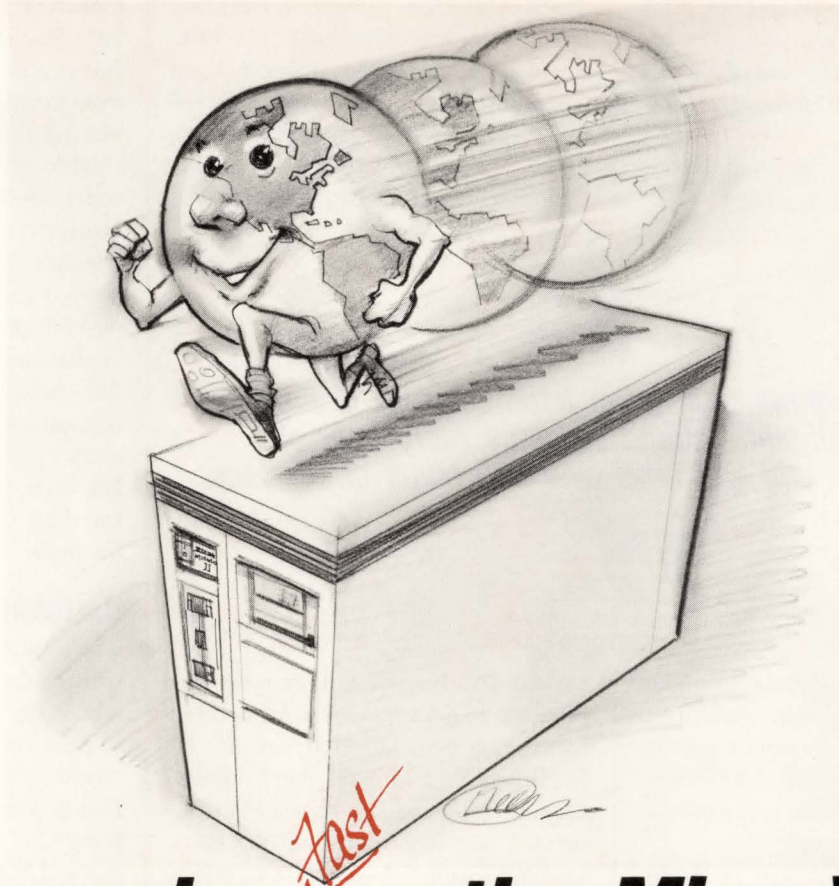
### **LUGs**

A LUG or Local Users Group is usually your first contact with DECUS. A Local Users Group is nothing more than a group of people in the same area who get together to exchange ideas. There is no fixed format for a LUG to follow; however, my Local Users Group in St. Louis is probably typical. We call ourselves SLLUG and target VAX and PDP-11 sites for membership. Another LUG in St. Louis handles Rainbows,

comfortable, and has complete audio-visual systems. We always meet on a Wednesday and start at 7:30 in the evening. Meetings begin with an open discussion time. This is a tradition we have had since our first meeting because we feel our main purpose for meeting is to answer people's questions. The open period usually brings out any serious bugs in the latest releases of VMS or RSX, questions and comments on third party hardware, and any other topic important to an attendee. The program starts around 8:15 and usually goes to 10:00, with topics covering a range of computing. Last month's speaker, Mike Truskowski from McDonnell Douglas, presented an overview of the MAP/TOP efforts. He was followed by Bob Tatum



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We haven't altered the basic workings of the packages one bit. But because both our COBOL versions run in virtual environments, you'll notice a tremendous difference in speed over the RealWorld micro version. We also added a few features of our own.

For example, in the GABA version you have complete control of every report in each package. You can send reports directly to a printer or the screen — or save reports for later printing and/or editing.

Both PDP-11 and VAX versions of the packages use extended virtual memory features to greatly outperform systems with task space or run-time imposed limitations. The PDP-11 version uses a self-reorganizing ISAM management and the VAX version used DEC's standard RMS to further aid in system performance.

For VAX systems, you don't even need run-time software. The packages run in native mode under both VMS and Micro-VMS (Version 4.0 or later).

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from the local Digital office who updated us on Digital's OSI and MAP/TOP product plans. Other topics this year include the new VAX processors, Ethernet installation, All-In-1, and DCL Command Procedures.

Other LUG activities occur outside of the monthly meetings. The LUG has

interest in 10 or more. For instance, in the last year I have worked in areas that touched topics covered by the Data Acquisition, Analysis, Research, and Control (DAARC), Hardware Management (HMS), IAS, Languages and Tools, Large Systems, Networks, Personal Computer, RSX, UNISIG, and the VAX

“

***A Decus symposium is an information explosion.  
If you diligently attend sessions every hour of  
every day you still will miss over 850 hours of sessions.***

”

accumulated a fair number of the public domain tape sets previously mentioned. The SLLUG librarian, chosen because he has a system with three 1600/6250 tape drives, will make copies to tapes that you supply and pick up.

Our LUG, like others, is pretty much self-sufficient. We have very little contact with the national DECUS organization other than renewing our license once a year. Things appear to be changing as DECUS offers more and more services targeted to LUGs. The National LUG Council, a recently formed U.S. Chapter committee, is developing programs for LUGs. There is a video tape library of past symposia sessions, a speaker's bureau, and financial aid to pay for printing and mailing our meeting announcements.

## **SIGs**

Once you become a DECUS member, you probably will start taking interest in a few SIGs or Special Interest Groups. SIGs are groups that are oriented to a particular application area or Digital product. There are 22 SIGs and it would not be unusual for someone to have an

Systems SIG. Next year, it wouldn't surprise me to get into new areas covered by the other 12 SIGs: Artificial Intelligence, Business Applications, Commercial Languages, Data Management, *Datatrieve*, Education (EDUSIG), Graphics Applications, MUMPS, Office Automation, RSTS, RT-11, and Site Management and Training.

No matter how wide your interest, most people end up with a "home SIG." This is where you interact the most with the national level of DECUS. Almost all U.S. Chapter activities are organized along the SIG boundaries. Each symposium session, newsletter article, and library submission is tied to a particular Special Interest Group.

My home SIG today actually is spread between VAX and Networks, because these are my everyday concerns. But the RSX SIG always will be my sentimental home. RSX is where I met my friends.

The most important aspect of DECUS, at both the LUG and SIG level, is the people you meet. DECUS gets you in touch with people who do the same thing you do for a living. This is "human networking" (see "The Personal Touch" by Bill Hancock, *DEC PROFESSIONAL*, February 1986).

I never realized the extent to which human networking worked until I went on a four-city business trip two years ago. I was traveling with a co-worker from the IBM side of the house. We were visiting different PBX and data switch vendors, but every evening, instead of watching television in a hotel room, I visited friends from DECUS. When the schedule shifted and we had a free afternoon, I called a friend at Stanford and we took an impromptu tour of their data switch and LAN. While touring a vendor's machine room in San Diego, I recognized an acquaintance from a former DECUS symposium, and thereby got an in-depth look at the product. My traveling companion was left shaking his head.

## **NATIONAL COMMITTEES**

The DECUS U.S. Chapter Bylaws names three permanent governing bodies. At the top of the heap is the Board of Directors. This group of six elected chapter members and one appointed Digital Equipment representative sets policy for the Society. A separate, appointed Management Council manages the various operational units. And, the Leadership Development and Elections Committee is charged with nominating qualified members for the Board of Directors election, and developing leadership for other positions.

The U.S. Chapter currently has three national committees: Symposia, Communications, and Library. Committee membership comes from SIG appointees and other interested volunteers. These are the people who produce the activities you see when you look at DECUS: meetings, newsletters, and software.

## **Symposia**

DECUS' most visible event is its twice-a-year national symposium. In five packed days, every current technical,

marketing, and management issue related to Digital Equipment is discussed in open sessions. The only trick is figuring how to be in 15 places at one time.

A DECUS symposium is an information explosion. If you diligently attend sessions every hour of every day you still will miss over 850 hours of sessions. Formal sessions are only one part of the symposium. There is the Digital exhibit hall, SIG campgrounds, Digital-sponsored suites, and pre-symposium seminars. Also, Expoconsul International holds its DEC compatible industry exhibitions — DEXPO — at the same time at some other location nearby. DEXPO provides free admission and shuttle bus service for DECUS attendees.

I now have been to 22 DECUS symposia and have mastered a few tricks of the trade. I have six rules for a successful DECUS symposium:

**1. Meet people.**

A symposium is the best place to start your people network. The best place to start is the SIG campgrounds and suites. Each Special Interest Group has a room it calls its own. You can wander in, find an empty chair, and join in a discussion of whatever the current topic is.

One of the truly amazing happenings at a DECUS symposium is the chance to meet real, live Digital software engineers. You can get your questions answered straight from the person who wrote the code. Even better, you get a chance to buttonhole the manager who owns the project to which you want to add support for your favorite widget. Developers are always introduced at certain sessions, such as the RSX Product Panel or Question and Answer session. You also will find a developer on duty in the RSX section of the exhibit hall. This person can tell you when and where to find the expert you seek.

**2. Sit up front.**

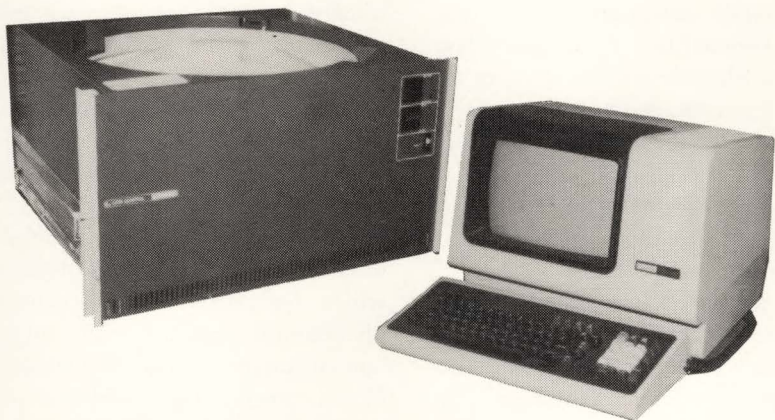
DECUS sessions are given by people like you. They are not professional speakers and do not have slick, fancy graphics.

You will get the most from a session by sitting up front where you can hear the speaker and easily see the screen. Also, you will end up with one of the 50 copies of notes the speaker brought for a session with 400 attendees.

**3. Keep an eye on the BOF schedule.**

A session scheduled right at the symposium is called a Birds-of-a-Feather or BOF session. Wandering in to a BOF session can turn out to be the highlight of your week. BOFs are the DECUS

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equivalent of a musician's jam sessions. The topics are timely and the loose format allows contributions from everyone.

#### 4. Use audio tapes for training.

One of the more recent innovations at DECUS symposia is a set of audio tapes of approximately 90 percent of the sessions. The tapes are recorded and repro-

mailed automatically to all members. 2. *Proceedings*, a collection of papers from each U.S. Chapter national symposium. Proceedings are also available for the Australian, Canadian, and European symposia. Proceeding papers are people's best work and tend to concentrate on user applications.



***By the time you've been to your third symposium in a row, you'll find yourself plugged in, and effective at collecting information and getting answers to your site's problems.***



duced by firms that specialize in this business, and are excellent quality.

Using the audio tapes is a great way to turn yourself into 10 people. When there is a schedule conflict, you can attend one session, and buy the tapes of the others. I use the tapes to train myself in new areas. (This week I am studying the intricacies of VMS paging and swapping while I drive to work.)

#### 5. Eat on the fly.

The session schedule has the annoying property of scheduling sessions through lunch and even dinner on Mondays and Thursdays. But you can avoid the crowds if you know when to go to the lunch tent (12:30 on Monday and Wednesday and 11:30 on Tuesday and Thursday).

#### 6. Attend regularly.

The last rule is that you keep coming back. By the time you've been to your third symposium in a row, you'll find yourself plugged in, and effective at collecting information and getting answers to your site's problems.

### Communications

The Communications Committee is responsible for the written word within DECUS. DECUS publishes four types of literature:

1. *DECUSCOPE*, the quarterly U.S. Chapter newsletter. This publication is

3. *Session Notes*, a collection of each SIG's session notes. These notes are usually a copy of the speaker's graphics and eliminate the need for extensive notetaking. Session notes are available to non-attendees through DECUSCOPE. The session notes are especially worthwhile for getting the most from audio tapes.

4. *SIG Newsletters*, which are published monthly, and resemble medium-size white telephone books. Each volume is divided into separate sections for each Special Interest Group. While the SIGs Newsletters is a single publication, it is actually the work of 22 SIG newsletter editors, and something you carefully file away after reading from cover-to-cover.


The RSX SIG is the granddaddy of SIG newsletters. More copies of its newsletter, the *Multi-Tasker*, have been distributed than all other newsletters combined. At its peak in 1981, DECUS printed and mailed 11,000 copies of the *Multi-Tasker* each month!

### Library

The last main activity area within DECUS is its library of public domain software. The current library has over 1200 programs and packages. While the

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programs are supplied in "as is" form, almost all submissions include sources and documentation.

The DECUS library is only a small part of the total software collected and distributed by DECUS. The DECUS library, with its formal submission system and indexed catalog, is the place to find polished public domain software. Software gems "in the rough" are found on the SIG tape collections made at each symposium and distributed through an informal LUG network setup by the National LUG Council.

Tape-swapping always has been a part of the national symposia, but on an informal, one-on-one basis. Phil Cannon revolutionized the process in 1977 when he called all the RSX LUGs around the nation and got them to bring a copy of their local libraries to the San Diego symposium. Phil and a few other hardy souls stayed up three nights in a row. They produced a master tape and then made copies as fast as possible.

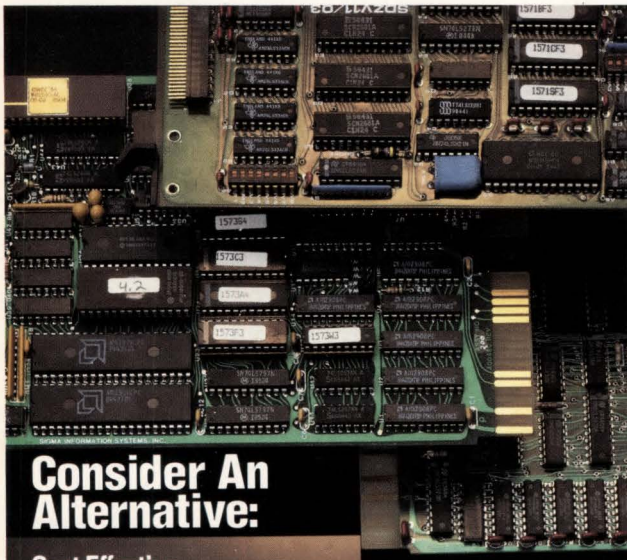
### How To Join

The best time to join DECUS is now. Membership is free and open to everyone. The easiest way to join is to circle number 283 on the Reader Response card and *DEC PROFESSIONAL* will send your membership query on to DECUS for you. You also can contact DECUS directly at DECUS, 219 Boston Post Road, Marlboro, MA 01752; (617) 480-3283, to get a membership application.

There is still time to register for the next national DECUS Symposium. The Fall 1986 Symposium will be held in San Francisco from October 6 through 10. If prior commitments keep you away, plan for Nashville in the Spring.

The process is only slightly more refined today. There is a booth in the exhibit hall for people to drop off submissions and sign a form stating that the software legally can be placed in the public domain. The tapes are collected by the RSX SIG, and a master tape is staged at the symposium. The person in charge of the process takes the tape home for more work and sends a final master tape to the DECUS office, where copies for each of the seven regional tape copy sites are made. Your local LUG simply sends some blank tapes to its regional copy site. When the copy is returned, it is duplicated for local distribution. In four to six months, the RSX SIG distributes over 50,000 blocks of software to hundreds of sites. This process is duplicated for other SIGs such as RT-11, RSTS, and VAX.

*Ralph Stamerjohn is principal engineer at Meridian Technology Corporation, St. Louis, Missouri.*



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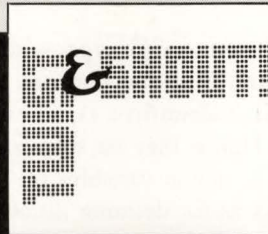


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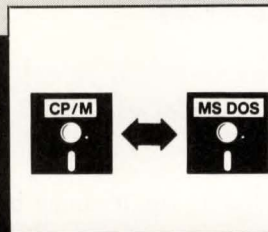


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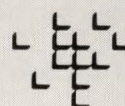
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# Enumerations And The Comma Operator

Enumerated Data Types are a relatively new addition to C and they are not yet universally available in compilers. An enumeration is a set of related values, each of which is referred to as an enumeration constant. For example:

```
enum flower {rose, violet, lilac, petunia};
```

declares **flower** to be an enumerated type with four members, named **rose**, **violet**, **lilac** and **petunia**. These member names are C language identifiers, as are variable, function and macro names. Hence, they are subject to the same naming restrictions. To define variables of "type" **flower**, use the same syntax as for defining instances of structures and unions. For example:

```
enum flower my_flower, your_flower, a_flower;
```

Just as structures and unions may be defined without tags, so can enumerations as follows:

```
enum {ford, dodge, plymouth, chevrolet} make1, make2;
```

Since the enumeration has no tag, it cannot be used to define other variables later in the program. By giving an enumeration a tag, the set of members can be placed in a header and **#included** as necessary throughout a program.

The **enum** types can have classes just like any other

*Editor's note:* This is the last installment in Mr. Jaeschke's 26-part tutorial on the C language. All 26 parts are now available as a bound two-volume set from Professional Press. Beginning with the next issue, he'll address topics suggested by readers and other miscellany.

In this issue, he explains enumerated data types and the somewhat obscure comma operator.

type. For example, enumerations may be **static**, **register** or automatic within a function, or **static** or global outside a function.

## Internal Representation

Each member of an enumeration is a named integer constant. That is, an identifier declared as an enumeration constant has type **int** and can be used in any context where an **int** is permitted. The constant value of an enumerator depends on the presence or absence of '=' characters in the definition list. In the **flower** enumeration:

```
enum flower {rose, violet, lilac, petunia};
```

no specific constant values are given, so the members begin at zero and increase by one from left to right. Therefore, **rose** has the value 0, **violet** is 1, **lilac** is 2 and **petunia** is 3. Constant values may be specified using '=' such that **flower** could be defined using:

```
enum flower {rose = 0, violet = 1, lilac = 2, petunia = 3};
```

Since the latter example states the default case, it serves no useful purpose. The only reason for assigning specific values is to produce a set where the numbers either overlap or otherwise are not consecutive. For example:

```
enum color {red, green = 2, blue, black = -2};
```

assigns the values 0, 2, 3, and -2 to the four identifiers **red**, **green**, **blue** and **black**. As shown, the value can be any valid integer value. Member values also may be duplicated as follows:

```
enum color {red = 1, green = 2, blue = 1, black = 2};
```



Since the range of member values may be discontinuous and duplicative, equivalents of the PASCAL operators **pred** and **succ** do not exist. These operators return the predecessor and successor values, respectively, for a set. However, if both **green** and **black** have the value 2, what is the successor to **red** or **blue**? Or, in the first definition of **color**, what is the predecessor to **green** (which is 2) when **red** is zero?

Since an enumeration constant is known as soon as it has been defined, it can be used to initialize subsequent constants in the same enumeration as follows:

```
enum color {red, green = red, blue, black = blue + 6};
```

And, as shown with **black**, the initializer can be any expression that reduces to an **int** at compile-time.

An enumeration constant has a constant value once it has been implicitly or explicitly initialized. It is NOT an lvalue and, therefore, cannot be used as the destination of an assignment statement such as **rose = 23**;

## Tag and Constant Namespace

Enumeration tags share the same namespace with structures and unions and they must be unique within that namespace. Each enumeration identifier shares the same namespace as variables, functions, and **typedefed** names. The scope of an enumeration constant is the same as that of a variable defined at the same place within the program.

```
/* illegal duplication of identifiers in the same namespace */
struct color {...};
enum color {...};
/* same again */
enum flower {rose, violet, lilac, petunia};
int rose;
```

Since enumeration constants share the same namespace, they must have unique names within enumerations as well. For example, the following is ambiguous and is not allowed since the identifier **violet** occurs more than once.

```
enum flower {rose, violet, lilac, petunia};
enum hue {violet, red, indigo};
```

In the following example, an enumeration of one type is assigned the value of another enumeration type.

```
enum flower {rose, violet, lilac, petunia} f;
enum hue {orange, red, indigo} h;

f()
{
    h = rose;
}
```

This should be flagged as a warning (if not a fatal error) by a good compiler since it is meaningless code. However, since **rose = 0** and **orange = 0**, using **rose** in any such context would allow **rose** and **orange** to be used interchangeably.

## Using Enumerations

Enumeration constants are really synonyms for integer constants and they can be used as follows:

```
enum flower {rose, violet, lilac, petunia};

main()
{
    enum flower my_flower = rose;

    /* ... */
    my_flower = lilac;

    /* ... */

    if (my_flower == lilac)
        /* ... */;
    else if (my_flower == violet)
        /* ... */;
    else if (my_flower != rose)
        /* ... */;
    else
        /* ... */;
}
```

Here, **my\_flower** is an automatic variable of type **flower**, which is initialized to the value **rose**. Since **my\_flower** is a variable, it can be used as an lvalue and is subsequently assigned the value **lilac**. Finally, **my\_flower** is compared for equality with several enumeration constants.

## Default Initialization

In the above example, **my\_flower** was explicitly initialized. What happens if it contains the default value? Well, if **my\_flower** were an automatic variable, its contents would be unpredictable. However, if it were external or **static**, as in the next example, it would contain the value zero cast to its type. And since enumerations already are type **int**, the default value is zero.

```
enum flower {rose, violet, lilac, petunia};
```

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```
main()
{
    static enum flower my_flower;

    if (my_flower == rose)
        /* ... */;
    else
        /* ... */;
}
```

In this case, the **static** variable **my\_flower** is initialized to zero, which is synonymous with the constant **rose**. Note, though, that this can be a problem with enumerations that don't contain a zero-value member as follows:

```
enum color {red = 3, green, blue, black};

enum color a_color;
```

In this case, the global variable **a\_color** is initialized to zero, which is not a "valid" member value. Therefore, it is always a good idea to ensure that an enumeration begins with a predictable value if one is assumed. That is, don't rely on the default initializer value zero being a valid member of the set.

### Mixing Enumerations and Integers

Since enumeration constants are really synonyms for integers, can **enums** and **ints** be mixed in expressions and, if so, is it meaningful?

```
enum flower {rose, violet, lilac, petunia};

main()
{
    enum flower my_flower = rose;
    int i = 10;
    int j;

    j = i + rose + violet;
    printf("j = %d\n",j);

    printf("petunia = %d\n",petunia);

    my_flower = violet - petunia;
    printf("my_flower = %d\n",my_flower);

    my_flower = 12345;
    printf("my_flower = %d\n",my_flower);

    ++my_flower;
    printf("my_flower = %d\n",my_flower);

    --my_flower;
    printf("my_flower = %d\n",my_flower);

    printf("sizeof(int) = %d\n",sizeof(int));
    printf("sizeof(my_flower) = %d\n",sizeof(my_flower));
    printf("sizeof(rose) = %d\n",sizeof(rose));
}

j = 11
petunia = 3
my_flower = -2
my_flower = 12345
my_flower = 12346
my_flower = 12345
sizeof(int) = 2
sizeof(my_flower) = 2
sizeof(rose) = 2
```

Yes, integers and enumerations can be mixed, but it isn't particularly useful since the meaning of (**i** + **rose**) is not intuitive. Since enumeration constants are integers, it's no surprise that they can be displayed using the **printf** **%d** mask. These constants CANNOT be displayed as "**rose**", "**lilac**", etc., because these are strings, whereas the constants are integers. Since their mnemonic is lost in such cases, there is no point displaying them since this requires their internal representation value to be known. And this is contrary to the general use of enumerations where the programmer simply wants a unique set of values with names, but is not interested in their actual values.

Some compilers may not allow the +, -, ++, --, or other operators to be used with enumerations. Others may warn of their use. Similarly, equality and inequality are the only comparisons that make sense. Something like (**rose** < **lilac**) is likely to be of little use, even if it is supported.

Assigning integer expressions to an enumerated variable also is permitted, but is not meaningful and, as we have shown, can result in a value that is not one of the valid set.

The **sizeof** expressions demonstrate that, for the compiler used, an enumerated type, its members, and **int**, all have the same size — two bytes. (Some implementations may use type **char** instead of **int**.)

```
enum flower {rose, violet, lilac, petunia};
char *flower_name[] = {"rose","violet","lilac","petunia"};

main()
{
    enum flower my_flower = rose;

    printf("flower is %s\n",flower_name[(int) my_flower]);

    switch (my_flower) {
        case lilac:
            /* ... */;
            break;
        case violet:
            /* ... */;
            break;
        case rose:
            /* ... */;
            break;
        case petunia:
            /* ... */;
            break;
        default:
            /* ... */;
            break;
    }
}

flower is rose
```

Some compilers may not consider **my\_flower** to be strictly of type **int**; hence, the explicit **int** cast in the array subscript expression. The program works as expected; however, it is possible for several enumeration constants

to have the same value, in which case, a **switch** cannot be used. A **switch** requires that all of its **case** labels be unique; therefore, we could not have:

```
enum {abc = 10, xyz = 10} zzz = abc;

f()
{
    switch (zzz) {
        case abc:
            /* ... */
            break;
        case xyz:
            /* ... */
            break;
    }
}
```

## Enumerations and Functions

If an enumeration variable or constant is used as a function argument, it is passed as an **int**. For example:

```
enum flower {rose, violet, lilac, petunia};

main()
{
    enum flower my_flower = rose;

    f(my_flower, rose);
}

f(f1, f2)
enum flower f1, f2;
{
    printf("f1 = %d, f2 = %d\n",f1, f2);
}

f1 = 0, f2 = 0
```

Here, both arguments are treated as the same type, **int**. Functions also could return values of type "enumerated type." A variable also could be explicitly cast to an enumerated type, although this isn't particularly useful.

## Enumerations versus #defines

It would seem that an enumerated set could be defined using macros as follows:

```
enum flower {rose, violet, lilac, petunia};

#define ROSE 0
#define VIOLET 1
#define LILAC 2
#define PETUNIA 3
```

The main difference is that a list of macros takes more effort to define since each value must be explicitly given and there is no way to force the list to be consecutive, short of using something long-winded like:

```
#define ROSE      0
#define VIOLET   ROSE + 1
#define LILAC    VIOLET + 1
#define PETUNIA  LILAC + 1
```

## Conclusion

Enumerations are implemented in C in a weak fashion without any of the real power of their PASCAL cousins. It's hard to think of practical uses for them and with the ability to define initializing constant values, duplicates and disjoint ranges, they easily can be error prone unless your compiler religiously checks their use.

While enumeration constants can be used as integers, there is no range checking done to determine whether an enumerated variable contains a value outside its "valid" range. There also is no way to find out the number of valid values for an enumerated type since `sizeof(enum-type)` returns the size of any one of the values.

## The Comma Operator

The comma punctuation character is used for two purposes in C: as a separator in a list of declarators, initializers, function arguments, or macro arguments; or, as the comma operator. If two expressions are separated by a comma, they are evaluated left to right, and the type and value of the result are the type and value of the right operand. For example, the statement:

```
i = 5, j++;
```

causes **i** to be set to 5 and **j** is incremented by 1. The value of the whole expression is the value of **j** after incrementing. This value is ignored. Note that the result of the whole expression is a value, NOT an lvalue. The result, therefore, cannot be used as the destination of an assignment. In the next statement:

```
i = (j = 6), (int) sqrt((double) j);
```

**j** is set to 6 and **i** is set to the square root of **j**. Expressions may be more complex involving more than one comma operator as follows:

```
i = e(), f(), g(), h();
```

Here, the functions **e**, **f**, **g** and **h** are called in order, with **i** being set to the value returned from **h**.

All of these examples could have been written without the comma operator and they probably would have been clearer. The one place where this idea is useful, if only to save some statements, is with the **for** construct. Consider the case where we have a number of things to initialize before a loop is entered.

```
for (i = 1, j = 2, k = 3; k < 5; i++, j++, k++) ...
```

The syntax of the **for** loop is **for (exp1; exp2; exp3)**, but by using the comma operator, **exp1** and **exp2** have been made to contain three separate operations each, as shown. Of course, even this example can be rewritten without the comma operators as follows:

```
i = 1;

j = 2;
for (k = 3; k < 5; i++) {
    ...
    j++;
    k++;
}
```

And taking that one step further results in:

```
i = 1;
j = 2;
k = 3;
for (; k < 5;) {
    ...
    i++;
    j++;
    k++;
}
```

and the **for** loop now can be replaced with **while** ( $k > 5$ ).

The comma operator guarantees left to right evaluation so that any side effects caused by the left-most expression actually must have taken place before the next right-most expression is evaluated. This should not be confused with the commas that separate arguments in a function call. In this case, these commas DO NOT force the arguments to be evaluated left to right. They are NOT comma operators.

While it is not a particularly good idea, a comma operator may be used in an argument list by placing parentheses around the expressions as follows:

```
f(abc, (i = 2, 234), xyz);
```

Here, function **f** is given three arguments, the second of which is the **int** 234.

Except for its use in the **for** construct, the comma operator is not particularly useful and certainly is not conducive to producing "self-documenting" code. A particularly nasty bug that can arise is with an array reference **x[i,j]** where **x** is a two-dimensional array. While **x[i][j]** may have been intended, the array subscript expression that results is **x[j]**, since the comma is a comma operator.

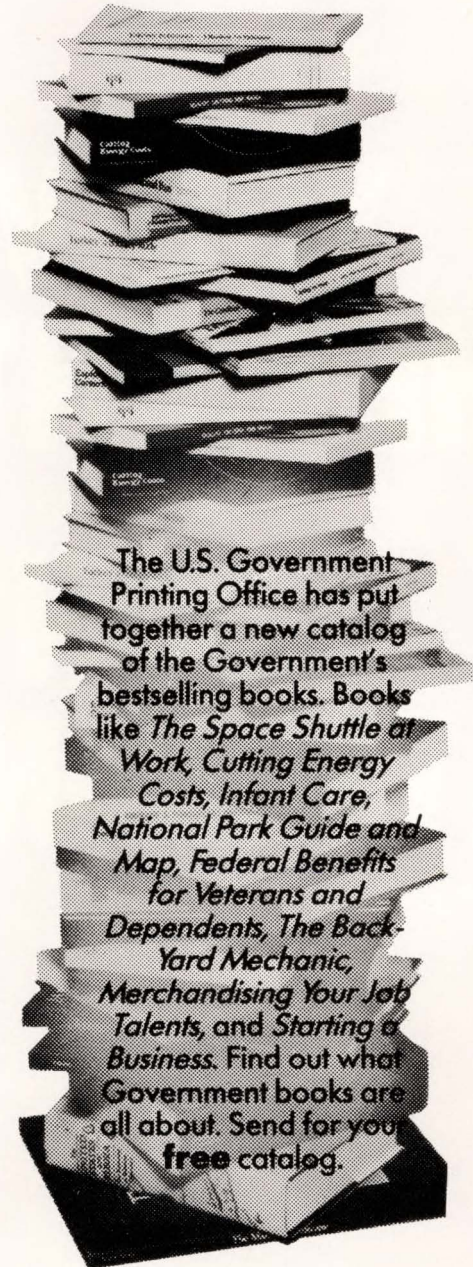
Starting with the next issue, I'll address various topics suggested by readers, including the VAX C compiler. I'd also like to hear from anyone using the DECUS C compiler on any machine, any of Whitesmiths' compilers or cross-compilers, or ULTRIX or BSD UNIX 4.x. If you sell or use products for C development on any DEC machine, drop me a line.

Readers are encouraged to submit any C-related comments and suggestions to Rex Jaeschke, 2051 Swans Neck Way, Reston, VA, 22091.

*Rex Jaeschke is editor of "The C Journal" and the author of numerous articles on the C language. He is a member of the ANSI X3J-11 standards committee for C.*

To order "Let's C Now," by Rex Jaeschke, in updated form, see page 104.

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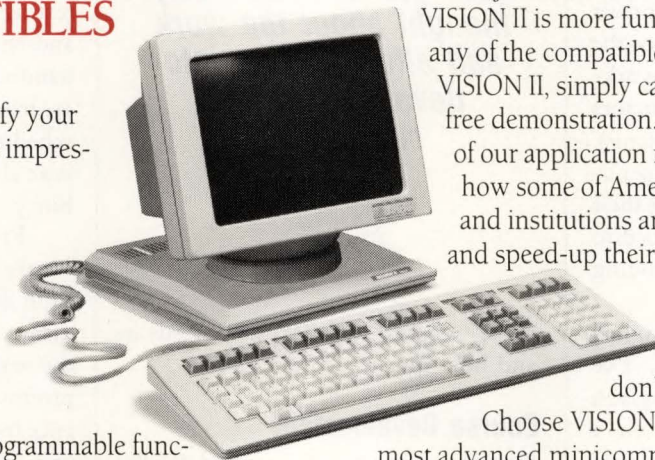
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## NETWORKING EDITOR

Bill Hancock

# Paying for Experience?

How many times have you received educational junk mail at your office? For me, it's a pretty regular occurrence. In fact, I believe that educational courseware promotional brochures account for over half the use of paper in the world today! In those brochures, more and more companies are pushing network and network-related courses as part of their offerings (I know this because I see the same companies sending me networking brochures with the same instructors as the courses on introductory systems). Even the big boys like Digital are spending more money and time getting their network course curricula developed to help meet the needs of the "exploding network marketplace."

I'm all for professionally designed and delivered courses. In fact, I've developed quite a few, and I've given literally hundreds of seminars on a variety of subjects (particularly networks). I have noticed, however, that there are some critical areas that many people never address when considering network education. As good consumers, we all try to get the best value for our money. In these days of tight travel and educational budgets, it's even more

critical that the training we receive proves useful to us when we return to the job. Therefore, in this article we shall explore network training: how it "hap-

“  
***Have you ever seriously  
thought about the work  
and effort that go into  
development of a  
course . . . ?***  
”

pens," what to look for, who needs it, and how much it costs.

### Course Development

One of the first things to consider is the problem of course development. Have you ever seriously thought about the work and effort that goes into development of a course or, more important, what prompted the course to be developed? Well, it usually starts with market research. An enterprising individual identifies the need for network educa-

tion, identifies a target marketplace, figures out how much money can be made, and presents his case to company management. If the marketing metrics are good, the company typically will identify course development resources, developers and instructors, and set up a development schedule and course pilot delivery schedule to test the new course on potential consumers. When the course has been developed and pilot testing completed, final modifications and enhancements are made. The final handouts and labs are produced, copies are made of all materials, and courses are scheduled for delivery. Obviously, this is an abbreviated list of what takes place, but you get the picture.

Probably the toughest part of the course development cycle is finding the right developer. While there are a great many competent network professionals, the real problem is how to impart that professional's knowledge and experience to a new consumer in a reasonable and expedient fashion. Developing a course is not like instructing one. The developer has to have a unique set of qualifications if a course is to be successful: He has to be very knowledgeable (or develop the knowledge, but that

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takes more time) in the subject presented, know how to write for the consumer, understand the problems and concepts of educating students and instructors, plan lesson time according to content and what reasonably can be learned in the planned time frame, and,

most important, be able to impart knowledge and experience to the student so that he can use the knowledge gained when he returns to the job.

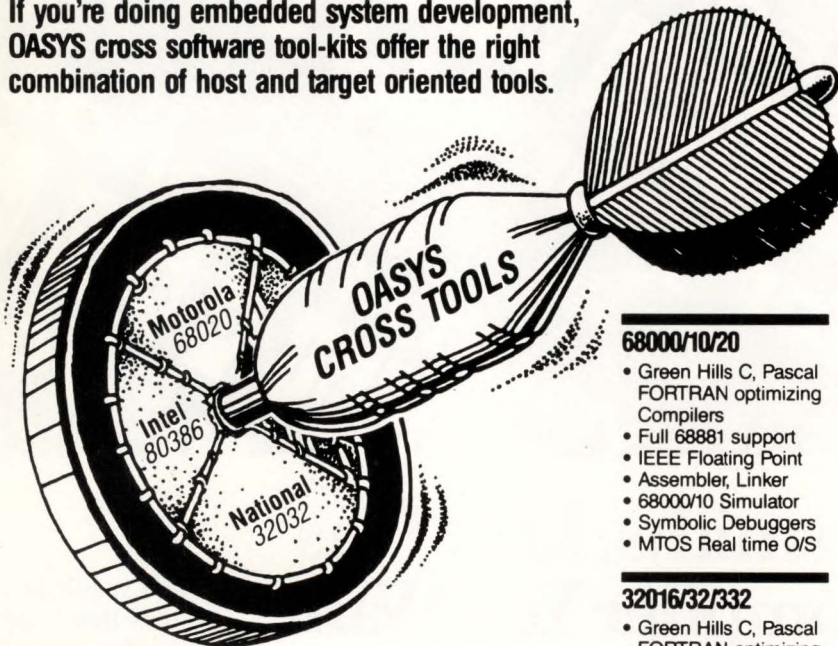
Now for reality. In many large companies, the previously described method of course development is the

standard. Many times, however, companies interested in the "quick kill," or the ones that jump on the network bandwagon, do not follow good, standardized course development procedures. The results can be catastrophic for everyone involved. I've attended courses where the instructors either didn't know how to teach, or didn't have a thorough understanding of what they were teaching. I once attended a seminar on net-

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“

*While college has a lot to offer, most curricula leave a lot to be desired in the area of network education.*

”

work queuing theory that confused me so much, it took me four months to get it straight; then, I found out what I had "learned" was WRONG!! In the meantime, I had wasted a good deal of time trying to explain what I had learned to my coworkers, some of whom did not understand what I was relaying to them (thank goodness — that was my first sign that something was amiss). Others knew enough about the subject to tell me that something wasn't right. It proved to be very embarrassing for me, for my coworkers and, ultimately, for the company that ran the course. In addition, it cost valuable productivity time, and rendered the software useless due to the need to redesign and recode sections.

### Instructors

Now that we have seen how courses are developed, let's consider instructor qualifications.

I'm a firm believer in experience as the best teacher. While college has a lot to offer, most curricula leave a lot to be

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desired in the area of network education. Many colleges emphasize the theoretical aspects of networking instead of the practical. Therefore, most of the competent networking instructors and consultants I've met have developed their knowledge through trial and error and have learned from both their successes and mistakes, and those of others.

Through experience, many things come to light that are not in the documentation: the problems of politics, dissimilar network software versions on different machines, and other problems that can be very subtle and very confusing. Anyone can read a manual, a good networking instructor has had to implement what the manual says and what it doesn't say, and perhaps has had to violate the rules to get the network to work. There is no substitute for experience and the best networking instructors have a lot of it, know how to teach it to their students, and understand how to apply it in the real world.

### Course Content

Every networking course has a topic list that usually is included in its marketing literature. Things to look for include:

1. A clear, thorough outline of course topics to be covered.
2. A brief description of the course (a management-oriented overview).
3. A section that describes what will be learned at the course.
4. Prerequisites for the prospective attendees.
5. Who will be teaching the course.
6. How long the course will last.
7. How much the course costs.

Beware of courses that don't include an outline or don't seem to give a clear idea of what is to be taught. Also, some courses may have more than one instructor listed, but in the fine print is a statement explaining that not all instructors will be present at each course offering or location. Sometimes, no instructor is listed at all. This is not

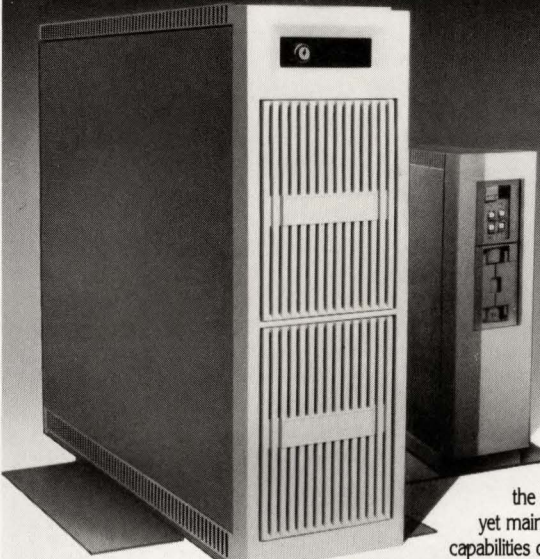
necessarily bad, but you should check to see who will be teaching the course before attending.

### Costs

Network courses tend to be more expensive than comparable courses in

operating systems or other subjects. The development of networking courses requires a network (or multiple networks). This means that the cost is much greater, in terms of components necessary, than for developing courseware that can be used on a single machine. When look-

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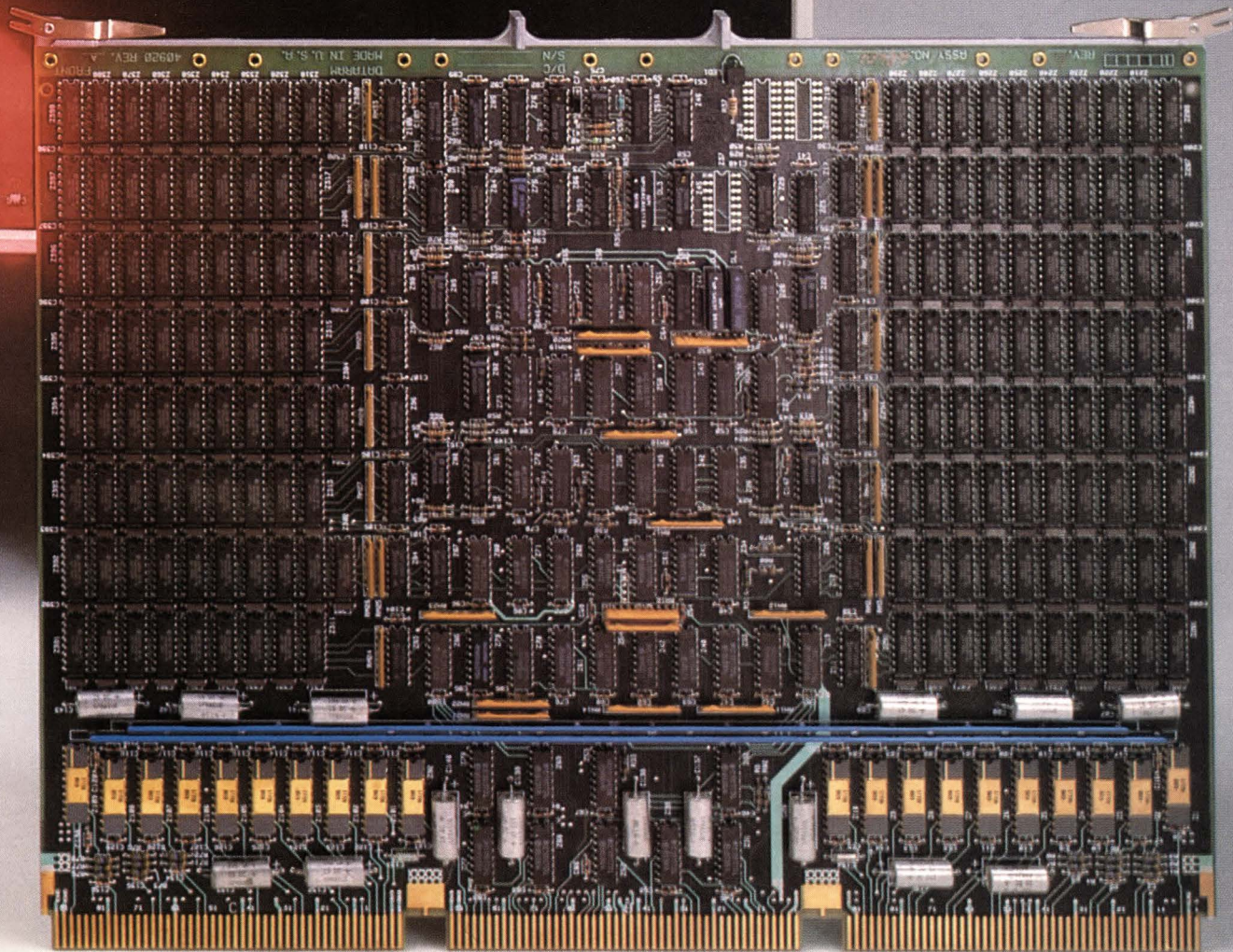
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## Recommended Courseware

As a general guideline, the following jobs require network education as described. "Network manager" assumes that the individual already knows quite a bit about networks; "network programmer" assumes that the individual is already a competent programmer.

1. Department Manager
  - a. Introductory course in networking.
  - b. Introductory courses on networking products for which you have responsibility.
  - c. Course on understanding network management.
  - d. If you control PBX operations, look for the following seminar types: PBX introductory courses, PBX planning and sizing, and cable management and planning.
  - e. Networking trends and technology courses.
2. Network Manager
  - a. Network product use courses on networking products for which you have responsibility.
  - b. Management courses and programming courses on those networking products.
  - c. Cable management and planning.
  - d. Network troubleshooting and debugging.
  - e. Network design and planning.
  - f. Network architecture courses.
  - g. If you control PBX operations, look for the following seminar types: PBX introductory courses, PBX planning and sizing, cable management and planning, and specific courses on PBXs in use and under your control — programming, managing, implementing and expanding.
  - h. Networking trends and technology courses.
3. Network Programmers
  - a. Product use courses and programming courses on networking products for which you have responsibility.
  - b. Designing applications for networked environments.
  - c. Network management conceptual courses.
  - d. Network architecture courses.
4. Network Users
  - a. Introductory course on networking and on networking products for which you have responsibility.
  - b. Network product use courses on those products.
  - c. Courses on how to use applications that have been developed or are in use in your environment.

ing into network course offerings, ask questions about the lab conditions and what kind of network resources will be available *at the location*. Brochures can be somewhat misleading. Not all networking courses require lab time, but for those that do, be sure you understand what facilities will be available. Companies that offer full spectrum course offerings usually are a good bet because they need solid lab facilities to support their offerings. I've also attended networking seminars where the machines were brought to the hotel where the seminar was being held, so it is quite possible that the offered facilities will be available. Always check first.

Costs usually vary according to how many days the course will run, where it is being held, what facilities are necessary to support it, how popular it is, and how much overhead is incurred by the company providing it. A popular course given by a popular instructor sometimes can be cheaper because more students will attend each offering, increasing the profitability of the course and lowering the overall cost. Introductory networking courses usually last two to three days and can cost anywhere from \$200 to over \$700. Longer courses (three to five days) can cost up to \$1000. The more technical the course, the more it will cost. For instance, a five-day intensive introduction course may cost \$1000, but a five-day internals course easily can cost \$1500 or much more, up to \$5000 per person per week. Technical courses typically do not draw as many students as the low-end courses. Therefore, it costs more to recoup development and overhead costs.

Some companies acquiring networks provide in-house education to their employees by contracting with outside educational vendors. Many times educational courseware vendors provide such courses at a substantial discount to a company because the overhead is reduced and a guaranteed stu-

dent load is realized. Also, travel costs for 10 students can be substantially reduced by bringing a course in house.

### Selecting A Course

How do you know which course you need?

The easy answer is that it depends on your level of expertise. How you define your expertise will have a lot to

“

**When selecting a course, be very honest in your self-appraisal . . .**

”

do with how satisfied you will be with the seminar choice you make. I've taught network product internals courses where some people who attended had never seen the product or a network. Two problems occur when you attend a course that is too advanced for your level of expertise:

1. You will not understand the presentation well enough to make efficient use of what you learn.
2. You will hold up the class, which hurts everyone involved.


Yes, it's true that most people will learn some useful things when they attend a course, no matter how advanced it is. It is also true, however, that retention of learned material degrades quickly if the material is not put into use soon after the learning process. When selecting a course, be very honest in your self-appraisal so that you properly can map the type of courses you will require for your job. Never attend more than one course at a time. Attending courses week after week does nothing but slow down the education process and reduce your learning and potential productivity. Always try to attend a

course, wait about two months and experiment with your acquired knowledge, then attend the next. This will insure maximum productivity for your training expenditure.

In summary, select network training just as you would a system or any

add-on component: carefully, weighing the advantages and disadvantages, and deriving maximum benefit from the cost and energy invested.

*Bill Hancock is an independent systems and network consultant in Garland, Texas.*




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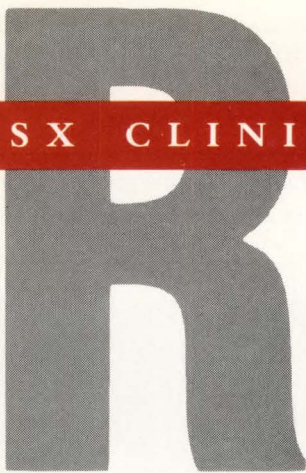
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**By Jim McGlinchey**

I respond to those questions that are both interesting and applicable to the general RSX user. Please mail your questions to: RSX Clinic, DEC PROFESSIONAL, P.O. Box 503, Spring House, PA 19477-0503. Questions also can be submitted through ARIS.

This month's column is really an amalgamation of several questions I've recently received on RSX-RSX and RSX-VMS interprocessor links. Used predominantly in Real Time Systems, these links provide a way to pass data between processors at very high data rates.

### DATA LINK OPTIONS

**Question:** We want to pass data between two PDP-11s running RSX. We need very high speed, as the messages must be received completely in under 15 milliseconds. Our messages are variable length, up to 200 bytes, containing binary data. Our local DEC office tells us that we should buy DECnet with a DEQNA Ethernet interface to do the job. That seems like overkill to us; all we want to do is pass 200-byte messages between two PDP-11s. We've heard of people using DR-11s in DMA mode to

pass data very quickly. Does RSX support this? What other options are available?

**Reply:** First, let's discuss why DECnet may not be the proper solution. DECnet's real utility is in its networking support and VAX compatibility. DECnet is not simple to set up or manage, and it has its overhead: For RSX it requires a large chunk of your primary pool, a bit of memory at the top end of the GEN partition, and a dollop of your CPU horsepower. In addition, DECnet has an unpredictable run time overhead when it is used in a route-through node. Real Time systems should be configured as end nodes in a DECnet network. Ethernet and DECnet are not the same animal. Ethernet provides the bottom two layers of the ISO seven-layer Open Systems Interconnect model upon which DECnet is based. DECnet provides those, plus the additional upper layers to make a full networking package. Ethernet can, therefore, be used with or without DECnet, depending on how much networking functionality you need. If you're just passing messages between two isolated processors, you probably won't be needing the upper layers of DECnet, and there's no sense paying the price for it, either in machine overhead or bucks.

Alternatives to DECnet abound. Let me qualify my remarks a bit first. If you are thinking about future expansion, in particular multiple machines, VAXs, network redundancy and file transfer, think in terms of using DECnet or some other full capability networking package. Let's limit our discussion from here on to the stated problem: a pair of machines that pass messages back and forth. This is a very important distinction, as the facilities that are well-suited to a dual

machine linkup sometimes are not readily expandable to a multiple machine configuration. Your choice of solutions depends on the following attributes:

1. The amount of data to be passed, both in absolute message length and the number of messages per unit time.
2. The time constraints imposed upon message delivery.
3. The distance between processors.
4. The reliability of the communications channel, which in turn dictates the type and amount of error checking to be done.

High speed synchronous links are my first choice. I like to use a pair of DMR-11s or DMV-11s linked by a coaxial cable. I like DMRs and DMVs because they have the error checking and resend logic included on the board, thus relieving the host processor of a great deal of compute-bound overhead. They also are reasonably high speed, capable of as much as a megabit-per-second data rate (see caveats below), if the processors are within a few feet of each other. They can be connected with short-haul modems and still realize a decent data rate. Both RSX and VMS have drivers for these devices in the standard operating system distribution kits. DECnet is not required. The DMR/DMV driver is one of a family of drivers called Message-Oriented Communications Drivers. The DMR/DMV driver is included in the RSX Distribution kit as XMDRV.MAC and is documented in the *RSX I/O Drivers Reference Manual*. ADMRs and DMVs are solutions which are upgradable to full DECnet.

The Ethernet communications controllers, the DEQNA and DEUNA for the Q-bus and UNIBUS respectively, are high-speed controllers that can be used with or without DECnet. Good Ethernet controllers also are available from third-party vendors, although the support software varies considerably in quality. RSX has a driver for the DEUNA in XEDRV.MAC, but not for the DEQNA; drivers are commercially available for the DEQNA. VMS has a driver for both





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the DEUNA and the DEQNA. These devices provide the message passing and routing capability of Ethernet. They can be used for direct high speed CPU-to-CPU data links. This solution can be used for multiple CPUs without DECnet, as long as you are passing

messages only (see caveat about file transfer below). The distance between processors is limited to the Ethernet recommended maximum distance. I recommend that you review the Ethernet spec before using Ethernet. In using these devices for Real Time, consider

carefully the effect of multiple collisions for the Ethernet.

The good ol' DR-11 family is the next candidate for use as a data link. The DR-11B, DR-11W, and DRV-11W, available from DEC or third parties, provide a direct 16-bit DMA parallel data path from one CPU to another. The problem here is software. The RSX distribution kit does not have a driver for this family of devices. Several drivers are available from the DECUS library, varying from the most simple to the Fermilab software, which is fairly complex, with error checking and resend capability built in. Drivers for DR-11s also are available from commercial sources. I have found that, if you limit your cable distances to 25 feet, the DR-11B/W can be relied upon for error-free transmission. Beyond that, you'll need the kind of error checking that is found in the Fermilab package.

Whatever DR-11 solution you choose must have some kind of synchronization associated with it. The two processors must exchange some kind of handshake both before and after the data is transferred, using timeouts as a way of checking for incomplete transfers. A protocol similar to the Request-to-Send/Clear-to-Send sequence commonly used on asynchronous lines would be appropriate here. Remember, these are DMA devices; you won't be able to look at the data as it comes in, therefore, a protocol based on embedded end-of-message characters can not be used.

Any of the above solutions should transfer that 200-byte message in the specified 15 milliseconds. Remember that RSX itself has overhead: The issuing of a QIO takes about 1.7 milliseconds on an 11/34. The issuing task should be given a very high priority so that other system tasks do not interfere (try to use priorities 240-246).

Last, and definitely least, are the asynchronous line multiplexers: the DL-11, the DZ-11, the DH-11, and their corresponding Q-bus versions. These will not satisfy your 15 millisecond requirement, but I mention them for

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completeness.

The DZ and DH are the preferable choices. They both have input FIFO buffers which help prevent lost characters when the transmission rate gets too high. In addition, the DH has DMA output, which relieves the sending CPU of a considerable amount of interrupt handling overhead. Try to avoid using DL-11s. The DL-11 has a single character input buffer and easily can be overdriven, which results in framing errors, data overruns, and lost data. In addition, the DEC DLV-11J (now called the DLVJ1) has some very nasty characteristics when subjected to heavy loads, causing it to intercept interrupts for other devices and violate the Q-bus protocol. The results, as the book says, are unpredictable. Always put a DEC DLV-11J at the end of the Q-bus, or use a third-party equivalent. Interfacing software to the RSX asynchronous lines has been covered thoroughly in the *DEC PROFESSIONAL*. The November 1985 "RSX Clinic" contained a discourse on interfacing asynchronous lines through the RSX terminal driver, and the March 1986 *DEC PROFESSIONAL* contained an article by Ralph Stamerjohn on the same subject.

Now a few caveats to finish the discussion. These issues are independent of the type of interface you choose.

1. Be careful to differentiate overall data rate from that which can be realized practically. A DMR-11 may be able to deliver a megabit per second, but that rate is dependent on the length of the message being sent. It is quite easy to degrade the DMR-11's performance by using very short messages so that the net data rate actually is less than 100 bits per second. An Ethernet, in addition, must be lightly loaded in order to minimize collisions, a loading factor of 10 to 20 percent being recommended by many vendors. Base your performance estimates on the practical, not the theoretical maximum.

Passing whole files can be a problem for both RSX and VMS, as the sender must take pains to transmit the

file attributes before sending the data and, likewise, the receiver must create the right attributes when writing the file. This will require a layer of software in addition to the device drivers mentioned above.

I've only summarized the issues in-

involved in interprocessor links, and I have not mentioned all the possible hardware options, such as the KMV-11 and some specific third-party offerings. I do believe, however, that I have hit the main items to worry about, and hope I've helped.

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# A

## DCL DIALOGUE

Kevin G. Barkes

# Quick & Dirty DCL Debugging

*Note: Users running VMS V3.x should substitute the lexical function F\$LOGICAL for F\$TRNLNM in the examples. The F\$EDIT and F\$ENVIRONMENT lexicals are only available in VMS V4.x; you'll have to devise your own alternatives.*

DCL command procedure debugging isn't pretty, but someone has to do it. And if you're the "someone" responsible for keeping all those .COM files running in non-FUBAR mode, you may want to consider making a few modifications to ease DCL maintenance and debug chores. This month we'll quickly touch on a few rather rudimentary ways

to speed up debugging efforts.

Since most .COM files turn command verification off (either through an explicit SET NOVERIFY or the F\$VERIFY(0) lexical call), we need an efficient method of enabling and disabling command echo without having to constantly re-edit the file.

This can be accomplished with a logical name "switch". The procedure looks to see if a certain logical name has been assigned. If the name exists, command verification is enabled; if not, no action is taken and the procedure continues unaffected.

To ensure that only authorized per-

sonnel have this capability, we can couple the logical name checking with a check of the calling process' identity. For an example, see Program 1.

To enable "debug mode," simply define the logical name DEBUG\_SWITCH to ON:  
\$ DEFINE DEBUG\_SWITCH ON

Note the equivalence name, ON, is not enclosed in quotes. Had you defined DEBUG\_SWITCH as "On," the translation check would have failed because of the case difference. You can circumvent this by using the F\$EDIT lexical in the command procedure line:  
IF F\$EDIT(F\$TRNLNM("DEBUG\_SWITCH"),"UPCASE") .EQS.  
"ON" ...

## PROGRAM 1.

```
#! Turn off verification
#! and save verification state
$ SAVE_VERIFY = F$VERIFY(0)
#!
#! If the proper logical name
#! translation exists, AND the
#! authorized user is running
#! this procedure, then turn
#! on verification.
#! In this case, the
#! authorized user is the
#! system manager.
#!
$ IF F$TRNLNM("DEBUG SWITCH") .EQS. "ON" -
.AND. F$USER() .EQS. "[1,4]" THEN -
SET VERIFY
.
.
#! Procedure end: restore
#! original verification state.
#! Note that original state
#! is not affected by the
#! debug switch.
#!
$ EXIT_VERIFY = F$VERIFY(SAVE_VERIFY)
$ EXIT
```

## PROGRAM 2.

```
#! Save the verification status
#! and turn off verification
#!
$ SAVE_VERIFY = F$VERIFY(0)
#!
#! So we don't have to keep
#! checking to see if we're in
#! "debug mode", set up a
#! quick symbol.
#!
$ DEBUG_ON = 0
$ IF F$TRNLNM("DEBUG SWITCH") .EQS. "ON" -
.AND. F$USER() .EQS. "[1,4]" THEN -
DEBUG_ON = 1

$ IF DEBUG_ON THEN SET VERIFY
#!
#! First, save the current
#! message level. "F$ENV"
#! is the lexical function
#! F$ENVIRONMENT()
#!
$ ORG_MES = F$ENV("MESSAGE")
$ MSG_ON = ORG_MES
$ MSG_OFF = "/NOF/NOI/NOS/NOT"
#!
```

## PROGRAM 2 . . . continued

```

$! If in "debug mode", then
$! change both MSG_ON and
$! MSG_OFF to full_messaging.
$! Otherwise, MSG_ON will be
$! whatever the user's value
$! was upon procedure execution,
$! and MSG_OFF will actually
$! turn off messages.
$!
$ IF DEBUG_ON THEN -
  MSG_ON := "/F/I/S/T"
$ IF DEBUG_ON THEN -
  MSG_OFF := "/F/I/S/T"
.
.
$! This simulates DCL

```

```

$! code which would
$! turn messages off
$!
$ SET MESSAGE 'MSG_OFF'
.
.
$! Restore messages:
$ SET MESSAGE 'MSG_ON'
.
.
$! Exit gracefully, restoring
$! all the original values:
$!
$ SET MESSAGE 'ORG MES'
$ EXIT_VERIFY = F$VERIFY(SAVE_VERIFY)
$ EXIT

```

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Now we have an efficient method of turning verification on and off. A simple `$ DEASSIGN DEBUG_SWITCH` returns the procedure to "non-debug" mode.

Another area that causes debugging headaches is the use of the `SET MESSAGE` command. `SET MESSAGE` is used to control the amount of information returned by executing DCL commands.

It is common to disable messages to avoid alarming the user with unimportant DCL "errors." For example, a procedure may routinely try to delete temporary files which may or may not exist from previous executions. This is generally accomplished by a simple `$ DELETE TEMPFILE.TMP;*`. If no previous temp files exist, the user may become upset when he or she sees the "file does not exist" error message returned by the delete command.

To get around this problem, DCL programmers commonly issue the following command somewhere in the procedure to turn off the messages:  
`$ SET MESSAGE/NOFACILITY-  
NOIDENTITY/-  
NOSEVERITY/-  
NOTEXT`

(The shortened form is `SET MESSAGE/NOF/NOI/NOS/NOT.`)

Unfortunately, this shuts off all error messages. If there's a bug in the procedure between the time the messaging was turned off and the time it was re-enabled with `$ SET MESSAGE/F/I/S/T`, you'll never see it.

Let's add a debugging switch for controlling `SET MESSAGE`, and add some functionality to our previous procedure. The results are shown in Program 2.

One final tip for quick and dirty debugging involves changing the manner in which symbols are used in your procedures.

You may wish to consider forcing DCL to evaluate the symbol as part of a string expression rather than permitting the automatic translation that normally occurs.

Assume we assign `$ STRING = "This is a string."`

Our command procedure contains the line:  
`$ WRITE SY$OUTPUT STRING`

In "debug mode" (verify on), your terminal would display the following:

```
$ WRITE SY$OUTPUT STRING  
This is a string.
```

But if we make a simple change,  
`$ WRITE SY$OUTPUT "'STRING'"`

the procedure will now display  
`$ WRITE SY$OUTPUT`  
"This is a string."  
This is a string.

Care must be exercised when using this type of symbol manipulation in order to avoid unexpected evaluations. It's a good idea to review the documentation on symbol assignments to refresh your memory.

Next month we'll look at error trapping and the use of `$SEVERITY` and `$STATUS`. Please direct your comments and suggestions to me at 4107 Overlook Drive, Library, PA 15129, or Compu-Serve user id 72067,341. In addition, I have reserved a portion of my company's dial-in customer support system/BBS for responding to generalized DCL-related questions from readers. The system operates 24 hrs/day, 7 days/wk and supports communications at 300/1200 baud, 8 bits, 1 stop bit, no parity. The on-line number is 412-854-0511.

*Kevin G. Barkes is a Library, Pennsylvania-based consultant specializing in VAX systems.*

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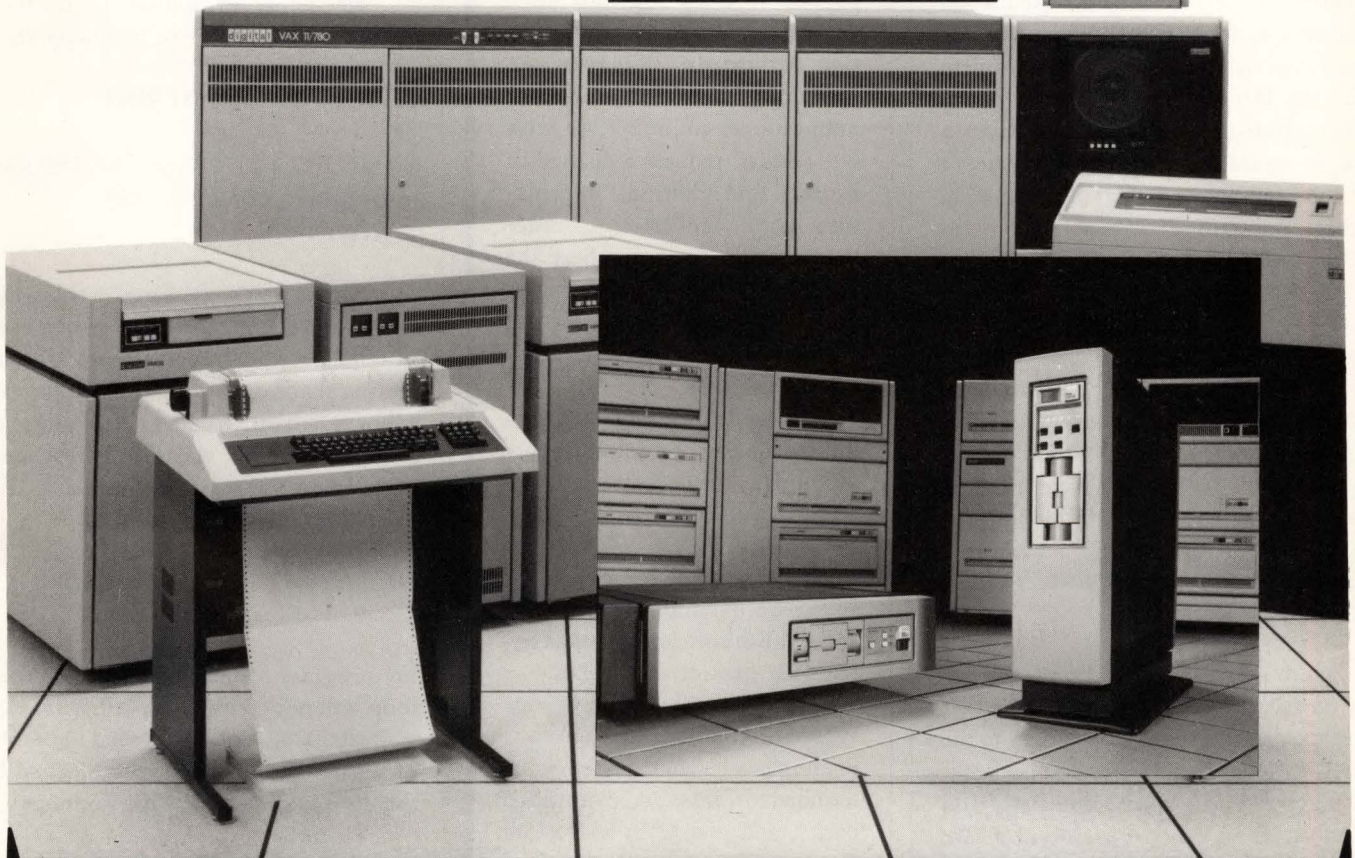
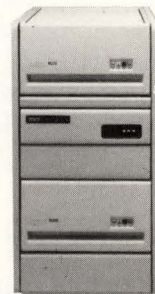
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## VMS V4.4 & Generic Printing

### QUERY:

*Hank Vander Waal:* For those of you using generic printing, DO NOT UPGRADE! The use of generic queuing (dumping reports into SYS\$PRINT and sending out to the printers based on form type) does not work and there is no known work-around!

### REPLIES:

*John F. McGlinchey:* Thanks for the information. I was just about to upgrade and that would cause a major problem for me. Has anyone else come up with this problem? If someone does know a work-around, I would appreciate a phone call before I upgrade to V4.4, in about one month.

*Geoffrey Brunkhorst:* I was waiting for my "pre-V4.4 upgrade backups" to finish, when I read your note about generic print queues. "Does not work" is vague and scary. Will a simple configuration work (one generic and two physical queues) if the forms are always set to DEFAULT? Does this bug have anything to do with the new V4.4 function:

```
SET
QUEUE/DEFAULT=(FORM__TYPE =
xxxxxxx) queue-name: ?
```

I'm going ahead with the upgrade (I have XEDRIVER and SMG bugs that are fixed in the upgrade according to the DEC CSC), so I will have to check out the generic print queue bug first hand and see if we can work around it (We rarely change forms on our generic queues).

Thanks for pointing this out, as it could have really spoiled our month-

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In addition, ARIS has a message center for communicating with other DEC users. There is no charge beyond that of the call, and many *DEC PRO* readers already are getting some excellent advice. Each month, we will select and publish some of the most interesting queries and replies.

To log in, you'll need your subscriber number (it's on your mailing label). Then, just set your terminal to 7 bits, 1 stop, no space parity, and dial (215) 542-9458. Baud rates: 300 or 1200.

In the near future, we will be including a transfer protocol to assist in downloading programs.

end report generation (planned for the 4th of July)!

*Antonio R Collins:* Concerning print bugs, we have a small VAX shop that is split between two distinct user bases and, therefore, two printers. When we went to V4.3, the print queues were changed from terminal queues to logical queues, using:

```
($ INIT/QUE/TER/ON=TXNN CIT$PRINT).
```

We define SYS\$PRINT to be the queue you want, but we no longer can do things like:

```
BACKUP/LIS = SYS$PRINT
```

or

```
TYPE/OUT= CIT$PRINT NODE::file
(for printing of remote files).
```

Any help?

As for SMG\$ routines: I thought they would be great to replace our use of TDMS, but I'm having a heckuva time getting them up. For instance, I have a subprogram (in COBOL) that edits a string (it accepts the display-ID and positioning information, but if I call it via PERFORM

```
(PERFORM get_string UNTIL
term_char ^ 2. get_string calls
"SMG_GET_ALPHA)
```

my program counter gets lost and the loop will not continue (specifically, PC = 20202020)! Could you send me a list of what will not work with SMG so I can stop killing myself for nothing?

Thanks.

*Geoff Brunkhorst:* SMG..? Let me say some things about SMG:

1. Upgrading to 4.4 for me was one step forward and two back. I gained the functionality of trapping broadcast



messages, but SMG now locks the terminal, so I can't open and close it for cute little DIBOL tricks (a la XCALL DBL\$. Wait to see if input has been typed.).

2. I use SMG\$READ\_KEYSTROKE in DIBOL to do a similar function of looping until field full or terminator, and have had no problems (we've used it since it came out). Looks like your COBOL code is pushing a longword of spaces (20202020) into the PC! What does DEBUG say? (Follow DEC's advice in debugging SMG routines using two screens.).

3. If you can code in MACRO, do it when dealing with SMG! Going from DIBOL to MACRO really made our screen display and input subroutines sing! It also may clean up your COBOL perform loop problems.

4. SMG is not reentrant code. If your input routines use or abuse ASTs, you may have to rethink your use of them. We did!

5. I heard of some bugs in SMGDEF for VMS V4.4, but I haven't seen any.

Hope you have good luck! If ya don't, write back and we'll talk again.

*Jim Hobbs:* Be sure that you have:

```
$ SET DEVICE/SPOOLED xxxx
```

for those terminals and/or line printers that you want to send output to, directly.

As for the COBOL program, there were some bugs with the ACCEPT and DISPLAY verbs. Check DSIN for the particulars. There is a patch that fixes (at least partially) that "undocumented feature," more commonly known as a bug!

*Augie Freda:* Hank, could you be more specific? We upgraded to 4.4 on June 1, and have 32 queued printers hanging out there, and have not had any trouble at all with queued printing. And we even run All-In-1!

In fact, we have a PDP, too, and DECnet all of our queued print requests on the PDP to the VAXcluster queues.

Thanks.

## PDP-11 MUX and PBX

### QUERY:

*Gerald Vezzosi:* We soon will be receiving our new MicroPDP-11/83. We will be using DEC's DHV11 multiplexers. Most of our application is in-house, but we will be installing a couple of phone lines to be used with Hayes modems. Our company is also installing an AT&T system 85 PBX.

My question is whether we can somehow use the PBX internally and access our MUX by dialing a local extension. What I want to accomplish is remote access to our PDP by using the telephone wiring system, and avoid having to run long RS-232 cables through our ceiling.

Is this feasible? Is there someone out there who can help?

Please respond; your help would be appreciated.

Thank You.

### REPLIES:

*Phil Anthony:* I don't see any reason why it couldn't be done, but I don't think it'd be very cost-effective for you. You'd have to put a dial modem up at the user workstation, plus an autoanswer modem on the PDP side, at fairly high cost; and, your users would be restricted to whatever baud rate the modems would support (Anything higher than 2400 baud probably would be prohibitively expensive). Finally, you'd be tying up expensive slots on the PBX that your company may have need for in the coming years, and it's not that cheap to upgrade a PBX.

As an alternative, have you thought about short-haul modems, (a lot cheaper than autodial/autoanswer modems) at both ends (user terminal and PDP) of a simple twisted-pair line? One reliable source for this kind of equipment is Black Box (can't lay my hands on my catalogue at the moment to give you their phone number). Their technical people also can give you advice on stringing up the connection.

Good luck!

*Kenneth Kemp:* There is a company called Teltone that markets a product that

combines your terminal data and your telephone voice signals (data over voice) over existing (or new) phone lines. Wherever you want a terminal, install one of their boxes and plug it into your telephone wall jack. Then, plug your telephone and terminal into the box. The two are independent of each other and can be used at the same time; or, even if one breaks, the other can still work. At your PBX, a "data splitter" is installed to remove the data signals from the voice lines and route them to the computer.

*Hal Hackney:* Mr. Vezzosi, As long as any in-house terminal that you want to use to access your system has a modem, it can dial up the PDP using the in-house PBX extension number and run as a remote user. In addition, there are some companies that advertise that you can use your PBX lines as you would in-house wiring, but these systems require additional hardware at both the computer and the terminal. And, since modems are getting so inexpensive, your best bet would be the modem approach. There are companies who advertise 9600 asynchronous modems which could be substituted for the Hayes.

*Tim Neumann:* We use a product from TELEPHONE, although I know that there are other vendors out there, too. TELEPHONE makes a telephone modem that works on the data-over-voice principle. At the terminal end you use a modem-sized box (it really is a modem of sorts) connected between your phone and your terminal, just like any other modem. Then, at the PBX (it pays to have it close to your computer installation), a similar box is placed on the same line, with the RS-232 connection going to the computer and the phone line continuing onto the PBX. This, in effect, gives you a dedicated line between your terminal and the computer, piggybacking on the existing

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phone wire.

I don't know the cost as opposed to plain modems, but you do get the advantage of still being able to use your telephone while working on your terminal.

Another alternative, if you haven't wired for the new PBX yet, is to have the phone company put in additional twisted pairs to use with line drivers. These are available from places like INMAC, for about \$200 a pair or more, and allow 19.2 speeds, up to a mile away. If you ask them nicely, the phone company doesn't mind terminating a few extra twisted pairs here and there. After all, you are paying for it.

### Current DIR from VMS

#### QUERY:

*Curt Snyder:* I know there must be an easy way to do this, but I haven't found it. I need to get the current directory name from within a VMS program (PASCAL). I can adapt from FORTRAN, BASIC or COBOL as required.

#### REPLIES:

*Kevin Pinkerton:* The system service SYSS\$SETDDIR, which is documented in the RMS utility manual in VMS prior to 4.4, and in the System Service's manual in VMS 4.4, should do what you want. It is meant to change your default directory, but if you give it a null argument for the new directory, it won't do anything but return your old (current) directory. However, it will not return the device, only the [xxxx] portion. The logical, SYSS\$DISK, always points to the device. You can use either the system service SYSS\$TRNLNM or the run-time LIBSSYS\_TRNLOG to translate SYSS\$DISK. (The latter may be a little easier to use for a novice.) Then, if you append what you get from SYSS\$SETDDIR to what you get from SYSS\$DISK, you will have everything you need.

*Mark Scranton:* With regards to getting the current directory from VMS, see "The 'IN' Foreign Command," (DEC PROFESSIONAL, May, 1986, page 64). There is a portion of the program

that deals with getting the current directory. I think I remember trying that portion and it worked. The code is in FORTRAN and uses system service calls, so it should be easily adaptable to other high-level languages.

*Jim McNall:* To get the value of, or

change, the current default directory, use the RMS System Service SYSS\$SETDIR. [new\_default\_dir][,length\_of\_default\_dir\_string] [,current\_default\_dir]

Further information is on page 115 of the RMS manual. ■

# VAX...

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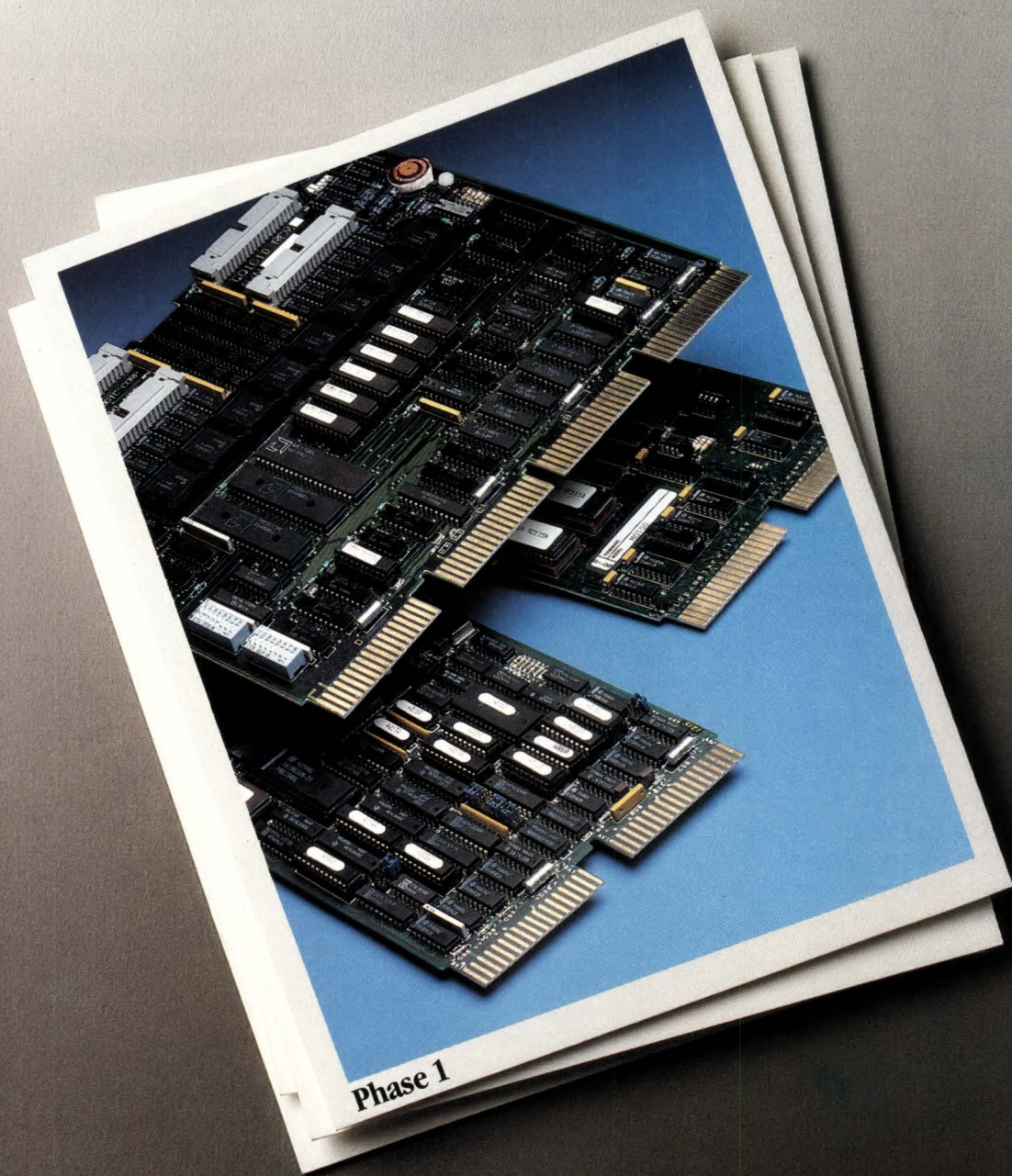
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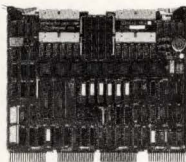
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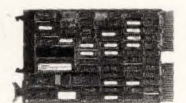
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**Jim C. Christopher**

# Cleaning Up A Computer Mess

If there is such a thing as the definitive data processing problem, then William E. Perry's *Cleaning Up A Computer Mess* must be the definitive text on solving that problem. If there is a computer problem hanging out there in the future somewhere, waiting to be another "first," I'd bet two to one that Perry's book already has provided a solution (and a preventive measure) for the mess to come. Why? There are two reasons.

First, it is almost axiomatic that business, government, and other large institutions don't invent new ways to make a mess of their data processing systems, they just find variations on many old themes. And in the second place, Perry's work is an extremely comprehensive diagnostic tool that provides tons of examples based on years of experience.

The main thrust of his writing is geared toward problems arising in medium to large installations. The problems are complex and so are the solutions. Perry makes no bones about it: If you are serious about solving your data processing mess, you are going to have to make an investment in time, effort and, of course, money. But there are efficient ways to do the job.

In Part 1, Chapters 1 and 2 tell you how you got into the mess you're in and clearly defines, in general terms, the distinctions between symptoms and causes of computer messes. Several rather humorously titled theories on how a computer mess occurs are presented. For example, the Rathole theory states that it is better to continue to try to fix an old dog of a system, because only current costs are considered, than to bite the proverbial bullet and trash

the system. My favorite is the Man-In-The-Moon theory which augurs that if enough bucks are spent, the computer system will do all kinds of magical things. Managers beware! The symptoms and causes that are listed are nothing new in themselves, but they are stated as the basis for a diagnostic tool that is used throughout the book.

The meat of the book is in Part 2, Chapters 3 through 12, which detail a variety of business problems and systematically use the diagnostic tools to provide solutions. In short, these tools consist of:

1. The "smell test," which is based on experience. Any experienced manager only needs to sniff the air in many situations to know that something is awry.
2. Using the accounting system to analyze performance data as a clue to problem areas. The problems found are the symptoms of the real causes. For example, trends in lost sales can lead to the root causes.
3. Diagnostic decision tables, Perry's own formula that is the basis of solution salvation.

A standard procedure is used to present each of the solution chapters. A general statement of the problem is put forth; it is in these opening segments that Mr. Perry really shines because he writes with great wit and clarity. Once the problem is stated, a list of symptoms related to the problem is listed and discussed. Solutions are then listed and referenced to the appropriate chapter in the book. While this is not the most ex-

citing thing to read over and over again in each chapter, it is effective.

Mr. Perry never waivers from the intention of the book, and that is to provide a comprehensive diagnostic tool to be used by managers, data processing specialists or executives to actually solve their computer problems. Whether it's a vendor who doesn't perform, a programmer or user who doesn't communicate or a manager who doesn't listen, the solutions are here. If it's a space problem, an I/O glitch, or an organizational structure that's causing the computer blues, Mr. Perry provides the insight to discovering solutions for a wide range of computer messes.

The book is summed up in Part 3 with a lot of good ideas on how to avoid problems in the future (assuming you took his good advice in the first place). The best is summed up in his advocacy of appointing someone in charge of the whole shebang in order to make it work, and I quote, "Policies come to fruition only when a single individual is charged with the responsibility of making them work." Amen.

*Cleaning Up A Computer Mess* by William E. Perry is one very good buy at \$29.95.

**Cleaning Up A Computer Mess—  
A Guide to Diagnosing and Correcting  
Computer Problems**  
By William E. Perry  
Published 1986 by:  
Van Nostrand Reinhold Co.,  
Inc., New York  
Cloth Edition: \$29.95

Reviewed by Jim Christopher

Continued from page 20.

```
Enter LIST2__FIELD2: 6
Enter LIST2__FIELD2: 7
Enter LIST1__FIELD1: 8
Enter LIST2__FIELD2: 9
Enter LIST2__FIELD2: 0
DTR> PRINT TEST
```

ENTRIES			
IN	LIST1	LIST2	
FIELD1	LIST	FIELD1	FIELD2
1	3	2	3
			4
		5	6
			7
		8	9
			0

However, a VARIABLE OCCURS clause is not allowed within another FIXED or VARIABLE OCCURS clause. The reason for this is that a VARIABLE OCCURS clause may appear only at the end of the record. If a VARIABLE OCCURS clause were to appear within another list with multiple occurrence, the first occurrence would not be at the end of the record. If one should attempt to define a record like:

```
DEFINE RECORD TEST-RECORD
USING
01 TEST-REC.
03 FIELD1 PIC X.
03 LIST1 OCCURS 3 TIMES.
05 LIST1-FIELD1 PIC X.
05 ENTRIES__IN__LIST PIC 9.
05 LIST2 OCCURS 0 TO 9 TIMES
DEPENDING ON
ENTRIES__IN__LIST.
07 LIST2-FIELD2 PIC X.
```

you get the error message:

“OCCURS DEPENDING ON not allowed within OCCURS list”

immediately following the line “05 LIST2 OCCURS 0 to 9...”

The data structure of a VARIABLE OCCURS within another FIXED or

VARIABLE OCCURS must be handled by the use of a VIEW with multiple domains.

In addition, Johnson reports, “Also, common commands such as READY and FIND cannot be used in a REPEAT loop.” While this is correct, it indicates a lack of understanding of DATATRIEVE. Within DATATRIEVE, there are STATEMENTS and COMMANDS. Simplistically, COMMANDS manipulate objects in the DICTIONARY and cannot be within BEGIN-END blocks (or REPEATS); STATEMENTS manipulate the actual data and some of them may be within BEGIN-END blocks and REPEATS. There is no reason to READY a domain within a BEGIN-END block; it can always be READYed before one enters the block. There is also no reason to need or use the FIND statement within a BEGIN-END block; it can always be done faster or more easily

with a FOR statement.

Earlier in the article Johnson reported, “One of the most useful features of DATATRIEVE is the editor, which is very similar to EDT and . . .” For a VAX system, the editor is not similar to EDT; it is EDT (including access to your EDTINI.EDT startup file). DATATRIEVE makes use of the callable interface to the DEC standard editor.

Again, Johnson is to be commended for her article. It is impossible to fully and accurately describe such a large and complex software package as DATATRIEVE in only a few pages.

Joe H. Gallagher, Ph.D.

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## Two-View Developed For PDP-11 Systems

DEC PROFESSIONAL erroneously listed the license price for Lilly Consulting/System Services, Inc.'s RSTS windowing software in its July issue.

Two-View (LCS/2VU) turns any two-page mode or scrollable CRT into a multi-job processing terminal. With 2VU, a user may switch back and forth between any two jobs established by the user. 2VU maintains screen mode and cursor positioning of the jobs being processed.

LCSS/2VU is available for PDP-11 systems running RSTS/E version 8.0 and greater. The correct fee for a single-use license is \$550. Discounts and multiuse licenses are available.

For more information and/or a demonstration package, contact Lilly Consulting/System Services, Inc., 7259 West Marine Dr., Milwaukee, WI 53223-9990; (414) 354-6731.

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## BBN Expands RS Series

RS/Explore and RS/Discover, two powerful new multiuser software systems that offer engineers and scientists assistance with data analysis and experimental design, will be released September 1st in the United States and Europe by BBN Software Products Corporation.

RS/Explore combines the full functionality of RS/1 with a statistical advisory component. The new system provides technical professionals with easy-to-use techniques for computer-aided interpretation and statistical analysis of data in research, development and manufacturing environments.

RS/Discover is an integrated software system for the creation and analysis of designed experiments in industry. It enables engineers and scientists to define more efficient experiments and to gain a more

thorough understanding of experimental results. RS/Discover supports the full range of requirements for experimentation — from the design of an experiment and its implementation, to the analysis and presentation of experimental results.

The new products run on a wide range of VAX equipment including the MicroVAX II and VAXstation. In addition, microcomputers running RS/1 can be linked to VAX systems running RS/Explore and RS/Discover, allowing the entire RS Series of products to be used in a single environment. For more information, contact BBN Software Products at 10 Fawcett Street, Cambridge, MA 02238; (617) 864-1780.

**Enter 902 on reader card**

## Meridian Releases PLOT-Q, Version 2.4

PLOT-Q, the queue management program for serially connected plotters under VAX/VMS, has been upgraded with new features designed to provide more convenient control of plotter operation.

You now may enter jobs in the queue with qualifiers that will invoke named ASCII strings that have been established for the system. These will be sent to the port immediately before or after the plot data, for the purpose of governing various aspects of plotter operation such as operating the automatic paper cutter, rasterizing data, and selecting plotters when there is more than one attached to a port.

Qualifiers have been established to allow users to specify which machine or machines are to be considered appropriate for execution of the particular job. These include PEN,

ESP (indicating an electrostatic plotter), DRAFT, and LOCATION, which allows for the channeling of a job to a specific plotter when there might be more than one appropriate device available.

For a product description and pricing information, call or write Meridian Software, Inc., P.O. Box 651, New Town Branch, Boston, MA 02258; (617) 527-0050.

**Enter 903 on reader card**

## Version 5 Doubles ORACLE Speed

Oracle Corporation's new Version 5 of its ORACLE relational DBMS and six new fourth-generation language (4GL) and decision-support software (DSS) tools are for application developers and end users. The new version of ORACLE boosts performance for typical jobs by 100 percent and provides further extensions to ORACLE's IBM/DB2-compatible SQL language.

The new software tools include:

SQL\*Forms — a 4GL application generation and run-time system, featuring screen painting and other facilities for simple, portable application development and prototyping.

SQL\*Plus — a 4GL interactive command utility for ad hoc data access and report writing.

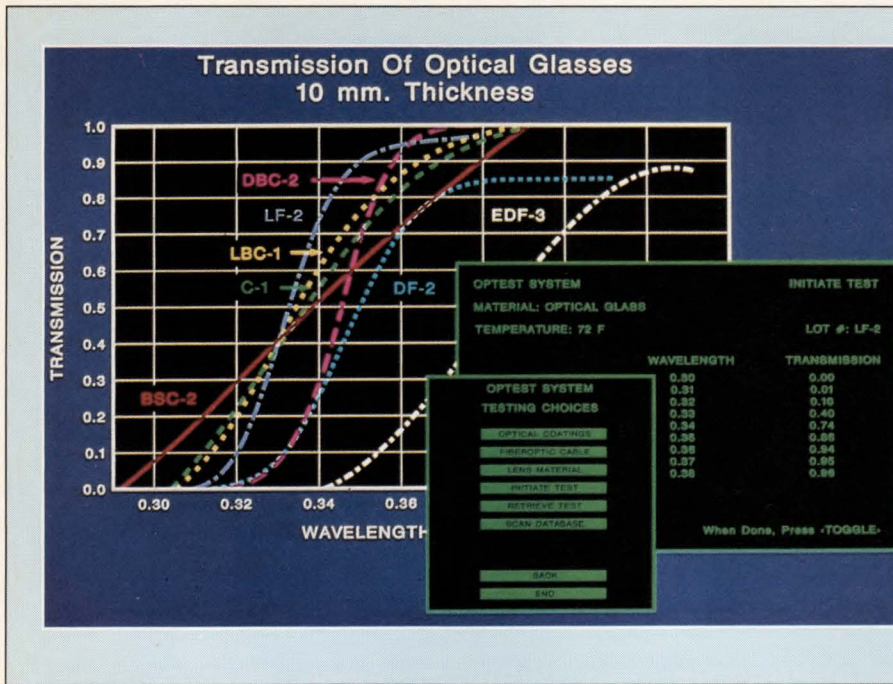
SQL\*Menu — a menuing tool to allow the creation of portable, easily customized, secure menu trees to provide end users with a simple operating environment for all of their applications.

SQL\*Graph — a business color graphics decision-support system or displaying SQP-retrieved data using bar, pie and line charts.

Easy\*Link — an enhanced, full-screen, point-and-select interface to its micro-mainframe intelligent link product.

Pro\*Ada — a programmatic interface to





## ENTER/ACT Provides Multiple Viewing

Precision Visuals, Inc.'s ENTER/ACT is a User Interface Management System. Multiple windows or panels allow different kinds of information to be displayed simultaneously. In this example, a menu panel presents several choices for you. The text panel shows graphical output from the test. Windows may be positioned, sized, deleted and popped to the display foreground. In addition, graphics windows can be fully interactive and may be panned or zoomed.

For more information, contact Precision Visuals at 6260 Lookout Road, Boulder, CO 80301; (303) 530-9000. Telex (RCA) 296428.

**Enter 900 on reader card**

ORACLE from the Ada language.

All of the new and enhanced products are in full production release for the VAX/VMS environment.

Oracle announced a new unbundled pricing structure with Version 5. The new structure allows users to license the ORACLE relational DBMS at a lower price, and to add on various separately-priced tools and utilities as desired.

For further information, call Oracle Corporation Headquarters at (800) 345-DBMS, or write to Oracle at 20 Davis Drive, Belmont, CA 94002.

**Enter 906 on reader card**

## Precision Announces Color Plotter

The new C448 electrostatic plotter from Precision Image provides high-throughput, wide-format plotting at 400 dots per inch in full-spectrum color, and is priced to allow use by small workstation clusters in a distributed plotting environment.

Featuring automatic cut-sheet feeding and delivery, the C448 simultaneously handles D- and E-size (ISO A1 or A0) paper or film, and can produce E-size plots within four minutes.

Unmatched color registration and image quality result from a proprietary design that avoids dot misalignment associated with humidity and tension variations that can occur between color applications on roll-fed

web machines.

An integrated highly pipelined processing architecture converts data to rasters — at speeds up to a million vectors per minute — and fills polygons at 50 million pixels per second. This permits offloading the rasterization process from the host computer, so design activities can continue during plot processing.

For easy hardware interfacing, the C448 supports a wide variety of serial, parallel and LAN interfaces, including Ethernet. The ISO and ANSI standard CGI software interface facilitates rapid applications development, and Calcomp and Versatec compatibility ensures problem-free migration.

For prices and more information, call or write Precision Image, 501 Chesapeake Dr., Redwood City, CA 94063; (415) 366-8900.

**Enter 904 on reader card**

## RS350 Added To Database Family

Britton Lee, Inc.'s new Relational Server RS350 database system is the second and more powerful member of Britton Lee's RS300 Series of low-end database systems targeted for the integrated office and shop floor applications. The RS350 is fully software compatible with the RS310, which was introduced last year, as well as Britton Lee's high-end IDM 500 Series of relational database systems.

The RS350 comes with up to 1.1 giga-

bytes of Winchester disk storage and 300 MB of 1/2-inch streaming tape backup for file archiving. In addition, the RS350 offers as an option 400 MB of optical WORM (Write Once Read Mostly) backup.

The RS350, like the RS310, utilizes a high-density 10 MHz database processor and 1 MB of direct access memory, which is expandable to 4 MB. The RS350 will support databases in excess of 1 gigabyte and handle 10 simultaneous queries at a transaction rate of up to 20 transactions per second.

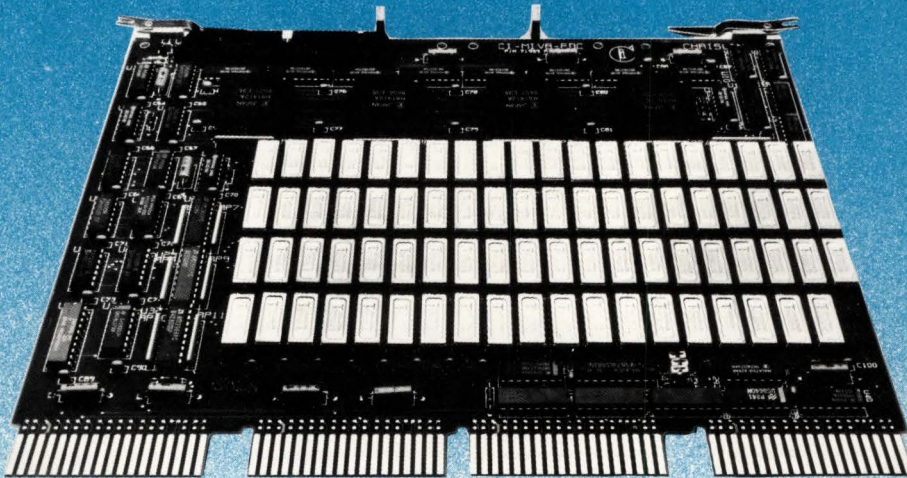
The RS350 sells for \$53,950-\$96,950 depending on system configuration. In addition, the RS310 can be field upgraded to the RS350 configuration for \$29,995-\$70,990, depending on the upgrade configuration.

To learn more, contact Britton Lee, Inc., 14600 Winchester Blvd., Los Gatos, CA 95030; (408) 378-7000. Telex: 172-585.

**Enter 905 on reader card**

*DEXPO West '86 will be held at the Civic Center in San Francisco, October 7-10. As vendors across the country prepare their products for exhibit, DEC PROFESSIONAL takes an early look at just some of their offerings. Our DEXPO preview begins on the next page.*

# MICROVAX II MEMORY with VAX PERFORMANCE



## ***ECC FOR ADDED RELIABILITY***

Reliability is a primary issue in any hardware purchase. Unreliable memory for a computer serving business or science is unacceptable. That is why Chrislin has developed an 8MB ERROR DETECTION AND CORRECTION (EDC) MEMORY FOR THE MICROVAX II. With standard parity memory, an error could occur in a matter of days. But with an EDC memory, the likelihood of an error would be a matter of years. VAX installations across the world have benefited from the use of Error Correcting memory. And now, MICROVAX II installations can have equivalent reliability with the new CI-MIV8-EDC.

Designed with the new 1MB DRAMs the board has four times less chips than comparable 256KB boards. An on board Control Status Register (CSR) for error logging allows you to identify and replace a failing RAM before it completely fails (produces a Hard Error). Socketed DRAMs make on site chip replacement a simple procedure. Unbeatable performance and reliability make the CI-MIV8-EDC a must for any computer installation.

Chrislin also offers 4MB, 8MB and 16MB parity memories for the MICROVAX II. In addition, Chrislin has a wide assortment of memory for the VAX 730, 750, 780 and any QBUS.

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## Park Software To Show New Program

Command File Scheduler (CFS) will be introduced by Park Software, Inc., at DEXPO West. CFS is a program that provides complete control over the scheduling of VAX/VMS command files and is designed to provide a perpetual batch processing schedule.

For more information, contact Park Software at P.O. Box 31529, Seattle, WA 98103; (206) 282-8886, or stop by Booth No. 1525.

**Enter 961 on reader card**

## DEXPO West Gets INTOUCH

Touch Technologies, Inc. returns to DEXPO with a repeat performance of its INTOUCH product.

INTOUCH is an application development tool and database language for VAX computers. It includes fully structured language and development tools such as line-by-line syntax checking, code change and continue, program tracing and a statistics

feature for optimizing programs. It has a transparent interface to VAX data files, and increased speed and response time over VAX BASIC and FORTRAN.

Ten-minute demonstrations will be conducted in Booth No. 834; or for more information, contact Touch Technologies at 609 South Escondido Boulevard, Suite 101, Escondido, CA 92025; (619) 743-0494.

**Enter 908 on reader card**

## Adapters Support Optical Disk Drives

U.S. Design Corporation has announced two new products that will make optical-disk storage accessible to users of DEC systems with Q-bus or Unibus backplanes. The 1108-03 and 1158-03 host adapters emulate DEC's Mass Storage Control Protocol (MSCP), and provide compatibility with all current versions of RSX and VMS software.

Using the Small Computer System Interface (SCSI), U.S. Design's 1108-03 and 1158-03 controllers bring Write-Once-Read-Many optical products into the MSCP environment. The U.S. Design 1108-03 sup-

ports the MicroVAX, MicroPDP and LSI-11 Q-bus systems; the U.S. Design 1158-03 supports the VAX and PDP-11 Unibus systems.

Contact U.S. Design at 5100 Philadelphia Way, Lanham, MD 20706; (301) 577-2880. Telex 710-826-0417. Booth No. 423.

**Enter 966 on reader card**

## MASS-11 To Be Shown In San Francisco

Microsystems Engineering Corporation will demonstrate its word processing and integrated relational database management software packages — MASS-11 and MASS-11 Manager — at DEXPO West.

MASS-11 features include two-dimensional line drawing, enhanced print routines that allow up to 127 font definitions, index and table of authorities generators, and a WPS-Style editor in MASS-11pc for the IBM PCs.

MASS-11 Manager is fully integrated with MASS-11 running on the VAX and IBM PC. This database management package runs in both command and menu-driven

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modes and has built-in conversion routines to and from various database file formats. For more information, contact Microsystems Engineering Corporation at 2400 W. Hassell Road, Suite 400, Hoffman Estates, IL 60195; (312) 882-0111; Telex 703-688. Stop by Booth No. 108.

**Enter 910 on reader card**

### **C-J To Feature FIXED ASSETS System**

Collier-Jackson, Inc.'s CJ/FIXED ASSETS is a fixed assets and property management system that accounts for and manages all of a company's assets online. As many books as desired can be set up for accounting, taxes or projections. Each book is independent and each can have its own depreciation frequency. For more information, contact Collier-Jackson, Inc. at 3707 West Cherry Street, Tampa, FL 33607; (813) 872-9990; or stop by Booth No. 714.

**Enter 911 on reader card**

### **GO-235 Released With High Resolution**

GraphOn Corporation's newest member of its GO-200 Composite Terminal Series, the GO-235, enters the market with high resolution and 60-Hz non-interlaced video at under \$1,700. List price for a single terminal is \$1,695.

The 60-Hz non-interlaced display permits the use of short persistence screen phosphors, eliminating screen flicker and smearing on the display. Alphanumeric emulations include the DEC VT220 and VT100.

For more information, contact GraphOn Corp. at Tower One, 5th Floor, 1901 S. Bascom Avenue, Campbell, CA 95008; (408) 371-8500; or stop by Booth No. 1600.

**Enter 912 on reader card**

### **Standard Memory To Show PINCOMM 630SX, 860S**

Standard Memories Division of Trendata Corporation will show its complete line of DEC-compatible add-in/add-on memories for VAX, MicroVAX, Unibus, and Q-bus systems at DEXPO West. Included will be the PINCOMM 630SX, an 8-MB memory for the MicroVAX II, and the PINCOMM 860S, a 4-MB memory for the VAX 8600/8650.

All Standard Memories DEC-compatible add-in memories carry a 10-year "5 Plus 5" warranty. With the exception of the PINCOMM 630SX, all RAMs are socketed

to facilitate field maintenance.

For more information, contact Standard Memories at 3400 West Segerstrom Ave., Santa Ana, CA 92704; (714) 540-3605; or stop by Booth No. 1620.

**Enter 913 on reader card**

### **ESCA Enhances HABITAT**

HABITAT is ESCA Corporation's real-time software environment. The enhanced version 2.2 of HABITAT supports programming in PASCAL, in addition to FORTRAN and VAX-11 MACRO.

See HABITAT, and ESCA's new PC17 emulation software package in action at DEXPO West, Booth No. 1746; or contact ESCA Corporation at 13208 Northrup Way, Bellevue, WA 98005; (206) 746-3000.

**Enter 914 on reader card**

### **Graphic Outlook Links To User Programs**

Stone Mountain Computing's Graphic Outlook, its VAX/VMS spreadsheet/slidemaker program, now links to user-written programs to carry out calculations too complex to express inside spreadsheet formulas. User programs can request inputs from the program user and values from the spreadsheet, as well as store data into the spreadsheet.

Release 4 of Graphic Outlook includes a Lotus Mode of operation that presents a user interface nearly identical to that of LOTUS 1-2-3, thus requiring no retraining of persons familiar with that program.

The program directly interfaces with DATATRIEVE, and offers, as a built-in feature, an implementation of the Simplex Algorithm for solving Linear Programming problems. A recently added feature allows users to redefine terminal keys to represent any string of Graphic Outlook commands. Demonstration tapes are available from Stone Mountain Computing Corporation, 1096 Cambridge Dr., Santa Barbara, CA 93111; (805) 964-9101. A program demonstration can be seen at DEXPO West, Booth No. 1225.

**Enter 915 on reader card**

### **TAPESYS V4 To Be On Display**

Software Partners/32, Inc. will be exhibiting TAPESYS V4 at DEXPO. TAPESYS V4 manages large tape libraries in VAX/VMS environments, including VAXcluster and remote DECnet configurations. Magtape

database management, security, archiving and easy user backup/restore are characteristics of the system.

TAPESYS V4 is available from \$4,000 to \$7,600, depending on processor size. The license price includes a one-year warranty. Cluster, site, corporate and academic discounts are available.

For additional information, contact Software Partners/32, Inc., 447 Old Boston Rd., Topsfield, MA 01983; (617) 887-6409; or stop by Booth No. 420.

**Enter 916 on reader card**

### **Dataram To Exhibit Spectrum Of DEC Memory**

Dataram Corporation will display its full line of DEC memory technology at DEXPO West. Introduced will be Dataram's fully compatible PDP-11/83 and 11/84 PMI bus memory. The quad-size DR-283 memory board offers 1.0 MB or 2.0 MB of data storage, plus associated ECC check information. Dataram's DR-283 is fully compatible with all Q-bus based systems such as the PDP-11/23, 11/73 and MicroVAX I.

In addition, Dataram's full line of DEC memory products will be featured; from its VAX 8600/8650 and MicroVAX II memory to solid state disk for PDP-11 and VAX systems, through its 200 MB/sec., Wide Word high performance memory system demanding scientific/engineering applications.

To learn more, contact Dataram Corporation, Princeton Rd., Cranbury, NJ 08512; (609) 799-0071. TWX: 510-685-2542. Stop by Booth No. 1420.

**Enter 919 on reader card**

### **DSI To Attend San Francisco Show**

Digital Solutions, Inc. (DSI) will exhibit at DEXPO West. DSI provides CPUs, systems, peripherals, options, memory products, disk drives, tape drives, hardcopy printers, subsystems, cables, communications, accessories, storage media, and hard-to-find parts.

To obtain further information, contact Digital Solutions, Inc. at 3054-B Gold Canal Dr., Rancho Cordova, CA 95670; (916) 638-5606; or stop by Booth No. 1024.

**Enter 922 on reader card**

### **K&H To Feature Management Tool**

Prestige PC, from K&H Project Systems, Inc., is a new management productivity tool with upload/download capability to the

entire range of K&H products on VAX computers.

The system has a highly visual user interface incorporating colorful full screen operation with pop-up menus. It has been configured around a relational database to facilitate integration with other software such as spreadsheet, accounting and other packages that accept SDF, DIF, or free formats data transfer. Prestige PC is currently under beta test at several companies in the U.S. and the U.K. It will be formally released in January 1987.

To find out more, K&H has main offices in Sparta, NJ; Wayne, PA; and Irvine, CA; and will be exhibiting at Booth No. 1037.

**Enter 920 on reader card**

### C. Itoh To Display OPCA-11

C. Itoh will exhibit its OPCA-11 Laser-Optics disk drive subsystem for VAX, PDP and LSI computers at DEXPO West. The OPCA-11 is a complete plug-in package that includes Unibus or Q-bus controller and software to provide the user with 2.6 gigabytes of write-once-read-many times data storage on each disk.

Included is a utility software program that provides the capability to transfer Files-11 data to and from the disk without any modification to your current program. Other files can be created using C. Itoh's FORTRAN-callable libraries program. Additional information is available by contacting C. Itoh at One Maritime Plaza, San Francisco, CA 94111; (415) 391-2510; or stop by Booth No. 2020.

**Enter 921 on reader card**

### Compu-Share To Show Accounting Software

Compu-Share, Inc. will demonstrate its tailorable accounting software at DEXPO West. The system is highly interactive and consists of: general ledger, accounts payable/receivable, payroll, order entry, inventory control, job cost and fixed assets. A preview of the new CSI purchase order systems will be demonstrated.

All packages are offered on the MicroVAX II version of A to Z plus, MicroRSTS, RSTS/E, MicroVMS and MicroPDP-11. The average price per package is \$3,000.

For more information, contact Compu-Share, 3824 50th St., Lubbock, TX 79413; (806) 792-3785; or stop by Booth No. 117.

**Enter 924 on reader card**

### CI Announces On-Line Access

Computer Intelligence (CI) has added On-Line Access to its VAX Lead Qualification Program (VAX LQP), a database that contains information on computer equipment at DEC sites in the U.S. and Canada.

Companies that market DEC compatible products can use data extracted with On-Line Access to perform a variety of target marketing functions. You can analyze buying intentions, develop telemarketing and direct mail campaigns, identify competitive sales situations, generate custom prospect



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lists, perform product planning, and more. CI provides custom reports based on client needs and specifications.

Find out more by contacting Computer Intelligence Corporation, 3344 North Torrey Pines Court, La Jolla, CA 92037; (619) 450-1667; or stop by Booth No. 2149.

**Enter 923 on reader card**

### Eastcom To Spotlight Syncra Software

Eastman Communications (Eastcom) will demonstrate its Eastcom Syncra data communications software at DEXPO West. Syncra software can be operated in SNA (Systems Network Architecture)/SDLC (Synchronous Data Link Control) and BSC (Binary Synchronous) environments. Nine distinct software packages allow linkage between DEC and IBM equipment without purchasing additional hardware. The software enables the error-free transmission, validation and reception of documents and files among multiple computer environments anywhere in the world.

Eastcom plans to demonstrate local and

remote connectivity among a number of different DEC and IBM configurations to show ease of document and file transfer.

Additional information can be obtained by contacting Eastman Kodak Company, 343 State St., Rochester, NY 14650; (716) 724-4731; or stop by Booth No. 1014.

**Enter 926 on reader card**

### 16-MB Memory Released For MicroVAX II

Chrislin Industries, Inc.'s new 16-MB memory for the MicroVAX II computer system puts 16 MB on a single card, a first in the microcomputer market.

The most important contributing factors behind the design of this module are that the board consumes less backplane slots and less power consumption.

The word size is 32 bits. Operating temperatures are 0-70 degrees C noncondensing. The board is 100 percent hardware and software compatible with the MicroVAX II.

For further information, contact Chrislin Industries, Inc., 31352 Via Colinas, #101,

Westlake Village, CA 91362; (818) 991-2254; or stop by Booth No. 1633.

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### PSI To Display Subsystems

Peripheral Services, Inc. (PSI) will exhibit its storage-expansion subsystems (high performance/small-to-large capacity disk and tape subsystems include controller, cables, cabinet and installation).

The subsystems are available for VAX, MicroVAX, Q-bus and PDP-11 (\$4,975-\$27,035) communication controllers and multiplexers.

Learn more by contacting Peripheral Services, Inc., 14215 Proton Dr., Dallas, TX 75244-3606; (214) 788-1782; or stop by Booth No. 1229.

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### Cambridge Joins List Of Exhibitors

Cambridge Digital Systems, a DEXPO West exhibitor, offers complete packaged systems specializing in data acquisition, office net-

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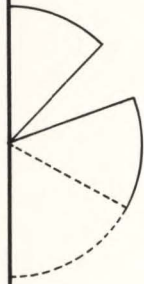
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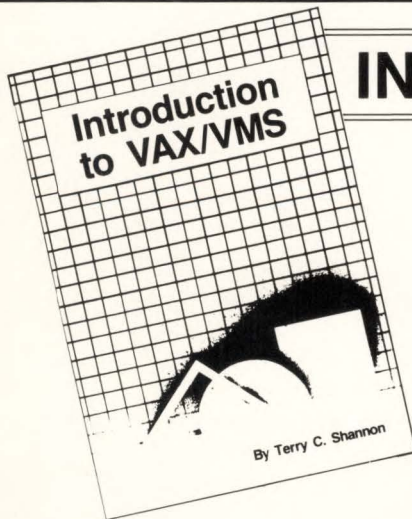
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## INTRODUCTION TO VAX/VMS

*Introduction to VAX/VMS* is a 312-page comprehensive overview of the VAX environment intended for users of all levels of experience who need to use VAX/VMS. No prior knowledge of computer systems or programming is needed to use this handbook effectively.

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plements the documentation available from Digital Equipment Corporation, bringing together in a single volume information contained in numerous reference manuals.

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working, process control, software development, UNIX systems, and custom system requirements.

The systems are based on MicroVAX II, LSI-11/73, PDP-11, including the new PDP-11/84 and other VAX processors. UNIX is available as System V/release 2, Berkeley UNIX 4.2 and System III/Version 7. All systems can be purchased with complete software.

Find out more by contacting Cambridge Digital, 23 East Street, Cambridge, MA 02141; (617) 577-8888. Telex: 92-1401. Visit Booth No. 804.

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### FlexLINK To Announce IBM/MVS Connection

FlexLINK International Corp. will demonstrate its IBM-to-VAX connectivity software at DEXPO West.

You can visit the FlexLINK Booth, 1731, for a hands-on demonstration at a VT220 terminal of FlexLINK's full screen 3278 terminal emulation.

Contact the company for more information at Washington Technical Center, 711 Powell Avenue S.W., Renton, WA 98055; (206) 228-8980. Telex 5101008155 FLEXLINK.

**Enter 935 on reader card**

### Signal Enhances SMARTSTAR, OMNIBASE

Signal Technology, Inc. has announced new releases of its SMARTSTAR and OMNIBASE application development and information management products for VAX systems.

The Version 5.0 release will incorporate both interactive and programmable Structured Query Language (SQL) capabilities, along with an integrated, interactive SQL report writer.

SMARTSTAR prices range from \$5,000 for the MicroVAX II to \$30,000 for the VAX 8600. OMNIBASE is priced from \$21,000 to \$50,000.

For more information, contact Signal Technology at 5951 Encina Road, Goleta, CA 93117; (805) 683-3771; or stop by Booth No. 1410.

**Enter 936 on reader card**

### Pennington To Show Translation Services

Pennington Systems, Inc. will show its new assembler-to-C program translation service at DEXPO West.

Pennington provides translation services through the use of a programming language translation utility it has developed called XTRAN. The initial implementation of XTRAN translates assembly code to the C programming language. XTRAN currently supports translation of assembly code for the

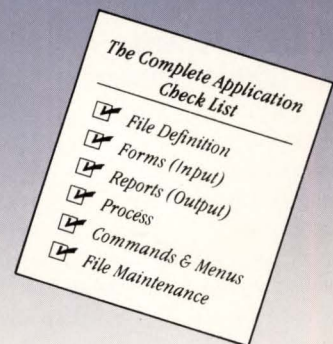
PDP-11 and VAX-11 computers.

Additional information can be obtained from Pennington Systems, Inc., 65 South Main Street, Building C, Pennington, NJ 08534; (609) 737-2727. Telex 136 479 (attn: 357). Cable PSIUSA. Visit Booth N0. 2113.

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## Joiner Announces Jnet V3.0

Joiner Associates will release its VAX/VMS Jnet V3.0 networking software for VAX/VMS to IBM/VM communications in September.

Jnet permits file transfer, electronic mail exchange, and interactive communication on a peer-to-peer basis.

It emulates IBM's RSCS networking protocol, allowing VAX systems to become full routing members of IBM store-and-forward networks.

Jnet runs under VMS version 4 on VAX and MicroVAX systems, and is priced by VAX model; license fees range from \$6,000 to \$19,500.

For additional information, contact Joiner Associates, Inc., 3800 Regent St., P.O. Box 5445, Madison, WI 53705-0445; (608) 238-8637. Telex: 650-110-6813. Stop by Booth No. 1846.

**Enter 928 on reader card**

## MCBA To Feature VAX COBOL Software

At DEXPO West, MCBA, Inc. will feature its newest VAX COBOL package, Fixed Assets and Depreciation, running on DEC computers under VMS.

Written in COBOL, the new Fixed Assets and Depreciation (A/D) package handles the basic accounting functions for asset acquisition, asset retirement and periodic calculation of depreciation. A/D supports up to nine sets of independent books and all commonly used depreciation methods, including ACRS.

Suggested retail prices for source code licenses of MCBA VAX COBOL software packages range from \$3,000 to \$6,000 for use on the first computer, depending on the specific model in use.

For more information contact, MCBA, Inc., 425 W. Broadway, Glendale, CA 91204; (818) 242-9600. Telex: 19-4188. Stop by Booth No. 1704.

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## Information Network Opens For DEC Users

Global Villages, Inc. has opened DIGITAL VILLAGE, the first worldwide information network for users and providers of DEC and DEC-compatible products.

Accessible with any modem-equipped computer by local phone call from thousands of cities worldwide, DIGITAL VILLAGE

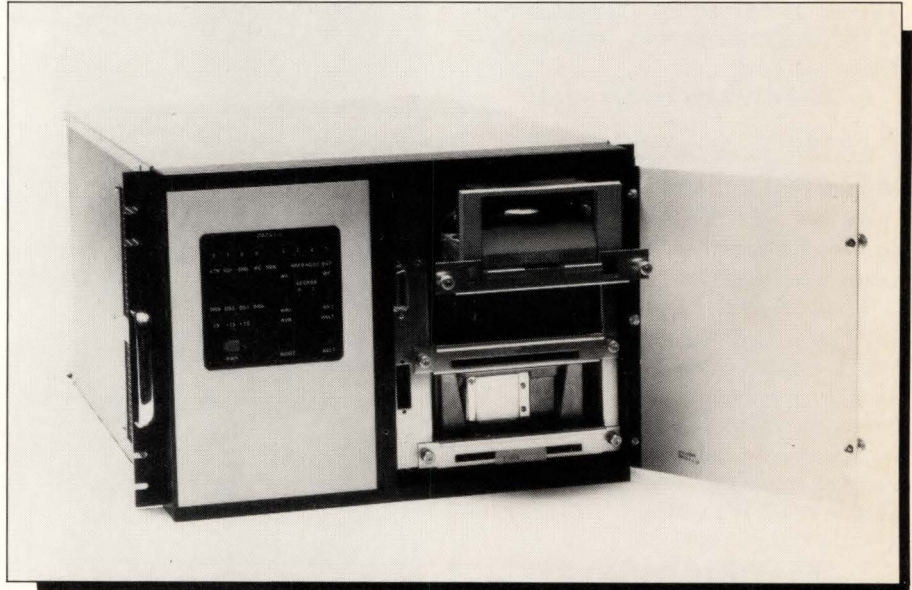
brings together hundreds of services in one place, 24 hours a day, 365 days a year. It offers interactive catalog purchasing of software and equipment, online special interest groups for VMS, RSX, RSTS, TOPS and 10 other areas of specific interest, downloadable software, and many other features designed for particular applications and operating environments.

For more information, contact Global

## Sigma To Feature SA-H155

Sigma Information Systems will exhibit its new SA-H155 12-1/4-inch high ruggedized industrial system enclosure with mounting for three removable media drives at DEXPO West.

The enclosure is designed so that each component is rugged and adapted to applications wherein an entire computer system may



*Sigma Information Systems will exhibit its new SA-H155 industrial system enclosure at DEXPO West in San Francisco.*

Villages at One Kendall Square, Cambridge, MA 02139; (617) 494-0189; or stop by Booth No. 1102.

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## Attendees To View VAX 8650 Memory

EMC Corp. will exhibit its 16-MB memory array compatible with the VAX 8650 computer systems at DEXPO West.

EMC's 16-MB array is the first commercially available memory board in the industry to utilize 1-Mbit technology. It enables the VAX 8650 and 8600 computers to address up to 128 MB.

For more information on EMC's VAX-compatible product line, customers can visit Booth No. 300 or contact EMC Corp. at Natick Industrial Centre, 12 Mercer Road, Natick, MA 01760; 1-800-222-EMC2 (in Massachusetts, (617) 655-6600). In Europe, contact EMC Corp. at 1 The Crescent, Woldingham, Surrey, CR3 7AO, England; 44 88 385 2434 (in the U.K., 08 8385 2434).

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be subjected to conditions of shock, vibration, dust, dirt and high ambient temperatures.

Price of the SA-H155 is \$4,500. Quantity discounts are available.

For more information, contact Sigma Sales at 3401 E. La Palma Avenue, Anaheim, CA 92806; (714) 630-6553. Telex 298607 SGMA. Visit Booth No. 118.

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## Subsystem Enhances PDP-11 Performance

The Cluster-11, from Cluster Technology Corp., is designed to enhance the performance of the PDP-11 series of minicomputers. The subsystem provides increased throughput and job support to RSTS/E users while preserving their investment in software.

The Cluster-11 will be shown at DEXPO West in Booth No. 1641, or for more information, contact Cluster Technology Corp. at 12 Alfred Street, Woburn, MA 01801; (617) 935-4344.

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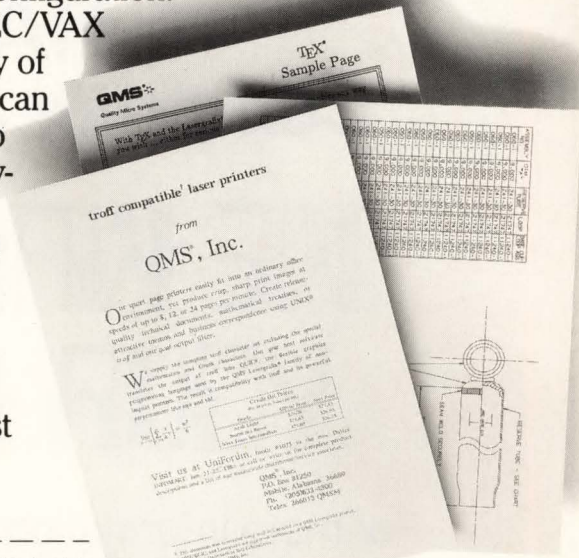
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## Dyna Five To Display Communication Boards

Dyna Five Corp. will have its full line of Q-bus compatible communication boards on display at DEXPO West.

Presented will be the D5-CI101-16 communication interface, the D5-CI101-8 communication interface, the D5-CI100-8 serial communication interface, and the D5-CI100-4 serial communication interface.

In addition, Dyna Five will present a new line of memory boards for the MicroVAX I and II systems, enclosures, power supplies, backplanes, and Q-bus expanders.

Additional information may be obtained from Dick Stoner, Dyna Five Corp., 3421 W. Segerstrom Avenue, Santa Ana, CA 92704; (714) 751-0133; or stop by Booth No. 1136.

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## Clearpoint Offers DEC-Compatible Memory

Clearpoint, Inc.'s most recent product announcements include the VXR8600 series,

offering 16-MB or 4-MB memory capacity, and the QRD RAM DISK.

The VXR8600 memory cards support Error Detection and Correction and are completely hardware and software compatible with the VAX 8600 and 8650. The QRD RAM DISK offers 4 to 64 MB of RAM DISK for the MicroVAX II.

For more information, contact Greely Summers, Marketing Manager, at 99 South Street, Hopkinton, MA 01748; (617) 435-5395; Telex: 298281; or stop by Booth No. 1241.

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## Toolkit To Be Unveiled At DEXPO Show

EXPERTWARE, Inc. will introduce its new Documentation Support Toolkit (DST) at DEXPO West.

DST helps users to develop, systematically record, and accurately document all information generated in major software development projects. Using DST, software developers can keep close track of changes during creation of a product and provide

finished documentation at the time the software is ready for delivery.

Documentation Support Toolkit is available for installation 30 days after order. Price of basic DST is \$20,000 for the multiuser version.

For more information, contact EXPERTWARE at 2685 Marine Way, Suite 1209, Mountain View, CA 94043-1125; (415) 965-8921; or stop by Booth No. 2034.

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## New Terminals Released For Application Needs

Human Designed Systems will exhibit its new family of DEC and Tektronix compatible terminals at DEXPO West. The six new members of its HDS2000 Series provide a full range of compatible terminals — ANSI standard, APL, medium- and high-resolution graphics — to meet the application needs of engineering, scientific, and business organizations.

The new terminals are the HDS2200 Video Display Terminal, the HDS2200G Video Graphic Terminal, the HDS2200GX

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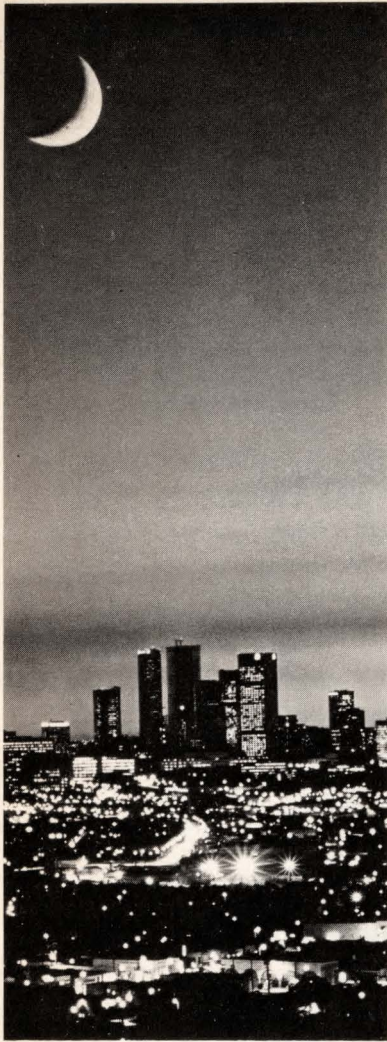
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October 7-10, 1986

Tuesday - Friday

10:00 a.m. to 4:00 p.m.

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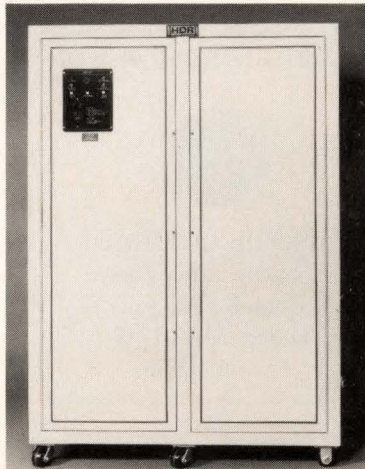
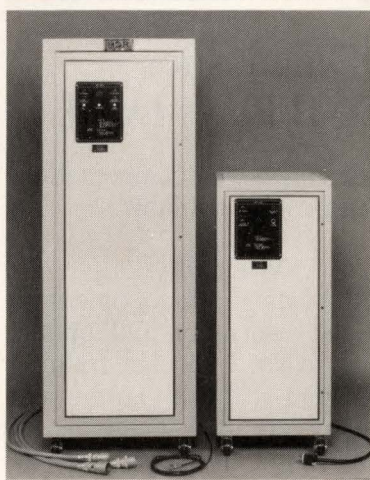
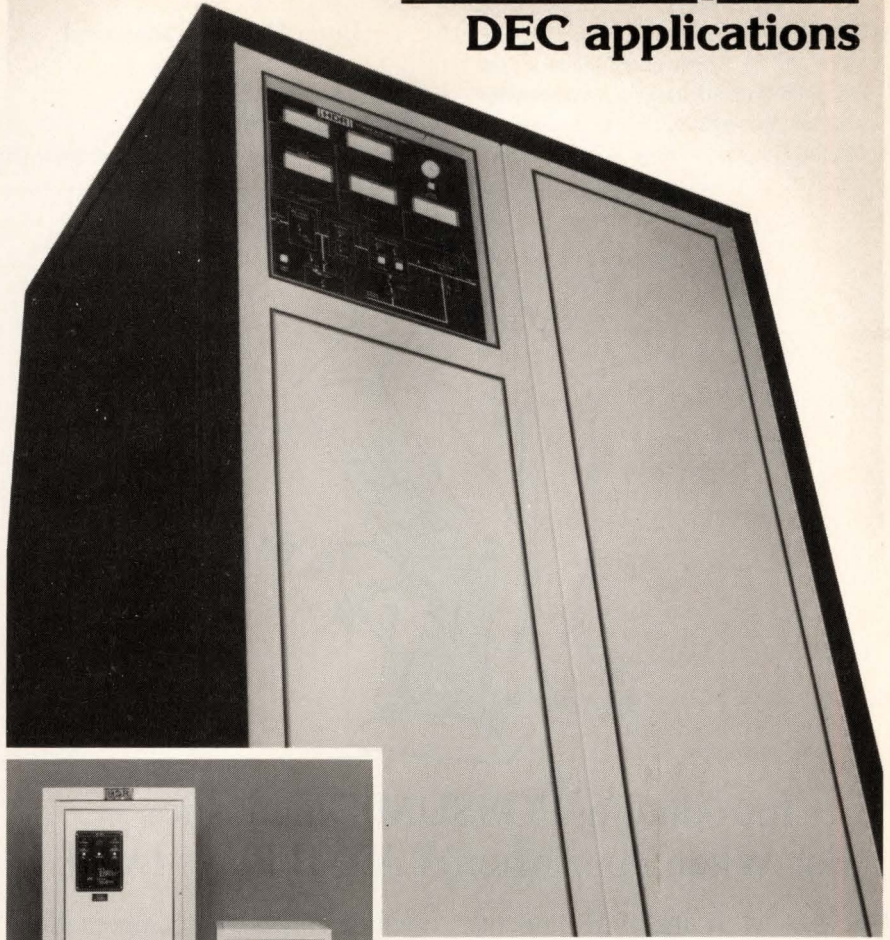


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Philadelphia, PA 19104; (215) 382-5000; or stop by Booth No. 1514.

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### Access Announces New 20/20 Version

Access Technology, Inc. will demonstrate the

newest release of 20/20 at DEXPO West in San Francisco.

Enhancements to 20/20 include optional letter/number cell notation, advanced macro capabilities, cell naming, and interfaces to industry-standard database programs.

20/20 runs on the VAX, MicroVAX, Rainbow and Professional Series.

For more information, contact Access at Six Pleasant Street, South Natick, MA 01760; (617) 655-9191; or stop by Booth No. 2024.

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### CDSA Specializes In VAX Products

C.D. Smith & Associates, Inc. (CDSA) will be offering specially priced VAX systems and options to qualified buyers at DEXPO West.

CDSA specializes in the VAX product line and buys, sells, rents and appraises VAX systems, options and CPUs. CDSA maintains an extensive inventory of VAX related items.

For more information, contact CDSA at 12605 E. Freeway, Suite 318, Houston, TX 77015; (713) 451-3112; or visit Booth No. 109.

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### DIGICALC Updated To Version 1.4

WHY Systems, Inc.'s version 1.4 of the electronic spreadsheet DIGICALC is available for the RSTS/E operating system.

Two new functions give DIGICALC word processing features. New paging and search functions make it easier for DIGICALC users to move around in a worksheet. Other new features include: goal seeking, list calculate, resizing spreadsheets, intelligent windows, and batch control.

For more information, contact WHY Systems, Inc. at 10607 N.E. 38th Place, Kirkland, WA 98033; (206) 822-3140; or stop by Booth No. 824.

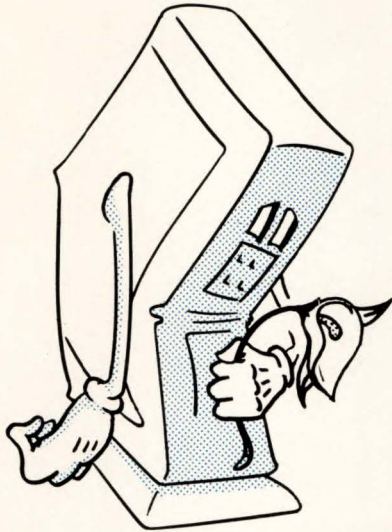
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### DDS Adds To Product Line

Digital Data Systems, Inc. (DDS) will be showcasing its newly introduced 4-MB and 16-MB memory boards for the VAX 8600 and 8650, as well as its new 8-MB board for the MicroVAX II at DEXPO West.

All DDS boards carry a five-year warranty and 24-hour repair replacement guarantee.

For more information, contact Digital Data



## Introducing POSSUM Diagnostics - For When Your MicroVAX-II Plays Dead.

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Emulex's CS41 uses a high speed 1.544 mbps T1 interface to link up to six 24-line remote distribution panels to the host controller board. This greatly reduces your cabling costs and simplifies installation, since only a single cable is required between the host and remote distribution panels instead of up to 144 individual user cables. Up to six clusters of 24 terminals can be connected to the host, with up to 5000 ft. of total cable length. Ring networks exceeding 5000 ft. total cable length can be easily configured with multiple 24-line remote panels, with minimum restrictions. CS41 is DS1 signal compatible and can be interfaced to microwave, infrared and fiber optic equipment.

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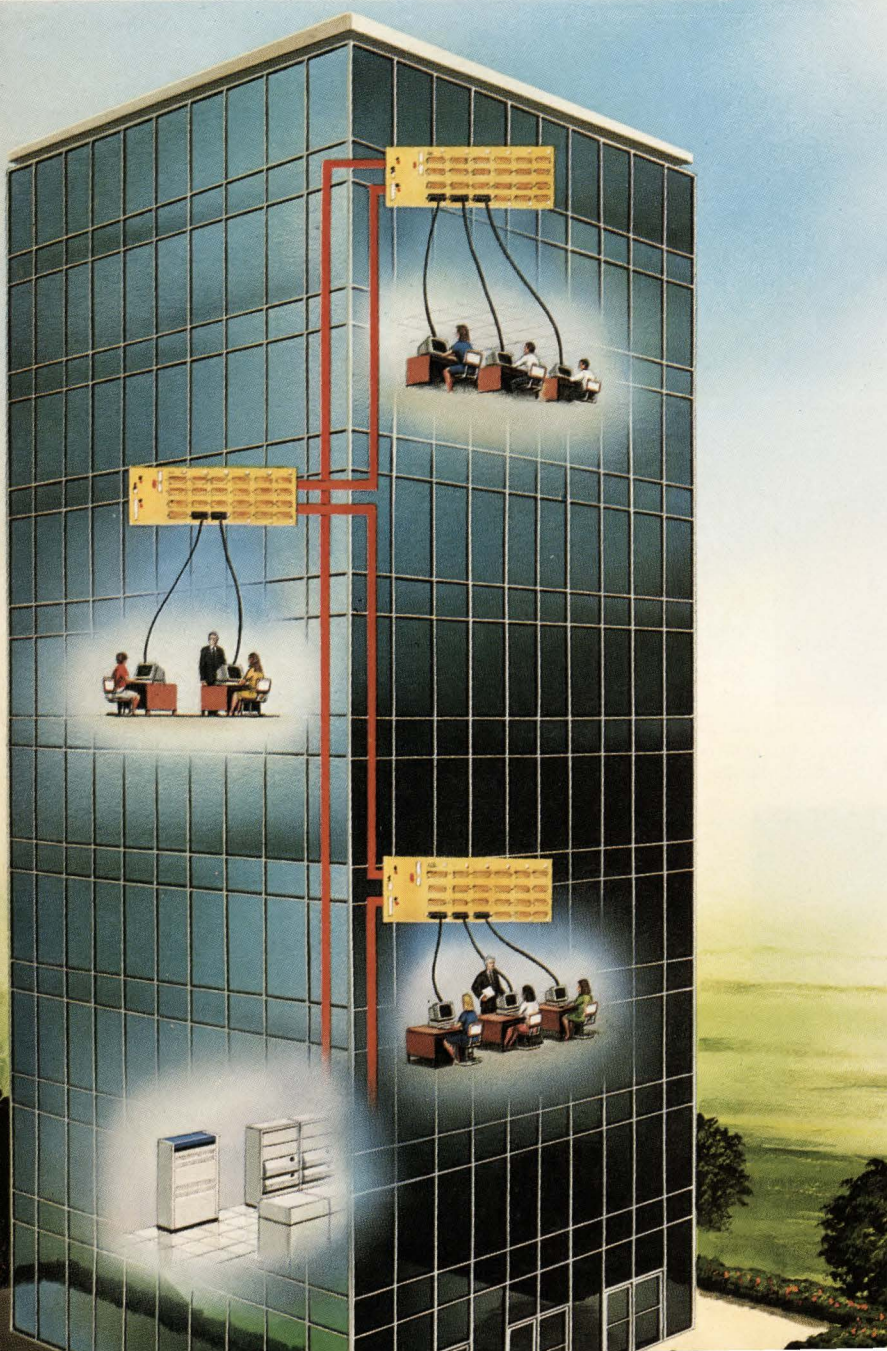
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Systems, Inc. at 1551 N.W. 65 Avenue, Plantation, FL 33313; (305) 792-3290; or stop by Booth No. 1524.

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## TECEX To Unveil Archiving Subsystem

At DEXPO West, TECEX will introduce its

TEC-OAS/1 Optical Archiving Subsystem for the VAX Series of architectures, from the Q-bus MicroVAX II on up to the UNIBUS 8650 Series of processors.

Utilizing a standard MSCP/DUDRIVER and FILES-11 QIO processor, the TEC-OAS/1 can be utilized as a standard VMS ODS-2 File Structured device. No

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For further information, contact TECEX at P.O. Box 6086C, Anaheim, CA 92806; (714) 632-6672; or stop by Booth No. 1411.

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## BellSouth Chooses CARE/DM Software

BellSouth Advanced Systems, Inc. has signed an exclusive marketing agreement with Care Information Systems, the manufacturer of the CARE/DM system, a healthcare software package.

DEC hardware and the CARE/DM multiuser, multispecialty system can serve the solo practitioner as well as group practices of two to 100 or more physicians, dentists or other healthcare providers with the same full featured system. CARE/DM software runs DEC computers from the MicroPDP line through the VAX 8600 series.

For more information, contact BellSouth Advanced Systems, Inc. at 505 North 20th Street, Suite 850, Birmingham, AL 35203; 1-800-235-5273; or stop by Booth No. 111.

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## Software Frees PC Users

Walker Richer and Quinn's enhanced Reflection 2 and Reflection 2 Plus DEC VT220 terminal emulation/communications software frees IBM PC users to continue with other DOS programs during file transfer and backup.

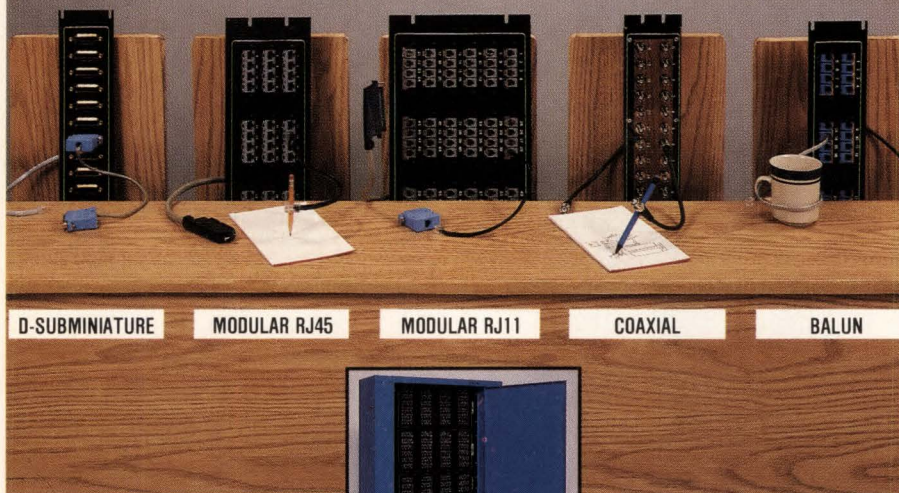
Reflection 2 and Reflection 2 Plus require an IBM PC or compatible with 256K bytes of memory, DOS 2.0 or later and at least one serial port. Reflection 2 Plus adds an exclusive file backup feature to the program.

Companion file transfer software for use on the VAX minicomputer and most UNIX systems is included as uploadable object code. Reflection 2 costs \$199 and the Plus version costs \$249.

For more information, contact Walker Richer and Quinn at 2825 Eastlake Ave. E., Seattle WA 98102; (206) 324-0350; or stop by Booth No. 1724.

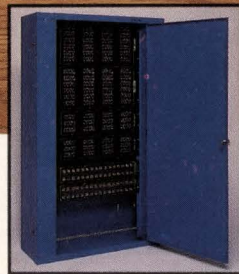
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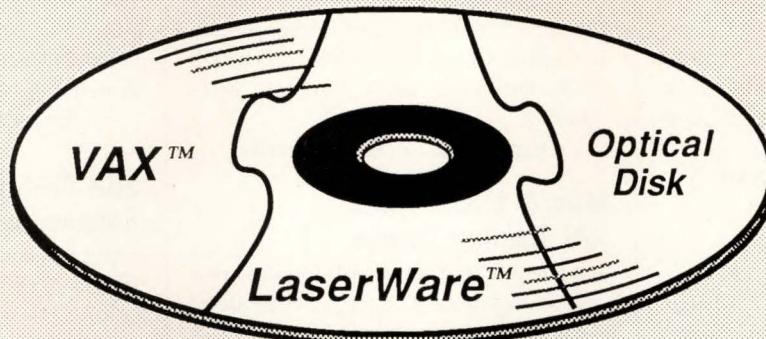
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## System Managers To View Quantum RS

CIS will demonstrate Quantum RS to system managers at DEXPO West. The menu-driven VAX resource management package performs resource accounting, department and project level accounting, budgeting and chargeback, performance analysis, capacity planning and session accounting.

Quantum RS is priced starting at \$2,500 for a single MicroVAX II, to \$12,000 for a VAX 8800.

For more information, contact CIS at 165 Bay State Drive, Braintree, MA 02184; (617) 848-7515. Telex 4996932. Visit Booth No. 1532.

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## OPTIFILE II Offers New Features

KOM's latest version of OPTIFILE software, OPTIFILE II, is device driver software that allows DEC computers to treat an optical "Write Once, Read Many" (WORM) disk drive as a regular magnetic disk.

Features include: no changes to user software; DEC RMS file structure support; direct write to disk; and no preallocation of disk space.

A complete OPTIFILE II subsystem sells for \$18,600.

For more information, contact KOM at 14180 W. 78th Street, Suite 120, Eden Prairie, MN 55344; 1-800-267-0443. Telex 00-290422. Visit Booth No. 613.

**Enter 949 on reader card**

## SMS To Introduce Industry First

The first DEC-Compatible MSCP triple controller for fixed disks, floppy disks and tape will be unveiled by Scientific Micro Systems (SMS) at DEXPO West.

The new product, the SMS 0108 controller, is designed for MicroVAX II and LSI-11 CPUs and supports ESDI and ST412-type Winchester disk drives.

The SMS display will be located at Booth No. 1316, or for more information, contact SMS at 339 N. Bernardo Avenue, Mountain View, CA 94043; (415) 962-5459.

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## GRAFkit Released For VAX Systems

ICEX, Inc. has released GRAFkit, a new low-cost graphics package for use with the MicroVAX II and MicroVAX II workstation.

The package, which can be used with large VAX systems, sells for \$2,500.

GRAFkit is an integrated system of high level utilities for presenting data visually through graphics in the VAX/VMS and MicroVAX/MicroVMS environments. Its functions are oriented toward organizing large amounts of numerical data and producing concise visual representations of this data. GRAFkit can be seen at DEXPO West at Booth No. 520, or for more information, contact ICEX at 740C South Pierce Avenue, Louisville, CO 80027; 1-800-222-ICEX; (303) 666-5400 (in Colorado). Telex 292-682.

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## Mini & Micro Offers A/V Training Course

Mini & Micro Educational Services' new audio/visual training course is being offered at the introductory price of \$1,500. VMS for the Timeshare Programmer is designed for a programmer who currently is programming on another machine and will be moving to the VAX/VMS operating system.

For more information, contact Mini & Micro Educational Services at 1030 Congress Street, Portland, ME 04102; (207) 773-0316; or stop by Booth No. 1045.

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## MDB Systems Releases RCS-P

A rack-mountable ruggedized peripheral subsystem by MDB Systems, Inc. is for users of commercial, ruggedized, and militarized DEC and DEC-compatible Q-bus and MicroVAX II computers. The subsystem, RCS-P, is another product in the family of MDB Ruggedized Computer Systems.

List price for the RCS-P with controllers starts at \$19,630 depending upon the type of peripheral devices selected. Delivery is six to eight weeks ARO.

For more information, contact MDB Systems at 1995 North Batavia Street, Orange, CA 92665; (714) 998-6900. TWX 910-593-1339. Visit Booth No. 1114.

**Enter 954 on reader card**

## General Robotics Adds To PYTHON Family

General Robotics Corp. (GRC) expanded its Q-bus product line into the UNIX world with the introduction of the PYTHON/32B, an ultra-high performance, 32-bit super-minicomputer. Now GRC has added two

new products: the PYTHON/JR and the SUPER PYTHON.

The PYTHON/JR and the SUPER PYTHON are multiuser UNIX engines for the DEC Q-bus. Each utilizes National Semiconductor's high-speed microprocessing chips and runs AT&T's UNIX V operating system. All PYTHON Family CPUs drive standard Q-bus peripheral controllers. For more information, contact GRC at 23 South Main Street, Hartford, WI 53027; (414) 673-6800. In the U.S. call toll-free 1-800-742-5264. Telex 6713838 GRCUSA. Visit Booth No. 1605.

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## ESP 6515 Offers Enhancements

Esprit Systems, Inc. will feature the enhanced ESP 6515, a DEC VT220 emulation terminal, at DEXPO West.

The ESP 6515 emulates the DEC VT220 while maintaining full compatibility with all DEC VT100 application software. It operates with the DEC System 10/20 accounting/database package and the DEC PDP-11 data inquiry application.

The enhancements include a 14-inch green or amber monitor with tilt/swivel display, improved keyboard ergonomics, full support of the VT100 graphics/national character sets and enhanced function keys. The list price is \$629.

For more information, contact Esprit Systems at 100 Marcus Drive, Melville, NY 11747; (516) 293-5600 or 1-800-645-4508; or stop by Booth No. 2006.

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## EXOS-8016-01 Serves Academic Environments

Excelan, Inc.'s new TCP/IP Network Software product for the IBM RT PC, the EXOS 8016-01, provides high-speed RT PC-to-host communications over an Ethernet network.

EXOS 8016 runs on IBM's AIX operating system — a UNIX System V superset designed to serve CAD/CAE/CAM and academic environments. The software works with Excelan's EXOS 205 Intelligent Ethernet Controller to provide PC networking solutions for both OEMs and end users. For more information, contact Excelan at 1800 Embarcadero Road, Palo Alto, CA 94303; (415) 494-2030. Telex 348395 McKenna Pla. Visit Booth No. 1436.

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## DISKIT/VMS Runs On Entire VAX Line

Software Techniques, Inc. has released DISKIT/VMS V4.4 for VAX computers. DISKIT/VMS is a system software package that offers VAX system managers and programmers a solution to disk fragmentation and other system performance problems.

DISKIT/VMS for a VAX is priced at \$3,900 and \$2,900 for the MicroVAX II. Multiple CPU licenses, volume discounts, and educational discounts are available.

For more information, contact Software Techniques at 6600 Katella Avenue, Cypress, CA 90630; 1-800-I-BUY-STI; or stop by Booth No. 1222.

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## Softool To Show Capabilities

Softool Corporation will demonstrate the newest version of its popular Change and Configuration Control Environment (CCC) at DEXPO West.

In addition, Softool will demonstrate its Programming Environment (PE) for FORTRAN, COBOL, and C, as well as its FORTRAN Automatic Conversion Tools (FACT).

For more information, contact Softool Corporation at 340 South Kellogg Avenue, Goleta, CA 93117; (805) 964-0560. Telex 658334. Stop by Booth No. 812.

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## Pulizzi To Introduce PC 300 System

Pulizzi Engineering, Inc. will introduce a state-of-the-art three-phase Z-LINE Power Distribution and Control System. The PC 300 (24 amps per phase) is 3.5 inches high, 12 inches deep (2.5 inches recess mounted) and 19 inches rack mounted with Adjustable Mounting Capability.

MULTIPLE TIME DELAY is available to sequence power up each phase with a controlled delay in order to prevent High Inrush Current problems. Six remote I/O connectors will provide remote on/off, emergency shut down, and the ability to power up additional controllers and equipment down line. Independent remote control over each phase as well as sequenced delayed remote control is available.

For more information, contact Pulizzi Engineering at 3260 S. Susan Street, Santa Ana, CA 92704; (714) 540-4229; or stop by Booth No. 1910.

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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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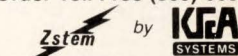
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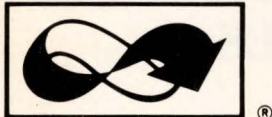
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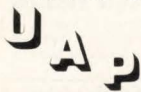
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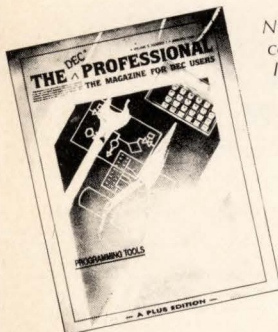
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# ADVERTISERS INDEX

Reader Service Number	Page	Reader Service Number	Page
286...Able Computer.....	27	82...Human Designed Systems.....	9
132...ABS Associates.....	118	175...Information Dimensions Inc.....	112
156...Access Technology.....	49	229...Information Dimensions Inc.....	113
2...ACS.....	154	33...Interactive Systems, Inc.....	153
262...Alisa Systems.....	138	34...Interactive Technology.....	157
272...Ambase International.....	104	98...Intersecting Concepts.....	115
200...APTtools.....	161	304...Intra Computer.....	104
88...BLAST/Communications Research Group.....	134	ITRON.....	20
281...C. P. International.....	19	256...ITRON.....	21
9...Camintonn/AST Research.....	28-29	91...James McGlinchey.....	151
305...Canalta.....	81	280...Kinetic Systems Corporation.....	25
10...CARE Information Systems.....	170-171	96...Lanpar Technologies.....	122-123
282...CASIO.....	73	99...Logicraft.....	177
11...CCRI.....	156	297...MegaTape Corp.....	61
292...Certified Equipment Sales.....	169	39...Meridian Technology Corp.....	77
12...Chrislin Industries, Inc.....	150	239...MICOM Interlan.....	8
223...CIE Systems, Inc., Image Group.....	42	41...Midwest Systems.....	155
100...Clearpoint.....	83	43...MTI Systems Inc.....	59
Cognos.....	INSERT	73...National Semiconductor.....	133
13...Collier-Jackson, Inc.....	47	219...Nevada Western.....	166
287...Computer Information Systems.....	43	166...Newman Computer Exchange.....	111
216...Computertime Network Corp.....	172	148...Nissho Electronics.....	53
78...Contel Information Systems.....	103	289...Node Electronics.....	114
237...Control Data Corp.....	97	72...Oasys.....	126
217...Datability Software Systems, Inc.....	3	Oracle.....	13
14...Dataram Corp.....	128-129	47...Park Software.....	169
218...Dataserv Parts.....	36	296...Parse Inc.....	164
120...Dataware, Inc.....	154	80...Perceptics Corp.....	167
16...DEC, Peripherals and Supplies.....	98-99	48...Peritek Corp.....	64
86...Dexcomp.....	135	160...Persoft, Inc.....	7
DEXPO.....	162	50...Polygon, Inc.....	75
122...Digital Data Systems.....	131	Professional Press.....	156
149...Dilog.....	144-145	52...Pulizzi Engineering.....	147
74...Dynalectron Service Network.....	85	89...Quality Micro Systems.....	159
125...EEC Systems, Inc.....	65	SAS Institute, Inc.....	105
21...EMC Corporation.....	69	SAS Institute, Inc.....	107
22...Emulex Corp.....	I.F. Cover	79...Scherers.....	87
23...Emulex Corp.....	165	260...Signal Technology.....	51
24...Emulex Corp.....	10-11	54...Software Techniques.....	89
25...Equinox Systems.....	4	214...SOLVEware Systems, Inc.....	I.B. Cover
180...Evans, Griffiths & Hart.....	55	56...Stone Mountain Computing.....	137
301...Everest Electronics.....	B. Cover	44...Syntronics.....	52
81...Fasbe Group.....	71	284...Syntax.....	143
127...GABA.....	109	136...Talaris Systems Inc.....	17
294...Gems Education & Management Service.....	114	259...Televideo Systems, Inc.....	14-15
222...General Robotics.....	127	205...TRW.....	151
211...GraphOn Corp.....	37	65...Unitronix.....	139
109...Hamilton.....	142	VAX Professional.....	115
231...Hamilton.....	160	67...Whitesmiths Ltd.....	125
255...HDR Power Systems.....	163	52...Z-Line.....	147

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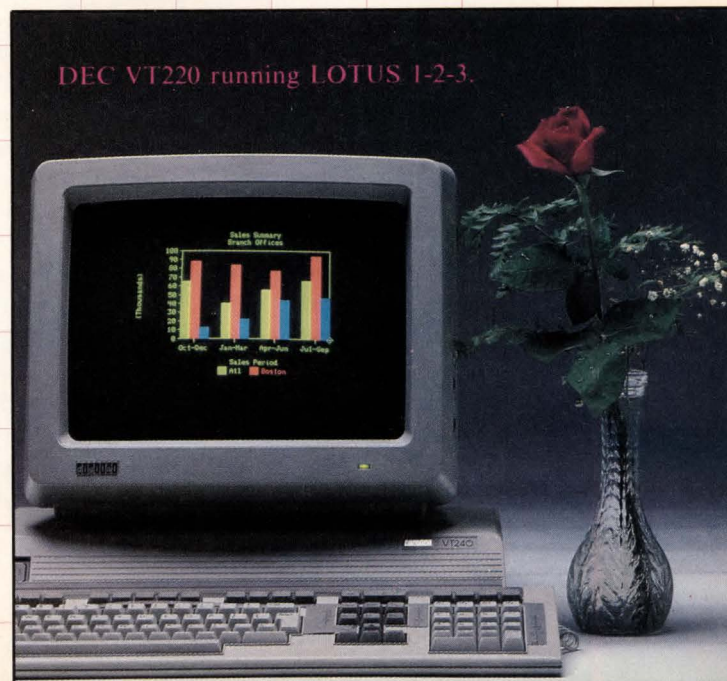
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By John C. Dvorak

# Dear NCC, Get Your Act Together!

"You write too many columns," an ex-editor and a fellow columnist berated me as we sat at a table at the Regis McKenna party during this year's NCC. If my column production was the only thing to talk about at NCC, then I knew something was wrong. Soon the discussion degenerated into an argument over who made the most money and nearly further degenerated into a food fight!

NCC was an incredible dud. It was obvious to everyone that somewhere along the line AFIPS (promoters of NCC) and their once-arrogant attitude towards everyone and everything (especially microcomputers) had resulted in a voodoo hex that may be impossible to remove.

While some observers saw the show as symbolic of some sort of industry depression, I saw it as a good sign. People didn't go because they simply had better things to do with their time than attend an unfocused show where you weren't even allowed to conduct business. At NCC you can't sell products, take orders or even recruit personnel. Life is too short for shows like this.

Before the show began, it was a foregone conclusion that there would be nothing there. DEC wasn't there. Data General wasn't there. Prime wasn't there. Apple wasn't there. Lotus wasn't there. Microsoft wasn't there. As far as microcomputers were concerned, this once-snubbed group said farewell. Only IBM, AT&T, Epson, Zenith and a bunch of Japanese companies bothered to show their stuff.

Regarding attendance, the best estimates always come from the cabbies.

The consensus was 20,000, if that many. My guess is that most of them were reporters. This is a far cry from the mobs that used to pack this show in the good old days back when it was in Houston or New York or Anaheim.

This disaster started months ago. One too many guys was telling one too many friends that they weren't going to this year's NCC because there would be nothing there. This became a self-fulfilling prophecy, no thanks to all of the bad publicity created by the AFIPS/NCC management.

Meanwhile, over the years, one big company after another dropped out. This gave people the impression that NCC was a sinking ship. The fact is that a show like this *has* to have DEC, Data General, Prime, Control Data, Floating Point Systems and even Cray as exhibitors. There are plenty of others who should be there, too. They're not there, though, because the show does them no good.

Then there's the bad blood from recent shows. Like the one in Anaheim where NCC spread into hot makeshift tents, and participants were dropping like flies because of the heat. Some exhibitors demanded their money back, or some recompense. A feud ensued, and lawyers threatened suits.

After a few more shows with waning attendance, someone discovered the big unanswered question: Exactly what is the point of NCC in the 1980s?

Listen to this — here is the quote from the cover of the program guide to this year's NCC: "Dynamic Dimensions of Computing: Implications For Management, Professionals and Users." Now, does that sound like garbage or what?

Somehow, this meaningless drivel was taken seriously. The concept was so

nebulous and eclectic that somehow the NCC organizers thought it would be all things to all people. Program chair, Addie Mattox, said in her exhibit guide message, "The committee's premise was that the NCC technical program should attract a diverse audience — researchers, data processing professionals, executives, scientists, educators, end users, product developers, business managers, salespeople, to name a few." Her list of who the show would attract almost outnumbered the attendees. Who are they kidding?

Then, she outlines the themes to be covered at the show: management issues (whatever that means), industry trends, controversial subjects (whatever that means), software, networking, hardware, artificial intelligence, end user computing, case studies, educational and societal issues. Do you sense a genuine lack of focus?

The biggest joke of the show, though, was NCC's Products Of The Year awards. This was the first year of such awards and further reflected the peculiar focus. These awards were aimed right at the microcomputer manufacturer for some unknown reason. The hardware product of the year went to the Plus Development Hardcard! The software product of the year went to *Filevision*, a software package for the Macintosh. Come on, is this the best we can do? This is mind-boggling when you consider the announcement of equipment like the CRAY-2 or the MicroVAX II. Who picked these things, a bunch of high schoolers?

My advice to the promoters of NCC: Get your act together!



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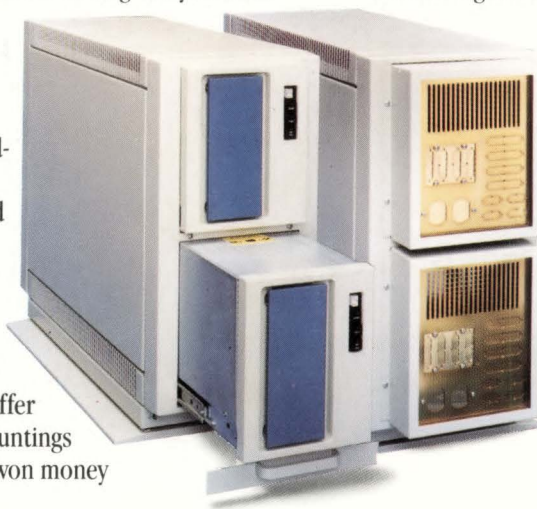
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