

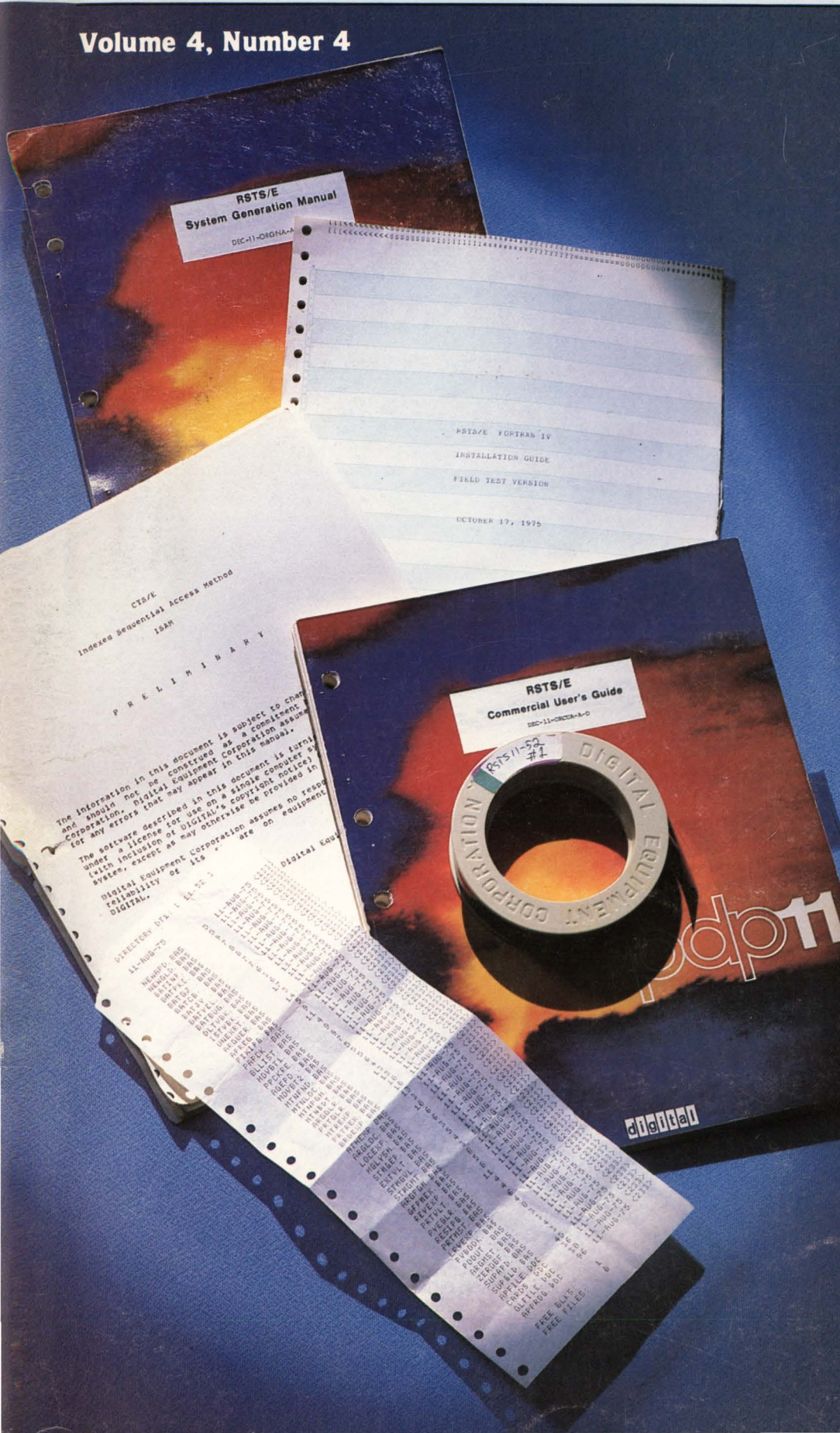
# RSTS PROFESSIONAL

Volume 4, Number 4

August 1982  
\$10<sup>00</sup>/issue, \$35<sup>00</sup>/year

## INSIDE:

- CB - Citizens Band Radio Emulator, Version 01.03
- RSTS Games: Two Reviews
- TYPE
- Writing a Run-Time System (or Happiness in the Hiseg)
- Selective Clearing of Logged Errors
- EDITING SYSTEMS: Misc. Items
- The VAX-SCENE: VAX-11/780 and VMS
- TIPS & TECHNIQUES: Determining SYS() Call Privileges
- The RSTS Crystal Ball — Part 2
- Why Call Your Bank Everyday
- SIMINI — A Simulation Mini Computer
- More . . .



# Financial Decision Support Canned For Easy Use!

## *Fast Flexible Information*

MAPS™ IS FRESH! It's the ideal decision support software product for today's financial manager. With MAPS you get fast, fresh, flexible information handling the moment you want it. Plans, forecasts, models, reports can all be created and manipulated right in your own department. Changes that affect your company can be reflected and evaluated on the spot. And best of all, MAPS is canned for easy use! Call Ross Systems right now. Ask for a demonstration of MAPS. You'll be amazed what a little fresh decision support can do. Currently available on worldwide timesharing, or purchase for DEC's,\* RSTS/E and VMS operating systems. Contact Ross Systems for more information today.

\*DEC is a trademark of Digital Equipment Corporation.

## *ross systems*

1800 Embarcadero Road  
Palo Alto, CA 94303  
(415) 856-1100

Regional offices: New York,  
Dallas, San Francisco, Los Angeles

*"Now that's fresh decision support."*

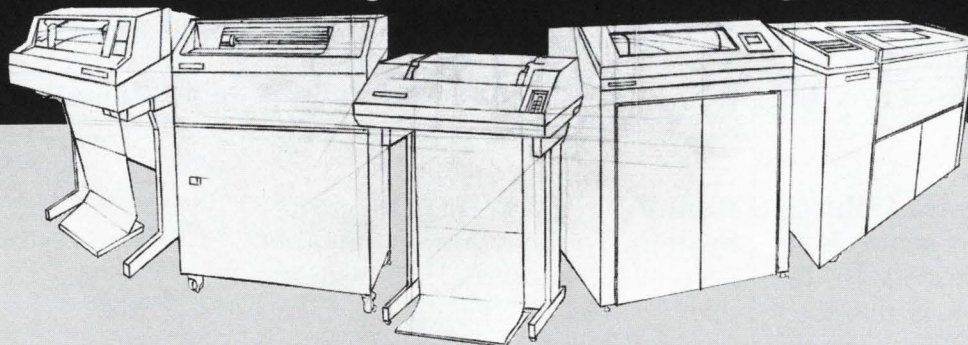
### **MAPS meets your daily requirements:**

Financial reports .....	100%
Financial planning .....	100%
Consolidations .....	100%
Financial modeling .....	100%
Performance forecasts .....	100%
Full color graphics .....	100%

# Southern Systems has a printer that's right for your computer.

## Compatibility guaranteed with all DEC processors!

**PDP/8, PDP/11, LSI/11, VAX, DEC 10, DEC 20.**  
Choose either long-line or short-line configuration.



Get the printer system that's guaranteed . . . from the leading add-on printer company, Southern Systems. You'll add-on a printer, plus unmatched expertise and top-quality service, when you add-on Southern Systems. Maximum



performance/minimum downtime results from technological innovation, expert installation and long-term service, nationwide. Sales offices in all major U.S. cities and in western Europe, United Kingdom and Canada.

## Southern Systems

The Printer System Problem-Solvers  
2841 Cypress Creek Road, Fort Lauderdale, Florida 33309  
(305) 979-1000 • (800) 327-5602 • Telex 522135  
In Canada (800) 661-1165 [Alberta: (403) 230-2044]  
In Europe 44-3-726-7282

My computer system is a \_\_\_\_\_

... and I need a printer system in the speed range of:

- 33-55 cps (letter quality)
- 200-300 lpm     600-900 lpm     1000 plus
- Parallel
- Serial (synchronous or asynchronous)

My requirements are  Immediate

3-6 months     For information only

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

Telephone \_\_\_\_\_

# SOFTWARE

**Dynamically Link To Any Other System.** The idea is to call up another system from your terminal. Better yet, call up another system, log in, and set up a dynamic link with one command.

**Multiple Tasks On The Link.** The link established becomes available to more than one user for inter-system task communication and file access. The link itself runs unattended.

**Dealing With Hardware Failures.** Total communication failure is diagnosed and announced to the users. Corrective action is fully automated. In the case of file transfers, there is an auto restart on the last block transferred. Data transmission errors are detected and corrected without user involvement.

**About The Latest Version Of CALOUT.** Yes, the latest version of CALOUT has been extended to include powerful new multi-user features. For the large and rapidly-growing group of current users, a pathway for a simple and inexpensive upgrade is provided.

**Cost Break On Licensing.** The whole approach in the design and implementation of CALOUT is for the licensing of a single host copy. This copy can be used to establish links with other systems. There are no additional licensing costs for each correspondent system. The idea of a network is not relevant. Link to any system you need to, *when* you need to.

**Transfer Sets Of Files.** The CALOUT package provides for wild card file transfers. This feature

## SYSTEM LINKS

### HOOKING UP LOCAL OR

### REMOTE SYSTEMS

### DYNAMICALLY

works much like PIP. Many files may be moved automatically, with a single request.

**Running Tasks On The Other System.** You may run on the other system as a normal time-shared user. The CALOUT package will let you run tasks, do intersystem job communication, intersystem file communication or file transfers as you wish.

**The Thing About File Attributes.** File attributes among the various operating systems can be a real problem, particularly where the VAX is concerned. CALOUT will transfer files of any type with automatic transfer and when necessary, the correct conversion of all file attributes.

**RSTS, VAX, RT11, RSX11 Supported.** The latest version of CALOUT is implemented for RSTS, VAX, RT11, and RSX11-M. Any one of these operating systems may be the host or the correspondent in a CALOUT link.

**Regarding Local Systems.** For systems that are physically near each other, the CALOUT package can be implemented without a telephone line or any special hardware beyond a simple cable linking the two or more systems.

**Linking With Foreign Operating Systems.** CALOUT may be used to link up with any operating system. If you are able to log in with a standard ASCII terminal, then you may do text transfers with any correspondent system.

**Achieving Very High Transfer Speeds.** CALOUT is limited to the transfer speeds supported by the communication hardware. It can be used with sophisticated high-speed hardware if required. You are not forced to buy such hardware with CALOUT.

The logo for Clyde Digital Systems, Inc. features the word "Clyde" in a bold, orange, sans-serif font. The letter "C" is stylized with a square cutout on its left side.

**How To Get More Information.** Call Lisa at (801) 224-5306, or write: **Clyde Digital Systems, Inc.**, 3707 North Canyon Road/Bldg. 3-E, Provo, UT 84604.



## From the editors. . .

### AUTHOR, AUTHOR!

Dave Mallery

I had an insight recently while hanging around the press room at the Atlantic City COMDEX show. The room was populated with an unfamiliar breed — reporters. They were going on about how they had been cruising the show floor 'getting stories' from various exhibitors. One reporter was especially vivid in his description of how the people in one booth had been falling all over each other to give him a demo and how he had curtly dismissed their efforts as unworthy of his attention.

My first reaction was: 'Boy, Carl, we ought to hire one of those. . .!' Then I realized that we would start sounding like all the other magazines in the business because 90% of their content is banged out by those slick journalists using pure marketing hokum as input and slick formula as output. 'a tale told by a computer. . .'

Our magazines are really YOUR magazines. We do not employ a single professional writer or reporter. If you don't like our content, then do something about it. Most of our 'regular' contributors never dreamed that they would be publishing frequently. There's lots of room for you—over a hundred pages a month.

The RSTS pro was born in a SIG meeting in the Spring 1979 DECUS at New Orleans. Every time I look back at Vol 1, Number 1, I am amazed:

- a) that it happened at all
- b) how good some of the articles are.

When you look at Vol. 1, Number 1 of the Dec Pro, you will notice that we have learned something about publishing; that we have learned how to sell advertising; and that we have developed some financial strength; but I am still amazed:

- a) that it happened at all
- b) how good some of the articles are.

### HOME COMPUTER

Carl B. Marbach

At last. A home computer that is a real computer. It even runs RSTS. Maybe that is what makes it the first machine I am willing to call a 'home computer'. The new MICRO-11 package just announced by DEC is what some of us have been waiting for. (Look for my article in the next issue.) It is also something some of us (Apple, TRS-80, PET ?) have been hoping would never happen: It did.

What is a 'home computer'? I will continue by asking, 'what is a mini-computer'? I would guess that a 'home computer' is a micro computer that can be bought for the home, or for home use (play?). That would mean it has to be cheap, small, reliable, use

ordinary power and require no special environment. I won't tell you what a mini-computer is because I don't know anymore (I used to know). So DEC has a real 'home computer' — not a micro, a 'home computer'. It is sort of a micro because it does use an 11/23, but it isn't really a micro because it doesn't use the new T-11 chip (PDP 11 on a chip).

It is not inexpensive, but probably affordable as a 'home computer' at just about \$10,000 complete. A friend of mine has about \$6,000 in his Apple and it isn't close to this in anything except game playing. . . oh yes, Apple and Atari win when it comes to games, but they lose big because they DON'T RUN RSTS. Add a VT-101 to this package and you have a real 10MB disk and 256K memory RSTS/E system! RSTS!

I recently read an article about what operating system was to become the 'standard' for the new 16 bit micro's. Was it to be CP/M-8 6 or PC-DOS or XENIX? I think not. It might be RSTS. In five years there will be two giants in 'personal computers': IBM and DEC. The others will go the way of Texas Instruments watches, Singer POS terminals, Xerox computers and other extinct species. These 'personal computers' will rule the roost of cheap software (you get what you pay for) and games. You want to play GAMES and do some computing? Buy a 'personal computer'. If you want a computer to do real commercial type work, manage your home finances, run budget models, follow the stock market, pay your bills, do word processing, teach the kids programming and have the full functions of a computer, you'll need a 'home computer'.

Are the micro based 'personal computers' friendly? Try one, it won't say "please say hello". Do they have RECORD I/O, OR RMS? How about TECO or EDT? GRIPE doesn't exist? Horrors! Is there a BATCH, or SPOOL? Can you run BACKUP or SAVER? Is there a REORDR and can they spell UTILITY? Did someone explain how the disks are organized, and how you can optimize them? Is there a SYSTAT or VTSDPY, and can you LOCK-11? When was the last time your system was down because of a bug in RSTS? Does the documentation take up a full bookshelf and change colors every year? Can a program written for a \$500,000 computer run on yours?

I hope my kids learn programming on a system whose lineage included a 28K computer that served 4 users in a school. That PDP 11/20 has grown to a \$500,000 128 terminal 11/70 and now to a \$10,000 'home computer'. What will be the "standard" 16 bit operating system? I'm using it right now, on my very own 'home computer': a PDP-11 running RSTS.

PLEASE SAY HELLO. 



#### Editors

R. D. Mallery

Carl B. Marbach

Assistant Editor/Advertising

Helen B. Marbach

Assistant Editor/Operations

Peg Leiby

Administrative Assistant

Hope Makransky

Editorial Assistant

Linda DiBiasio

Subscription Fulfillment

Kathi B. Campione

Claire Hollister

United Kingdom Representative

Pauline Noakes

RTZ Computer Services Ltd.

P.O. Box 19, 1 Redcliff Street

Bristol, BS99-7JS

Phone: Bristol 24181

#### Contributors

Dale L. Bargar

Paul DeBenedictis

John Cato

Wef Fleischman

Michael C. Greenspon

Philip Hunt

Michael H. Koplitz

Bill Marbach

W. Franklin Mitchell, Jr.

Bob Meyer

Joel Schwartz, M.D.

David Spencer

#### Cartoons

Douglas Benoit

#### Game Verification Team

Bill Marbach, Mary Marbach,

Sydra Mallery, Sam Mallery

#### Design & Production

Grossman Graphics

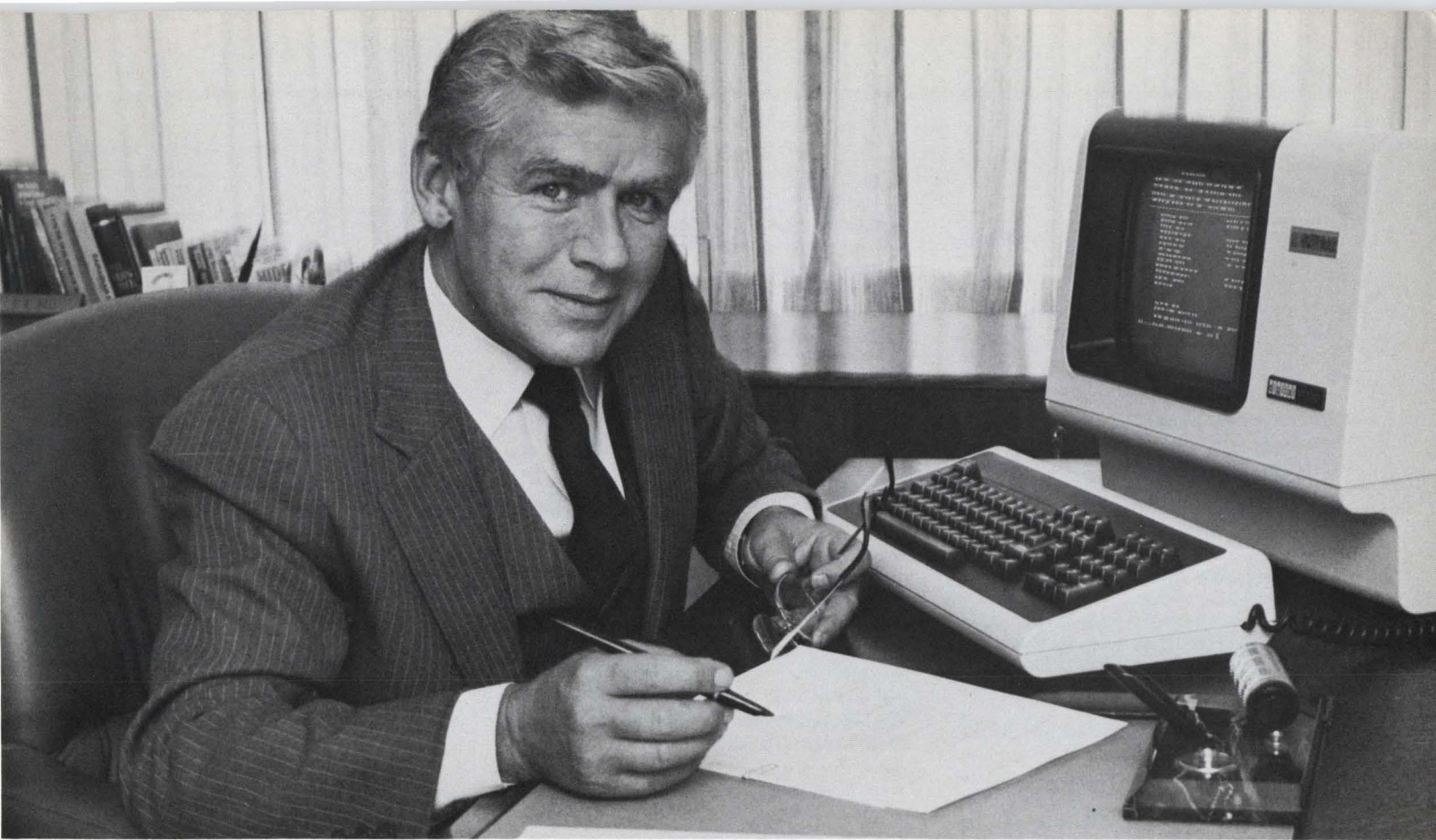
#### Printing & Binding

Schneider Litho Co., Inc.

ALL PROGRAMS PUBLISHED IN THE RSTS PROFESSIONAL ARE WARRANTED TO PERFORM NO USEFUL FUNCTION. THEY ARE GUARANTEED TO CONTAIN BUGS. THEY ARE DESIGNED TO GET YOU THINKING. THEY ARE INTENDED TO EDUCATE AND ENTERTAIN. THEY ARE PUBLISHED ON THE PREMISE THAT IT IS BETTER TO SPREAD PEOPLE'S BEST EFFORTS AROUND EVEN IF THERE IS AN OCCASIONAL PROBLEM. IF YOU USE THEM, MAKE THEM YOUR OWN, AND YOU WILL NOT GO WRONG.

Editorial Information: We will consider for publication all submitted manuscripts and photographs, and welcome your articles, photographs and suggestions. All material will be treated with care, although we cannot be responsible for loss or damage. (Any payment for use of material will be made only upon publication.)

\*This publication is not promoted, not authorized, and is not in any way affiliated with Digital Equipment Corporation. Material presented in this publication in no way reflects specifications or policies of Digital Equipment Corporation. All materials presented are believed accurate, but we cannot assume responsibility for their accuracy or application.



# TAKE THE "WORK" OUT OF RSTS/E NETWORKING AND SAVE MONEY TOO.



If information processing is important to you and your organization, then an efficient networking system is essential. DMG/NET is a networking software package designed for RSTS/E systems, which is not only highly efficient, but is also multi-functional, simple to use and can cut your communication costs substantially.

## YOU DON'T HAVE TO BE A COMPUTER PROFESSIONAL TO USE DMG/NET.

DMG/NET allows interactive access to electronic mail systems, public databases, service bureaus and other remote systems, whether they are RSTS/E, other DEC systems or even non-DEC. File transfer is possible between RSTS/E systems—local or remote, and operation is so simple, anyone can use the system—even your non-computer people. Once a connection is made, communication is exactly as if the remote computer was in the next room.

## YOU CAN CUT YOUR COMMUNICATION COSTS BY UP TO 90%!

DMG/NET not only makes network communication extremely simple, but through the utilization of X.25 networks it makes communication extremely cost efficient too. No matter what the size of your RSTS/E system, if you currently use dial-up or leased lines, installing DMG/NET with X.25 could cut your communication costs by up to 90%!

If you'd like to take the "work" out of your networking and save money at the same time, send for more information on DMG/NET.

Just complete the coupon and mail it to us today. Or give us a call and we'll be happy to arrange a demonstration.



Return coupon to:  
Digital Management Group Ltd.  
4800 Yonge Street, Willowdale  
Ontario, Canada M2N 6G5

- Tell me more about DMG/NET for RSTS/E.
- I'd like some information on DMG/NET for VAX.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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

Zip \_\_\_\_\_ Phone ( ) \_\_\_\_\_

DP7/82

## Digital Management Group Ltd.

4800 Yonge Street, Willowdale, Ontario, Canada M2N 6G5  
Telephone: (416) 225-7788





# **BEFORE you add memory (or anything else) to increase system performance**



## **You should add DOPTER!**

DOPTER is an easy to use RSTS/E disk copying program which

**INCREASES SYSTEM PERFORMANCE UP TO 50%.**

DOPTER performs all of the standard functions necessary to structure a RSTS/E disk volume and automatically does the following:

- Places all files and free space in their optimum positions.
- Produces better optimized MFD/UFD's than REORDR.
- Deletes unused file attributes from source, task, and object library files saving UFD and cache accesses.
- Places and pre-extends the MFD.
- Places the most used files at the front of the UFD's.
- Places the UFD's with the most activity toward the front of the MFD.

### **For More Information**

If you would like more information on how you can increase the performance of your RSTS/E system with DOPTER and a free copy of "RSTS/E DISK OPTIMIZATION IN A MULTI-USER ENVIRONMENT", phone or write SPH today.

RSTS/E is a registered trademark of Digital Equipment Corporation.



**System  
Performance  
House, Inc.**

5522 Loch More Court • Dublin, Ohio 43017 • 614-265-7788

CIRCLE 108 ON READER CARD

# CB — CITIZENS BAND RADIO EMULATOR VERSION 01.03

By Philip Hunt, O.L.F.B.P., 6400 E. Broad Street, Columbus, Ohio 43213

## Description:

CB is a very versatile program running in 2K of user space that will allow any users on the system to communicate with each other as they would on a citizen's band radio.

A 'Talk' channel is used to send messages to anyone currently 'Monitoring' that channel. A user may monitor any or all of the 40 'channels' available, but may only talk on one.

Commands are defined to allow the user to change talk channels, monitor and unmonitor channels, list users by user or by channel, set 'Restricted' messages that will only be received if the sender and receiver (or receivers) have the same password set, etc.

## Program Entry:

When the user enters the program, he must enter a 12 character 'handle' that will be transmitted everytime he sends a message. The prompt for sending messages is a 'T' with the channel number you are currently talking on included, example: 'T19>' would mean you are currently talking on channel #19. If an extra bracket ('>') is included in the prompt, it would indicate that the user has a password set for his messages and that only people with the same password will receive them. For entry by CCL, see CCL/LOGGED-OUT formats.

As noticed, anything not beginning with a '/' is sent to other users on the users current TALK channel. The slash indicates a command entry.

Note: If a blank line is entered i.e.; a carriage return is struck with no items on the line AT ALL, CB will print its' version number and return for more commands/messages.

## Commands:

### /TALK Chnl#

This command will change the channel the user is currently transmitting on. When the user first enters CB, the channel will be set to 19. Valid channels are 01-40; any other entry will give an error message. The channel that is set for Talk will cause all messages sent to be received by any user currently monitoring that channel unless a password has been set (See /RESTRICT). Note: when changing Talk channels, the previously set Talk channel will still be marked for monitor.

### /MONITOR Chnl#,Chnl#,. . .,Chnl#

This command will allow the user to monitor multiple channels. When the user first signs into CB, he will only be monitoring channel 19. Valid channels are 01-40; any other entry will cause an error message for that channel, but all other entries on the command line will be processed.

If the channel number is entered as negative, then the channel specified will be 'UNMONITORED'. Note: You cannot unmonitor your current TALK channel.

### /RESTRICT nnnnnn

Restrict allows a user to set a password up to 6 characters long. When a password is set, the user's messages will only be sent to other users monitoring the channel who have the same password set. This allows private messages to be sent. Note: Privileged users can obtain Restrict passwords (See /List) and can receive Restrict messages (See /Spy). Messages with this set will have the word 'SECRET' appended to the message (See Message Formats).

### /BROADCAST [Chnl#] Message Text

This command will allow a user to send a message to any valid channel ignoring the user's password protection. If channel is specified, then the message will be sent to that channel; otherwise, the message will go to your current Talk channel. This command is useful if you would like to send one message to everyone on your channel, but want to keep most of your messages 'Private'.

### /CALL Kb#

This command will send a message to the specified terminal currently NOT running CB, to request that he do run CB. The message sent is of the form:  
\*\*CB-User: Handle - Please enter CB on Channel #n\*\*

NOTE: If the specified job is already in CB, an error message is generated and the message is not sent.

### /TIME

This command will display the current date and time. This is useful when using CB for an extended period of time.

### /KB

KB will toggle a bit in the user flag word allowing him to receive KB numbers when a message is received by him (See Message Formats). The default for this is 'OFF'.

### /PPN

PPN will toggle a bit in the user flag word allowing him to receive user PPN numbers when a message is received by him (See Message Formats). The default for this is 'OFF'.

### /JOB

JOB will toggle a bit in the user flag word allowing him to receive JOB numbers when a message is received by him (See Message Formats). The default for this is 'OFF'.

### /UPPER

Toggles the user flag word informing CB to start

A E GLER  
 OR TEKTR  
 MANUFACTUR  
 AMPEX INTERN  
 BUSINESS MACH  
 HONE & TELEGR  
 WESTERN ELECT  
 ELECTRIC GOOD  
 & MANUFACTU  
 HONEYWELL, J  
 DATA MERCK, T  
 NATIONAL SEMI  
 POLAROID, LE  
 WILLIAMS COMP  
 JOHNSON & JO  
 McDONNELL DC  
 STANDAR OIL  
 ATLANTIC RICH  
 INTERNATIONAL  
 GENERAL ELECT  
 STANDARD OIL  
 INTERNATIONAL  
 SUN, UNITED DE  
 EASTMAN KODAK  
 GOODYEAR TI  
 & RUBBER, BO  
 ROCKWELL I  
 MINNESOTA M  
 LOCKHEED, I  
 HONEYWELL, J  
 GENERAL DYN  
 INLAND STEEL  
 CONTROL DAT  
 MERCK, MEAD  
 McGRAW-EDIS  
 ABBOT LABOR  
 NORTHROP, U  
 HUGHES TOOL  
 ZENITH RADIO  
 G. D. SEARLE  
 AM INTERNATI  
 GENERAL INSTR  
 BALLY MANUF  
 AVERY INTERN  
 GENERAL MOT  
 STANDARD OIL  
 ATLANTIC RIC  
 TENNESCO, S  
 ROCKWELL PET  
 INTERNATIONAL  
 PHILLIPS PET  
 UNION CARBID  
 SPERRY, GENER  
 AMERICAN TI  
 HUGHES TELE  
 EDISON, AME  
 ROHM & HAAS  
 AM INTERNATI  
 INTERNATIONAL  
 FAIRCHILD I  
 NATIONAL SEMI  
 CONDUCTOR,  
 INTEL, MEMOR  
 AVERY INTERN  
 BECKMAN INSTR  
 STANDARD OIL  
 OF CALIFORNI  
 SUN, UNITED  
 BOEING, WEST  
 TECHNOLOGIES  
 WESTERN I  
 INTERNATIONAL  
 GEORGIA-PAC  
 HARVESTER,  
 WESTER  
 BENDIX, LIT  
 TON INDUST  
 MERC  
 WILLIF  
 WILLI  
 U.S. /  
 MCGRA  
 INTEL  
 INTECH  
 AMERCA  
 EASTMAN K  
 BOEING, W  
 WESTINGHO  
 WESTINGHOE  
 ELECTRIC, GO  
 GOODYEAR T  
 & RUBBER, X  
 RCA, LTV, R  
 ROCKWELL A  
 INTERNATIONAL,  
 BALLY MANU  
 MANUFACTURING,  
 BECKMAN INSTRUMENTS,  
 DOW JONES, BUNK  
 FORD MOTOR, INTERN  
 WESTINGHOE, WEST  
 GEORGIA-PACIFIC, MINN  
 BENDIX, LITTON INDUST  
 CONTROL DATA, MER  
 NORTHROP, U.S. /  
 G. D. SEARLE, WILLIF  
 AM INTERNATIONAL,  
 FAIRCHILD INDUSTRIES,  
 NATIONAL SEMICONDUCTOR,  
 INTEL, MEMOREX,  
 AVERY INTERN

# Fortune 500's finest have selected us for use with their DEC and DG minicomputers.

For over a decade, System Industries has provided reliable and cost-effective data base storage alternatives to many Fortune 500 companies using DEC and DG minicomputers. SI has over 20,000 installations around the world today, because we've given DEC and DG users just what they wanted:

**1. MORE RELIABILITY.** SI provides great data base solutions—like our redundant Add-On Non-Stop Reliability (ANSR) systems. Or our 160 or 675 Mbyte, SMD-compatible Winchester storage systems, for more dependability and increased throughput.

**2. SPACE SAVING CONFIGURATIONS.** The SI storage alternative puts many more Mbytes in a single footprint. We'll give you the equivalent of 8 "logical" RM03s in the space normally occupied by one RM03 from DEC. Or the

equivalent of 6 RM05s in the space normally occupied by four from DEC.

**3. EXCELLENT SERVICE.** We maintain service centers in the U.S. and Europe. We offer 4-hour response to calls within a 50-mile radius of major U.S. cities. And 24 hours/day, 7 days/week service contracts in all metropolitan areas.

**4. FAST DELIVERY.** SI has built its reputation on quick delivery. Typically, we can give DEC and DG users value-packed data base storage systems in 30 to 45 days ARO.

For more information about the popular choice of the Fortune 500, and the accepted storage alternative of DEC and DG minicomputer users, contact us today at any of the offices listed below.



**United States:** 1855 Barber Lane, Milpitas, CA 95035, (408) 942-1212, Telex 346459.  
**Europe:** System Industries (Europe), System House, Guildford Road, Woking, Surrey, GU22 7QQ, England, (44) 4862 5077, Telex 859124.  
**California** (714) 851-6289, (213) 822-3161; **Colorado** (303) 986-1591; **Georgia** (404) 955-2252; **Illinois** (312) 948-9330; **Massachusetts** (617) 431-7240; **Michigan** (313) 663-4925;  
**New Jersey** (201) 839-8650; **New York** (212) 696-0650; **Ohio** (513) 771-0075; **Texas** (713) 497-7224, (214) 386-8776;  
**Virginia** (703) 734-9700; **Washington** (206) 451-8791; **West Germany** (49) 6102 5464; **Sweden** (46) 08-63 16 20





# You can get more from your RSTS system with MAS-M.

MAS-M is the application software system from Martin Marietta Data Systems that can help you do more with your DEC hardware. That's because MAS-M is the on-line software system that gives you much more than you'd expect from packaged software.

## More Flexibility.

MAS-M's modular design lets you choose from 10 different application systems:

- Accounts Receivable
- Accounts Payable
- General Ledger
- Order Processing
- Invoicing
- Inventory Control
- Inventory Accounting
- Bill of Materials
- Material Requirements Planning
- Purchasing

You can implement just the modules you need to satisfy your demands. And no matter which combination you choose, the MAS-M system is always fully integrated.

MAS-M's flexible design also makes it easy to install, and simple for your users to operate. And, since MAS-M is written in

BASIC-PLUS-2, and based on the RMS-11 data management system, the software is fully compatible with your current RSTS/E operating system and DEC software.

## More Control.

You can count on MAS-M for more comprehensive data accuracy and security, too.

MAS-M's powerful transaction processing MONITOR gives you maximum control over your data—from start to finish. User passwords and menu selections are checked against user security profiles. Data entry validation is also standardized in the MAS-M MONITOR, so any invalid data can be corrected *before* it reaches your application program.

## More Productivity.

MONITOR is also an important tool in developing new applications. You can use MONITOR to create input screens and validation rules on-line. And, MONITOR can help you improve programmer productivity by providing a standard framework for input of code that minimizes the difficulties of

user interface and terminal characteristics.

## More Support.

You can count on Martin Marietta Data Systems for system development and implementation, comprehensive training, and clear, concise documentation. We can also provide an extensive Maintenance Service to support your MAS-M system.

What it all adds up to is a packaged software system that can give you everything you need to get your jobs done. And more. Write or phone us today, and we'll tell you more about how the MAS-M software system can work for you.



**MARTIN MARIETTA  
DATA SYSTEMS** ◊


Martin Marietta Data Systems  
Marketing Services, R/H  
6303 Ivy Lane, Greenbelt, MD 20770  
(301) 982-6500

**MARTIN MARIETTA**



" I THOUGHT EMULEX  
JUST MADE DISK AND  
TAPE CONTROLLERS."

" BITE YOUR TONGUE!  
HOW ABOUT PH, DZ, OR  
DV-WHATEVER? BEST  
PRICES IN TOWN."



# EMULEX IS MORE THAN ABLE TO COMMUNICATE WITH DEC.

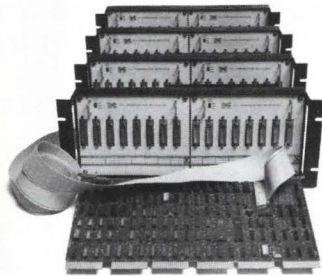
We're also able to save you plenty: For instance, you get DH11 performance for a DZ11 price. Four new space-saving single-board communications multiplexers. And an increase in VAX-11 terminal handling capacity by up to 50%. Maintained nationwide by Control Data.

Microprocessor-based architecture and common hardware deliver faster, more flexible line-handling. Self-test on power-up. Full software transparency. And Emulex reliability standards.

Communicate with Emulex now. Write or call Emulex Corp., 2001 Deere Ave., Santa Ana, CA 92705; (714) 557-7580, TWX 910-595-2521. Outside Calif.: (800) 854-7112.

For immediate off-the-shelf delivery, call our national distributor: First Computer Corporation, 645 Blackhawk Dr., Westmont, IL 60559; (312) 920-1050. In Europe: Emulex Corp., 10th floor, Cory House, The Ring, Bracknell, Berkshire, England. Telephone: 0344-84234; Telex 851-849781.

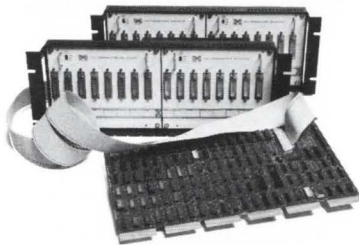
CS11/H (PDP-11) \$7560 for 48 lines\*  
CS11/U (VAX-11) \$7884 for 48 lines\*



Up to 64 DH11 channels from one board.

DH11-compatible MUX lets you mix RS-232 & current loop interfaces in 8-line groups. Built-in DM11-compatible modem control. DMA output eliminates host interrupts. Self-test capabilities. Transparent to PDP-11 software. Emulex' own software on VAX.

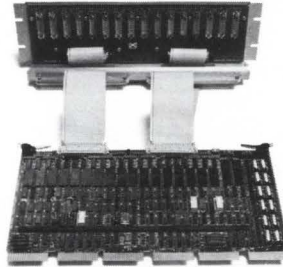
CS11/V \$4464 for 16 lines\*



Higher DV11 performance, lower price.

DV11-compatible multiplexer. Mixes 8-lines synchronous & asynchronous on PDP-11s. Ideal for Bisync & DECNET. 8-32 lines per controller. DMA input & output. Software transparent under DECNET. Compact package offering higher line-handling speeds & improved throughput.

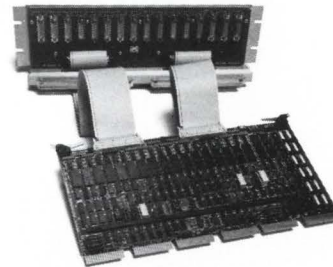
CS21/Z \$2550\*



Replace DEC DZ11/E and save.

Perfect if you don't need DH11 performance. Software-transparent to all DEC operating systems. Easy PROM change enables quick upgrade to DH-11 performance. Saves one slot per 16 lines.

CS21/U (VAX-11) \$2844 for 16 lines\*  
CS21/H (PDP-11) \$2520 for 16 lines\*



New economical DH11-type multiplexer.

Lowest cost, high-performance communications MUX. Priced way less than DEC's DZ11, with DMA to boot. 16 RS-232 lines per board, modem control included. Can use H317 distribution panel. Transparent to PDP-11 software; Emulex software on VAX.

\*Price each in 100 quantities. All Emulex disk, tape, and communications products can be combined to reach quantity price breaks.

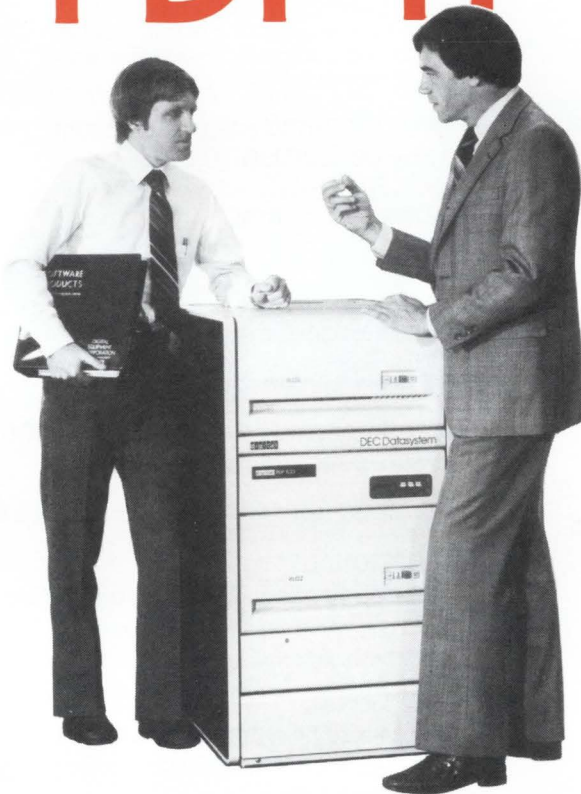


**The genuine alternative**





# "Don't buy a PDP 11"



VAX, PDP & DEC are trade marks of Digital Equipment Corporation

"... With departmental budget cuts, high interest rates, hardware prices falling back, an upgrade down the road..."

"But I've always bought PDP11s. They're the best."

"I didn't say don't USE a PDP11... just don't BUY one!"

"Huh?"

"HAMILTON will rent you the latest in DEC systems — popular 11/23s, 11/24s, 11/34s and 11/44s, and all on a simple no-deposit monthly payment basis. Great for fitting into tight budgets. You'll get prompt delivery, the systems configured the way YOU want them, AND they'll bundle in your choice from HAMILTON's extensive software and utilities library."

"That sounds great, but don't these rental schemes lock you in for 5 years?"

"No, not if you rent from HAMILTON. If you know you're never going to change so much as a terminal for 3-5 years, then go talk to your bank about a long term lease. But, if you want the flexibility of upgrading either all or any part of your system when you need to, then go talk to HAMILTON about rental. They'll listen."

"That's really interesting. I didn't know I had that kind of rental alternative."

"And what's more, you can talk to HAMILTON about their rental-with-purchase-option plan which gives you the right to buy the system when you're ready."

"But will DEC maintain my HAMILTON rental systems?"

"DEC maintenance is already INCLUDED in your monthly rentals. Plus, HAMILTON handles all the shipping and guarantees you a really smooth installation."

"HAMILTON certainly has a comprehensive rental program."

"Of course. They have more experience in renting DEC systems than anyone else, with thousands of installations in Europe and North America."

"You know, if they hadn't limited my department budget this year, I could have gone straight to a VAX. Hey. I don't suppose HAMILTON rents...."

"VAX? Of course! Call them now at..."

Toll Free 800-631-0298

In New Jersey 201-327-1444

In Canada 416-251-1166

or complete the coupon for an individual rental quotation on a system of your choice."

## HAMILTON RENTALS

6 Pearl Court, Allendale, N.J. 07401

PLEASE RUSH ME A QUOTATION BASED ON THE FOLLOWING SYSTEM: CIRCLE ONE ONLY IN EACH LINE

PROCESSOR 11/23 11/24 11/34 11/44 VAX11/730, 750, 780  
 DISKS RX02 RL01 RL02 RK07 RM02 RM80 RM05 RP07  
 OPERATING SYSTEM RT11 RSX11M RSTS/E VAX/VMS CTS  
 SOFTWARE WORD PROCESSING DBMS ACCOUNTING  
 GRAPHICS OTHER \_\_\_\_\_  
 RENTAL 6 Months 12 Months 18 Months

Name \_\_\_\_\_  
 Position \_\_\_\_\_  
 Company \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Telephone Number \_\_\_\_\_

# HAMILTON RENTALS

Pearl Court, Allendale, N.J. 07401

415 Horner Ave., Toronto, M8W4W3

LONDON PARIS DÜSSELDORF CALGARY



# DILOG GOES WITH LSI-11, PDP-11, VAX-11\*

DiLOG offers the widest range of single board DEC emulating disc and magnetic tape controllers for LSI-11, 11/2, 11/23, PDP-11 and VAX-11 compatibility.

This growing family includes over 20 software transparent disc and tape products: WINCHESTER AND BACKUP SOLUTIONS FOR MOST APPLICATIONS.

**DISC**—5¼" 8" or 14" WINCHESTER/SMD/CMD/LARK/CARTRIDGE/FLOPPY controllers with RX02, RK05, RL01/RL02, RP02/RP03, RK06/RK07 and RM02/RM05 emulations and features like 22-bit addressing, 32 or 56-bit ECC, universal formatting (allows you to mix drive types on the same controller without hardware modification), and automatic media flaw compensation.

**MAG TAPE**—¼" cartridge/½" NRZI/PE, streaming or conventional couplers or controllers with TM11, TS03 and TS11 emulations.

#### NEW VAX-11/PDP-11 CONTROLLERS

- DU 132 TS-11 emulating coupler with expanded buffering for streaming or conventional ½" industry standard magnetic tape drives. One coupler can accommodate up to 4 drives at speeds to 125 ips, and you get dual density 800/1600BPI as an added feature. RT, RSX, RSTS and VMS software compatibility.
- DU 215 RK06/07 emulating SMD disc controller with 56-bit ECC, universal formatting, optimal device for Winchester and CMD applications. RSX, RSTS and VMS software compatibility.
- DU 218 RM02/05 emulating SMD disc controller for SMD and Winchester applications with full software transparency under RSX and RSTS as well as Media compatibility when used with 80 and 300 MB SMD (CDC 9762/9766) compatible disc drives.

#### NEW LSI-11 CONTROLLERS

- DQ 212/215 SMD interface. Universal formatting allows mixing or matching two 8" or 14" drives with different characteristics and without component changes for up to 220 MB of software transparent formatted capacity. 56-bit ECC, RP02/03 or RK06/07 emulations.
- DQ 444 CDC FINCH interface. Intelligent uP module mixes any two drives of this class with universal formatting. RL01/02 emulations. Built-in drive capacity expansion handling.

All DILOG controllers are price competitive with significant OEM discounts being offered under a Mix and Match plan. 30-day delivery is standard. Distributor inquiries invited. For complete price/performance details, contact DILOG.

#### Corporate Headquarters


12800 Garden Grove Blvd. • Garden Grove, Calif. 92643  
• Phone: (714) 534-8950 • Telex: 681 399 DILOG GGVE

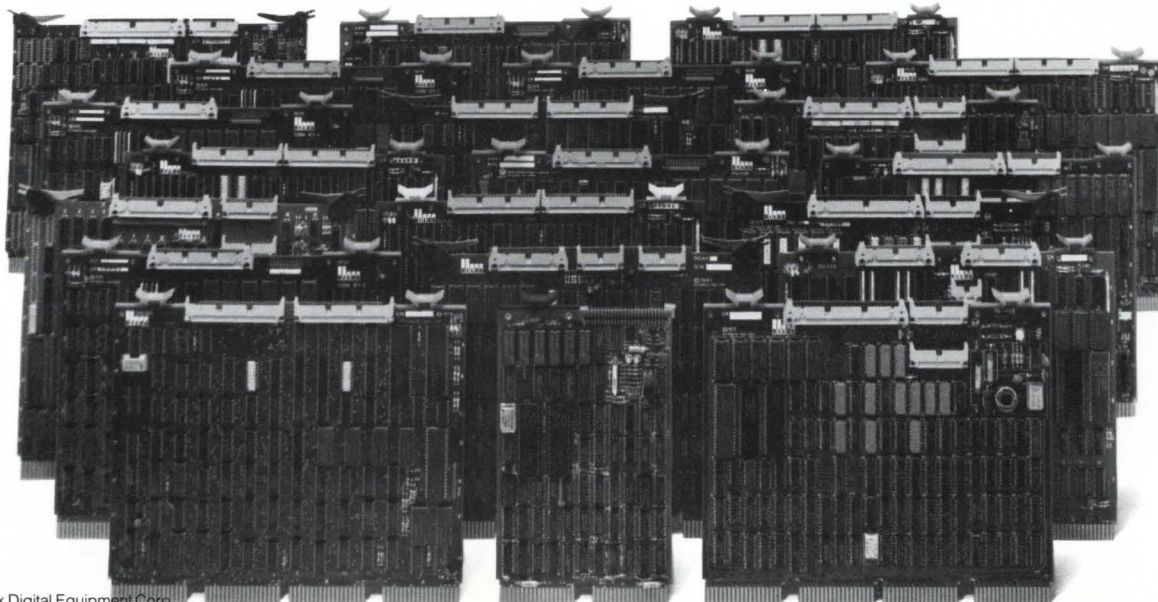
#### Eastern Regional Sales Office

64-A White Street • Red Bank, New Jersey 07701  
• Phone: (201) 530-0044

#### European Sales/Service Office

12 Temple Square • Aylesbury, Buckinghamshire • England  
• Phone: 44-296-34319 or 34310 • Telex: 837 038 DILOG I G

**DISTRIBUTED  
LOGIC CORP.**  
**DILOG**   
NUMBER 1 FOR DEC-11



\*Trademark Digital Equipment Corp.



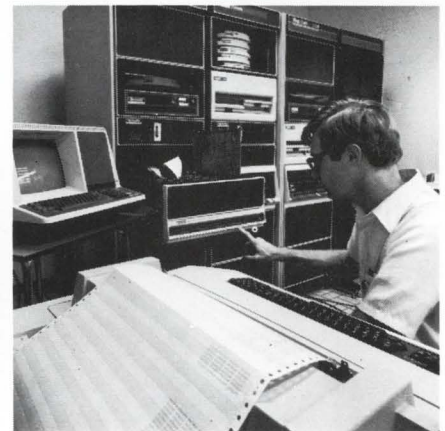
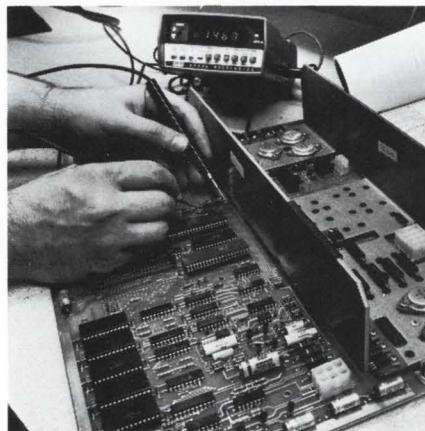
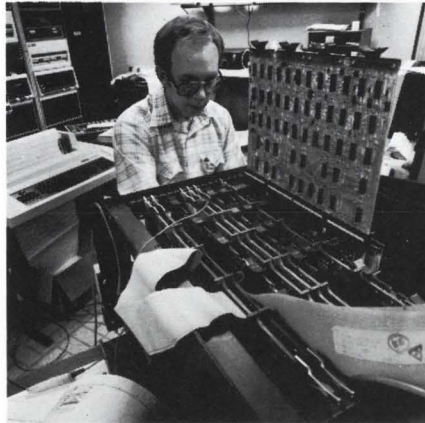
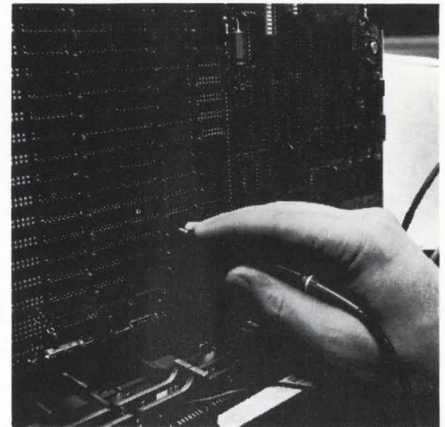
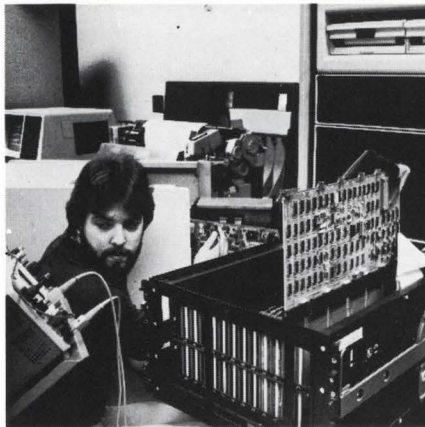
# The Single Source for Digital Products Service

## DEC Module Repair, Exchange or Replacement

Photos show how we're fully equipped to repair and test DEC, PDP-11\* and TERMINAL MODULES. All modules we repair are 100% inspected.

### DIGITAL PRODUCTS REPAIR CENTER

939 Eastwind Drive  
Westerville, Ohio 43081  
614/890-0939



## Expert, Fast and Reliable Work

Serving the computer systems market since 1973, we are now troubleshooting, repairing and testing hundreds of modules weekly.

**We can turn around a critical repair job in just 24 hours!** Ten-day service is normal.

The modules we return to you are **guaranteed** to meet or exceed the manufacturer's specifications. And we prove it by submitting an inspection and test report.

For emergency service, 7 days a week, 24 hours a day, call

# 614/890-0939

\*DEC and PDP are registered trademarks of Digital Equipment Corporation.

















## **TRIDAKIT**

The system that offers  
Productivity, Accuracy  
plus More.

# **PRODUCTIVITY PLUS**

---

### **PRODUCTIVITY**

TRIDAKIT is a set of application development modules that automatically generates up to 90% of program code four times faster than conventional programming methods. Programmers can instruct TRIDAKIT to produce on-line applications with simple easy-to-use commands.

Incorporated in TRIDAKIT is a powerful file management system which can open and maintain 255 files simultaneously. TRIDAKIT based applications allow for caching of files, reduced use of the File Processor (FIP), and a reduction in the use of small buffers.

### **ACCURACY**

Included with TRIDAKIT are documentation, programming, operations and project management modules. Application program code errors are practically eliminated.

Detailed documentation is automatically produced as a by-product of the application definition. Changing the documentation changes the program code. With TRIDAKIT, each member of the project team always has the latest, most up-to-date version of the documentation.

### **PLUS MORE**

Security is strictly enforced with TRIDAKIT. Each user of TRIDAKIT must be defined before an application can be accessed.

TRIDAKIT is responsive to special problems that are commonly forgotten in applications such as audit trails, I/O tracing and "point-of-failure" data base recovery. These are automatically included in TRIDAKIT based applications.

### **INFORMATION**

If you would like more information on how you can increase application development productivity with TRIDAKIT, phone or write today.

RSTS/E is a registered trademark of Digital Equipment Corporation.



**Tridacor Systems, Inc.**

820 FREEWAY DRIVE NORTH • COLUMBUS, OHIO 43229 • (614) 431-0805

CIRCLE 82 ON READER CARD

VERSION 2.2 NOW AVAILABLE

## QUE.11 — V2.2

**ONE JOB SPOOLER  
FOR RSTS/E CONTROLS  
ALL SPOOLING**



### QUE.11:

- DEC QUE Compatible
- Block letters on spooled header page
- One job controls all spooling
- Saves small buffers and job slots
- Spawns jobs as needed
- Handles line printer and keyboard spooling
- Controls as many BATCH JOBS as pseudo-keyboards
- Full parameter replacement in QUE
- calls "DO" command replaces indirect processors
- QUEMAN SYS call supported
- Program deliveries — NOW
- Only \$1500 single CPU license
- Trial Version \$100

*For more information contact:*

### **On Track Systems, Inc.**

**P.O. Box 245  
Ambler, PA 19002-0245  
Phone: 215/542-7133  
In Europe:**

**Procyon Informatics, Ltd.**  
**19 St Kevins Road  
Dublin 8, Ireland**

## EDITORS' NOTE

David Spencer of Infinity Software has written several RSTS Real-Time Games. When used "stand alone" they offer realistic performance. Here are two differing opinions on how they are:

## RSTS GAMES: ONE MAN'S (BOY'S) OPINION

By Bill Marbach

David Spencer and Atari have two things in common. They both make electronic games, and they both work hard on them. However, only David Spencer's games are challenging enough to make you want to come back again and again.

My favorite David Spencer game is called SUBS. This game takes extraordinary hand eye coordination and a little bit of luck. The object is to hit the enemy before he hits you by using only radar and keen eyesight.

In INVADE your objective is to stop the little alien attackers from landing or hitting you. The tempo of this game is very slow making this game the easiest of them all.

The last game is PACKER. We all know it as Pac-Man. However, this game is just as good as Pac-Man. This game even has an intermission where you can watch a little show. This game is very much like the real Pac-Man, and could show up ATARI any day.

When you compare the two you see ATARI has better color, sound, action, and graphics. However, David Spencer's games take more skill than Atari games which are usually easy. So David Spencer keep up the good work.

Overall Grade 1-10

David Spencer — 9.3

Atari — 8.5

# NO CAUSE FOR EXCITEMENT

By Joel Schwartz, M.D.

The other day I got an excited call from our beloved editor telling me there were new games on the computer. The urgency in his voice caused me to have only two helpings of dessert instead of the usual three and I rushed right over to see them.

The first one I played was called PACKER. This is a real-time RSTS/E game for VT100-type terminals. The instructions tell you that until recently you have been employed as a packer in a robot manufacturing plant. However, there was an accident which caused robots to rebel and it is your mission, if you decide to take it, to deactivate the robots loose in the plant or be killed. My advice is to pass up the mission. I wish I had. This game is really a poor copy of the popular arcade game PAC-MAN. I really don't know if graphics can be done with the finesse that they are done on the smaller home computers, but being chased by an A and eating a @ so I can then chase and eat a A,B,C or D on a black and white screen with no sound effects just doesn't do very much for me. It's like driving in a Mercedes and then trying to get excited over driving in a Honda.

The second game I played was INVADE. You guessed it, this game was the main frames answer to the arcade game SPACE INVADERS. The object of the game for those of you who have been in hibernation for three years is to destroy the incoming wave of alien invaders without being killed by the bombs they drop. My objections were the same for this game. No graphics, no sound, no color, no fun.

The final game I played was called SUBS. This was billed as a real-time warfare game for two players on individual terminals. The two users compete against each other by attempting to destroy the other's submarine. Although the graphics were also poor on this game, it did have some unique features which made it worth playing. The monitor was divided into a bigger screen and a smaller one. The latter was a sonar screen used to locate the general vicinity of your opponent while the former was used to maneuver your sub close enough to your enemy to destroy him with your torpedoes. I liked the idea of a two terminal interactive game with a human opponent instead of pitting your skill against the computer.

On my way out Carl asked me how I liked them. I didn't want to hurt his feelings (he is extremely sensitive) so I told him they were great, and it was only because of the lateness of the hour (it was about eight-thirty) that I had to leave. I hope he doesn't read my article!



## Dreaming of Electronic Mail

**Product Name:** Dreams Version 5.0

Since its first sale in 1979 Dreams has grown in capability and user acceptance. It is now in use on over 40 RSTS/E systems around the country.

### Special Features:

- DECnet compatibility—message transmission to distant nodes. Includes message queuing to unavailable nodes.
- Invoke your favorite style of editing (EDT, DECword, WORD-11, TECO, etc.) with a smooth transition to and from the editor.
- Flexible method for accessing and maintaining multiple mail files.
- Subjects for mail files as well as individual messages.
- Retract unread messages.
- Recover your last deleted message.
- Specify times as well as dates in relative or absolute form to control message appearance or expiration or to narrow selection criteria.
- Full compatibility with Batch. This opens up a world of possibilities for keeping abreast of unattended operations and for implementation of a repetitive reminder system based on day of the week or other longer intervals.
- System manager may assign defaults for accounts, projects, and the entire system including the assignment of certain privileges.

The Dreams package consists of over 40,000 lines of source code in more than 70 modules plus significant documentation both as documents and as on-line help. CSPCOM or BASIC-Plus-2 builds these sources into only 5 Dreams tasks: TELL, MAIL, WHO, SMASH, and MANAGE (plus POSTMN for the DECnet version). Computers with sufficient memory may use the customized resident library and resident run-time system.

A VAX version will be available later.

### Typical Electronic Mail Features are also included in Dreams:

- Send to names, nicknames, or groups.
- Scan, reply, forward, or store for later appearance.
- New, old, priority, or suppressed messages for each mail file.
- Automatic routing of messages.
- Many other convenient features.

### Ordering information:

Available on 9 track 800 or 1600 BPI tape. Multiple CPU discount schedule:

First License	
Dreams/5	\$3000.00
DECnet modules	\$3000.00
Second and Third License	40% Discount
Fourth and Fifth License	50% Discount
Sixth and up	70% Discount
Educational Institutions	Additional 50% off the total

Maintenance and new releases: Annual fee of 12% of current list price after the first year.

### For more information contact:

**Tom Burnett**  
DCXX Software Services  
Dickinson College  
Computer Center  
Carlisle, PA 17013  
717-245-1513

RSTS/E, VAX, DECnet, and DECword are trademarks of Digital Equipment Corporation.  
WORD-11 is a trademark of Data Processing Design, Inc.

# TYPE

By W. Franklin Mitchell, Jr., Computer Operations Supervisor  
Erskine College, Due West, South Carolina 29639

The addition of TYPE to Erskine's RSTS system has made the task of running a small college on a small computer somewhat better. TYPE is a program system that transfers information from a disk file to a user's terminal using a very small amount of main memory. All TYPEs share a 1K (words) run-time system and each TYPE's job size is 1K. TYPE uses a 1,024 byte disk buffer.

A very large portion of the data processing at Erskine produces some kind of printable disk file such as reports, labels, program listings, etc. TYPE was created to lessen the impact of many users moving the contents of these files to printing terminals. TYPE also allows users to do new things.

In the beginning, all users used PIP to print reports on terminals such as LA-120s and LA-36s. Ten simultaneous file dumpers using PIP occupy at least 164K words of main memory. The first version of TYPE was written in BASIC-PLUS. Ten TYPEs in BASIC-PLUS occupy 20K (not counting the always present BASIC run-time system). As options and enhancements were added, the size of the BASIC-PLUS version of TYPE began to grow. Finally, TYPE was put into assembly language and worked into its own run-time system. Ten TYPEs now occupy only 11K of main memory!

## TYPE User's Guide

The following TYPE help message shows the features built into TYPE:

File specs may contain wildcards. Several files may be listed together if they are separated by commas. Any switches apply to all files listed together. Switches must go on the end. Legal switches are

```
/F output form feed 1st
/R no "Ready" once done
/x x copies, where x is a digit 2-9
/N file name is printed 1st
/Q query mode
/B binary mode
```

Multiple switches may be used (e.g. /F/R)

The /F switch allows a user on a printing terminal with forms control to use one page for log in, listing directories, etc. and to form feed to the top of the next form for file output.

The /R switch suppresses BASIC-PLUS's "Ready" once TYPE is done.

TYPE will print x copies of all files specified if it finds a slash followed by a single digit 2 to 9. For example,

```
TY JUNK.LST/3 -prints 3 copies of JUNK.LST
TY A.LST,B.LST/2 -prints 2 copies of A.LST followed by 2
                  copies of B.LST
```

The /N switch prefaces each copy of each file printed with the name of the file.

The /Q query mode is like the /Q or /IN switch of better known file transfer programs.

The /B switch makes TYPE send the data in a file to a user's terminal in binary mode. This is useful when you want tab characters to remain tab characters (not groups of spaces), ESCapes to stay ESCapes (not dollar signs), etc. /B automatically sets /R. This mode can be used to send text that contains LA-120 "change the character size" escape sequences.

The following examples demonstrate some happenings that are perhaps strange but expected:

```
TY C.LST,C.LST/9 -prints 18 copies of C.LST
TY Z.TXT/3/5 -prints 5 copies of Z.TXT, earlier /3 is
              ignored
TY A.LST/2,B.LST/3 -prints 3 copies of A.LST only, "/"
                  terminates file spec scan. Switches
                  must be last!
```

If WORK.BAC has a protection code with bit 64 set (run only),

```
TY WORK.BAC -prints nothing.
If RIDICU.LAS has a file size greater than 65,535 blocks,
TY RIDICU.LAS -will not work properly. No attempt
              has been made to treat this as an error.
```

## TYPE installation

Installing TYPE on your system is very simple. A contiguous copy of TYPE.RTS must be placed in account [0,1], two other files are created in the TYPE account (the TYPE account can be any account on any disk), and the ADD TYPE and add CCL commands must be added to both your running system and to your start up files. (The CCL can be something other than TYPE if desired.)



# WRITING A RUN-TIME SYSTEM

(or, Happiness in the HISEG)

By Bob 'Macro Man' Meyer

Now that you've been reading this column for many months, and I know you've been keying in & testing all the neat little programs I've been publishing, it's time for a treat. This issue, not only are we going to write some more Macro code, we're gonna write a run-time system. A sample rts is included with this article; if you key it in as printed and assemble as instructed, it should work on your system. Keep in mind that its sole purpose in life is to demonstrate how to make an rts from scratch, and therefore has very little market value (in other words, if your caught playing with this thing on the job, you might not have one. . .). First I'll attempt to describe what a run-time system is, then I'll explain how to use OSCAR.RTS, the program in the example.

### What is a Run-Time System?

A run-time system is basically a Macro program that has been linked to run at the high end of the user's address space (thus the term HISEG). If the rts is written with re-entrance in mind, it can be made read-only (the monitor & memory management hardware will enforce this) and shared by any number of users. This proves to be very economical on small systems where memory is limited; only one copy of a program need be resident for any number of users to access that program. As you're probably aware, that's how Basic-Plus is implemented; a read-only sharable interpreter & keyboard monitor (among other things) that can be used by many folks for many different applications, but only ties up 16K of memory at most. The low segment, or LOSEG, is the actual user job image: variables, instructions, buffer space, (push-pop code in the case of Basic-Plus) or in some cases, just raw data, depending on the run-time system.

### The Psudeo-Vector region.

This 'vector' area is actually a block of words at the very end of the user job image. Each word contains an address of an entry point into the run-time system. The monitor accesses the psudeo-vectors so that the run-time system can be given control in the case of certain events; some of these events are shown below with their respective PV entry point names (see the code at the end of the example program for the PV layout (or refer to COMMON.MAC)).

Event	PV entry point used
User runs a program NAMEd to this rts.	P.RUN
User SWitches to this rts.	P.NEW
User types 1C.	P.CC
Some code accesses an odd memory address (with a WORD instruction).	P.BAD
Some user types 2 1C's before we get time to service the first one.	P.2CC

# UNITRONIX means DEC

IMMEDIATE DELIVERY from \$6MM warehouse inventory



TERMINALS MODEMS

PDP 11/03, 11/23 + 11/44 SYSTEMS

With RLO1s & RLO2s or Winchester Drives

INTERFACES

FLOPPYS

Std. & Custom Software

SAVINGS SPOTLIGHT

**\*\*FREE\*\***

DEC Personal Computer with purchase of a computer system

CALL FOR LATEST PRICES

**(201) 231-9400**

Sale or Lease Avail.



**UNITRONIX CORPORATION**

197 Meister Ave. • Somerville, NJ 08876 • TELEX: 833184  
CIRCLE 25 ON READER CARD

As you can see, the vector region has many uses, and provides the monitor with a path into the run-time system for a number of situations. If the coding is done carefully, the rts can become VERY secure, as even the wise-guy typing several control-C's in succession can't ever get past the P.2CC entry point until we decide what to do with him. The psudeo-vector region is the primary difference between a run-time system and an resident library; a reslib has no psudeo-vectors.

### Assembling & Task building the example RTS.

Assembling the demo rts is really no big deal. The code requires no outside help, with the exception of the PRINT module included in Figure 2. The following commands will assemble the required modules:

```
RUN $MAC
MAC> OSCAR = OSCAR
MAC> PRINT = PRINT
MAC> IZ
```

### Task building is a bit more complicated.

As I stated previously in the article, the monitor requires that the rts has its pseudo-vector region at the very

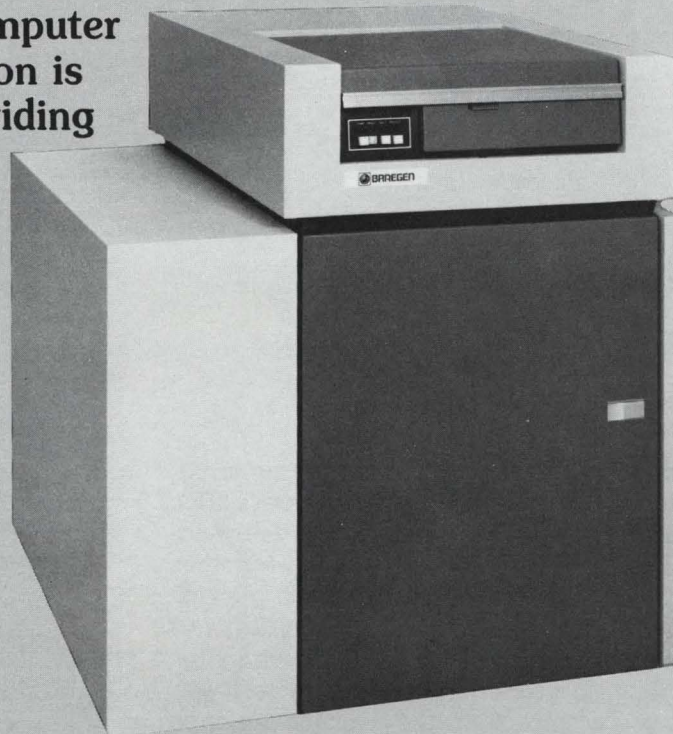
. . . continued on page 54



# BRAEGEN MPD HAS THE DISK STORAGE SUBSYSTEM YOU NEED

INTRODUCING THE DSL-SERIES OF DISK STORAGE SUBSYSTEMS

Braegen's Minicomputer  
Peripherals Division is  
committed to providing  
the systems and  
peripherals  
DEC-users need.



## BENEFITS

- Compatible with \*DEC \*PDP-11 and \*VAX Massbus systems.
- Provides \*RM03/RM05 Emulation with enhancements.
- Supports mixed drive sizes.
- Supports DEC Dual Port Diagnostics.
- Supports Overlap Seeks.
- Fast delivery.
- Local service and quantity discounts available.

For more information on the DSL-Series of mass storage subsystems or any of our full line of DEC-compatible computer systems, disk and tape subsystems, printers, memories, multiplexers and more, please call or write:

Marketing Dept:



3320 East La Palma Avenue  
Anaheim, California 92806  
Telephone (714) 520-9200

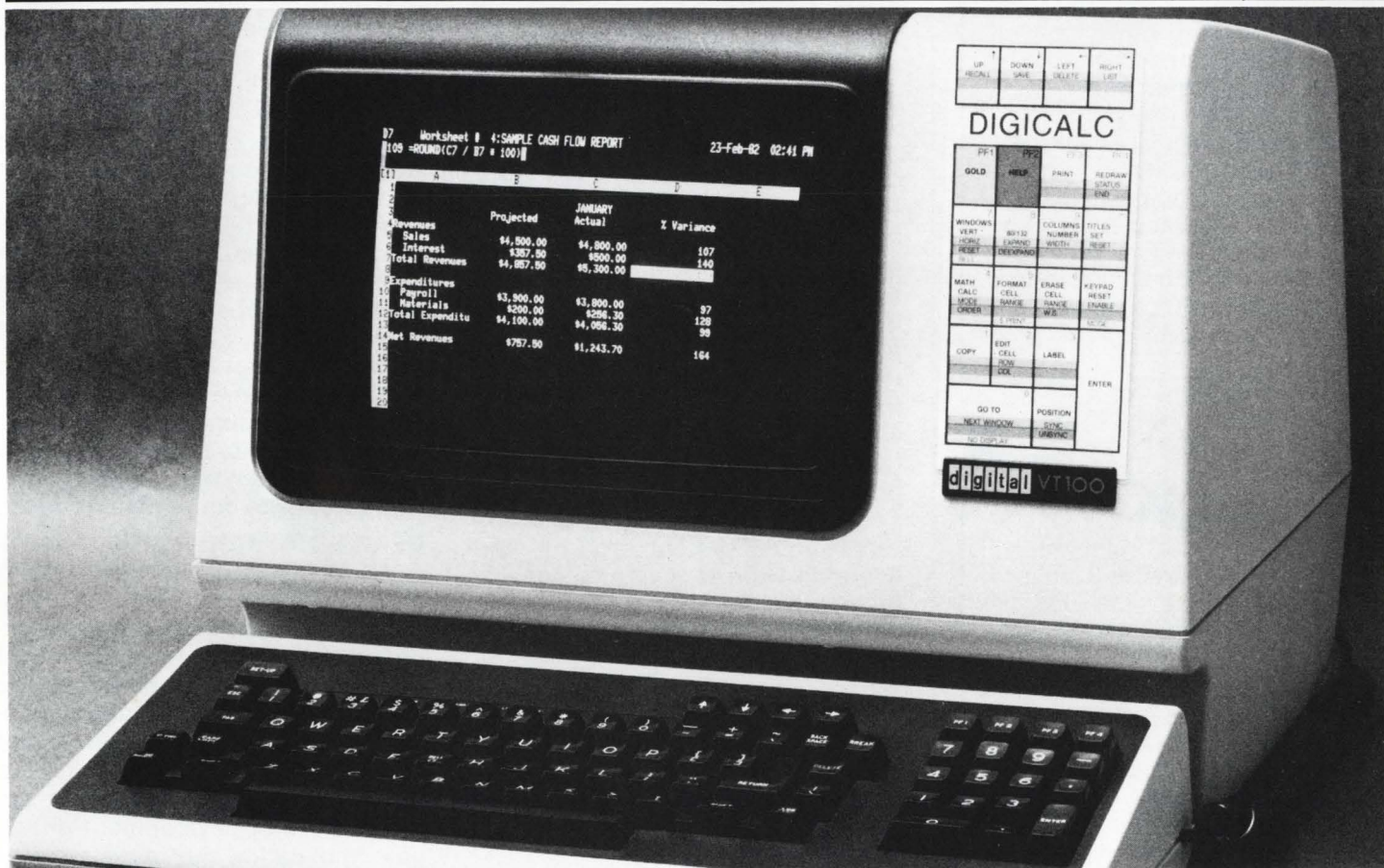
"Be sure to ask about our field service force in over 50 cities nationwide."

\*Trademarks of Digital Equipment Corporation



# DIGICALC™

The total electronic spread sheet for DEC™ computer systems.



**WHY SYSTEMS has developed the "big machine" software package for Executives, Accountants and Professionals who need their numbers fast and accurate.**

DIGICALC® is designed exclusively for DEC equipment, with an amazing range of applications and one of the finest built-in automatic training procedures on the market. Prepare everything from budgets to multi-year forecasts, change one value and DIGICALC will re-compute all of your results and give you a hardcopy too. The tabular worksheet display on the wide screen can be as simple or complex as you wish and has the capability to call on numerous mathematical functions. For an amazing display of DIGICALC's ease of operation and virtually limitless capabilities call WHY SYSTEMS. Runs on RSTS/E and VMS.

- ON-LINE HELP AND SELF TEACHING MODE
- TEN KEY NUMERIC DATA ENTRY
- EXTERNAL FILE INTERFACE
- WORKSHEET CONSOLIDATION
- "BOARDROOM QUALITY" REPORTS
- EXTENSIVE MATH FUNCTIONS  
ALGEBRAIC  
LOGICAL  
FUNCTIONAL  
SCIENTIFIC  
USER DEFINED FUNCTIONS
- SAVES AND RECALLS WORKSHEETS.

**WHY**  
WHY SYSTEMS INCORPORATED  
17130 Avondale Way, N.E.  
Redmond, WA 98052

**CALL TODAY (206)881-2331 FOR FREE BROCHURE AND DIAL-UP DEMONSTRATION**





**“WE’RE READY!”**

**The “RSTS Pro” Staff**

David Spencer, Infinity Software Corporation

## MISCELLANEOUS ITEMS

In this issue, I have four items of interest. First is documentation on the "mysterious" VT100 escape sequences. Next, for those who hate uppercase prompts, patches to change the Basic Plus II compiler and BP2COM prompts from "BASIC2" to "Basic2". Also, some useful patches for the BACKUP package. And last, a small and efficient TECO.INI file for those who are tired of all the overkill that the DEC supplied version performs.

### 1.0 "Unknown" VT100 escape sequences

The VT100 terminal has some undocumented escape sequence "features". To invoke one of these features, set your VT100 in ANSI mode and send "<esc>[nq", where:

<esc> is an escape with parity (Chr\$(155%))  
[ is a bracket character  
n is one of the numbers in the next figure  
q is the lower case letter "q"

These sequences seem to work on a stock VT100, with AVO, and with the printer option. I haven't been able to test VT101 series yet to see if it works on them. All VT100 emulators I have seen DO NOT perform these sequences.

The following figure lists the escape sequence number and what they do. Those sequences that light LEDs do not seem to affect the terminal's operation in any way, contrary to what the lights might say.

1. 133 Lights L3
2. 134 Lights L4
3. 135 nothing(?)
4. 136 Alarm bell
5. 137 Fast repeat key mode, even some control keys!
6. 138 Turns off "On Line" and lights "Local"
7. 139 Lights "KBD Locked"
8. 140 Lights L1
9. 141 Lights L2
10. 142 Lights L3
11. 143 Lights L4
12. 144 nothing(?)
13. 145 Alarm bell

The numbers 146 to 254 continue to repeat the sequence by nines over and over, as partially shown above. Anything from 255 and up turns off the "On Line" LED and turns on the "Local" LED.

### 2.0 Changing the BASIC2 prompt

In previous versions of Basic Plus II, DEC made it easy to change your prompt to mixed case. With version 1.6, this was prevented. The following ONLPAT command file will change the "BASIC2" prompt to a more appealing "Basic2".

```
!  
! Change the compiler prompt to "Basic2"  
!  
File to patch? $BASIC2.TSK  
Base address? 26:660  
Offset address? 0  
Base   Offset   Old       New?  
000660 000000 040502 ? "BA + 20000  
000660 000002 044523 ? "SI + 20040  
000660 000004 031103 ? "C2 + 40  
000660 000006 000000 ? !C  
!  
! Change the keyboard monitor prompt to "Basic2"  
!  
File to patch? [0,1]BP2COM.RTS  
Base address? ..RDY  
Offset address? 10  
Base   Offset   Old       New?  
164466 000010 040502 ? "BA + 20000  
164466 000012 044523 ? "SI + 20040  
164466 000014 031103 ? "C2 + 40  
164466 000016 005015 ? !C
```

### 3.0 Useful BACKUP patches

In the following figures, I have listed three very useful patches to the BACKUP package. All of these patches are intended to be installed after the application of the current patch kit. These patches were developed for the version 7.0 BACKUP package, but they also work on the version 7.1 copies as well.

#### BACKTO

BACKTO normally opens files mode zero. If BACKTO doesn't have write access, it prints the "data unreliable" message. ("?Protection violation" causes a re-open mode 4096.)

One of our clients has some very large data-base files that are opened in shared update mode. Their problem is sometimes when BACKUP is being done BACKTO will open one of the files when no one is using it. Chugging smoothly along, BACKTO keeps the file opened mode zero. This prevents ANY production job from opening that file until BACKUP is finished with it.

The following patch forces BACKTO to always open files in read-regardless mode (4096). This way, access to data files will never be denied. The disadvantage is the loss of the "data unreliable" checking. This, I think, is a small price to pay.

This patch, and the next two, can be applied with the CPATCH program.



RSTSPROFESSIONALRSTSPROFESSIONALRSTSPROFESSIONALRSTSPROFESSIONALRSTSPROFESSIONALRSTSPR

```

*G/2/V<cr>
2!<tab><tab>PROGRAM<tab><tab>: BACKTO.BAS<cr>
*H/M9%=2048%/V<cr>
<tab> M9%=2048% &<cr>
*I/+4096%/V<cr>
*2G/Z/-BV<cr>
<tab> M9%=2048%+4096% &<cr>
*EX<cr>

```

### BACFRM

Often, I use BACKUP to transport files from one system to another. Sometimes I find a lot of space is wasted on small files when the disk clustersize of the output system is smaller than the input system. The happens because BACKUP has the "feature" of retaining clustersizes. The following patch creates files using the current pack clustersize by disabling the clustersize stored by BACKUP.

```

*G/2/V<cr>
2!<tab><tab>PROGRAM<tab><tab>: BACFRM.BAS<cr>
*H/CL:"+/V<cr>
<tab><tab>C%=C%+"/CL:"+NUM1$(20%(P0%,18%)) IF (20% AND 2048%) &<cr>
*2G/Z/-BV<cr>
<tab><tab>C%=C%+"/CL:"+NUM1$(20%(P0%,18%)) IF (0% AND 2048%) &<cr>
*EX<cr>

```

### BACDIR

The performance of the BACKUP package can be helped considerably by compiling it against Basic Plus II (or CSPCOM). If this done, then you have gained some extra address space to add code to increase further the performance of some of the BACKUP components.

The following patch for BACDIR opens its files with a large recordsize. This large buffer reduces disk accesses and greatly improves BACDIR's elapsed time.

```

*H/21/V<cr>
2!<tab><tab>PROGRAM<tab><tab>: BACDIR.BAS<cr>
*H/1040<tab>/V<cr>
1040<tab>TO=TIME(0%) &<cr>
*G/OPEN W%/V<cr>
<tab> OPEN W% FOR INPUT AS FILE 1% &<cr>
*AI<cr>
<tab><tab>,RECORDSIZE 4096% &<cr>
<eso>*V<cr>
<tab> Z%=SYS(PRIV.ON%) &<cr>
*G/OPEN W% FOR INPUT/V<cr>
<tab> OPEN W% FOR INPUT AS FILE 2% &<cr>
*AI<cr>
<tab><tab>,RECORDSIZE 4096% &<cr>
<eso>*V<cr>
<tab> M%=12% &<cr>
*H/15010<tab>/V<cr>
15010<tab>ON ERROR GOTO 15100 &<cr>
*G/OPEN FNU%/V<cr>
<tab><tab>OPEN FNU$(P3%,N%,4224%,4096%) FOR INPUT AS FILE M% &<cr>
*AI<cr>
<tab><tab><tab>,RECORDSIZE 4096% &<cr>
<eso>*V<cr>
<tab><tab>Z%=SYS(PRIV.OFF%) &<cr>
*EX<cr>

```

### 4.0 Simple TECO.INI file

Below is a TECO initializer file modeled on the one supplied by DEC. It prints the version of TECO, job number, keyboard number, account logged into, date, time, and command to enter TECO. This initializer loads the VTEDIT macro by default. (Use of the "/NOVT" switch disables loading).

This simplified code is patterned directly from the source TECO.INS found on the distribution tape, but without all the silly messages, file-type checking, and other timewasting junk. I will admit it's cute, but it gets old when you're waiting for VTEDIT to load.

## STOP WORKING OVERTIME!

Especially when these Infinity Software products are available:

**DUMPT** Never write one of those time-consuming "quick and dirty" file dump programs again. Output in ASCII, octal, hexadecimal, and Radix-50, large file support, efficient Macro-11 code, and an attractive report format are just some of the features. Only \$250.

**ENTRY** Super *SOURCE* code BASIC2/CSPCOM subprogram for VT100 data entry. All the standard field editing features plus low character output for efficient use of low speed lines. Now for \$500.

**PASMAN** The intelligent solution to system account and password management. Identify users, control system access, and generate reports for the boss. Just \$500.

Now that you've got those off-hours free, try a few of our arcade style games for VT52 and VT100 terminals.

**BLKADE** Up to a total of eight players try to fence in their opponents in this game of skill and strategy.

**PACKER** Collect the radio-active dust from the maze before the four robots catch you. (VT100 only.)

**INVADE** Protect the planet with your laser base from the alien invaders from space. (VT100 only.)

**SUBS** Locate and sink your opponent's submarine before he sinks you.

**STRWRS** You have five minutes to destroy the Death Star before it destroys your moon base.

**WIGGIT** Drop water crystals in front of the Martian Wiggits before they clone and capture you! (VT100 only.)

The first game is \$39.95, any additional ones are reduced to \$29.95. All our products come with their own user guide. California residents please add 6½ percent.

For more information, please write or call:

### INFINITY SOFTWARE CORPORATION

2210 Wilshire Blvd, Suite 801  
Santa Monica, California 90403  
(213) 820-2702

CIRCLE 87 ON READER CARD







# RSTS/E INTERNALS MANUAL

The RSTS community has been clamoring for years for a book that details the inner workings of RSTS/E. Well, clamor no more. Michael Mayfield of Northwest Digital Software, and M Systems, the publisher of The RSTS Professional and The DEC Professional Magazines, have teamed up to produce the RSTS/E Monitor Internals Manual.

This manual describes the internal workings and data structures of the RSTS/E monitor. It also notes differences in the internal structures between version 7.1 and earlier versions of the monitor. Future updates will include changes for new versions of the monitor.

Information is available for all levels of users:

- Gain a basic understanding of the workings of the monitor for optimizing system performance.
- Information on disk structures allows recovery of data from corrupted disk packs.
- Special uses of runtime systems and resident libraries allow complex applications to be developed without degrading system performance.
- Write your own custom device drivers for that "foreign" device you need to add but thought you couldn't.

## CONTENTS:

Chapter 1 describes the structures used by the monitor that are resident on disk. These include the directory structure, disk allocation tables, Save Image Library (SIL) formats, bootstrap formats and bad block mapping.

Chapter 2 describes the tables used within the monitor to control system resources and provide program services. These tables provide job, memory, file and device control, as well as program services such as interjob communication.

Chapter 3 contains information on writing and installing a custom device driver. It describes the entry points and information the driver must provide to the monitor as well as the subroutines and macros the monitor provides for the driver.

Chapter 4 contains information that enhances information already provided by Digital on writing custom resident libraries and runtime systems. It concentrates mainly on non-standard uses of resident libraries and runtime systems to increase system performance and functionality.

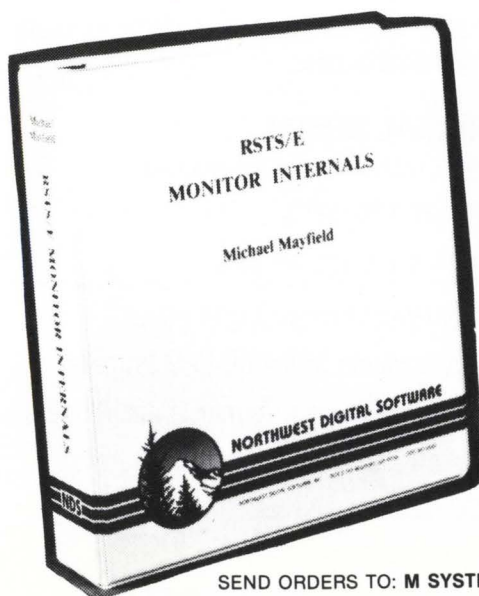
Appendix A provides six quick reference foldout charts:

- The directory structure.
- The monitor tables.
- Fixed memory locations and common data structures.
- Monitor subroutines.
- Device driver entry points.
- Device driver macros.

Appendix B provides examples of the peek sequences required to access most of the monitor tables. It also contains an example program that uses many of the monitor tables to display a job and open files status.

Appendix C provides an example device driver.

Appendix D provides an example runtime system that doubles as a menu system for restricting specified users to a menu of options.



# \$95<sup>00</sup>

# HAMILTON

## VAX

### TIME SHARING

#### VMS, FORTRAN, BASIC & WORD PROCESSING

ATTRACTIVE PRICING

#### PDP 11 to VAX Conversion Support

Call Toll Free **800-631-0298**

In New Jersey **201-327-1444**

Pearl Court, Allendale, N.J. 07401

## TIME SHARING

Total Support Timesharing for New York area users

### SOFTWARE AVAILABLE

VAX/VMS

VMS Fortran 77

VMS Basic

VMS FMS (Forms Management  
System)

VMS MACRO Assembler

VMS Multikey SORT Utility

VMS EDT Full Screen Text Editor

Tektronix PLOT 10 including Interactive  
Graphics Library (IGL) and Easy Graphing

Hamilton Word Processing

DRS Data Base Management System

Compucon CAPE PAK packaging design tool

Fully supported PDP11 versions of RT11,  
CTS 300, RSX11M, and RSTS/E,  
operating systems for media and software  
conversion to VAX/VMS

### COMMUNICATIONS

300/1200 baud dial up

(Local call for 212 users)

Multiplexed leased lines available for multi-  
terminal access

### TERMINAL RENTAL

Rented, installed and maintained

DEC VT 100 CRT's

LA34 & LA 120 Printers

Diablo Word Processing Printers

Data Products 300/600 LPM Printers

Tektronix Graphics Terminals and Plotters

Hewlett Packard Terminals & Plotters

GDC Modems and Micom Multiplexors



# USER-11: POWERFULLY PRODUCTIVE.

People productivity. It's more important than ever. And a good database system can mean *real* productivity.

USER-11 is a high-performance database system.

It is a fact: Software designed with USER-11 is built more quickly, operates more reliably, and performs better than other software techniques.

USER-11 is unique. It's easy to install. Easy to learn. And easy to apply. Adaptive tools and a standard approach ensure that maintenance is easier than ever.

A key to USER-11's success is its powerful, dictionary-based modules. Software developers simply describe and assemble these modules to create custom business packages—at an unprecedented rate.

Naturally USER-11 is supported with excellent documentation and a variety of training options for beginner to expert. Our commitment is to your complete satisfaction.

Whether you are a software provider or a software user, we guarantee you will be delighted.

Ask us about USER-11 and our family of business software products, or better yet, ask a *productive* USER!



**North County  
Computer Services, Inc.**  
2235 Meyers Ave.,  
Escondido, California 92025  
(714) 745-6006, Telex: 182773

\*USER-11 is currently available for DEC computers using the RSTS operating system.



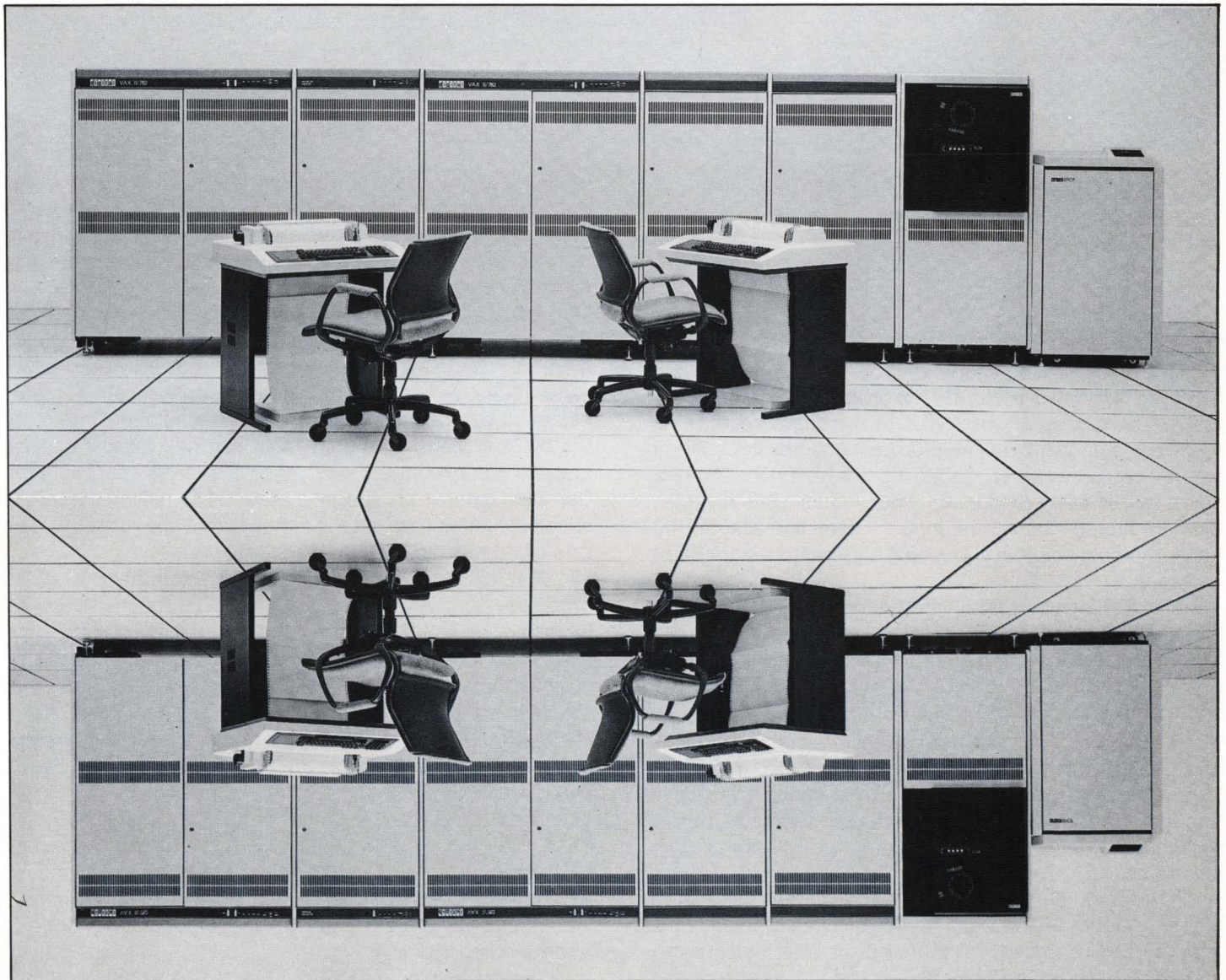


# The VAX-SCENE

Number 9

(RSTS PROFESSIONAL, Vol. 4, No. 4)

August 1982



**INSIDE:**

VAX-11/780 AND VMS



## VAX-11/780 AND VMS

By Michael H. Koplitz

### THE VAX-11/780 PROCESSOR

The VAX-11/780 processor (see figure A) is a set of hardware logic that performs the operations of a computer system according to the VAX-11 architecture. The integrated components of the processor are: the CPU, including its cache, writable diagnostic control store, floating point accelerator (optional), clocks and console; Main memory and its controllers; Input/output bus adapter; Optional multiport memory; Optional high performance 32-bit interface.

The CPU performs all of the logical and arithmetic operations requested by the computer system. The CPU contains sixteen 32-bit general purpose registers for data manipulation, and the Process Status Longword for controlling the execution states of the CPU.

The CPU also includes 12K bytes of writable diagnostic control store for updating the instruction set microcode. This area is also used for storing microcode diagnostics. The processor can also support 12K of user writable control store, which the user can use to program the processor in microcode.

The VAX-11/780 console consists of an LSI-11 microcomputer (PDP-11/03) with 16 bytes of read/write memory and 8K bytes of ROM (used for LSI-11 diagnostics and LSI bootstrap), a floppy disk system, a hard copy terminal (LA120) and optional remote diagnostic port (RDC). The operator communicates with the VAX-11/780 via the console with a set of user oriented commands.

The VAX-11/780 memory interconnect (same as synchronized backplane interconnect (SBI)) is the system's internal bus conveying addresses, data, and control information between the processor and memory, and between memory and I/O controllers. The memory interconnect has a

cycle time of 200 seconds and can transfer 32 bits each cycle. Data transfers use two consecutive cycles to transfer 64 bits at a time. The maximum memory interconnect transfer rate is 13.3 million bytes/second.

The VAX-11/780 Main Memory consists of MOS RAM integrated circuits with a cycle time of 600 nanoseconds. A memory controller can access a maximum of 4M (4,194,304) bytes. Two memory controllers can be connected to the memory interconnect, yielding a maximum of 8M bytes of physical memory that can be available on the system. The maximum total physical address space is 2 to the 29th power or approximately 512 million bytes. It should be noted that data is fetched from the memory at a rate of 64 bits/access.

The memory controller will buffer a command while it processes another to increase system throughput. Main memory can also be interleaved. The memory system employs error checking and correction that corrects all single bit error and detects all double bit errors.

Memory Cache is the primary cache system for all data coming from memory, including addresses, addresses translations and instructions. The memory cache is an 8K byte, 2 way set associative, write through cache.

The address translation buffer on the VAX-11/780 is a cache of virtual to physical address translations. The cache contains 128 virtual to physical page address translations which are divided into equal sections; 64 system page translations and 64 process page translations. Each section is two-way associative.

The instruction buffer on the VAX-11/780 is eight bytes long and improves CPU performance by prefetching instructions in the instruction stream. The instruction buffer effectively eliminates the time spent by the CPU waiting for instructions to be fetched. The processor interfaces for a MASSBUS peripheral (high speed disks or tape drives) is the MASSBUS adapter. The MASSBUS adapter performs control, arbitration, and buffering functions. Up to four MASSBUS adapters can be connected to the memory interconnect.

Each MASSBUS adapter includes its own address/translation map that permits scatter/gather disk transfers. The MASSBUS adapter includes a 32 byte silo data buffer. Data are assembled in 64 bit quadwords (plus parity) to make efficient use of the memory interconnect bandwidth.

All devices other than the high speed disk drives and magnetic tapes are connected to the UNIBUS, an asynchronous bidirectional bus. These devices include all Digital- and user-developed real-time peripherals. The UNIBUS is connected to the memory interconnect through the UNIBUS adapter. Up to four UNIBUS adapters can be placed on the memory interconnect. The UNIBUS adapter translates an 18 bit UNIBUS address into a 30 bit memory interconnect address. The speed of data paths on the UNIBUS is 1.35 million bytes/second.

## THE VMS OPERATING SYSTEM

### VAX/VMS Operating System Overview

VAX/VMS is a general purpose operating system for VAX systems. VMS allows for a high-performance environment for the concurrent execution of multiuser timesharing, batch and real time applications written in BASIC, COBOL, FORTRAN, PASCAL, BLISS, CORAL, PL/1 and assembly language.

VAX/VMS features include memory management, event-driven priority scheduling, shared memory, file and interprocess communications, data protection based on ownership and application groups, user privilege and resource allocation control, and easy-to-use, easily extended command language.

VAX/VMS also includes multijob batch processing, program development tools, extensive file and record management services, programmed system services for process and subprocess control and interprocess communications, common run-time procedure library, and system maintenance utilities.

VAX/VMS also includes the following facilities: Operating system nucleus, including virtual memory manager, swapper, system services, and I/O device driver, user authorization control programs, job initiator, and symbiont manager, account manager, and operator communications manager.

Other special features include error logging and print utility, DCL command interpreter, MCR command interpreter, interactive and batch editors, macro assembler, linker with cross reference, library maintenance utility, common run-time procedure library, symbolic debugger for native programs, RMS, FILES-11, SORT/MERGE utility, user environment package, and software maintenance release update utility.

### VAX/VMS VIRTUAL MEMORY SYSTEM

VAX/VMS consists of  $2^{32}$  (two to the 32nd power) bytes of virtual address space divided into system and process spaces, each of which has  $2^{31}$  bytes. Process virtual space is divided into a program region and a control region. The program region contains the image of the job currently being executed. The control region contains information

maintained on behalf of the process by the system, and it contains the user stack and the kernel, executive and supervisor mode stacks. Only a small amount of the control region is reserved for the system, the remainder is available to the user.

The virtual memory for a process is subdivided into pages. Each page consists of 512 bytes. The system and user virtual spaces are described in a data structure called the system page table (SPT) which contains one page table entry for each page of system virtual memory. When a virtual page is in memory, the page table entry contains the page frame number needed to map the virtual page to a physical page.

The process's virtual space is described in two page tables: the PO page table for the program region and the P1 page table for the control region. The hardware system base register (SBR) and system length register (SLR) provide the physical address and the length in longwords of the system page table. Given the contents of the SBR and SLR, it is possible to locate all system virtual pages.

Memory management uses page tables as the data base to contain the status and location of virtual pages of processes. A process contains an entry in the appropriate process page table to describe that page and its location.

The following are descriptions of the processes and services performed by VAX/VMS:

#### WORKING SET

The section of pages of a process that need to be in memory, remaining pages are kept on a secondary storage device.

#### BALANCE SET

The set of processes that reside in physical memory are termed the balance set. This set of processes has memory requirements that balance with available memory of the system.

#### WORKING SET SWAPPER

The working set swapper is a small process that returns process working sets into the balance sets and removes them from the balance set. The main function of this process is to provide memory residency for the highest priority executable processes so that they may be scheduled for execution.

#### PROCESS SCHEDULING

VAX/VMS operating system defines 32 levels of software for scheduling processes. The lower 16 levels are reserved for normal processes, while the higher 16 levels are reserved for real-time processes. The scheduler makes scheduling using the following policies:

1. Maintaining a queue for each state that a process can attain.
2. Reacting to system events.

System events are occurrences that causes the status of one or more processes in the system to change.









Going from RSTS/E to VAX/VMS?

# MIGRAID3

can help get you there.

**MIGRAID3™** USERS WITH A RSTS/E DISK PACK MOUNTED AS A "FOREIGN" VOLUME UNDER VMS CAN

- TRANSFER RMS-11 FILES DIRECTLY TO VMS, READY TO USE
- COPY ASCII STREAM FILES DIRECTLY TO RMS-32 SEQUENTIAL/VARIABLE FORMAT
- TRANSFER VIRTUAL ARRAYS AND BLOCK I/O FILES, READY TO OPEN ORGANIZATION VIRTUAL

**MIGRAID3** SUPPORTS RSTS/E WILD-CARDS FOR BULK COPIES, AND OFFERS A COMPREHENSIVE DIRECTORY FACILITY TOO!

\$800 (U.S.) Single-CPU license; QDA/OEM terms available.



**COMPUTER METHODS CORPORATION**  
P.O. BOX 592  
MOORESTOWN, NJ 08057  
(609) 778-8440

RSTS and VAX/VMS are registered trademarks of Digital Equipment Corporation.

CIRCLE 152 ON READER CARD

August 1982

ALRSTSPROFESSIONALRSTSPROFESSIONALRSTSPROFESSIONALRSTSPROFESSIONALRSTSPROFESSIONALRSTSP

## SAMPLE OUTPUT

Symbol	SYS #	Privilege?	Description
		Norm/Current	
UU.TB3	-29	No No	MONITOR TABLES PART 3
UU.SPL	-28	No No	ONE-SHOT SPOOLING REQUEST
UU.DMP	-27	Yes Yes	ONLINE MONITOR SNAPSHOT
UU.FIL	-26	Yes No *	FILE UTILITY
UU.ATR	-25	No No	READ/WRITE FILE ATTRIBUTES
UU.CCL	-24	Yes Yes	CCL COMMAND ADD/DELETE
	-23	Yes Yes	RESERVED
	-22	Yes Yes	RESERVED
	-21	Yes Yes	RESERVED
	-20	Yes Yes	RESERVED
UU.LOG	-19	Yes Yes	SET NUMBER OF ALLOWED LOGINS
UU.RTS	-18	Yes Yes	RUN-TIME SYSTEM & RESIDENT LIBRARY CONTROL
UU.NAM	-17	No No	SET FILE'S RUN-TIME SYSTEM NAME
UU.DIE	-16	Yes Yes	SPECIAL SHUTUP LOGOUT
UU.ACT	-15	Yes Yes	ACCOUNTING INFORMATION DUMP
UU.DAT	-14	Yes Yes	DATE/TIME CHANGER
UU.PRI	-13	Yes Yes	PRIORITY, RUN BURST, MAXIMUM CHANGER
UU.TB2	-12	No No	2ND PART OF MONITOR TABLES
UU.BCK	-11	Yes Yes	BACKUP FILE ACCOUNTING CHANGER
	-10	Yes Yes	RESERVED
UU.HNG	-9	Yes Yes	HANGUP/ENABLE A DATASET
UU.FCB	-8	No No	GET FCB/DCB INFORMATION
	-7	Yes Yes	RESERVED
UU.POK	-6	Yes Yes	POKE MONITOR MEMORY
	-5	Yes No *	RESERVED
	-4	Yes Yes	RESERVED
UU.TB1	-3	No No	1ST PART OF MONITOR TABLES
UU.NLG	-2	Yes Yes	SET NUMBER OF ALLOWED LOGINS TO 1
UU.YLG	-1	Yes Yes	SET NUMBER OF ALLOWED LOGINS TO MAXIMUM
UU.PAS	0	Yes Yes	CREATE AN ACCOUNT
UU.DLU	1	Yes Yes	DELETE AN ACCOUNT
UU.CLN	2	Yes Yes	CLEAN A DISK PACK
UU.MNT	3	Yes Yes	DISK PACK MOUNT/DISMOUNT
UU.LIN	4	Yes Yes	LOGIN
UU.BYE	5	Yes Yes	LOGOUT
UU.ATT	6	Yes Yes	ATTACH
UU.DET	7	Yes Yes	DETACH
UU.CHU	8	Yes Yes	CHANGE PASSWORD/QUOTA
UU.ERR	9	No No	GET ERROR MESSAGE TEXT
UU.ASS	10	No No	ASSIGN
UU.DEA	11	No No	DEASSIGN
UU.DAL	12	No No	DEASSIGN ALL
UU.ZER	13	No No	ZERO DEVICE
UU.RAD	14	No No	READ ACCOUNTING INFORMATION
UU.DIR	15	No No	GET DIRECTORY INFORMATION
UU.TRM	16	No No	SET TERMINAL CHARACTERISTICS
UU.LOK	17	No No	WILDCARD DIRECTORY LOOKUP
	18	Yes Yes	RESERVED
UU.CHE	19	Yes No *	CACHE ENABLE/DISABLE
UU.CNV	20	No No	CONVERT DATE/TIME TO ASCII
UU.SLN	21	Yes Yes	SET/CLEAR SYSTEM-WIDE LOGICAL NAMES
	22	Yes Yes	RESERVED
UU.SWP	23	Yes Yes	ADD/REMOVE SWAP, OVERLAY, ERROR MSG FILES
UU.JOB	24	Yes Yes	JOB CREATION
UU.PPN	25	No No	WILDCARD PPN LOOKUP
UU.SYS	26	No No	RETURN JOB STATUS INFORMATION
	27	No No	RESERVED
UU.NME	28	No No	NAMED DIRECTORY HOOK

## WRITING A RUN-TIME SYSTEM (or Happiness in the HISEG)

... continued from page 31

top end of the users address space. One way to do this is as follows; we put the psudeo-vectors in a psect called '.99998'. The faithful task builder (who loves putting psects in alphabetical order) will force this psect to the end of our partition, after all the other rts code. Now we have the vectors at the end of our code, but in order for the rts to work, the last word in the vector region must land at (octal) 177776. This means that the vectors must begin at 177732; so, we put a 'dummy' psect (with nothing in it) just before the psudeo-vector region. That psect is called '.99997.' Now we can use the EXTSTCT (extend section) option of the task builder to force our psudeo-vectors to start at just the right place. Unfortunately, this method requires two task builds; one with an EXTSTCT of zero, so we can calculate how much to extend the dummy psect, then another with the EXTSTCT option plugged in to actually get the rts to line up. Next the entire mess is run through MAKSil, which adds a symbol table to the code and through some other black magic, actually builds the rts. Since this task build procedure leaves lots of room for human error (and since I'm quite lazy) I use a system of 2 ATPK command files, and a TECO macro to build the

rts. The first command file builds the rts with an EXTSTCT of zero, then runs the TECO macro. The TECO guy looks at the TKB map of the rts, finds out where the psudeo-vector psect actually starts, and calculates what the EXTSTCT parameter should be for the psudeo-vectors to line up. It then edits the SECOND command file, plugging in the newly figured EXTSTCT value. (Please keep in mind that TECO isn't a supported product. . .) We then execute the second command file to task build the image with the new EXTSTCT value, then run it through MAKSil. Figure 1 shows the first command file, Figure 2 is the TECO macro, Figure 3 is the second command file.

### Using the rts.

In order to enter the new rts, you can do one of two things; you could SWITCH to it with the switch cusp (or just execute the switch rts sys call), or you could run a program which has been NAMED to that rts. For example:

```
Ready

SW OSCAR
Welcome to OSCAR
[Exit]
```

Ready

... continued on page 56





OR:

PIP JUNK.TSK/RT:OSCAR (any executable program will do for now)

[1,12] OSCAR.MAC

Ready

RUN JUNK.TSK  
Oscar doesn't RUN programs yet...  
[Exit]

Ready

Next issue I'll attempt to show how to read the executable code (in this case JUNK.TSK) and even allow it to execute, and how to use the run-time system debugging tool, RTSODT. If you thought ODT was a blessing, wait till you see RTSODT. . .

Enjoy!

```

.title oscar a demo run-time system
.ident /1.0/
.enabl lc
;
;define some things in the loseg
;
kbasea ==2000 ;kb bulfer

;
;define some directives & rsts locations
;
xrb ==442 ;address of xrb
firgb ==402 ;address of firgb
.exit ==104046 ;exit directive
.write ==104004 ;write directive

;
;define some text
;
.psect text
newmsg: .asciz /Welcome to OSCAR/<15><12>
runmsg: .asciz /Oscar dosen't RUN programs yet.../<15><12>
eximg: .asciz /[Exit]/<15><12>

.psect code
new:: mov #2000,sp ;setup user stack
mov #newmsg,r0 ;point to message to be printed
call print ;and print it
br exit ;then exit

run:: mov #2000,sp
mov #runmsg,r0 ;point to message
call print ;go print it
br exit

exit: mov #eximg,r0
call print
.exit

.page
.sbttl define pseudo-vectors
;
;bits in p.flag
;
.asect
= 400
PF.KBM: .BLKB . ;RTS IS A KEYBOARD MONITOR
PF.LUS: .BLKB . ;RTS ALLOWS ONLY 1 USER (NO SHARING)
PF.RW: .BLKB . ;RTS WANTS TO RUN MAPPED READ/WRITE
PF.NER: .BLKB . ;RTS DOESN'T WANT ITS ERRORS LOGGED
PF.REM: .BLKB . ;UNCONDITIONAL REMOVE FROM MEMORY ON EXIT
PF.CSZ: .BLKB . ;RUN SIZE IS COMPUTED FROM FILE SIZE
PF.SLA: .BLKB . ;(SAVE THE LOAD ADDRESS, M.PHYA)
PF.EMT: .BLKB . ;RTS WANTS EMT CODE IN LOW BYTE AS A PREFIX

.macro vector at,to
= ve+at-p.off
.word to
.endm vector

.psect .99997
.psect .99998
ve::

o.flag == pf.kbm | pf.ner ;say we're a keyboard monitor,
;and we don't wish to log any errors
o.dext == ^RBOB ;default runnable extension for this rts
o.msiz == 1 ;minimum size for jobs under this rts
o.size == 24. ;maximum size

vector p.flag,o.flag
vector p.dext,o.dext
vector p.isiz,o.msiz
vector p.msiz,o.msiz
vector p.fis,exit
vector p.cras,exit
vector p.stit,exit
vector p.new,new
vector p.run,run
vector p.bad,exit
vector p.bpt,exit
vector p.iot,exit
vector p.emt,exit
vector p.trap,exit
vector p.fpp,exit
vector p.cc,exit
vector p.2cc,exit
vector p.size,o.size

pvend::

.asect
= 177776
.BLKW -1 ;UNAVAILABLE WORD
P.SIZE: .BLKW -1 ;MAX SIZE FOR A USER'S IMAGE IN K
P.2CC: .BLKW -1 ;ADDRESS OF 2 QUICK CONTROL/C'S
P.CC: .BLKW -1 ; " " CONTROL/C TRAPPING
P.FPP: .BLKW -1 ; " " 0244 TRAPS (FPP)
P.TRAP: .BLKW -1 ; " " 034 TRAPS (TRAP)
P.FMT: .BLKW -1 ; " " 030 TRAPS (NON-MONITOR CALL)
P.IOT: .BLKW -1 ; " " 020 TRAPS (IOT)
P.BPT: .BLKW -1 ; " " 014 TRAPS (ODT OR T-BIT)
P.BAD: .BLKW -1 ; " " BAD ERROR RECOVERY
P.RUN: .BLKW -1 ; " " ENTRY TO RUN A NEW PROGRAM
P.NEW: .BLKW -1 ; " " A NEW ENTRY
P.STRT: .BLKW -1 ; " " SYSTEM START
P.CRASH: .BLKW -1 ; " " CRASH RECOVERY
P.FIS: .BLKW -1 ; " " 0244 TRAPS (FIS)
P.MSIZ: .BLKW -1 ;MIN SIZE FOR A USER'S IMAGE IN K
P.JSIZ: .BLKW -1 ;(HISTORICAL...)
P.DEXT: .BLKW -1 ;DEFAULT EXECUTABLE EXTENSION (FAD50)
P.FLAG: .BLKW -1 ;FLAG WORD DESCRIBING THE PTS
.BLKW -1 ;DUMMY TO GET BACK TO THE
P.OFF: ; STARTING ADDRESS OF THESE "VECTORS"

.end new

```

FIGURE 1

Yes Virginia, there is a Macro Man!

# Call MACRO MAN

for superior performance

- RSTS Internals •
- Custom Macro Programming •
- RSTS or 11M •

LEARN MACRO FROM THE MASTER!  
Seminars available — call for details.

MACRO UTILITY LIBRARY  
Available now — call for information.

Also Available Now —  
VAX MACRO Consulting

**RSTS/E  
MACRO PROGRAMMING COURSE**  
To Be Given  
September 13 — September 17  
in  
Philadelphia

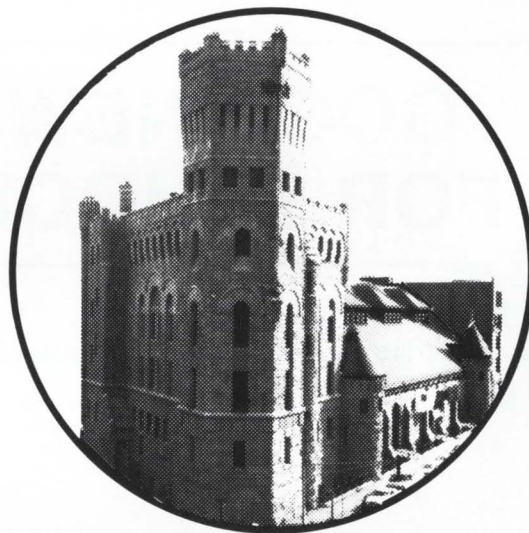
**Bob 'Macro Man' Meyer**  
9 Lockwood Avenue, Fieldsboro, NJ 08505  
609—298-9127

# Take a look at IRUS '82

1982 Conference  
And Exposition  
For DEC Users

Boston Park Plaza  
and Plaza Castle  
October 4 - 6, 1982

Sponsored by Independent RSTS Users Society (IRUS)  
and Hardcopy Magazine



#### THE CONFERENCE

Consisting of a program of seminars, workshops, and panel discussions on aspects of RSTS, VAX, other operating systems and languages. Seminars will examine the influence of microcomputers, communications, and distributed processing on the DEC users, and a look will be taken at the current and future trends in DEC-compatible software and hardware technology.

Plan to attend if you are an analyst, system manager, project leader, or data processing manager, and you need information and ideas from the DEC world.

#### THE EXPOSITION

A gathering of exhibitors of software, hardware, and services who specifically want to meet the DEC user community. The schedule has been designed to bring together exhibitors and attendees in a relaxed social setting, in addition to appealing to that walk-in market that a city like Boston can attract because of its importance to the East Coast market.

Plan to exhibit if your organization will benefit from being part of a DEC-compatible conference which encourages contact between vendor and user.

**Exposition management under the direction of Dame Associates, Inc. Boston, MA**

To: DAME ASSOCIATES, INC.  
51 Church Street, Boston, MA 02116  
(617) 482-0097

- Please send full details when available on how I can register to attend the  
**IRUS '82 Conference & Convention**
- Please send full details on how our company can reserve exhibit space at the  
**IRUS '82 Exposition**

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Product/Service \_\_\_\_\_

Street Address \_\_\_\_\_

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

Postal Code/Zip \_\_\_\_\_ Country \_\_\_\_\_

For further information on attending the conference, contact IRUS, 3657 Boston Post Road, Suit 4, Warwick, R.I. 02886 (401) 738-4430

CIRCLE 145 ON READER CARD

**NEW DEC**

**DECWORD  
VT 102-WA**

## Word Processing Terminals

### Decword Software PDP-11/23, RLO2 Systems

Other DEC terminals, components,  
and systems in stock



**Spartin Systems**

**713/496-0771**

14925-A Memorial • Houston, Texas 77079



CIRCLE 79 ON READER CARD

```
[1,12] PRINT.MAC

.title print
.ident /1.0/

;
;print.mac
;print routine for oscar.rts
;
;to use:
;   mov   #string,r0
;   call  print
;where:
;   string is the address of the asciz string to be printed
;

.psect code
print:  mov   r1,-(sp)      ;get a register
        mov   r2,-(sp)      ;or 2
        mov   r0,r1        ;save pointer to string
10$:   tabt  (r0)+         ;find null byte at end of string
        bne          10$

        sub   r1,r0        ;calc length of string
        mov   #xrb,r2      ;point to xrb
        mov   r0,(r2)+     ;put in length of string
        mov   r0,(r2)+     ;twice
        mov   r1,(r2)+     ;point to string
        clr  (r2)+         ;channel to print to
        clr  (r2)+         ;lab block (for disk files)
        clr  (r2)+         ;wait time
        clr  (r2)+         ;modifiers

        .write          ;do the write

        mov   (sp)+,r2     ;restore everything
        mov   (sp)+,r1

rts    pc                ;return to caller

.end
```

**FIGURE 2**

```
!
!primary tkb cmd file for oscar.rts
!
$allow no errors
mac oscar=oscar
run $tkb
oscar/-hd,oscar/-wi/ma,oscar=oscar
print
/
extsct=.99997:0
stack=0
par=oscar:160000:20000
//
run oscar.tec
$@ oscar2
```

**FIGURE 3**

[1,12] OSCAR.TEC

```
!
!teco macro to align oscar.rts !
!
$$@a/Working.../
@er/oscar.map/
5<a>
:@s/.99999:/"u @s/.99998:/'
@s/"ed/ r
'o
\ua !save end of rts!
@^a/new EXTSTCT is: /
177732-ga ua
qa==
hk
@eb/oscar2.cmd/
y
@s/extsct/
@s:/
k
qa\
@i/
/
@ex//
$$
```

**FIGURE 4**

```
!
!secondary tkb cmd file for oscar.rts
!
$allow no errors
run $tkb
oscar/-hd,oscar/-wi,oscar=oscar
print
/
extsct=.99997:17516
stack=0
par=oscar:160000:20000
//
$allow fatal errors
ut remove oscar
$allow no errors
run $maksil
oscar/rt5

no
```

**FIGURE 5**

# GOOD NEWS FOR SCHOOLS



**FINAR Introduces  
A New Educational Discount:**

# 100% OFF

LIST PRICE

FINAR - The financial modeling language that is used by hundreds of commercial enterprises around the world is now available to universities, colleges, and other educational institutions.

- Your finance office can use it for budgeting, cash flow forecasting, and other accounting tasks.
- Your business school can give students experience with a state of the art financial modeling system.
- Your professors can use it to do research and consultancy.

**HERE IS OUR OFFER:**

FINAR is normally sold for \$18,500.00 to commercial enterprises. These firms also pay an annual fee of 10% for maintenance and support of the product. We will provide your school with the software for free. Your school, on an annual basis, will pay only the \$1,850 maintenance fee normally charged to our commercial accounts.

**If your school has a PDP-11/RSTS or VAX/VMS computer system and you want to take us up on this offer call or write:**



**James B. Hotze & Co.**

3303 South Rice Avenue, Suite 208  
Houston, Texas 77056  
(713) 960-0848

CIRCLE 51 ON READER CARD



# Your time is money

Every second you spend programming costs you money. Our **DEC-compatible software** gets you faster answers and more productivity with lower programming costs.

Take EasyEntry, our forms management and data entry system for the PDP-11 and VAX. You design and implement forms on-screen — in hours instead of days.

But you don't sacrifice versatility for speed. EasyEntry is powerful enough to handle complex tasks like transaction processing and data retrieval.

It can be used as your complete data processing system.

And we have three more software solutions to save you time and money: AIS-PL/I, a multi-purpose language for the PDP-11 and VAX; BURCOM-11, our exclusive Burroughs-DEC communications link and WP Saturn, a powerful word and list processor for the PDP-11 and VAX.

Applied Information Systems — we get you the information you need. When you need it.

**applied information systems, inc.**

500 Eastowne Dr.,/Suite 207/Chapel Hill, NC 27514/919/942-7801

CIRCLE 151 ON READER CARD

# THE RSTS CRYSTAL BALL — Part 2

By Michael C. Greenspon, Integral Information Systems, Los Angeles, California

No portion of this document may be reproduced for profit without the express written permission of Integral Information Systems.

The information in the document is believed to be accurate and correct, however Integral Information Systems assumes no liability for any errors which may appear in this document, or any changes which may occur in the described software.

Welcome once again. This month the Crystal Ball has news of interest to all RSTS programmers, so even if you don't use MACRO-11, read on. I'll be telling you how to use some of the new undocumented monitor features from BASIC. Also, you should be preparing to install RSTS version 7.2, and I have more notes and details on new structures in 7.1 and later.

## ERRATUM

First, though, I'd like to correct a minor error in the last issue. In the disassembly listing of the .XPEEK code, the comments indicate that .XPEEK cannot be used to examine run-time systems or resident libraries. This is simply a case of "reading the wrong bit" (see the BIT BITWRD(R2),#14). What is really being tested there is non-existent memory or locked out memory. The .XPEEK call will peek at run-time systems and reslibs with no problem, but remember, you must check and make sure that they are resident. Even with such a check, timing problems could pop up, so this is not recommended for heavy use. The best application for .XPEEK is looking at monitor memory and other entities for which residency can be guaranteed. I'll have more on .XPEEK and its uses later in this article.

## MONITOR FIXES

As I mentioned last time, there is a nasty bug in UU.TRM. I was assured at DECUS that the problem was "Fixed in the source in 7.2," however if you will be running 7.1 for any length of time, you may want to install this patch. As far as I know, it causes no problems, and we are currently running 7.1 with it. It is possible that it could conflict with future DEC patches; however, chances are there will be no more patches for V7.1.

Note that the command file installs two patches separately so that ONLPAT won't complain about a patch spanning OVR and another module. ALWAYS install the patch in the order listed. This patch replaces several lines of code which were "... accidentally deleted when the code was edited." The patch is as follows:

```
File to patch? <LF>
Module name? RSTS
Base address? PATCH
Offset address? <LF>
```

Base	Offset	Old	New?
??????	000000	000000	? MOV!0046
??????	000002	000000	? BITBI2761
??????	000004	000000	? 1
??????	000006	000000	? DDJBNO

??????	000010	000000	? BNEI22
??????	000012	000000	? MOV!0246
??????	000014	000000	? MOV!0346
??????	000016	000000	? CLR!00
??????	000020	000000	? MOVBI6100
??????	000022	000000	? DDUNT
??????	000024	000000	? ASL!00
??????	000026	000000	? MOV!2737
??????	000030	000000	? PR5
??????	000032	000000	? PS
??????	000034	000000	? JSRI537
??????	000036	000000	? CALLMI
??????	000040	000000	? SETPRM
??????	000042	000000	? KBDAPS
??????	000044	000000	? MOV!2737
??????	000046	000000	? PR3
??????	000050	000000	? PS
??????	000052	000000	? MOV!2603
??????	000054	000000	? MOV!2602
??????	000056	000000	? MOV!2600
??????	000060	000000	? INCB!64
??????	000062	000000	? 20
??????	000064	000000	? RTS!07
??????	000066	000000	? 1C

```
File to patch? <LF>
Module name? OVR
Base address? TRM1
Offset address? 160
```

Base	Offset	Old	New?
??????	000160	105264	? JSRI737
??????	000162	000020	? PATCH
??????	000164	001020	? 1C

## MONITOR OVERLAY TABLE

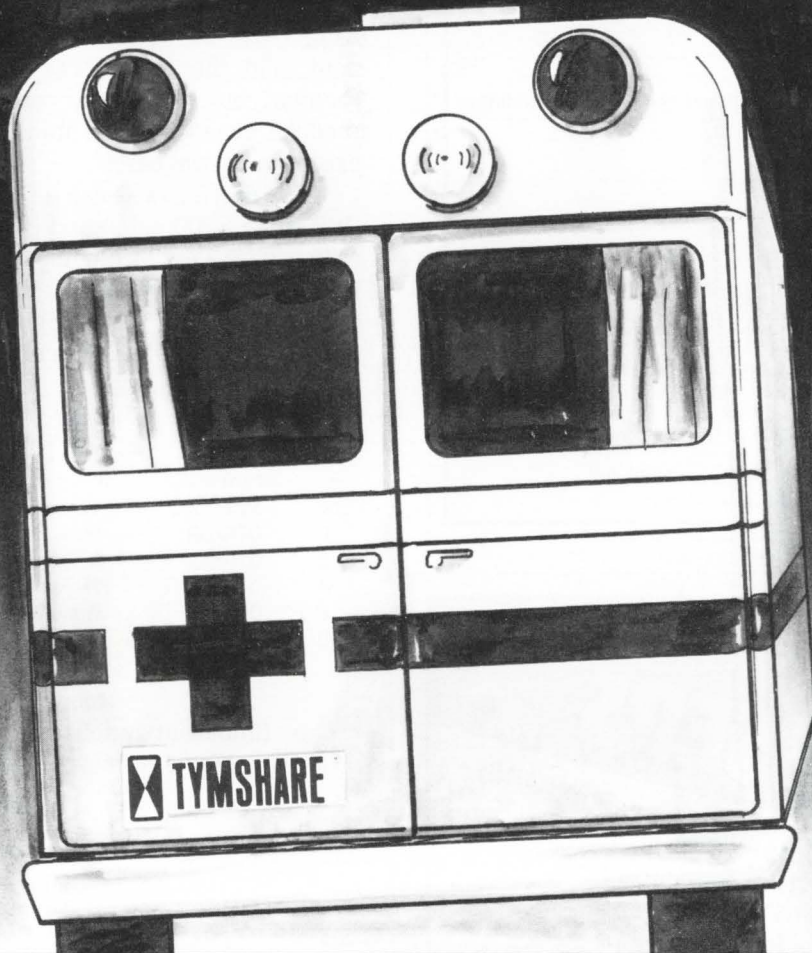
In the last issue, I mentioned the possibility of a monitor overlay table. I have since had the time to play with a running 7.1 system and confirm all of my suspicions about this phantom table. The definitions for the structure can be found in KERNEL.MAC, however I will detail it in a moment. First, a little history and explanation of monitor overlays.

Before version 7.1, modules were made resident or non-resident at link time. The FIP phase was linked before OVR, with any resident modules included. OVR was then linked against FIP's symbol table to resolve module addresses, etc. INIT's load routines loaded all of FIP at startup, and the resident modules along with it.

In 7.1 and later, CONFIG.MAC defines symbols in the form xxxRES where "xxx" is the name of the module to be made resident (SND, DIR, etc.) These symbols are globalized in TBL.MAC, and built into the overlay table at the beginning of the OVR phase. At link time, all modules, whether they are to be memory resident or not, are linked into OVR. All that determines if the module is resident is a bit in the

# Computer ills ???

# We'll Come To You



# Rx

When your computer system is down, you feel it. Tymshare's prompt emergency response will have your computer installation healthy in short order. To keep your system operating efficiently we will prescribe a custom preventive maintenance program which will insure maximum availability at the

lowest possible cost.

Why not investigate the benefits that Tymshare computer maintenance can offer you.

For more information on how our maintenance programs will best fit your needs, call ....

## COMPUTER SYSTEMS and SUPPORT DIVISION

 **TYMSHARE**®

EAST: 10111 George Palmer Hwy. / Bowie, Md 20716 / (301) 459-8363  
CENTRAL: 11999 Katy Freeway / Houston, Tx 77079 / (713) 870-0923  
WEST: 3300 Capital Avenue / Fremont, Ca 94538 / (415) 794-2538

# RSTS Likes ACCOUNTING TWO\*

## Financial Software for RSTS / E

General Ledger      Accounts Receivable

Accounts Payable      Installed and proven in Canada  
and the USA.

Flexible reporting structure and formatting  
**System adapts to the end user**

Table driven software  
**Changes made easily**

Multi-level accounting  
**Allows varying methods of branch and company consolidation**

Menu selection  
**Easy to use**

Fully documented  
**Easy to learn**

Rental plan also available  
**Conserve your capital budget**

For your Management Overview phone, write, or circle the reader card.



**IAS**  
Computer  
Corporation  
Limited

6080 Young Street  
Suite 401  
Halifax, Nova Scotia  
B3K 5L2

Contact: G. Patrick Hunt      Director of Marketing

\* Proprietary Product of IAS Computer Corporation Limited

CIRCLE 112 ON READER CARD

# PDP-11/ RSTS USERS

**Our Generalized Reporting System (GRS)**  
is absolutely the most powerful information  
retrieval and formatting tool available for  
RSTS systems. It enables you to:

- Give your users ad-hoc access to your database with an English-like query facility
- Extend the life of old applications
- Develop new reports in minutes, instead of days
- Free up your programmers for more important assignments

GRS is easily interfaced to any RSTS file system or DBMS. And it's available on a one-month trial basis for only \$100!

Can you really afford to be without GRS? Call or write today for free literature and licensing information.

**etc** ENTERPRISE  
TECHNOLOGY  
CORPORATION  
305 Madison Avenue  
New York, NY 10165  
(212) 972-1860  
Telex 177959

CIRCLE 4 ON READER CARD

overlay table. As I will demonstrate, this bit can be easily changed, and module residency can be modified without doing a new SYSGEN.

As I described in the last issue, startup under 7.1 is quite a bit different, due to the module residency scheme. INIT loads the permanently resident portion of the monitor. When RSTS gains control, it dispatches to an internal FIP function called STA. STA is hidden in the module LOD in the OVR phase. STA scans the overlay table and loads any modules marked as being memory resident.

STA makes no checks for what is normally allowed to be resident, therefore it is possible to make any module resident by patching the table. I brought up a 7.1 system with EVERY module (except LOD, which is only used once) resident, and the system ran just fine. True, I had a 62K monitor, but... In any case, the advantage in making modules other than the standard ones resident is minimal, except in special cases.

The overlay table can be found at the very beginning of OVR (base 2000 octal) and is comprised of a table header, followed by a list of module headers, one per module. Each module header contains the description of each of the overlays contained in the module. (Currently, this is only the length of the overlay.) The exact format is as follows:

### Overlay Table Header

Offset		
Octal	Mnemonic	Description
0	OTHFOR	Format number, currently 0
2	OTHREV	Revision number, currently 0
4	OTHSIH	Table header size, currently 12 octal
6	OTHSIM	Size of each module header, currently 6
10	OTHSIO	Size of each overlay entry, currently 2

### Module Header

(Immediately follows Overlay Table Header)  
(Table terminated with a fullword 0)

Offset		
Octal	Mnemonic	Description
0	OTMNAM	Module name (RAD50) or 0 for end
2	OTMFLG	Module flag word, see below
4	OTMNUM	Number of overlays in this module

### Overlay Entries

(OTMNUM of these immediately follow Module Header)

Offset		
Octal	Mnemonic	Description
0	OTOLEN	Length of this overlay

Currently, there is only one bit defined in OTMFLG. Its name is OTFRES, and, if set, indicates that the module is memory resident. This is the magic bit to toggle. Since the table is rather long, it can be a hassle to use ONLPAT to find the module name. I have written a program called ONLRES (listed at the end of the article) which can be used to change OTFRES for any module in the table.

Please note that although the changes can be made on-line to the installed SIL, they will not take effect until the



system is re-booted. Also, INIT is likely to give the message "Monitor size has changed from xK to xK." You should go through the TABLE sub-option of DEFAULT and fix up your memory allocation table. If you made your monitor larger (i.e. added resident overlays) INIT will reset the memory table, and you will have to go through DEFAULT.

**HIDDEN MONITOR CALL**

In the last issue, I documented the .XPEEK call, which allows for peeking at blocks of physical memory. Obviously, this is an extremely useful call, however since it is an EMT (as opposed to a UUO subfunction) it cannot be executed directly from BASIC.

While I was peeking through some 7.1 code, I discovered something rather interesting. The .MESAG handler (message send-recv EMT) has a hard-coded compare for a subfunction code of 4. I followed the branch, and guess where it wound up . . . just before the beginning of the .XPEEK code! Two move instructions transfer the physical source address from the FIRQB to the XRB, where .XPEEK expects it. This means that you can XPEEK by executing a .MESAG call. Message send-recv is of course usable from BASIC, and so is XPEEK!

In a conversation with the RSTS developer responsible for .XPEEK, I questioned him as to the hidden .MESAG subfunction. He said he implemented it so that he could easily debug .XPEEK from BASIC. He also added that XPEEK was intended for use by some DECnet utilities, in order to allow for XBUF peeking, and, unofficially, that the call was probably not going to go away in future releases.

The format of the call from BASIC for XPEEK via message send-recv is as follows: (Note that I have attempted to be consistent with the Programming Manual, so please tolerate the description of the first byte of the call . . .)

Data Passed:

Bytes	Meaning
1	CHR\$(6%), the SYS call to FIP.
2	CHR\$(22%), the send/recv function code
3	CHR\$(4%), the .XPEEK subfunction code
4	CHR\$(M%), where M% contains the most significant six bits of the physical address to XPEEK at.
5-6	CHR\$(L%)+CHR\$(SWAP%(L%)), where L% contains the least significant bits of the physical address. Bytes 4-6 form the physical base address to XPEEK at. This must be an area of memory which exists on the system, and is not locked out. You can only access memory which is in the monitor's MEMLIST, therefore you cannot XPEEK at the I/O page. The physical base address is a byte address and may be odd, i.e. point to the high byte of a word.
7-10	Ignored.
11	CHR\$(C%), the channel number of the I/O buffer to return the data in. If C% is between 1 and 12, the system returns the data in the buffer for channel C%. The channel must be open. Channel 0 can be used for the I/O buffer (not recommended) if 128 is added to the channel number; that is, CHR\$(128% + 0%). In general, CHR\$(128% + C%) allows channels zero through 12 to be used for I/O buffers.
12	CHR\$(0%) reserved—must be zero.

**TERMINALS FROM TRANSNET**

PURCHASE PLAN • 12-24 MONTH FULL OWNERSHIP PLAN • 36 MONTH LEASE PLAN

DESCRIPTION	PURCHASE PRICE	PER MONTH		
		12 MOS.	24 MOS.	36 MOS.
<b>DEC</b>				
LA34 DECwriter IV Forms Ctrl.	\$1,095	\$105	\$ 58	\$ 40
LA100 Letter Printer RO	1,995	190	106	72
LA120 DECwriter III KSR	2,295	220	122	83
LA120 DECwriter III RO	2,095	200	112	75
LA12A Portable DECwriter	2,950	280	155	106
VT100 CRT DECscope	1,695	162	90	61
VT101 CRT DECscope	1,195	115	67	43
VT125 CRT Graphics	3,295	315	185	119
VT131 CRT DECscope	1,745	167	93	63
VT132 CRT DECscope	1,995	190	106	72
VT18XAC Personal Computer Option	2,395	230	128	86
<b>TEXAS INSTRUMENTS</b>				
T1745 Portable Terminal	1,595	153	85	58
T1765 Bubble Memory Terminal	2,595	249	138	93
T1940 CRT	1,795	173	96	65
T1785 Portable KSR, 120 CPS.	2,395	230	128	86
T1787 Portable KSR, 120 CPS.	2,845	273	152	102
T1810 RO Printer	1,695	162	90	61
T1820 KSR Printer	2,195	211	117	80
<b>LEAR SIEGLER</b>				
ADM3A CRT Terminal	595	57	34	22
ADM5 CRT Terminal	645	62	36	24
ADM32 CRT Terminal	1,165	112	65	42
<b>DATAMEDIA</b>				
EXCEL 12 CRT Terminal	1,595	153	85	58
EXCEL 42 Smart Buffered CRT	995	96	54	36
COLORSCAN 10 Color CRT	3,195	307	171	116
<b>TELEVIDEO</b>				
910 CRT Terminal	650	62	36	24
925 CRT Terminal	850	82	46	31
950 CRT Terminal	1,075	103	57	39
<b>NEC SPINWRITER</b>				
Letter Quality, 7715 RO	2,895	278	154	104
Letter Quality, 7725 KSR	3,295	316	175	119
<b>GENERAL ELECTRIC</b>				
2030 KSR Printer 30 CPS	1,195	115	67	43
2120 KSR Printer 120 CPS	2,195	211	117	80
<b>EPSON</b>				
MX-80 F/T Printer	745	71	42	27
MX-100 Printer	895	86	48	32
<b>TIMEPLEX</b>				
E0400 4 Channel Stat Mux	1,525	147	82	55
E0800 8 Channel Stat Mux	2,050	197	110	74

FULL OWNERSHIP AFTER 12 OR 24 MONTHS • 10% PURCHASE OPTION AFTER 36 MONTHS

MICROCOMPUTERS

APPLE • COMMODORE • HP87 • DEC

ACCESSORIES AND PERIPHERAL EQUIPMENT

ACOUSTIC COUPLERS • MODEMS • THERMAL PAPER • RIBBONS • INTERFACE MODULES • FLOPPY DISK UNITS



**TRANSNET CORPORATION**

1945 ROUTE 22 • UNION, N. J. 07083 • (201) 688-7800  
TWX 710-985-5485 800-526-4965 OUTSIDE N. J.

CIRCLE 28 ON READER CARD

**DEC RSTS/E USERS**

From one of the pioneers in commercial data processing using RSTS. Off the shelf software ready for immediate delivery. Completely interactive. Extensively documented. Fully supported. Ideal for OEM's, service bureaus or end users. Cost effective solutions including:

- ACCOUNTS PAYABLE
- GENERAL LEDGER
- FINANCIAL REPORTING
- ACCOUNTS RECEIVABLE
- PAYROLL
- FIXED ASSETS

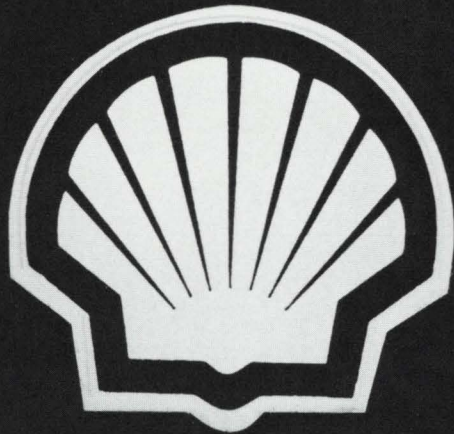
For complete details, contact us at:

**Plycom** services, inc.

P.O. Box 160  
Plymouth, IN 46563  
(219) 935-5121

CIRCLE 42 ON READER CARD





**FPS80 HAS PROVEN ITSELF IN COMPANIES  
LIKE SHELL INTERNATIONAL. IT IS BE-  
COMING A BIG NAME IN FINANCIAL  
PLANNING.**

**JOIN US.**

**WE ARE LOOKING FOR U.S. DISTRIBUTORS  
FOR OUR PRODUCTS. NOW IS YOUR  
CHANCE TO SHARE IN OUR SUCCESS.**

**IF YOU SELL DEC COMMERCIAL SOFT-  
WARE, WHY NOT ADD THE UP AND COM-  
ING FINANCIAL PLANNING PACKAGE TO  
YOUR RANGE OF PRODUCTS?**

**FOR INFORMATION CONTACT:  
D HOLROYD  
RTZ COMPUTER SERVICES  
6 ST JAMES'S SQUARE  
LONDON SW1Y 4LD  
TELEPHONE 01-930 4163  
TELEX 24639**



# BACmac can do it all!

BAC into RTS / BAC into MAC / BAC into BAS

BACmac is a unique software tool, running under RSTS/E, which provides the following conversions:

- translation from Basic-Plus "compiled" back to Basic-Plus source code (only the comments will be missing)

- translation from Basic-Plus into Macro source code, which compiled under RSTS runs faster than Basic-Plus

- translation from Basic-Plus into Macro source code which may be compiled under RSTS for execution under RT11 — a migration facility

- translation from Basic-Plus into a RUN-TIME-SYSTEM. Now you can write an RTS in Basic-Plus. The ideal solution to memory thrashing due to "multi-copy" applications programs.

RSTS/E, RT11, Macro-11 and Basic-Plus are trademarks of Digital Equipment Corporation.

Western Distributor:  
**Telecom Computer Systems, Inc.**  
 P.O. Box 03285  
 Portland, Oregon 97203  
 503/286-5122

**ADOS** | Advanced Digital  
 Office Systems

Eastern Distributor:  
**New England Micro Technology, Inc.**  
 P.O. Box 767  
 Marblehead, Mass. 01945  
 617/631-6005

CIRCLE 138 ON READER CARD

```

\      LENGTH% = LENGTH%
      + FNWORD$(ADDR% + OTHSIM% + I% * OTHSIO%)
      FOR I% = 0% TO OVERLAYS%-1%
      ! Tally up total space requirement
\      STAT% = ""
\      STAT% = "non-"
      UNLESS FNWORD$(ADDR% + .OTMFLG%) AND .OTFRES%
      ! Decide if module is resident or not
\      NAM% = RAD$(FNWORD$(ADDR% + .OTMNUM%))
      ! Get module name
\      GOSUB 1050 IF NAM% = MODULE$
      ! Ask about changing it if we found
      ! the module (and not doing directory)
\      PRINT NAM% + HT + FNOC$(LENGTH% + HT + NUM$(OVERLAYS%))
      + ", " + HT + STAT% + "resident"
      UNLESS LEN(MODULE$)
      ! Print the directory line
      ! unless we aren't doing directory
\      ADDR% = ADDR% + OTHSIM% * OVERLAYS%
      ! Advance to the next module header
      ! Finish up directory printing
\      NEXT
\      PRINT "?Module not found in OVR"
      UNLESS FOUND% OR LEN(MODULE%) = 0%
      ! Error if we didn't find the module
      ! (and not doing a directory)
\      GOTO 1040
      ! Re-prompt for module name

1050 FOUND% = -1%
      ! Now we've found it
\      PRINT "Module " + NAM% + " contains "
      + NUM$(FNWORD$(ADDR% + .OTMNUM%)) + ". overlay";
\      PRINT "s"; IF FNWORD$(ADDR% + .OTMNUM%) <> 1%
\      PRINT ". Total size is " + FNOC$(LENGTH%)
      + " (" + NUM$(LENGTH%) + ".) bytes."
\      PRINT "Module is currently " + STAT% + "resident."
      ! Print out status of module
\      MAKRES% = ""
      ! Junk this
\      OTMPLG% = FNWORD$(ADDR% + .OTMPLG%)
      ! Get the module flagword
\      MAKRES% = "non-"
      IF OTMPLG% AND .OTFRES%
      ! We're going to make it non-resident
      ! if it is currently resident
\      RESP% = ""
\      UNTIL LEN(RESP%)
      ! Until we have an answer
      RESP% = FNINPUT$("Make module " + MAKRES% + "resident? ", "YES")
      ! Get an answer
\      PRINT "Enter YES or <lf> to make module " + MAKRES%
      + "resident," + CR + LF + "or NO to leave module " + STAT%
      + "resident."
      UNLESS LEN(RESP%) ! Print this if abuser hit <cr>
\      NEXT
\      RETURN IF LEFT$(RESP%, 1%) = "N" ! Do nothing if abuser said NO
\      SIL.ALL% = LEFT$(SIL.ALL%, OFFSET%) + CVT$(SWAP$(OTMPLG% XOR .OTFRES%))
      + RIGHT$(SIL.ALL%, OFFSET% + 3%)
      ! Change status of module (this is a
      ! bit of a kludge)
\      PUT #.SIL.IO%, RECORD CURRENT.BLK%
      ! Write it back
\      RETURN
      ! That's all

10000 !

\      ! Error trapping:
\      !
\      !
\      RESUME 10010
      ! Resume to handle the error

10010 IF ERL = 1000%
      THEN PRINT ERT$(ERR) + " while trying to read INIT.SYS - continuing"
      ELSE GOTO 1010
      ! Print any errors and ignore them

\      IF ERL = 15010%
      THEN GOTO 32767
      ! Abuser hit "Z", etc.
      ! Get out quickly

\      IF ERL = 1010%
      THEN
      IF ERR = 5% AND M$(2%) = 0%
      THEN ERROR% = ERR
      ! Save error for right message
      OPEN SIL% + "[0,1]" FOR INPUT
      AS FILE #.SIL.IO%, MAP SIL
      ! Try to open it on [0,1]
      PRINT "File found in account [0,1]"
      GOTO 1020
      ! Say we found it and go back
      ELSE
      PRINT ERT$(ERR)
      ! Error opening SIL
      GOTO 1010
      ! Try, try again

\      IF ERL = 1020%
      THEN PRINT "?Null length file?" IF ERR = 11%
      PRINT ERT$(ERR) UNLESS ERR = 11%
      GOTO 1010
      ELSE
      IF ERL = 10010%
      THEN PRINT ERT$(ERR) UNLESS ERROR%
      PRINT ERT$(ERROR%) IF ERROR%
      GOTO 1010
      ! Error opening SIL

\      DEF FNINPUT$(PROMPT$, DEFAULT%)
      ! Return line of input from terminal

15010 PRINT IF CCPOS(0%)
      PRINT PROMPT%;
      GET #0%
      FIELD #0%, RECOUNT AS I%
      IF (ASCII(I%) AND 127%) = 10%
      THEN
      IF LEN(DEFAULT%)
      THEN
      FNINPUT% = DEFAULT%
      ! Then return the default

```



**Attention  
DEC users:**



## **MTI has what you need to turn your VT100 into a CP/M® personal office computer.**

Digital's VT 18X option can be installed on your VT 100 in just 15 minutes by your MTI field service representative. It features two 180K byte 5¼" mini floppy drives in a small box. A second dual unit can be added for a total of 720K bytes.

A library of CP/M software programs is available from MTI in addition to the operating software. Choose from over 2000 programs encompassing high-level languages and popular applications.

MTI is one of the few Authorized Digital Terminals Distributors, so we can give you the best of two worlds; terminals, based on advanced technology from the industry leader, and tailored software and services from an applications specialist.

Whether you buy, rent or lease our equipment, you'll find MTI is the one source for all the terminals, peripherals, systems, applications expertise and service you'll ever need. At good prices. Call us today.

**New York: 516/621-6200, 212/767-0677, 518/449-5959**

**Outside N.Y.S.: 800/645-6530**

**New Jersey: 201/227-5552**

**Ohio: 216/464-6688**



AUTHORIZED **digital**® TERMINALS DISTRIBUTOR

Applications Specialists & Distributors, New York, New Jersey and Ohio.  
Intel, Texas Instruments, DEC, Dataproducts, Lear Siegler, Hazeltine,  
Diablo, Racal-Vadic, Digital Engineering Retro-Graphics, Cipher, Epson,  
SMS, Elgar and 3Com.

CP/M is a registered trademark of Digital Research, Inc.



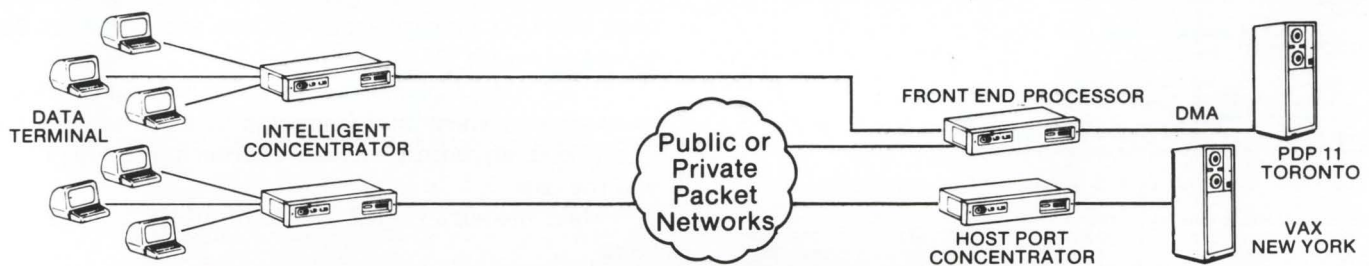






# What gives your VAX or PDP 11 TOTAL NETWORKING, MORE THRUPTUT AND BETTER PERFORMANCE?

## Cableshare's full line of Dec maintained X.25 computer communication products.



Our family of LSI-X.25 products are designed to give you everything needed to join the Networking revolution. You will increase the efficiency of your operation while improving your speed, accuracy, flexibility and control.

### Front End Processor

Connects your PDP-11 or VAX to packet switched networks without any application software changes while it increases CPU processing capacity and eliminates expensive communications port hardware.

### Intelligent Concentrator

Allows up to 32 asynchronous terminals to access your computer through packet networks. Plus, it supports formatted screen mode for

prompting and checking information from data entry clerks. The templates are stored in the concentrator and accessed as needed for greater accuracy and reduced CPU processing time.

### Portal

File transfer between VMS, RSTS/E and RSX-11M systems eliminating magnetic tape or costly hardware solutions. Portal can be used with Cableshare's full X.25 networking products to provide file transfer over both public and private packet switched networks.

### Electronic Mail

Provides a rapid cost efficient way to exchange business information at any time or place, accessed by standard terminals directly or through any X.25 network.

 cableshare inc.

20 Enterprise Drive  
P.O. Box 5880  
London, Ontario N6A 4L6  
(519) 686-2900

Suite 1810  
25 Adelaide St. E.  
Toronto, Ontario M5C 1Y2  
(416) 365-7322

Suite 203  
825 Manning Gardens N.E.  
Calgary, Alberta T2E 7L4  
(403) 248-1304

Plaza Office Centre  
Route 73 and Fellowship Rd.  
Mount Laurel, New Jersey U.S.A. 08054  
(609) 234-8141







A note of thanks to DEC users and the entire DEC-compatible community...

**You made DEXPO 82 your Show.  
So we're making DEXPO/West 82  
bigger to serve you even better.**

You didn't have to participate in DEXPO 82 to benefit from its immediate success. The strength of the first Show — held last May in Atlanta — assures support for more and bigger DEXPO Shows in the future. For DEC users and compatible vendors, it means new opportunities to meet face-to-face and help shape a prosperous DEC-compatible industry.

Both visitors and exhibitors who were at the Show are quick to agree that DEXPO is now the single most important event for every member of the DEC-compatible community. And they are looking forward to an even bigger DEXPO/West 82 — at the Anaheim Convention Center, December 7-9. This time, many DEC users are planning to bring teams of executives to see and compare the latest DEC-compatible hardware, software, services and supplies.

For their part, a large proportion of exhibitors are planning to return with expanded exhibits and product innovations. They'll be joined by as many as 75 new exhibitors.

DEXPO/West 82 will be the most comprehensive exhibition of DEC-compatible alternatives, enhancements and special solutions the world has ever seen. It will serve the largest audience of DEC users ever to visit one show. Most important of all, you can be sure DEXPO/West 82 will meet *all* your DEC-directed needs... a tradition that will be continued at DEXPO/East 83, Kiel Auditorium, St. Louis, May 22-24, 1983.

**DEXPO™/West 82**  
**The Second National  
DEC-Compatible Industry Exposition**  
Anaheim Convention Center  
Anaheim, California  
December 7-9, 1982

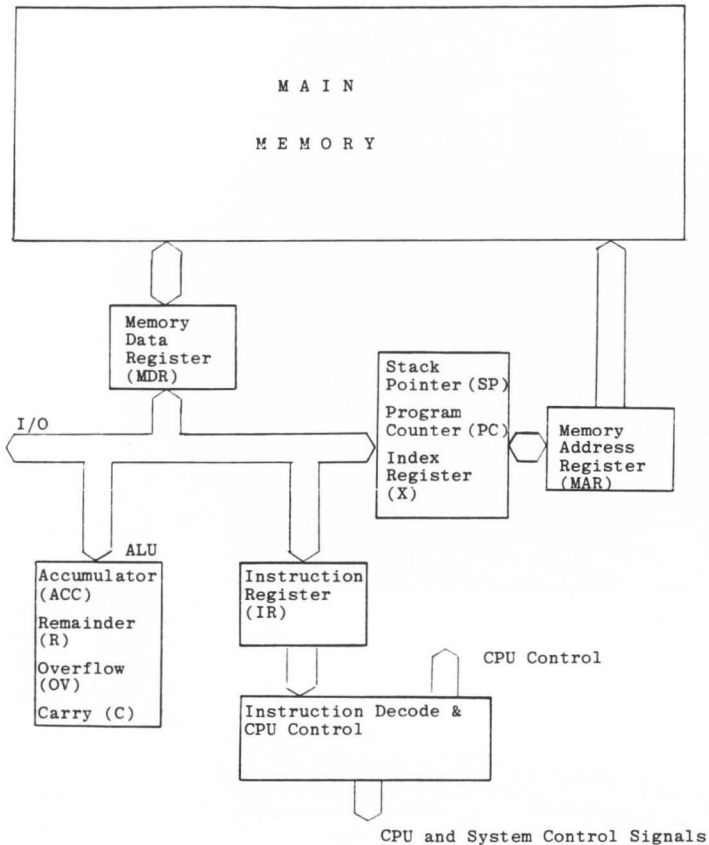
**TELL ME MORE ABOUT DEXPO/WEST 82**

- Send me and my associates \_\_\_\_\_ visitor registration tickets and complete information on the vendors and products we'll find at DEXPO/ West 82.  
(amount)
- I'm interested in exhibiting in the DEXPO Shows. Send me a prospectus, a floor plan and a complete list of exhibitors.

NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
TELEPHONE ( ) \_\_\_\_\_

Mail to: Expoconsul International, Inc.  
19 Yeger Road  
Cranbury, NJ 08512  
CALL: 609-799-1661

### 2.6 Architecture



# IT'S 5:30 PM, FRIDAY

Your FORMER programmer just went home.  
 He dialed into a non-priv account, let himself  
 in through a 'back door'. ([1,82] X.TSK <232>)  
 He is now linking the bottom of [1,2] to the  
 top with ODT. He is planning a couple of  
 custom monitor patches.  
 He is not mad anymore. . .

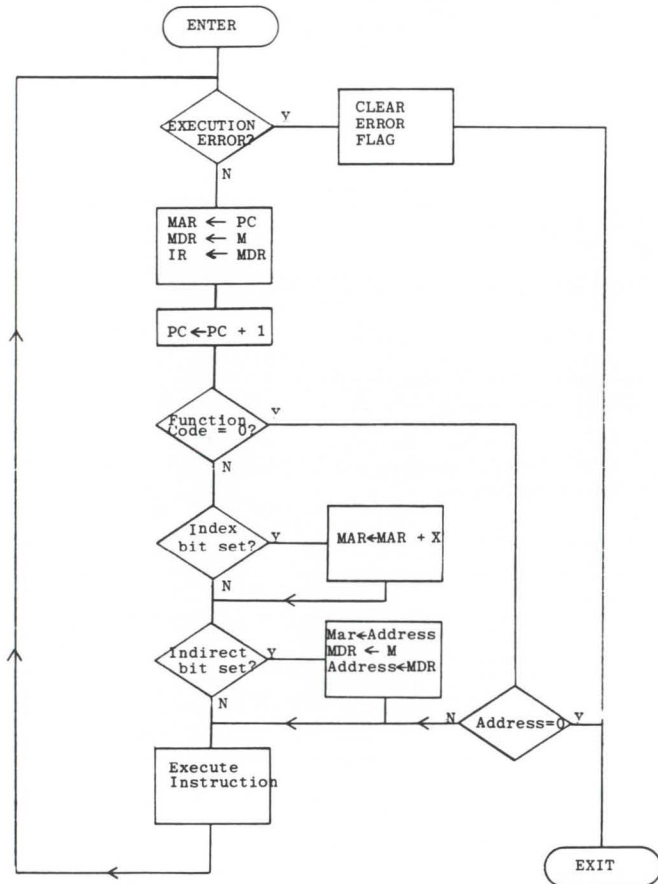
**LOTS OF LUCK!**

# LOCK-11

NDD 70 James Way, Southampton, PA 18966  
 (215) 364-2800

CIRCLE 80 ON READER CARD

### 2.7 Execution Cycle



### 2.8 Data Representation

#### 2.8.1 Integers

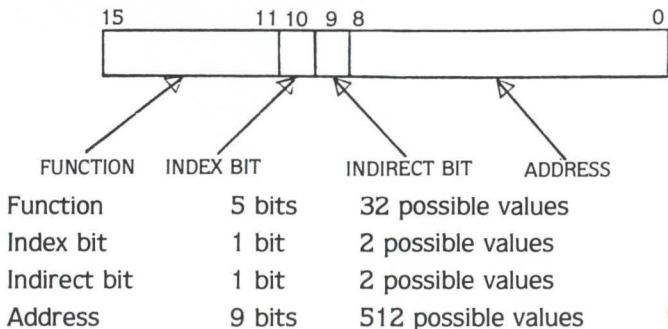
An integer is held as a 16-bit 2's complement signed integer in one word of store.

#### 2.8.2 Characters

All characters are represented by their 8-bit ASCII code. Two characters can be stored in one word, instructions being available for byte manipulation.

#### 2.8.3 Instructions

Each instruction is contained in a single 16-bit word, divided as follows:





## Letters to The RSTS PRO

... continued from page 6

RSTS, and tasks that require some sophistication with its internal operation to make proper response or decision, i.e., system generation. As this is my background I found the Monday and Thursday evening "Carl and Dave Shows" at DECUS very helpful, but they didn't go far enough. Some of the handouts were helpful but where do I go if I need more details. How about some articles that cover RSTS internals, or if this has already been published how about a reference list of books or articles, in this or any other publication that can help the newcomer to RSTS.

You two gentlemen have made, and are continuing to make a very significant contribution to the user community with both this publication and your many contributions to DECUS, many thanks from a newcomer!!!

Sincerely, Jerry C. Forshee  
Computer Systems Analyst  
Green & Company Inc, CPAs  
Bloomington, IN

Welcome to the 'community', Jerry. We are soon going to try to develop a cumulative index of the RSTS PROFESSIONAL. In addition, RSTS internals expert Mike Mayfield has produced a manual (see page 43).

I was just leaving through the back issues of your magazine and I happened to see the reprint of the photograph labeled "How TECO? Why TECO? Can you tell us?" In the letters to the Editor section. (Dec. 1980, p. 19, v. 2, #4) I realize this is a little late, but I am offering my answer anyway. I will leave it to you to question my honesty but I will assure you I am not copying down the real answer from a later edition, for even if you did print the answer to the puzzle, I would not know for several recent issues were lost.

**Answer:** It is obvious that the Tampa Electrical Companies truck is stuck! The sign says "Cars Only" and a truck is not a car!

What about it — do I get a shirt?

Yours faithfully, Joseph Yaffee  
Morgan Equipment Co.  
Papua, New Guinea

Joseph, 'the TECO affair' lasted several issues (ended June 1981, v.3, #2). Even with that your answer is unique — wrong, but unique. Because of that (and because we wouldn't mind being shown off in New Guinea), we might have sent a shirt — but alas we don't know your size.

Dear Carl & Dave,

I just read in the June issue of the RSTS Professional your editorials about "break-in artists" playing destructive games, and I quite agree with your evaluation (although I would have used the term "juvenile delinquents" rather than "children").

But tell me . . . how come that one of these "children" has just been added to your list of "contributors"? It occurs to me that you could have used better judgment.

Sincerely, Paul Koning  
Raymond, NH

**CARL:** Since you raised the subject, I might as well vent some of my feelings regarding the "Atlanta Break-in". First, some of the blame must rest on the persons who set up the RSTS demo system so that it could be compromised so easily; some might even argue that this was "entrapment", or making

it so easy to do that doing it was not a crime. Second, while I do not agree with or condone the actions of the breakers, I will defend their right to free speech. I will not publish articles which have no common good or redeeming qualities, and I would argue I have met that goal so far; specifically, all the articles in the June issue are of high quality.

The crime in question was not so much the break-in; it was the malicious things that happened once the "kids" were in. The 'POKING' of the monitor and the ensuing system crash were clearly not in the best interests of anyone at DECUS save the 'breakers' themselves. Clearly they should be reprimanded, and even monitored while at the demo machines, but to censure them would do further disservice to the RSTS community we are trying to serve.

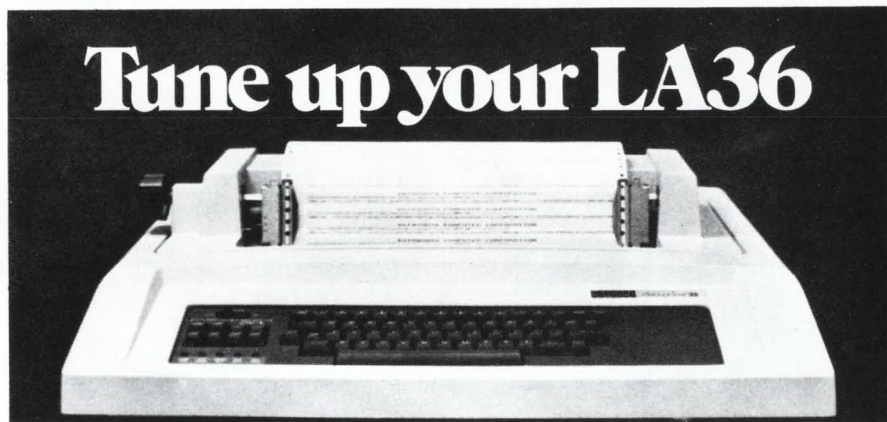
**DAVE:** I really appreciate your letter. I doubt I can publish it, or any suitable response without a libel suit.

I published the article and will publish the next after agonizing much — it's the sin we hate and not the sinner. The articles are quite good and show an upward trend . . .

[Want to switch jobs for a few weeks??]

## LETTERS to the RSTS Pro . . .

. . . is your column! Send us your comments, suggestions, photos, or notes of interest to the RSTS community. We'd enjoy hearing from you.



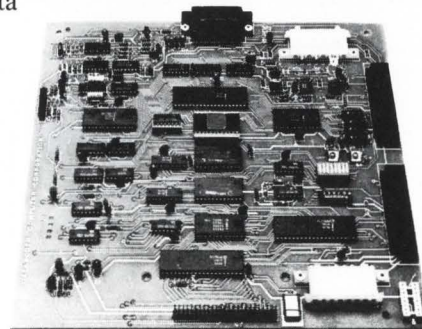
## Tune up your LA36

### The DS120 Terminal Controller makes your LA36 perform like a DECwriter® III.

The Datasouth DS120 gives your DECwriter® II the high speed printing and versatile performance features of the DECwriter® III at only a fraction of the cost. The DS120 is a plug compatible replacement for your LA36 logic board which can be installed in minutes. Standard features include:

- 165 cps bidirectional printing
- Horizontal & Vertical Tabs
- Page Length Selection
- 110-4800 baud operation
- 1000 character print buffer
- X-on, X-off protocol
- Self Test
- RS232 interface
- 20 mA Current Loop interface
- Top of Form
- Adjustable Margins
- Double wide characters
- Parity selection
- Optional APL character set

Over 5,000 DS120 units are now being used by customers ranging from the Fortune 500 to personal computing enthusiasts. In numerous installations, entire networks of terminals have been upgraded to take advantage of today's higher speed data communications services. LSI microprocessor electronics and strict quality control ensure dependable performance for years to come. When service is required, we will respond promptly and effectively. Best of all, we can deliver immediately through our nationwide network of distributors. Just give us a call for all the details.



**datasouth computer corporation**

P.O. Box 240947 • Charlotte, North Carolina 28224 • 704/523-8500

# DEC SYSTEMS & COMPONENTS

C.D. SMITH &  
ASSOCIATES, INC.  
12605 E. Freeway,  
Suite 318  
Houston, TX 77015  
(713) 578-8464

CIRCLE 54 ON READER CARD

## DO YOU REMEMBER THIS?

(Photo contest, RSTS Professional, Vol. 4, #3, p.101.)



Photo contests appear in the RSTS Professional occasionally and readers have until publication of the next issue to submit their answers. We may, from time to time, limit the number of correct answers eligible to receive prizes.

I am currently engaged in adding a room to my home. In the construction of this room I used some exterior grade plywood to brace the corners of the new room. This plywood has stamped on the back the symbol 'Teco Tested'.

Reference is now (finally) made to the photo contest. Although my 'Teco Tested' item is plywood, the item pictured in the photo appears to be composition board or pressed-wood.

My tee-shirt size is large. Joe Sanders  
Metrodata Computer Systems, Inc.  
Dallas, TX

The photograph shows a piece of Teco Tested particle or chip board.

We enjoy your publication very much and are looking forward to the DEC Professional.

Paul Bates, President  
RYO Theatre Services Ltd.  
Toronto, Ontario

Wood products, such as particle board are "Teco Tested." Looks like chip board in the photo.

Bill Van Vechten  
Hawaii Preparatory Academy  
Kamoela, HI

P.S. Size Medium T-Shirt. Thanks!

Joe, Paul, & Bill,

You are correct, you are the only respondees, you are receiving T-shirts. (We should have asked, "How? Teco Tested?!")

## Dear RSTS Man

... continued from page 36

MB will provide an amazing improvement. The 70, however, will require that you upgrade your controller to Mass Buss compatible level. The 44 will provide you with a good 20-25 job system whereas a 70 should yield 45 jobs. Of course, these are ball-park figures stated in complete ignorance of your application. The improvement you should see first is relief from swapping. Always configure enough memory to hold your job max times your swap max plus monitor, runtime systems and resident libraries (after all, they are practically giving the megabytes away today). The above is true for both 44's & 70's. The next obstacle you hit will be either cpu or disk boundedness. (Note, small buffers are no longer a problem in V7.1.) This will be application dependent. Let's hope that by then, you can afford a second system.

### DEAR RSTS MAN:

There has been a lot of confusion about why RSTS/E limits programs to 31KW rather than 32KW. The reason for this limitation is quite simple. It's all for the lack of one byte.

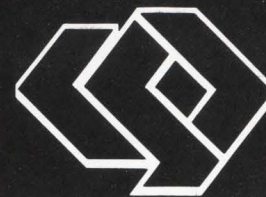
Several routines within the monitor need to check that the user's buffer is within his program area. These routines do this by comparing the address just beyond the end of the buffer to the address just beyond the end of the job.

If the job is allowed to be 32KW, its highest legal address is 177777 (octal). Adding one to this number causes an integer overflow and a resulting value of 0. This says that all buffers must end before location 0, an obvious impossibility.

This problem can be corrected. In fact, I think not correcting it before now may have been an oversight on the part of Digital. Most of the routines within the monitor, including memory management and swapping, handle 32KW just fine.

I will work up a patch to RSTS V7.1 to allow handling of 32KW and send it to you for a future issue. Until then, I hope this explanation helps your readers understand the 31KW limitation.

Mike Mayfield  
Northwest Digital Software



# COBOL

SOFTWARE SOLUTIONS  
FOR PRODUCTION AND  
FINANCIAL CONTROL

Available on  
**VAX**  
in native mode  
**PDP 11**  
under RSX or RSTS

OFF-THE-SHELF SUPPLY  
Enquire about our  
30-DAY TRIAL  
ON YOUR MACHINE

# IMP CON

## FULL FACILITIES FOR:

General Ledger—  
Accounts Receivable—  
Accounts Payable— Sales Orders—  
Stock Control— Purchasing—  
BOM— Works Orders —MRP—  
Work in Progress Monitoring

Send for  
FEATURE WALL CHART  
to:

**COMPUTER SYSTEMS  
DEVELOPMENT (CSD) LTD.**

75 Marylebone High Street,  
London W1, England.

Tel: 01-935 2255

CIRCLE 150 ON READER CARD

# ELECTRONIC MAIL. PRACTICALLY SPEAKING.

Sooner or later you will be using electronic mail. It just makes good sense. When you do, you will want a system that is complete—a delivery system, a scheduling system, and an information manager. Your electronic mail system will become an essential part of your office environment. USER-MAIL is such an electronic mail system\*.

USER-MAIL's power is easy to control. It relates to the way you work. Electronic IN, OUT, and HOLD baskets are just what you would expect. You can scan your IN basket, selecting only those message subjects you wish to read. Or, you can place a message into your HOLD basket for a number of days to have it automatically reappear in your IN basket on the appointed day. You can even have USER-MAIL recall specific messages by providing your own selection criteria. Replying, forwarding, and sending to groups are as easy as can be. And these are just a few of the features in store for you.

You owe yourself a closer look. Write for a brochure or give us a call direct.



**North County  
Computer Services, Inc.**  
2235 Meyers Ave.,  
Escondido, California 92025  
(714) 745-6006, Telex: 182773

\*USER-MAIL is currently available on DEC computers using the RSTS operating system.  
RSTS is a registered trademark of Digital Equipment Corporation.  
USER-MAIL is a trademark of Logic eXtension Resources.





printers such as the TI810, Centronics 704 or Teletype 40 — printers which present the transition of a buffer-full status line from a SPACE (+12VDC) to a MARK (-12VDC) when the printer buffer is full and no further data should be sent. The Buffer Ready circuit allows the printers to be run at maximum speeds with no danger of buffer overrun. The RS-422 capability allows placement of printers, Video Display Terminals or other devices with corresponding circuitry at distances up to 4000 feet from the host computer.

Also unique to the MDB interface is the availability of four levels of priority interrupts (as compared to one level for DEC DLV11-F) which allows the assignment of priority to high speed devices. The MLSI-DLV11-FX offers a serial EIA-RS-232C/CCITT V.24, 20 MA current loop, as well as an RS-422 interface. Baud rates are programmable and switch selectable from 50 to 19.2K baud. Also switch selectable are the Word Character Format, the Address and Interrupt Vectors.

For further information: Jonnda Perry, Director of Marketing Administration, MDB Systems, Inc., 1995 N. Batavia Street, Orange, Calif. 92665.

Price: \$385.00 in single units. Delivery: 3 Days ARO.

#### EEC SYSTEMS ANNOUNCES THE AVAILABILITY OF LEX-11

Wayland, MA — EEC Systems announces the availability of LEX-11, a multi-user word and data processing software package designed for use on DEC PDP-11, LSI-11 and VAX Computers. Designed under the RSTS/E operating system it also runs under the RT-11, RSX-11M, TSX-PLUS, UNIX, IDRIS and VMS in the compatibility mode. The complete system requires only 300 blocks of disk space and can be run on an LSI-11 with 32K of memory. The run-time system uses 8KW of memory and on multi-user systems LEX-11 requires less than 16KW per user. The system is re-entrant and common code has been used whenever possible.

LEX-11 can be used for such tasks as personalized mass mailing, contracts, standard forms, manuals and statistical tables. It can be utilized for invoice production, list processing, generating custom forms and data management. It can also be used in conjunction with a typesetting machine. All operations on LEX-11 have been designed to make things as easy as possible for the user.

Some special features of LEX-11 include:

- Full screen editing
- LEX-11 supports almost any terminal and different terminals
- It produces standard ASCII text files and can be interfaced with other DEC software
- Programmers can edit their own programs using LEX-11
- Users can reprogram terminal keys to perform any operation
- The visual calculator allows for mathematical operations to be incorporated in a document
- LEX-11 works the same way for the user on all operating systems
- Users can create custom forms for their own applications

- Users can define their own menus according to their application requirements

- Other features include graphics, 90,000 word spelling dictionary and list processing.

EEC Systems specializes in DEC PDP-11 based hardware, and software which runs on the PDP-11 and VAX computers.

For more information contact: Eric Dickman, EEC Systems, 286 Boston Post Rd., Wayland, MA 01778, 617-358-7782.

#### EMULEX, CDC EXPAND PRODUCT SERVICE COVERAGE

Santa Ana, CA — Emulex Corporation and Control Data Corporation have expanded their third party service agreement to include the Emulex CS11 series of communications multiplexer products.

Under the original agreement, Control Data's Engineering Services Organization provides complete maintenance and spares stocking for Emulex disk and tape controllers used with Control Data peripheral storage devices on PDP-11 and LSI-11 computer systems made by Digital Equipment Corporation. In the major service areas, maintenance service coverage is available for entire PDP-11 or LSI-11 systems, including the CPU, memory and other options.

This agreement has now been amended to include the CS11 series communications multiplexers made by Emulex. The change is significant because it adds Emulex products which don't involve Control Data Peripherals, according to Phillip (Flip) Begich, Emulex director of national marketing.

"The communications products have been added primarily because of demand from Control Data service customers for them to handle all Emulex products," Begich said. "Control Data has been doing an excellent job of providing total DEC system service at competitive prices for several years, and a big plus is that they offer maintenance of mixed vendor systems from a single source."

The Control Data service is available for complete DEC systems in 17 cities around the United States, with another five to be added during the first quarter of 1982. Service for subsystems-only is available in those same cities, with an additional 20 or more cities planned for addition in 1982. Subsystem maintenance of Emulex/Control Data products is also available in Canada, the U.K., and Germany. Control Data also supports Emulex's own System Group for end user installation and service in the United States.

Based in Santa Ana, Emulex Corporation is the leading supplier of disk, tape and communications controllers for use in interfacing a wide variety of peripheral devices to computers made by Digital Equipment Corporation.

INDEPENDENT USERS GROUP HOSTS FALL CONFERENCE AND EXPOSITION  
Warwick, RI — You will have to be in Boston, Massachusetts on October 4 - 6 to meet the best of the DEC-related community at IRUS '82, a Conference and Exposition for DEC users, sponsored by the

Independent RSTS Users Society (IRUS) and Hardcopy Magazine.

IRUS, a user-run, user-supported organization of RSTS, VAX and other DEC installations, began holding fall conferences three years ago. Due to their success attendance at the conferences has doubled every year. In addition to a seminar program, last year's conference, Access-11, included a large-scale DEC compatible trade show — the very first of its kind — with 20,000 square of exhibition space and an in-depth representation of compatible software, hardware and services. The IRUS tradition continues this fall at the Park Plaza Hotel and Exposition Castle in Boston with an expanded series of seminars, workshops, panel discussions, and an exposition that covers the range of DEC compatible products.

"IRUS '82 is much more than a DEC-compatible trade show," explains Monica Collins, chairman of the group. "IRUS '82 is the one and only conference for the DEC-related community and will offer its participants an unrestricted view of the entire marketplace — ideas and products. The information and contacts made at IRUS '82 will benefit users and vendors alike."

Last fall's successful conference held at the Hartford Civic Center in Connecticut was truly a national event attended by people from 22 states, Canada, England and Israel. The Boston location this October provides vendors access to the heart of the East Coast market, and with an international airport; and extensive accommodation facilities, travel to IRUS '82 from anywhere in the world will be convenient.

The conference includes a program of seminars, workshops, and panel discussions that follow the theme of "Options for the '80s". Topics include technical and managerial concerns and aspects of RSTS, VAX, VAX conversions, the influence of micro-computers on the DEC user, communications and distributed processing for the DEC user and more. Sessions have been planned that compare many of the operating system software available for PDP-11 computers including UNIX.

Monica Collins sums up the goal of the conference: "IRUS has been built on the free flow of information, and it is in that spirit that IRUS '82 will convene the widest variety of informed viewpoints available in the DEC world."

Some exhibition space is still available. Contact Dame Associates, 51 Church Street, Boston, MA 02116; (617) 482-3596.

Since seminar space is limited, people interested in attending should pre-register before September 10th. Contact IRUS '82, 3657 Post Road, Suite 4, Warwick, RI 02886. (401) 738-4430.

#### CALOUT CATCHES ON

Provo, Utah — Clyde Digital Systems, Inc. reports a large and rapidly growing user base of its communication utility program CALOUT. Users report that they are particularly pleased with the ease of use provided by this package. In comparison with products such as DECNET users



for overall corporate planning. Some of C-CALC's other advanced features are: computed coordinates, support of up to 120 labels, choice of alpha or numeric coordinates, variable column widths, if-then-else, text is allowed in equations, and cells may be set to blink, bold, or underline on a specified condition. C-CALC's most striking feature is, without a doubt, its speed and CPU efficiency. More users may simultaneously use C-CALC without taxing your system.

All DIGITEC Software Design, Inc. products include a full year of cost free maintenance and extensive customer support. Regular update releases provide our users with a constant source of the most advanced, state-of-the-art products on the market. DIGITEC is currently seeking distributors for all markets. For more information, please contact: DIGITEC Software Design, Inc., 14125 108th Avenue N.E., Kirkland, WA 98033, (206) 821-7507.

#### ENGLISH COUNTRY HOUSE BECOMES MARKETING AND SUPPORT CENTER

Irvine, CA — ABLE Computer has moved its English Marketing and Support Center into a country house about 45 miles west of London. The new center will be the focal point for all sales, service, repair and training in the United Kingdom, Belgium and the Netherlands.

The building was chosen partly for quaintness and location but primarily for size, according to Bob Jones, International Director of Marketing. Jones said, "We really needed the room. We had already outgrown our original office and decided to get excess space now rather than move soon again to accommodate the growth which is anticipated. That's why we bought a two-story brick house with 1500 square feet of floor space on a half-acre lot in the English countryside. This gives us a one hundred and seventy-foot frontage on the A-4 leading into Newbury and offers our customers a real sense of company presence in the United Kingdom."

Roger Scarlett has been Marketing Manager of the English office for the past two years and will continue in the same capacity at the new facility. Under his direction the building has been remodeled to contain offices, a display area and repair facilities on the first floor and guest quarters on the second. The address is ABLE Computer, ABLE Computer House, London Road, Newbury, Berkshire, England RG13 2QJ. The telephone number is 44 (0635) 32125, and the TELEX is 848715 ABLE G.

ABLE is the world's largest independent supplier of enhancement interfaces for the VAX, PDP-11, System 20 and LSI-11 series of computers. The company manufactures an extensive line of communications, memory and general-purpose products all of which are hardware compatible with and software transparent to the host machine. They are supported and serviced worldwide with offices and plants located throughout the United States and Canada, as well as England, Germany and Puerto Rico.

#### NEW DMA INTERFACE MODULE WITH USER IMPLEMENTABLE THROTTLE TO OPTIMIZE COMPUTER PERFORMANCE FROM MDB SYSTEMS

Orange, CA — MDB Systems, Inc., the world's largest independent manufacturer of computer interface modules, has developed an improved version of a DR11-W module for DEC Unibus and VAX computers that maintains full operating and diagnostic transparency to DEC software.

The MDB DR11-W has in addition to all of DEC's capabilities, a switch selectable DMA throttle that controls the peak rate problem by allowing optimum data transfer without affecting overall CPU performance.

MDB marketing manager, Stan Margulis says the DMA throttle feature lets the system designer specify the average thru-put rate of the DMA Link or Port so that a smaller CPU can perform the same job as a larger unit, or a user can get more from an existing system.

Another of the unit's features is that it uses on-board self test diagnostics. Micro sequencer driven, the switch selectable test features monitor DMA read/write cycles to and from memory and generates 16 unique data patterns for read/compare testing. Edge mounted LEDs indicate to the user any error conditions.

All operating parameters of the MDB-DR11-W are selectable from edge mounted switches, thereby precluding the powering down of the system to remove the board to change modes or operation. Eight addresses and interrupt vectors are stored in PROM and are independently switch selectable, including DEC recommended assignments.

Bus control and DMA cycle timing are controlled by delay lines for high speed and precise cycle timing.

All of the MDB unique features which are not available on DEC's DR11-W, will assist the user in quick fault isolation and reduce the cost of ownership and maintenance.

The MDB-DR11-W is priced at \$1,500

in single quantities. Delivery of units is scheduled for September.

#### RSTS/E: VMS USERS INSPECT BEFORE THEY BUY

Bedford, MA — Clyde Digital Systems has recently announced that by means of its new computer to computer communication software CALOUT, actual product will be transferred to user sites previous to purchase. Through the imaginative use of the CALOUT utility, CDS is attacking historic apprehensions surrounding the acquisition of packaged software from non-local vendors.

CDS can transfer the following packages to RSTS/E and VAX users equipped with a dial in line. Serious buyers then have the opportunity to inspect and evaluate these products before a 30 day latch is executed. CALOUT permits user to dial up a second CPU and exchange data files of any kind. CONTRL provides remote interactive training and user support. Complete log file of session may be kept.

DOC makes 4 logical terminals out of 1 physical terminal. Complete log files of each job session may be kept.

IMAGE allows DOC log file to be played back intelligently, one frame at a time.

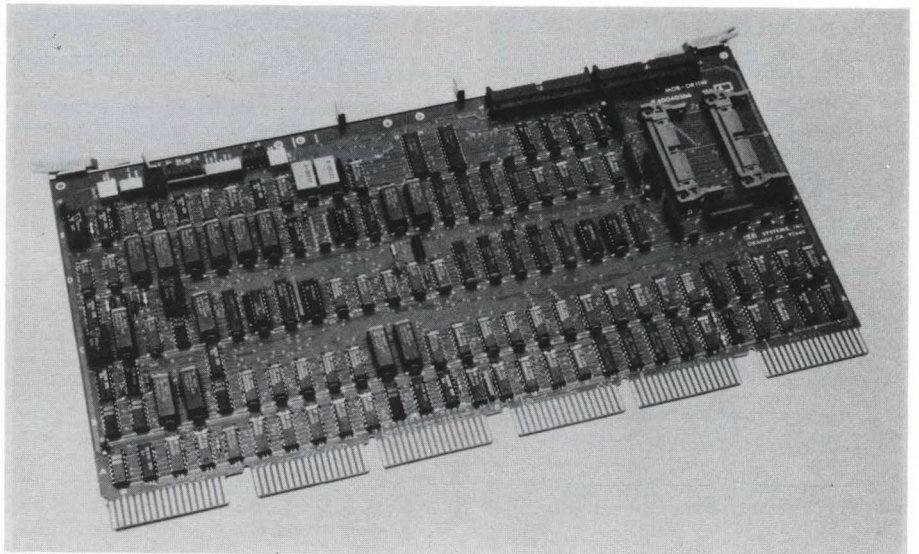
MONITR records entire dialog of selected job session in a secured log file. This is invisible and unintrusive to users being monitored.

LOCK simplifies and generalizes menu creation. Limits user to authorized menu. Records tasks run.

VAX users please note that CALOUT is the only package presently available on VMS. All others will be announced shortly.

Full support and all necessary documentation is provided to ensure success during and after the approval period.

For detailed information on this offer or for information on how to use CALOUT in similar fashion contact: Clyde Digital Systems, P.O. Box 348, Bedford, MA, (617) 275-6642.

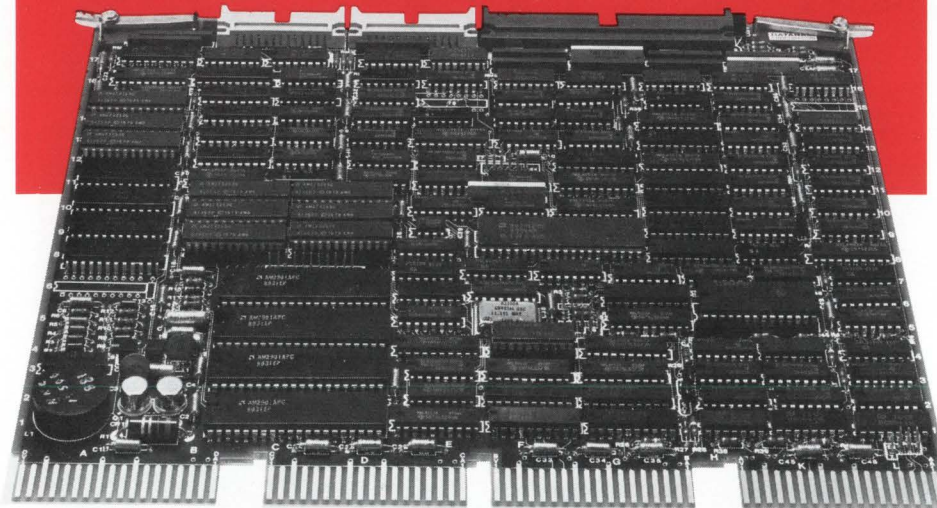


MDB-DR11-W — Direct Memory Access Interface Module for UNIBUS and VAX Computers





# DEC-COMPATIBLE PERIPHERAL CONTROLLERS



LSI-11<sup>®</sup> compatible controller  
for 80-300MB CDC,  
Ampex and Fujitsu CMD/SMD

Dataram Corporation offers the industry's widest range of DEC-compatible peripheral controllers — from comparatively simple NRZI tape controllers to complex 300 MB storage module drive (SMD) controllers.

An impressive array of state-of-the-art controllers, all built around high-speed bipolar microprocessors. All software compatible with the host LSI-11, PDP<sup>®</sup>-11, or VAX<sup>®</sup> minicomputer...and all available now.

And Dataram's controllers are designed to save you money, and, more importantly, space — our controllers typically occupy half the space required for the comparable controller from DEC. Doing it with a level of performance that makes any member of this family worth looking at.

The chart shows our current family of peripheral controllers, growing every day. If you don't see the controller you need, we're probably working on it right now. Call us and discuss your requirements.

**DATARAM  
CORPORATION**

Princeton Road  
Cranbury, New Jersey 08512  
Tel: 609-799-0071 TWX: 510-685-2542

CONTROLLER	DESCRIPTION	COMPATIBILITY
C03	Cartridge disk controller	RK05
C33	Cartridge disk controller	RK05
T03	NRZI mag tape controller	TM11/TU10
T04/C	Mag tape streamer coupler	TM11/TU10
T04/N	NRZI mag-tape controller	TM11/TU10
T04/D	Dual density mag tape controller	TM11/TU10
T34/C	Mag tape streamer coupler	TM11/TU10
T34/N	NRZI mag tape controller	TM11/TU10
T34/D	Dual density mag tape controller	TM11/TU10
T36	Dual density mag tape controller	TM11/TU10
T34/T	GCR mag tape controller	TM11/TU10
S03/A, S04/A	80 MB/300 MB SMD controller	RM02/RM05
S03/A1, S04/A1	80 MB/160 MB SMD controller	RM02
S03/B	80 MB/300 MB SMD controller	RK07
S03/C	200 MB/300 MB SMD controller	RP06
S03/D, S04/D	96 MB CMD controller	RK06
S33/A	80 MB/300 MB SMD controller	RM02/RM05
S33/A1	80 MB/160 MB SMD controller	RM02
S33/B	80 MB/300 MB SMD controller	RK07
S33/C	200 MB/300 MB SMD controller	RP06
S33/D	96 MB CMD controller	RK06

Products printed in red are LSI-11 Bus compatible.

Products printed in black are UNIBUS<sup>®</sup> compatible for PDP-11 and/or VAX minicomputers.

DEC, LSI-11, PDP, UNIBUS and VAX are registered trademarks of Digital Equipment Corporation.

NOW

VMZ/32™

# ABLE ~~VAXDZ~~ more than clears up your data traffic jams.



You've been hurting over the problem with VAX interrupt capacity for some time. Now we have a device that breaks up the terminal handling bottleneck in the fast lane. It's ABLE VMZ/32, a VAX system with an output buffer which lets you send up to 16 characters. With the optimum set

The ABLE VMZ/32 outperforms any DH class device...and is fully transparent to VMS, version 3.0.

Here's the best part. You can easily upgrade your VaxDZ to an ABLE VMZ/32 for only \$750.00. ABLE will give you a 10-day turnaround.

VAXDZ puts sixteen lines with modem control on a single hex-width board at one unit load and includes a panel which supports EIA only (an optional mix of EIA/CL).

Your VAX-11/730, -11/750 or -11/780 system can beat DH performance and match DMF/32 performance at less than DZ prices. Ask for benchmark data.

new... Write for details. We'll include information on the ABLE line of UNIBUS-compatible products, as well as the MAGNUM™ Series of computer systems.

**ABLE**

**the computer experts**

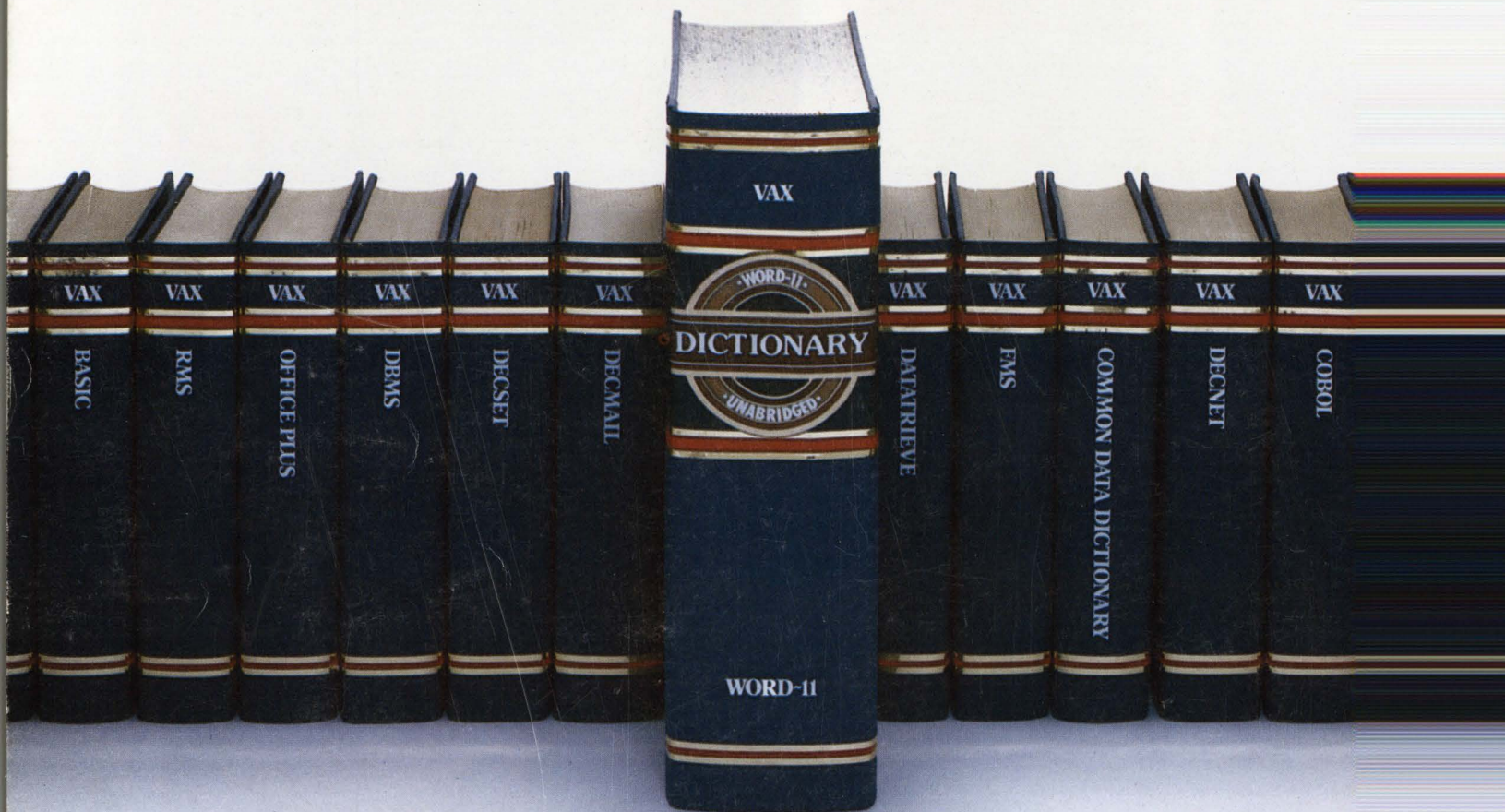
ABLE COMPUTER, 1732 Reynolds Avenue, Irvine, California 92714. (714) 979-7030. TWX 910-595-1729 ACT IRIN.

ABLE COMPUTER, ABLE Computer House, London Road, Newbury, Berkshire, England RG13 2QJ. 44(0635) 32125. TELEX 848715 ABLE G.

ABLE COMPUTER GmbH, Forsthausstrasse 1, 8013 Haar (Near Munich), West Germany. 49 089/463080, 463089. TELEX 05213883 ABLE D.

VAX and UNIBUS are trademarks of Digital Equipment Corporation.

# WORD-11. The Word Processing System Vital For VAX.



## The Unabridged Addition.

No matter how many additions you've made to your VAX,<sup>TM</sup> it won't be complete without WORD-11.<sup>TM</sup> It's the sophisticated word processing system designed to help you use all the other information you've stored. With features like list processing, built-in dictionaries for spelling error detection, automatic table of contents and footnoting that make report writing a snap.

WORD-11 runs concurrently with data processing on multiple terminals. It's easy to use. And it's been up and running in hundreds of installations all over the world for years.

WORD-11 is easy to install and operate. It's

cost effective. And it's supported by a dedicated team of experienced specialists. It could be the most important addition you make to your VAX installation. For details, Call, (714) 993-4160.

WORD-11 is also available for Digital's RSX-11M,<sup>TM</sup> RSX-11M PLUS<sup>TM</sup> and RSTS/E<sup>TM</sup> operating systems.



**Data Processing Design, Inc.**

AUTHORIZED **digital** COMPUTER DISTRIBUTOR

**CORPORATE OFFICE**  
181 W. Orangethorpe, Suite F  
Placentia, CA 92670  
714-993-4160 Telex 182-278

**N Y OFFICE**  
420 Lexington Avenue, Suite 633  
New York, NY 10170  
212-687-0104

**WASHINGTON D C OFFICE**  
4520 East-West Highway, Suite 550  
Bethesda, MD 20814  
301-657-4098

WORD-11 is a trademark of Data Processing Design, Inc.  
VAX, RSX-11M, RSX-11M PLUS, and RSTS/E are trademarks, and remaining titles are products or trademarks of Digital Equipment Corporation.

CIRCLE 59 ON READER CARD