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CONTENTS

AUGUST 1987 VOL. 6, NO. 9

SCIENCE

32 **TALK**
by James Stanley
A VMS to oscilloscope communication program.

40 **THE FLYING VAX**
by Michael Suchko
A state-of-the-art solution for simulating air traffic control.

50 **ECHOing VAX**
by Ron Levine
The VAX and ECHO have been combined to form a powerful, capable and inexpensive development tool.

ARTICLES

58 **MAC/VAX: DECing APPLES**
by Carl B. Marbach
Has Apple finally found its way into corporate computing?

62 **IBM vs. DEC: TRANSACTION PROCESSING**
by John Biazzo
DEC/ACMS vs. IBM/CICS, Part 2.

66 **COMMUNICATIONS: CROAK PROOF KERMIT**
by Gerald W. Cichanowski
This tip is one you'll want to save for quick reference the next time you need to transfer a file.

68 **WORD PROCESSING: *WORD-11* V4.1**
by Bruce Feldman
GREEN and GOLD and new all over.

Continued on page 6.

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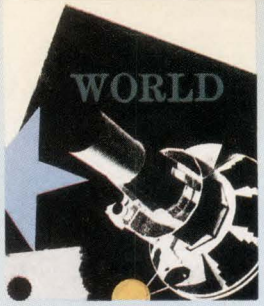

CONTENTS

Continued from page 5

76 **VAX: USING FMS TO CREATE MENUS**
by Damon D. Judd
VICEDIT enhances the friendliness and efficiency of the Idaho Department of Water's in-house software.

82 **DBMS: *InterBase***
by Philip A. Naecker
A DSRI-compatible distributed database.

DEPARTMENTS & COLUMNS

Publisher
by Carl B. Marbach
Time for a Change....12

Editorial
by Dave Mallery
A Strong and Confident Giant....16

Networking Editor
by Bill Hancock
Terminal Servers as Underachievers....94

Managing Your MicroVAX
by David W. Bynon
MicroVAX II as File Server....98

DCL Dialogue
by Kevin G. Barkes
Alarms and Excursions....106

Legal
by Herbert Swartz
Louisiana Bayou....110

From the Lab
by Dave Mallery
The Racal-Vadic 9600VP Modem....114

Back End
by John C. Dvorak
New DEC PC?....146

Letters....18

***ARIS*TALK**....22

Dateline DEC....26

Marketplace....116

Used Equipment....138

Product Showcase....140

Classified....142

Advertisers Index....144

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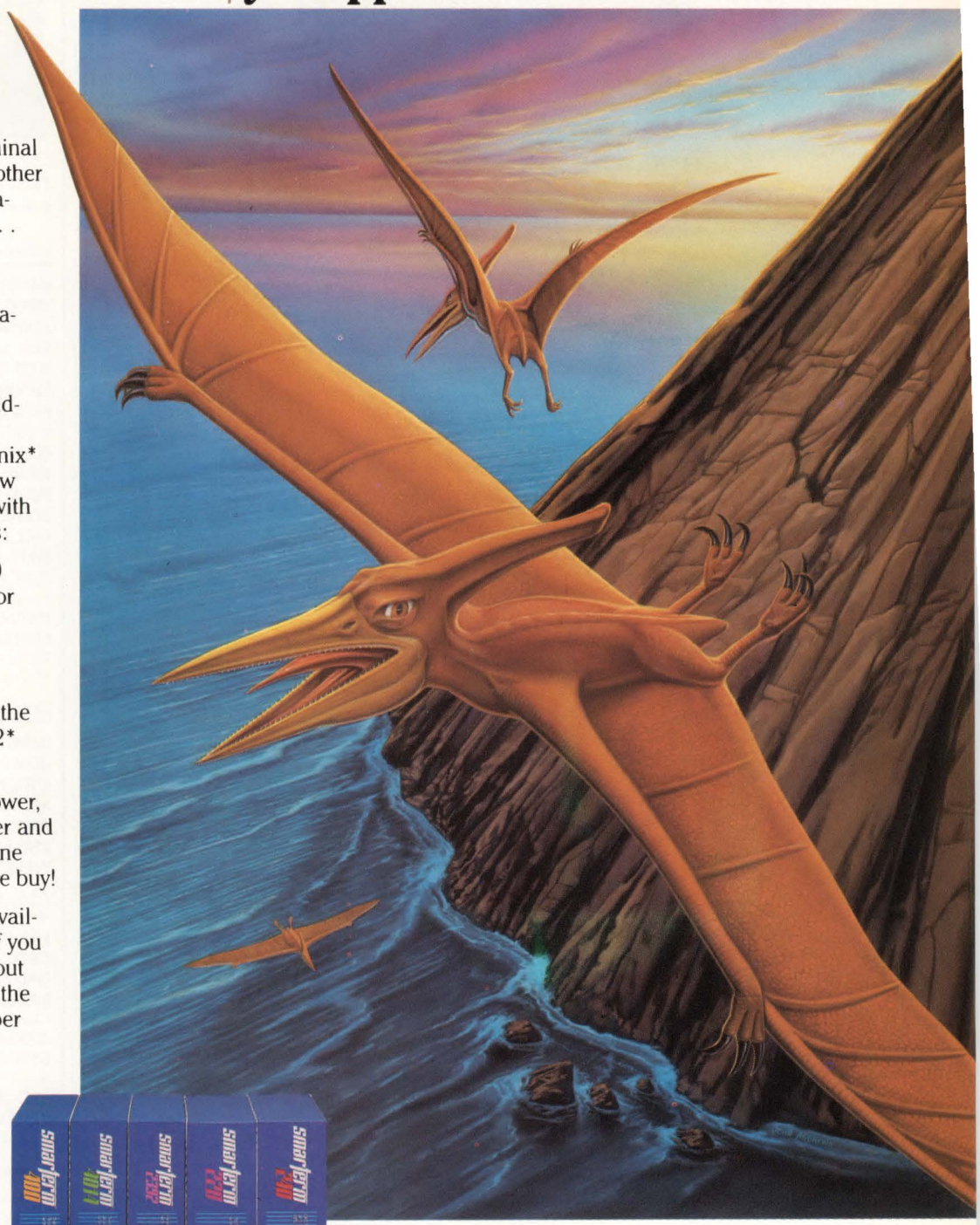

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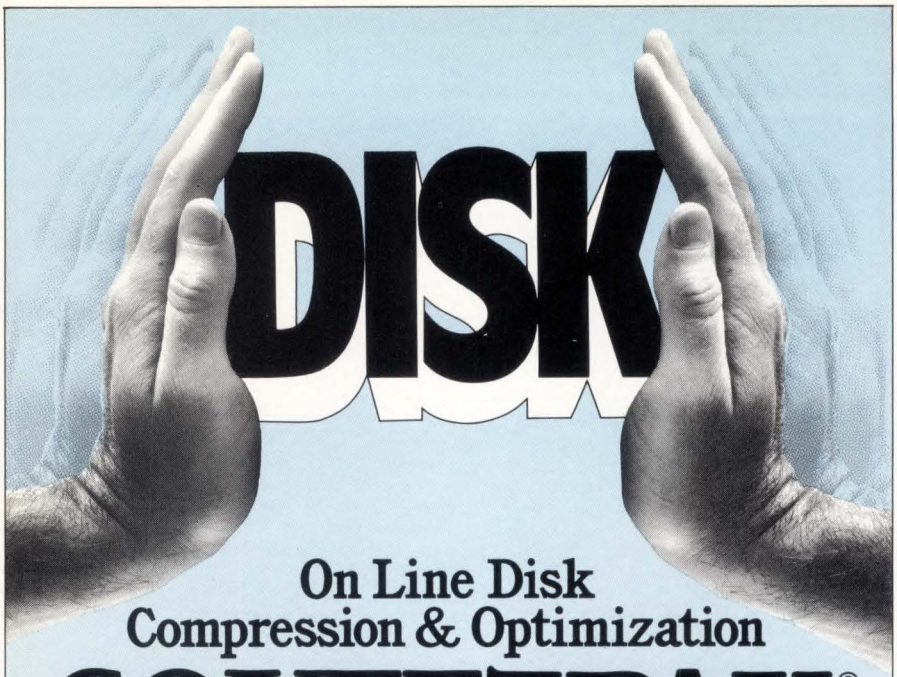

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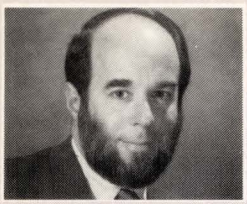

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Time For A Change

The classic model of DEC computing is a minicomputer supporting many distributed "dumb" terminals. The intelligence is concentrated in the main computer with terminals just doing input and output.

Programs popular on PCs were written to run on the main DEC computer, like the first *VisiCalc* clone for the PDP-11, *DigiCalc*. Small database applications followed. Word processing had been popularized on DEC systems before it proliferated to micros, and graphics appeared as soon as Tektronix introduced its first graphics terminal in the early 70s.

Even the newest DEC graphics terminals, the VT330 and VT340, are dumb. Despite the internal processor and the "dragon" chip set, they still can draw only what the main computer tells them to. If they had any real intelligence, they'd do real windowing and not old fashioned split screens.

Technology now demands a new way of thinking.

In the late 70s DEC's model of computing included distributing equally sized computers to increase power and do "distributed data processing." This model was based on the fact that most VAXs were equal, while today's line of VAX computers spans from the desktop to the mainframe. The newest idea now includes a *departmental* computer — a middle sized VAX that connects to the corporate mainframe or large VAX. A large company would have many such departmental computers serving the needs of each department and sharing data with the mainframe and with other departments. This implies that the mainframe and the departmental computers are connected by a transparent layer that allows each department equal and free access to the data it needs.

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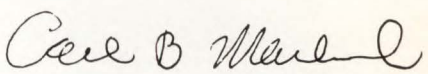

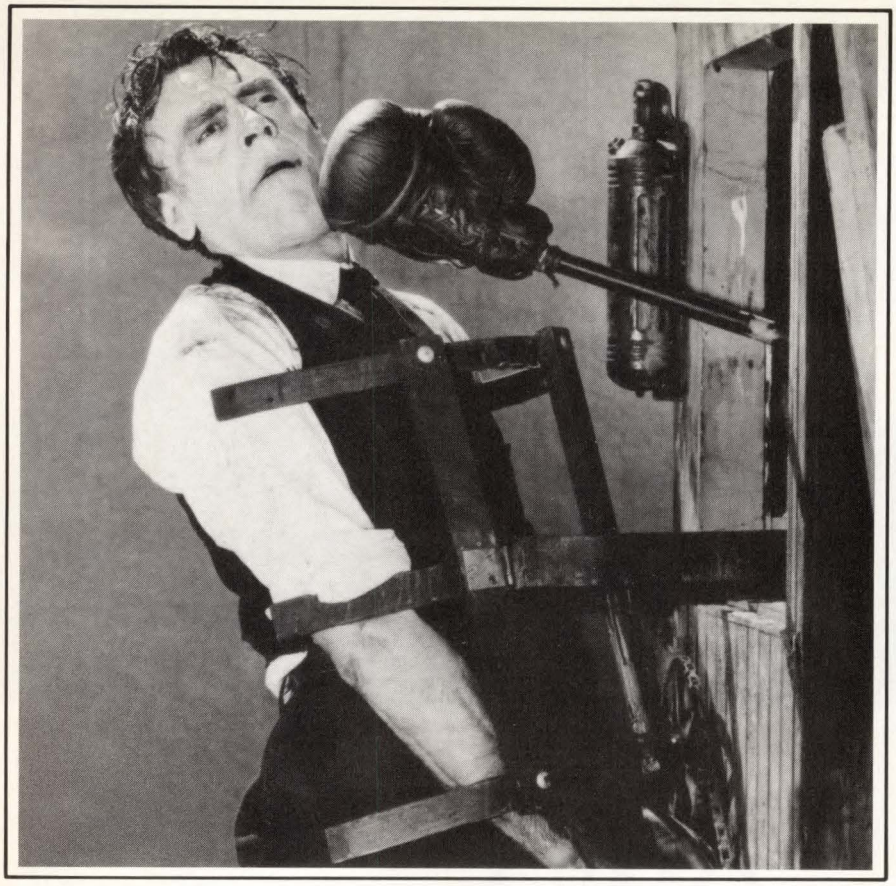

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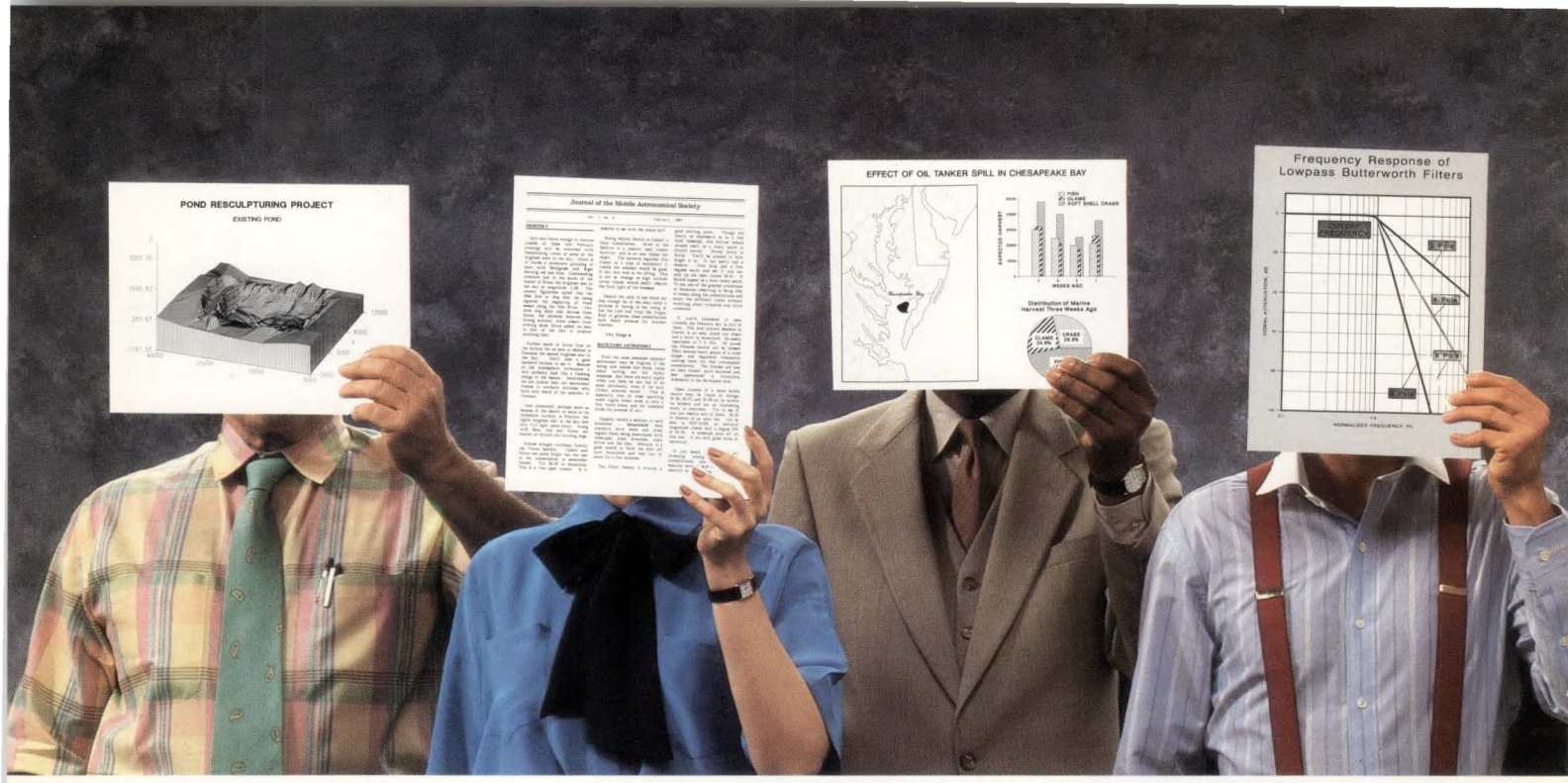

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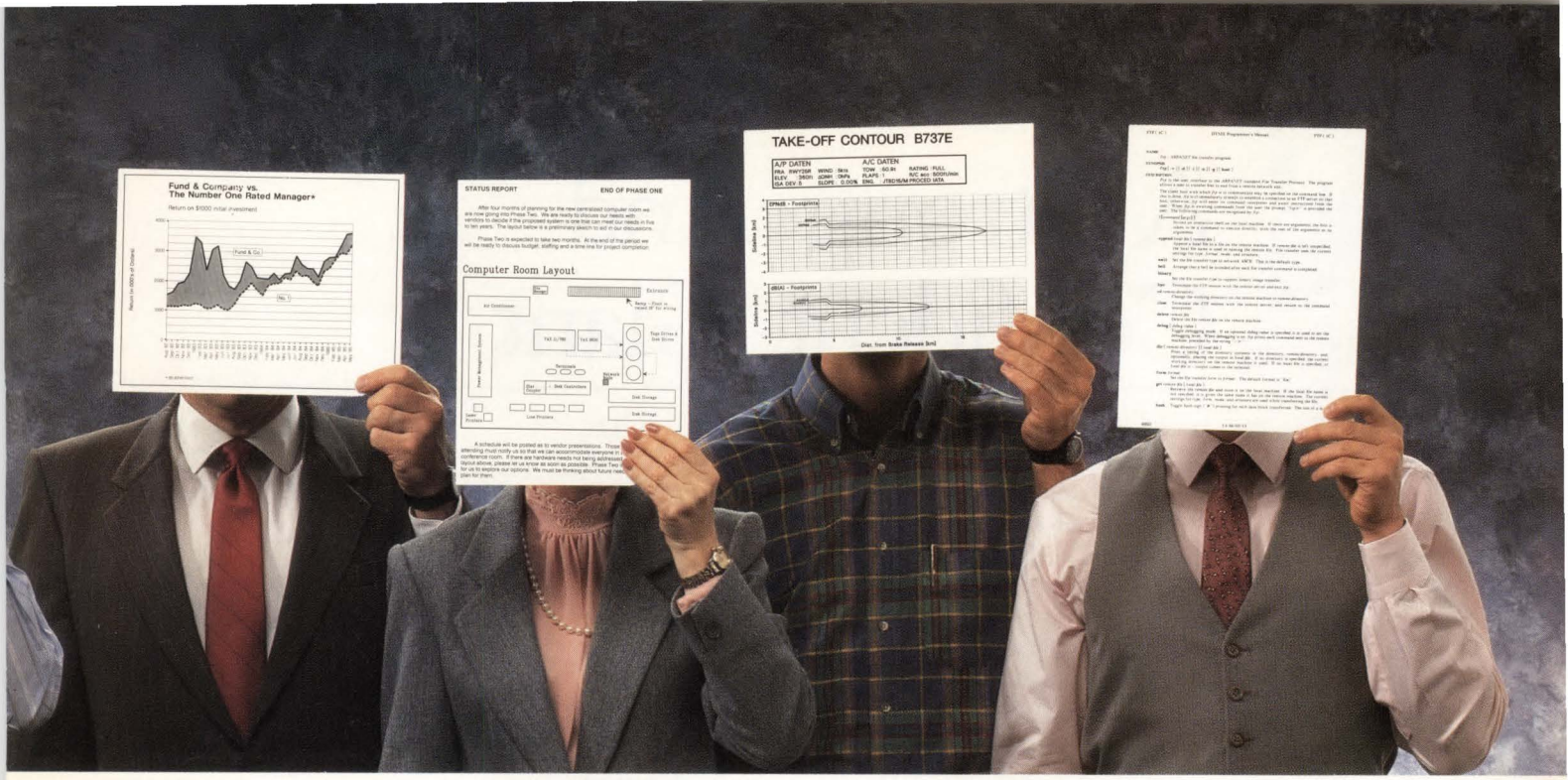

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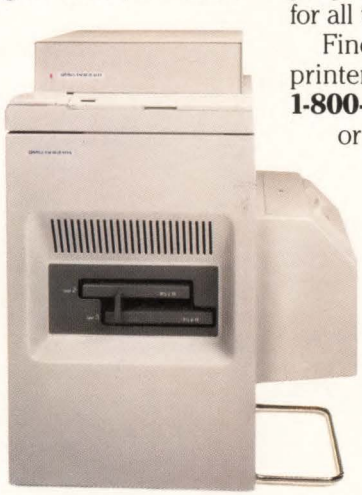

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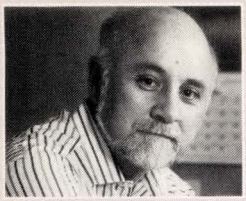

EDITORIAL

Dave Mallery

A Strong And Confident Giant

DEC just announced the halving of workstation prices. The quantity one list price of a diskless VAXSTATION 2000 is now approximately $4,600. That's less than the price of a well-configured AT and far below the cost of a big 386 machine. And what you get for the money is a diskless, fully licensed Local Area VAXCLUSTER node! I detect an earth shaking, trend setting move by a strong and confident computer giant.

It's the kind of move you make when you have several billion dollars in the bank and decide it's time to grab a significant market share in an important area. I think it will change the way we look at computing. It certainly will change us here at Professional Press. These workstations are ideal for programming, typesetting, and almost anything else one step above rote data entry. Each one adds about one-half MIP to the cluster. Our poor 750 is looking more like a big file server!

One reflection on this is that there's still a missing element: all of the necessary PC software. Solutions do exist though, like the Logicraft 386 box that just happens to run on a ThinWire Ethernet.

The price of a workstation at this level opens up a new area of application that previously was possible, but priced too high because of the hardware. The workstation for the programmer is a prime example. Any of our programmers could benefit from the multiple sessions that are the basis of the VAXSTATION. The entire company will benefit from the distribution of the computing load. The biggest complaints today come when all three programmers are at it hot and heavy. The poor 750 just sinks!

This announcement will be the beginning of the migration of the workstation from the sophisticated CAD/CAM world into the normal workaday world we all inhabit. This will be a revolution.

Dilog Redefines MicroVAX* Disk Storage.

Wide-Open Performance. DILOG's controllers remove bottlenecks! Exclusive DYNAMIC TRANSFER SEGMENTATION™ increases system throughput by executing multiple transfers in an order that minimizes disk latencies. And Only Dilog Has It!

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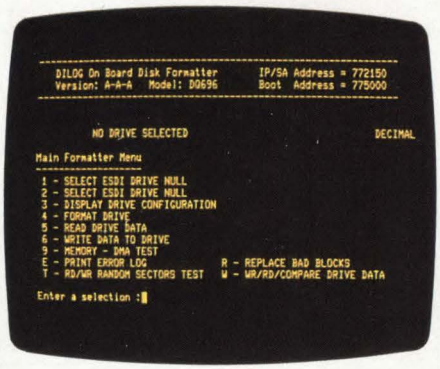

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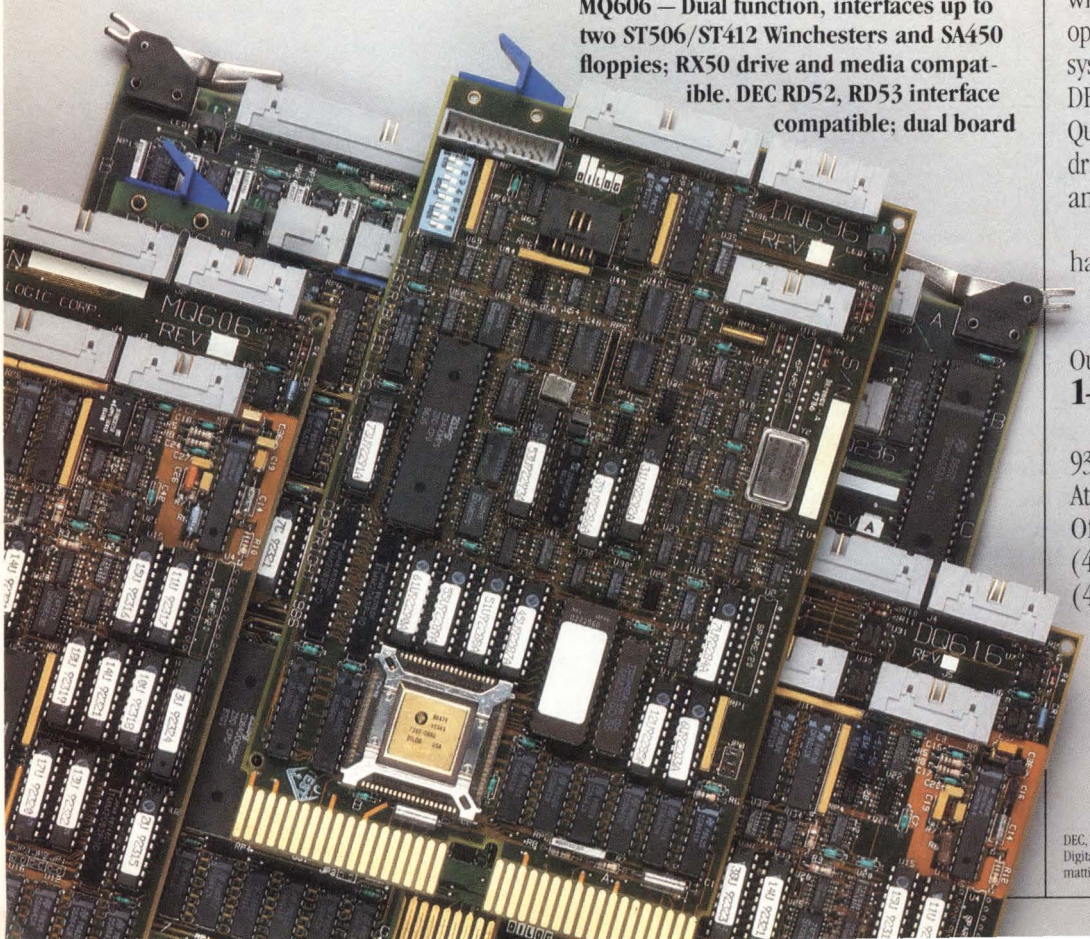
MQ606 — Dual function, interfaces up to two ST506/ST412 Winchesters and SA450 floppies; RX50 drive and media compatible. DEC RD52, RD53 interface compatible; dual board



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LETTERS

HATS OFF!

I wanted to write this letter as a public thank you to Mr. Carl Marbach for assisting our firm in analyzing a performance problem at one of our customer sites.

I'm sure that most of your readers are aware of the cumulative knowledge of Digital hardware and software that's congregated in your offices. Had I not met Mr. Marbach at DEXPO, the system in question still would be unsatisfactory. In a few short hours, we satisfied a customer and received an order for another system. Hats off to the people who know more about fine-tuning DEC equipment than DEC itself.

Joseph Greene, President
Distribution Management Systems Inc.
Milford, Connecticut

MORE ON *VTERM*

As a three year user of *VTERM* (*VTERM II*, *VTERM III*, and *VTERM/220*), I know how easy it is to use and was glad to see it discussed in *"VTERM/220"* by David Bynon and David Rasor (May 1987). I have a few comments on some things that were touched on in the article:

1. Using *VTERM/220* with a monochrome monitor: The color combination that seems to work the best is foreground, white; background, black; and underline, red. (These were the default on *VTERM II* and *III*.)
2. EDT keypad mapping: The DEL CHAR key does exist. On the PC it's the PrtSc/* key. (Check your *VTERM/220* map — it's there.)
3. VTRANS protocol: I use this frequently for transferring text files to a VAX 11/780 running under VMS 4.5 and it works beautifully. However, after transferring the file it should be edited to delete the CTRL-Z that most PC programs put at the end of a file. Also, depending on the package that file was created with, you may find extra, erroneous characters at the end of the file that need to be deleted.

Linda Feeney
Senior Academic Analyst
Rider College Computer Center
Lawrenceville, New Jersey

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

LICENSING PER USER

Applications generators, statistics, graphics, word processing, spreadsheets, etc., normally are used by only a few individuals at a time. In a large VAX environment this makes many layered products difficult to cost justify. And yet DEC and third-party software suppliers continue to set license prices according to the CPU size with little or no regard for the actual number of users.

The mere fact that an 8600 "can support upward of two hundred users" is insufficient justification for pricing a database package at more than $100,000 when the same package with the same functionality can be licensed on a PC for less than $2,000.

I offer this solution: make layered

UPDATE

In reference to my article, "An Easy Print Tip," May 1987, page 92, I've received many calls asking me how to enter the Escape character. At right is a modified version of the command procedure, where the escape character is defined differently.

S.S. Nagaraj
Computer Task Group
Raleigh, North Carolina

```
$  ! Command procedure to print or spool the files on the
$  ! terminal
$  !
$  ESC[0,7]=27
$  FORM_FEED[0,7]=12
$  IF F$GETDVI("SYS$OUTPUT","TT_DECCRT") .NES. "TRUE" THEN GOTO 0_EXIT
$  On Control_Y then GOTO NORMAL_EXIT
$  ON WARNING THEN GOTO NORMAL_EXIT
$  SET_PRINT = ESC+"[5i"
$  SET_NORMAL = ESC+"[4i"
$  SET TERMINAL/FORM_FEED
$  SET NOVERIFY
$Print_loop:
$  Inquire File_name "File to Print (Press RET to end )"
$  If File_NAME .eqs. "" Then exit
$  WRITE SYS$OUTPUT SET_PRINT
$  COPY 'FILE_NAME' TT:
$  WRITE SYS$OUTPUT FORM_FEED
$  WRITE SYS$OUTPUT SET_NORMAL
$  GOTO PRINT_LOOP
$  !
$NORMAL_EXIT:
$  WRITE SYS$OUTPUT SET_NORMAL
$  EXIT
$  !
$0_EXIT:
$  WRITE SYS$OUTPUT "The terminal is not a DEC terminal"
$  EXIT
```

RAF. THE MAINLINE TO YOUR MAINFRAME.

RAF REMOTE ACCESS FACILITY.™ THE EASIEST, FASTEST, MOST COMPLETE WAY TO TAP DEC MAINFRAME POWER AT YOUR PC.

RAF is a PC-to-host communications system designed to integrate your PC with all the data and power of a VAX or DECSYSTEM-20. RAF does the job transparently, seamlessly and faster than any other PC-to-DEC host software. But read on, because RAF offers a lot more!

EASY ACCESS TO REMOTE DATA

RAF fools the PC into "thinking" that remote files are local. So you can utilize your regular PC software to access data stored on a remote system. It's as if the data were stored locally on your PC! Use WordPerfect, MASS-11 and other PC editors to create or edit files stored on a remote VAX. And use PC spreadsheet programs like Lotus 1-2-3 to manipulate remotely stored spreadsheets.

SHARE REMOTE SYSTEM PRINTERS

Why dedicate a printer to a PC when RAF allows PC's to share remote system printers transparently? With RAF, PC software thinks your PC is equipped with its own local printer! And RAF lets you define all remote printer options. With RAF, you decide which remote printer to use or which forms to utilize.

COMPLETE ACCESS OF REMOTE COMPUTERS

RAF delivers automatic access to remote computers through a scripting mechanism that allows you to define each step of an automatic login. Or complete VT100 and VT220 terminal emulators unlike any other software system. RAF's VT100 and VT220 support allows for instant switching between PC and VAX applications.

ASYNCHRONOUS AND ETHERNET SUPPORT

You can use RAF to communicate asynchronously or over Ethernet. A single copy supports both, so you can install RAF asynchronously now and switch to Ethernet if it's available in the future. Also, RAF allows some users to operate asynchronously while others utilize Ethernet. RAF supports asynchronous communications over modems, networks or via direct connections—at speeds from 300bps to 38kbps. Over Ethernet, RAF transfers data up to 100,000 characters per second (800 kbps)—that's about ten times faster than any other comparable communications product! And RAF allows Ethernet users to maintain multiple connections with remote systems—as if they're connected through a DEC terminal server.

TRAINING, SUPPORT AND UPDATES

In order to make sure you put every outstanding RAF capability to your fullest advantage, we have prepared a comprehensive RAF videocassette trainer. This two hour cassette—$29.95 if purchased separately—is yours *free* with the purchase of a RAF host master license.

For on-going and immediate technical support, eligible RAF users can call our special hotline, 1-800-DIAL-DSS. And as new RAF versions are made available, eligible users can update their PC software automatically through the RAF electronic distribution system. In so many ways, RAF is your main line to the DEC mainframe. Call for more information now.

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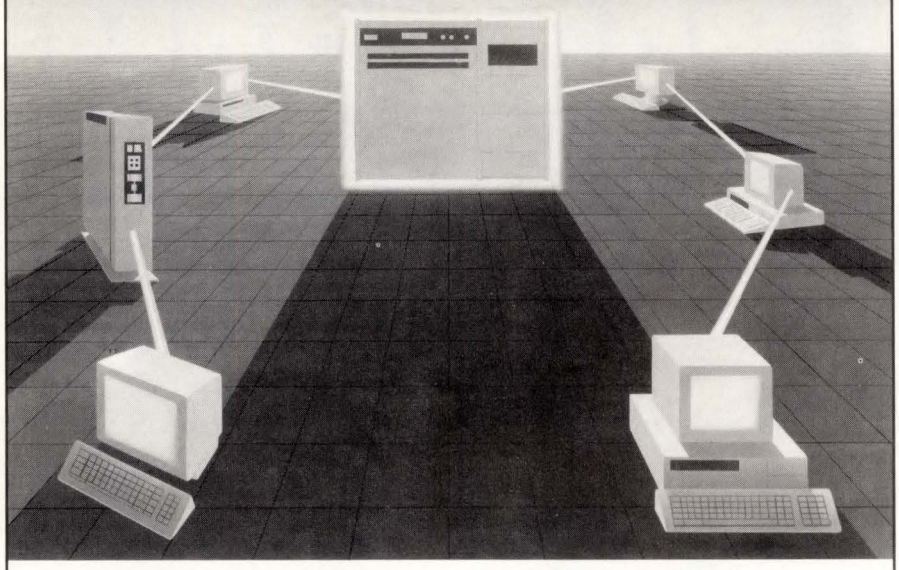
Syntax LAN Software Servers
Bringing It All Together.



MS-DOS, VAX/VMS, and UNIX LAN CONNECTIVITY

Syntax LAN server products turn your minicomputer into a multi-functional LAN server while the minicomputer continues to process your existing applications. Syntax products integrate PC LANs with DEC VAX and standard UNIX minicomputers.

CONNECTIVITY – Syntax has solved the connectivity problem. Now an IBM PC user, operating MS-DOS, can create a file on the mini server or the PC, store or copy this file to a DEC VAX/VMS and/or a UNIX computer, and this file can be transparently and concurrently used by a VAX or UNIX application. Files created by VAX/VMS or UNIX applications can be directly used by PC programs in the MS-DOS operating system.

COMPATIBILITY – Syntax server products, **VIM** and **SMBservers,** are compatible with the industry standards including **Ethernet, Microsoft Networks, TCP/IP,** and **XNS. VIM** and **SMBservers** are compatible with the most popular operating systems including **MS-DOS, DEC VAX/VMS,** and **UNIX**
(System V, bsd4.2, ULTRIX, and XENIX).

Syntax offers you the equipment and software choices from the leading LAN manufacturers including **Excelan, Ungermann-Bass, 3Com, Micom,** and **DEC.**

FUNCTIONALITY – With Syntax server software on your minicomputer, networked PCs can use the storage, printers, and other resources of the minicomputer. PC users can concurrently share information, programs, and electronic mail facilities. The PC data stored on the minicomputer can easily be protected and backed up during normal minicomputer backup processes.

With Syntax products, the PC user can access the minicomputer resources using the high speed Ethernet LAN connection. Terminal emulation services like **REFLECTION 2** allow the PC user to execute minicomputer applications, access remote computers using the minicomputer communication facilities, and interface to other networks like DECnet. The potential is limited only by your imagination!

SYNTAX IS THE RIGHT CHOICE – Our products offer more features, higher performance, more choices, more connectivity, standards compatibility, and better price/performance than any other. Just ask our customers about our support! One other reason to select Syntax: we have been offering easy to use PC-to-minicomputer Ethernet LAN connectivity products longer than anyone else. We know your problems and provide superior solutions.

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products intelligent enough to monitor and limit the number of simultaneous users; establish licensing prices on the basis of first user plus additional users, so the purchaser can buy as few or as many simultaneous licenses as needed; choose one VAX model as the base machine and incorporate a factor in the pricing structure to compensate for the (true) productivity increase or decrease realized by running the software on a given target machine; and provide a patching mechanism so the upper limit can be raised if and when a purchaser wishes to buy more "licenses."

This arrangement would let a shop such as ours cost justify an $1,800 graphics package for two users. We will not be a customer for that package if we can't obtain the $35,000 currently needed to accomplish the same purpose for the same two people.

Al Sutherland
Weyerhaeuser Canada Ltd.
Prince Albert, Saskatchewan

LIKES COLUMN

As a member of an "in-house" service organization, I was happy to see you add a column on field service.

William R. Abernathy
Wilmington, Delaware

UNFAIR OMISSION

I read John C. Dvorak's "What's New In PCs?" in his "Back End" column in the June issue with considerable interest. I agree with the bulk of his column, but feel Mr. Dvorak unfairly omitted both Commodore Business Machines' Amiga computers and line of IBM PC clones. The Amiga machines are quite nice and already offer IBM's future OS/2's major advantage: multitasking. I've enjoyed Mr. Dvorak's columns before (still do, and still will!). I don't always agree with him, but his columns are always interesting if not always informative.

John Palmer, President
New Orleans Commodore Klub
Metairie, Louisiana ■

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James Baker, Mathew Bender

"The best data-entry package on the market. Much more flexible than anything else".
Anne Miller, Energy Simulation Specialists

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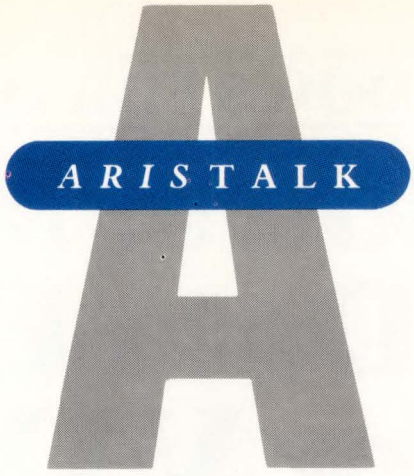

Editor's note: The Special Interest Group (SIG) category number, recently added to the ARIS Message Center, and the ARIS message number (MESS) are included here to help you find particular ARIS entries.

DOWN AND OUT IN RA-81 VILLE

Kitty George (SIG 22/MESS 101): We recently have encountered a problem when adding a second UDA controller to our VAX 11/780 that may lead to misdiagnosis as a disk problem. If you run into this same situation, hopefully you won't lose as much time as we have in isolating it and replacing disks willy nilly for no gain.

The environment — VAX/VMS V4.5 on a 780, two DW780 UNIBUS controllers and six RA81s, three per UDA controller. The second UNIBUS is empty except for the UDA50.

The problem: Files created or updated on the second controller (DUB0, DUB1, or DUB2) were being corrupted. Usually, these indexed files have no problems with the data per se, but the indexes aren't all there.

Diagnostic note: There were no entries whatsoever in the hardware error log, although the problem existed for more than two weeks, messing up dozens of files. Files on the DUA side were fine. Files on the DUB side appeared fine, except for all kinds of weird RMS errors when trying to access the data (the WRITEs never gave any problems). We replaced the UDA controller twice, the boards in the RA81 several times and the cables several times. The command ANALYZE/ERROR_LOG never gave us a clue about where the problem lay.

The Colorado Software folks said it must be some funny interaction between hardware and software. They requested a tape of the corrupted files plus the programs that blew up on these files. They got it and said, "Yep, you have corrupt files."

Finally, we could get the system to break — did a BACKUP/VERIFY of a file from DUA0 to DUBx. The VERIFY pass failed each time.

Field Service came in, replaced DW780 boards left and right, and the system started to die outright. But after four more hours of swapping boards, rebooting and BACKUP/VERIFYing, we had the culprit, a bad M??72 board. It never squealed to the hardware error log and passed the EVCBA DW780 diags with flying colors. But it caused us an awful lot of grief and down time.

How To Use ARIS

If you are a subscriber to *DEC PROFESSIONAL*, you can call up our VAX and log into ARIS, our **A**utomated **R**eader **I**nformation **S**ervice. In ARIS, you can download programs from our publications, communicate with our editors, request a change of address, find additional information about advertisers, view our used equipment classifieds, order books and back issues, check the guidelines for submitting articles, access our cumulative index, and take a peek at our editorial calendar for the year.

In addition, ARIS has a message center for communicating with other DEC users. There is no charge beyond that of the call, and many *DEC PRO* readers already are getting some excellent advice. Each month, we will select and publish some of the most interesting queries and replies.

To log in, you'll need your subscriber number (it's on your mailing label). Then, just set your terminal to seven data bits, one stop bit and space parity, or eight data bits, one stop bit and no parity, and dial (215) 542-9458. Baud rates: 300, 1200 or 2400.

In the near future, we will be including a transfer protocol to assist in downloading programs.

THE KENNEDY TAPES

QUERY:

Andrew Horne (SIG 23/MESS 29): I'm the system manager of a MICROVAX II with two Kennedy 9400 TRI density tape drives. My problem revolves around the MICROVAX being too slow to get the Kennedy drives into streaming mode when doing neat things like a BACKUP, DISKCOPY, etc. The Emulex TC03-type board lists a great utility for speeding up the backup process, but for VAXs other than the MICROVAX II. Any suggestions?

REPLIES:

Jonathan M. Prigot (SIG 23/MESS 30): I've been reading many articles on the BACKUP/CRC option and the MICROVAX's lack of CRC in hardware. The upshot is that unless you specify /NOCRC, your CPU is going to spend a lot of compute cycles doing that calculation. There also was discussion of the optimal value for /BUFFER, but the /NOCRC was what made the difference.

Jeff Corbett (SIG 23/MESS 31): First suggestion: Use the /BUFFER=5 qualifier to use two extra I/O buffers. This trimmed 10 to 15 percent off my VAX 750/TU80 backup time.

Second suggestion: If you trust the

WHEN PC WEEK CALLED OUR DEC TERMINAL EMULATOR THE MOST ACCURATE, THEY WERE MOST ACCURATE.

REPRINTED FROM PC WEEK, APRIL 1987

The most accurate emulation of the VT/220 is VTERM/220, from Coefficient Systems Corp., of New York. This isn't very surprising, since the firm's original VTERM was the first DEC terminal-emulation package for the PC. The current version of VTERM has 50,000 licensed users

VTERM/220's emulation of the VT/220 keyboard, video and escape sequences is so meticulous that if one disconnects a real VT/220 terminal and plugs the cable into the serial port of a PC running VTERM/220, the host computer won't know the difference.

VTERM/220 offers the largest number of file-transfer protocols of any VT220 emulator. The user has a choice of Coefficient's VTRANS-8 and VTRANS-7, XMODEM, ASCII text and Kermit.

Beyond the accuracy of its emulation capabilities, VTERM/220's great strength is its flexibility. It can be set up to handle almost any terminal-communications requirement.

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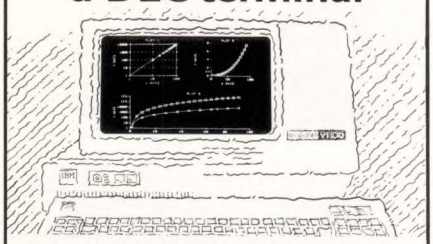
With PC-VT, your IBM PC does more than a DEC terminal



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error detection features on your tape drive and/or you don't store tapes very long, you can use the /NOCRC qualifier on the save set specification; i.e., BACKUP disk-spec save-spec/SAVE_SET /NOCRC, which means BACKUP will not be able to detect any errors on reading the tape later. Your tape drive also should have parity detection and usually will find the error before BACKUP anyway, but safety first. OK, now that the warning is over, BACKUP spends about 50 percent of its CPU time calculating the CRC. Stop calculating the CRC and speed up the BACKUP. We use this on daily backups (which have a two-week shelf life) only. We like it.

Phillip A. Crews (SIG 23/MESS 32): Another way to speed VMS BACKUP is to specify /GROUP = 0. This eliminates XOR redundancy records from the backup tapes (also reducing reliability). This also allows you to pack about 10 percent more data on a tape than the default /GROUP = 10.

I understand that some controllers (including the TC03, I think) generate a hardware CRC for each record written to tape.

We run our own variety of backups at 17 sites. We don't do any sort of CRC generation or redundancy grouping, however, and we've never lost any data on reloads. A lot of the reliability of tape backups depends on the brand of tape.

OUT OF SYNCH

QUERY:

Peter Romano (SIG 11/MESS 103): We've been getting the message DECNET CIRCUIT DOWN LINE SYNCHRONIZATION LOST, for several weeks suddenly on both of our VAXs that communicate via DMFs. We called DEC on phone support, modified SRP, IRP and LRP SYSGEN parms as suggested, but to no avail. Because we still get the message, does anyone have any other alternatives? Our system load and general use on DECNET between VAXs have been increasing lately, so I still think it's a resource-related problem, but how do I confirm that?

REPLIES:

John Pullins (SIG 11/MESS 104): Peter, we just installed a VAX 8530 system using DECSERVER 100/200s over Ethernet last week. After Field Service checked out the system, including the Ethernet port, and found no problems, they released it to us to play with. When I tried to configure in the Ethernet line to my DECNET database, the circuit came up and then back down with the same sync loss error that you mentioned. This happened about every five seconds — up, down, up, down.

Field Service came again and checked out the Ethernet with no problems. I figured it had to be something I was doing wrong. After fooling around with DECNET and reading through the books for two days, I was about ready to call Software Services.

It dawned on me to check the physical links to the servers first and, sure enough, the cable attached to the Ethernet port on the 8530 had one loose pin that pushed back when plugged in and didn't make a connection.

Fixing this pin solved my problem — no more sync lost errors, and the line stayed up. Anyway, this may be the same type of situation you may be experiencing on your DMF lines. Check out the physical link between the two machines. There may be an open circuit somewhere along the way.

Antonio R. Collins (SIG 11/MESS 105): While we were running DECNET between our 730 and 750 over leased phone lines via DMF-32s, we often received those same messages. If they're intermittent, there's nothing to worry about (a lost packet now and then will cause it). But if they're persistent (the circuit stays down more than five minutes), then check out your DMF-32s and cable. If you have diagnostics, run the DMF-32 exerciser and check it out yourself — you might want to call INMAC or someone to make up a duplicate sync cable, and then you can try it.

Last, you might want to set up an async link between your TX devices as a backup. ■

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The TravelMate 1200 with VT-100 emulation capability also carries an impeccable pedigree — a 15-year heritage of reliable, rugged design and dependable operation. After all, it's a

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For more information on the Silent 700 Series, TravelMate and VT-100 emulation, call toll-free **1-800-527-3500.**

TEXAS INSTRUMENTS

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*In locations where a phone jack is not accessible, the optional acoustic coupler may be required.

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DEC and VT-100 are trademarks of Digital Equipment Corporation.
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Analyzing The APA

SPSS-X Performs Statistical Analyses For Psychiatrists

The American Psychiatric Association (APA) is heavily into analysis, not *psycho*analysis but *statistical* analysis.

Through the use of data management, data analysis and graphics software, the APA is able to gain unique insights into its membership. The insights include information on which parts of the country face over- or undersupplies of psychiatrists, financial analysis of membership dues, tracking the effectiveness of special promotional activities and preparing reports required by the U.S. Postal Service for bulk mailings.

To accomplish these tasks, William More, a Ph.D. statistician who heads the APA's data processing unit, uses an array of computer software including the *SPSS-X* statistical analysis package, DEC's proprietary Common Data Dictionary (CDD) and the *DATATRIEVE* data manager, all running on a DEC VAX 11/780 superminicomputer. With this system in place, Dr. More and his staff create monthly statistical reports based on the 34,000 member records in the association's database. "In addition to the monthly reports, we can respond quickly to such special requests as how many foreign medical school graduates are practicing in a particular group of states," Dr. More says.

The APA's membership information is stored in the *DATATRIEVE* database. The *SPSS-X* package has a "hook" to *DATATRIEVE* called SPSS-X Capture. "With *SPSS-X* and *DATATRIEVE*, I haven't found a request I couldn't handle," Dr. More says.

The combination of *SPSS-X, DATATRIEVE* and CDD means that all users can employ the same file definitions for data in the master file. Dr. More explains, "It makes everything consistent, so that when Department A is talking to Department B, everybody is using the same words."

A Variety Of Uses

Statistical routines contained in *SPSS-X*, such as frequencies and crosstabs, are used to study membership characteristics by state or geographic region. SPSS-X Tables, an option to *SPSS-X*, generates tables about specific membership information for display on the association's videotex system. Psychiatrists can access these tables from their own terminals.

In addition, the APA uses *SPSS-X Graphics* to display the results of analyses as bar charts, pie charts and maps of the U.S., showing, for example, what parts of the U.S. have an oversupply or undersupply of psychiatrists.

SPSS-X also has led to better prediction of association revenues, that is, membership dues. According to Dr. More, "*SPSS-X* allows us to look at how much the association has billed and collected by state and member class. Then, that data is used to project future revenues."

In addition, the APA staff uses *SPSS-X* to analyze the effectiveness of meetings and professional programs. "We can see what mix of people attend and what type of person is attracted to a particular program," Dr. More notes. Questionnaires completed by attendees are tabulated to find problem areas such as poor presentations or loosely organized program content. These findings then are used to plan more effective future sessions. *SPSS-X* also tabulates results of association elections and determines the winners.

Other association staff members also use *SPSS* to do their own analyses on their own terminals. "Once you train people, it's there for them to use," Dr. More says. A technical support unit of *SPSS*, dedicated to *SPSS* products on DEC equipment, helps the APA staff with any questions.

The *SPSS* support group is very familiar with DEC's operating system and file structure," Dr. More notes. "When DEC comes out with new versions of computers, the support people are on top of the changes and make *SPSS* compatible with them right away."

For more information on SPSS contact Jeffrey W. Wiss, Public relations coordinator, SPSS Inc., 444 N. Michigan Ave., Chicago, IL 60611; (312) 329-2400.

DEC Goes For Gusto

Joining With The Supercomputers

Researchers, scientists and engineers require high-powered computer systems to exchange data and programs to augment research and development activities. They also need computers that can perform complex computations rapidly and precisely. Other applications include mechanical computer-aided engineering, electrical computer-aided design, molecular modeling, fluid dynamics, weather forecasting, and seismic analysis and reservoir simulation.

To examine the details of a molecular model that would otherwise be impossible to observe, for example, researchers often turn to supercomputers, the world's fastest computers. Supercomputers are capable of processing, and storing, tens of thousands of simultaneous equations. Cray Research Inc., commands about two-thirds of the worldwide market for supercomputers, including the CRAY-1 and CRAY X-MP systems.

DEC's VAX, VAXCLUSTER systems and VAXSTATION workstations complement the supercomputers in a distributed supercomputing environment. Using standard communications ports, general-purpose computers are often used for pre- and postprocessing operations, freeing the supercomputer to perform highly sophisticated and complex scientific and engineering problems.

Because VAX systems can be integrated into networks, the resources of Cray supercomputers can be shared by hundreds of users. Many research and engineering organizations in industries ranging from pharmaceutical and petrochemical to automotive and aerospace, and education institutions worldwide use the VAX system to distribute Cray supercomputer power.

The new VAX Supercomputer Gateway, cooperatively developed by DEC and Cray Research, provides the first cooperatively developed link between systems from both companies. Cray's Station software provides the human interface for the gateway. The VAX Supercomputer Gateway integrates Cray supercomputers into a VAXCLUSTER environment. The marketing and development agreement with Cray Research, and the Gateway resulting from the agreement, represents part of DEC's continuing program to provide integrated solutions that address the full range of an enterprise's computing requirements — from the desktop to the supercomputer center.

Reservoir simulation, which is a technique used for determining oil and gas reserves, is shown on a VAXstation II/GPX workstation.

DEC and Cray announced the Gateway in June at the Hayden Planetarium of the American Museum of Natural History in New York City, before a group of 150 media, industry consultants, and financial analysts.

Built on DEC's VAX BI technology, the new gateway is a high-performance interface that links the Cray into a VAXCLUSTER system. The gateway can be located a maximum of 50 feet from the Cray system and can be used with any VAX system or VAXSTATION workstation operating under the VMS operating system linked through a DECNET network.

The Gateway supports Cray's Station software for VAX/VMS systems enabling users of VAX systems to submit jobs to the supercomputer and retrieve jobs automatically. It stages the input and output data sets and jobs, stores and manages the large amounts of data produced by the supercomputer, and performs data conversion. Additionally, the gateway handles network communication to and from the supercomputer, and offloads "housekeeping" chores from it.

"It is our intention through this agreement to help provide our customers with integrated product solutions that will give them a superior performance, a competitive advantage and the best return on investment," said Robert M. Glorioso, DEC's vice president of High Performance Systems. "In addition, we will expand supercomputing into new application areas."

The VAX Supercomputer Gateway includes a VAX processor, expandable memory, interfaces to DEC's

VAXCLUSTER systems and networks via DECNET software, and a special high-performance interface to the Cray. It is priced from $18,000.

"Our alliance with Cray reinforces our commitment to provide our customers with a complete range of computing solutions from the desktop to the supercomputer via a single operating system, VMS," Glorioso said.

Service for the VAX Supercomputer Gateway hardware and related Digital products is offered through DEC's worldwide support services and includes installation and one-year DECservice warranty. Service and support also include VAX diagnostic software that "talks" to the Cray Research diagnostic software. Cray Research services the Station software.

The *Nightly Business Report* Goes Digital

DEC Provides News Show With Computer System To Speed Processing Of Editorial And Production Elements

DEC has provided a complete newsroom computer for the *Nightly Business Report*, a half-hour program that has the largest national audience of any daily business news program on television.

Ed Fleming, the show's national news manager, will supervise the computerized newsroom operations. According to Fleming, "Our primary job is collection, processing and broadcasting information gathered from worldwide sources. We're delighted that the DEC system will position our operations in the forefront of electronic newsrooms."

The system, which includes DEC's MICROVAX II and VAXSTATION computers, will expedite processing of the editorial and production elements of the news show. The new computer system also offers the capacity for online control of scripts, rundown, teleprompter and other production elements. It has full text retrieval from national and international news wire services, online communications with the *Nightly Business Report's* 16 bureaus worldwide, the establishment of a custom database and the creation of extensive archiving and cross-reference programs.

Software to operate the system is provided by Satellite Information System Company (SISCOM) of Boulder, Colorado.

Nightly Business Report airs on public television and originates from WPBT in Miami. It is delivered live via satellite to 240 stations.

DEC has been a major underwriter for the *Nightly Business Report* for five years and currently shares underwriting responsibilities with Kidder, Peabody Group Inc.

Tying Laboratory Functions

Centrum *Unifies Chemical And Pharmaceutical Applications*

"*Centrum* is *ALL-IN-1* for the laboratory" says Joel Schwartz, president of Polygen Corporation. He's referring to his company's scientific software and to DEC's successful office automation software, pointing out that both are convenient interfaces to a range of computing tasks.

ALL-IN-1 gives an office worker a 'main menu containing choices for word processing, filing, communications, spreadsheet analysis, mail and applications programs. Similarly, *Centrum* gives a chemical or pharmaceutical researcher access to the functions *he* needs, such as molecular modeling, numerical analysis, statistical analysis, chemical structure database searches, scientific word processing, filing and communications.

Below the level of its main menu, the central focus of *Centrum* is its scientific word processor. This is an Interleaf-style program: icon and mouse driven, with multiple windows, font control and graphics capabilities. The *Centrum* word processor is different from most other word processors, however. Graphs, statistics and drawings in a document aren't simple pictures. They're connected to the application program and data that generate them.

Take, for example, a molecule drawing. Normally, you must first use a molecular modeling program to create a file that contains the drawing. Then you can enter your word processor and paste the drawing where you want it. With *Centrum,* you include information about the modeling application in the document itself. *Centrum* drives the modeling software to produce the drawing and includes it at the place you've chosen.

One limitation is that the *Centrum* word processor must "know about" the way the application works: you can only access applications that *Centrum* understands. Despite this drawback, *Centrum* appears to give scientists an integrated work environment. Just as *ALL-IN-1* ties the work done by employees in many offices, *Centrum* may unify the work done by chemical and pharmaceutical researchers.

Centrum runs on a variety of hardware configurations — all of which revolve around a VAX or MICROVAX as a central server. PCs, terminals or workstations connect to the server for multiple users.

For more information, contact Polygen Corporation, 200 Fifth Ave., Waltham, MA; (617) 890-2888.

—Charles Connell

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Take a look at our printers. The revolutionary CI-400 and CI-800 matrix line printers offer four print modes to meet virtually any printing need — from 400 and 800 lpm express output down to the convenience of 85 and 170 lpm corporate letter quality. And just-the-right graphics and office memo speeds in between.

The LIPS 10 Plus laser image printing system continues to garner kudos wherever it runs, with its print quality, compatibility, 600,000 page life cycle and user-power features. Ten pages per minute of unparalleled first-class performance.

Our three-speed dot matrix Tri Printer/4000 is no slow poke either. In technology or speed. At top gun, it runs all day and night in data processing mode at 400 cps, as well as 87.5 cps for letter quality output. Not to mention higher graphics speeds for bar codes, forms and charts.

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C.Itoh's printers and terminals. You have to be pretty good to run with C.Itoh.

Good work, DEC.

For more information on C.Itoh's fast-running DEC-compatible peripherals, contact CIE Terminals, a C.Itoh company, 2505 McCabe Way, Irvine, CA 92714; or call (714) 660-1421 or our toll-free number (800) 624-2516.

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DECUS Worldwide Calendar of Events

August 24-28, 1987	DECUS Australia Symposium, Perth, Western Australia
Aug. 31-Sept. 1, 1987	DECUS Asia-Pacific Symposium, Pan Pacific Hotel, Singapore
September 3-4, 1987	DECUS South American Symposium, Sao Paulo, Brazil
September 7-8, 1987	DECUS South American Symposium (cont.), Buenos Aires, Argentina
September 3-4, 1987	DECUS Israel Symposium
September 7-11, 1987	DECUS Europe Symposium, Rome, Italy
November 5-6, 1987	DECUS Mexico Symposium, Mexico City, Mexico
November, 1987	DECUS Japan Symposium
December 6, 1987	DECUS U.S. Pre-Symposium Seminars, Anaheim Convention Center, Anaheim, CA
December 7-11, 1987	DECUS U.S. Fall '87 Symposium, Anaheim Convention Center, Anaheim, CA

MACCS-II Zeros In On Molecules

Chemists Now Have An Application Specific DBMS

Applying computers to chemistry has been a real challenge. A chemical database is particularly difficult to computerize because chemical structures are recorded and displayed in detailed graphic images. These representations must be converted into meaningful data and then stored and accessed in a useful and efficient manner. For a long time, this required the power of a mainframe computer. Now, however, full-featured software packages are available that run efficiently on minicomputers like the VAX.

The *MACCS* system from Molecular Design Limited of San Leandro, California, was one of the first of these packages designed exclusively for minicomputers. The enhanced *MACCS-II* system allows chemists to draw a molecular structure or substructure on the screen of a graphics terminal and retrieve from the *MACCS-II* database such items as duplicate molecules, or a list of all molecules containing the specified substructures.

MACCS-II also provides related information like the physical properties of the structure, biological test results from pharmaceutical or agricultural testing procedures, the history of the compound and literature references. The *MACCS-II* system can search, store, retrieve, display and plot chemical structures of all types and related data. In addition, the package provides data security for proprietary chemical structures.

The system can transfer information between different *MACCS-II* databases for the production of chemical reports. Access to chemical data and related information stored in other data management systems also has been incorporated into *MACCS-II*. An optional DBMS interface module provides direct access to related data stored in systems such as *ORACLE, System 1032* and *INQUIRE*.

—Bruce Feldman

Pittsburgh Software Looks At VAX *DEChealth*

DEC Tests Employee Health System

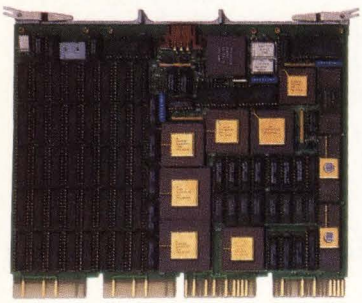
Pittsburgh Software Company Inc. has been selected by the Medical Systems Group of DEC as a consultant to evaluate market demand for VAX *DEChealth*, an employee occupational health and safety information management system.

Pittsburgh Software's President Thomas Lucidore reported, "DEC is conducting extensive marketing research on behalf of VAX *DEChealth*, a software product that runs on the VAX, to meet demand for this employee health and safety system. As part of that effort, Pittsburgh has assembled a team of product specialists who will recommend design strategies and possible future enhancements based on research conducted in several major U.S. markets."

VAX *DEChealth* is a comprehensive occupational health and safety information management system developed and supported by Digital. Using VAX *DEChealth*, occupational health professionals can track patterns of illness and injury, correlate health problems with environmental factors in the workplace and report critical information as needed.

For more information, contact Pittsburgh Software company Inc., 3400 Forbes Ave., Pittsburgh PA 15213; (412) 683-8010.

Introducing A High-Performance Graphics Engine With A Low Sticker Price.



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Here's a high-performance champion that's graphically superior.

It's CalComp's new Formula 1™ Series. The hot little graphics engine that uses new, custom VLSI gate-array technology to give you as many as four workstations from a single MicroVAX II. Without excess power drain. Before CalComp got in the race, a MicroVAX II could gain graphics capability only by using multiple slots. Or with the addition of separate, bulky and expensive controller hardware. Now there's no contest.

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Drop the Formula 1 Series graphics engine into your MicroVAX II and see what it'll do. Because there's no other way to get high performance and four-on-the-floor at a price like this.

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SCIENCE

TALK

A VMS To Oscilloscope Communication Program.

By James Stanley

It's useful to be able to program Tektronix 11401 and 11402 digitizing oscilloscopes with minicomputers using the RS-232 interface. This is valid even if the anticipated use of the computer interfaces is in conjunction with IEEE-488 controllers or personal computers.

The 11401 and 11402 digitizing oscilloscopes are general-purpose instruments designed for use in benchtop and ATE environments, and are capable of acquiring records of up to 10K from up to eight input channels (or combinations of channels) at rates of 20 megasamples per second.

These instruments include both IEEE-488 and RS-232 interfaces for communication with, and programming by, host controllers and computer systems. Using Tek Codes and Formats compliant commands, the user can program the full range of instrument data gathering parameters and options.

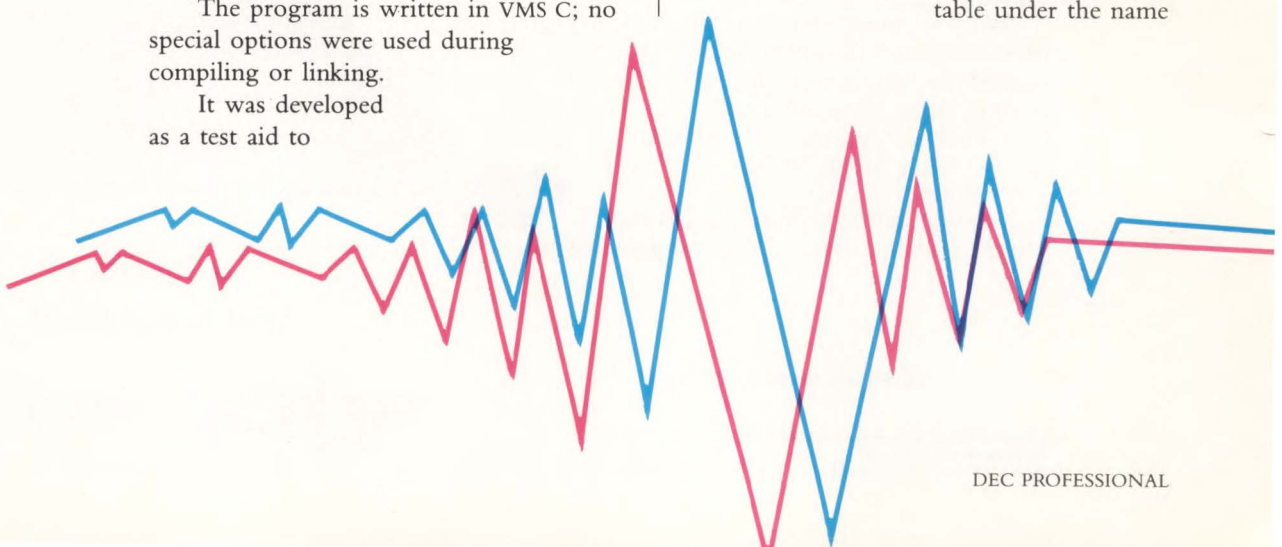
TALK allows the 11401 and 11402 to receive programming commands from, and return data to, a VAX/VMS computer and shows how to configure a VAX RS-232 serial port and the 11401 or 11402 so that communication can be established.

The program is written in VMS C; no special options were used during compiling or linking.

It was developed as a test aid to instrument software designers and allows developers to write routines that can exercise programmable features of an instrument. Other uses include manufacturing test and measurement systems, remote operation (via a modem), loading RS-232 "define" strings (instrument MACRO commands), and loading instrument settings from files stored on the VAX. The latter is particularly useful because the 11401 and 11402 can store up to 10 sets of front panel settings in non-volatile RAM. The settings can be created and saved in libraries of VMS files and readily downloaded as needed.

The program allows you to connect to an instrument at a (named) serial port, send instrument commands and queries, and receive instrument responses and data. You may optionally initialize the instrument from a VMS file and store responses in another file. Responses may be printed optionally on your terminal. All commands and responses are in the form of ASCII strings. While the 11401 and 11402 support binary transmission of waveforms and front panel settings, the program described here does not.

The program is installed in your symbol table under the name



TALK using the command:

```
talk :== "$ user$disk:
  [user_directory]talk.exe"
```

where your disk and directory give the pathname to the executable file TALK.EXE. The program is invoked using the input line:

```
talk -pport_name -ccommand_file
  -llist_file
```

where port_name is the name of the serial port to which the instrument is attached, command_file is the (ASCII) file of instrument commands used to set up the 11401 or 11402, and list_file is the file to which instrument responses are to be sent. Both the command_file and list_file are optional.

The program establishes communication with the instrument, sends the commands in the command file (instrument responses during setup are thrown away), and prompts you for command input (>). You then may issue commands and queries. In each case, the instrument's response is sent to the listing file (if listing is enabled and a filename was given at invocation), and sent to the screen (if screen printing is enabled).

You may enable and disable screen and file listing using keyboard commands. CTRL-B toggles file listing on and off. CTRL-D toggles screen listing on and off. Initially, file listing is OFF and screen listing is ON.

You also may send a DCL command (device clear) to the instrument at any time to clear its input and output buffers and place it in a state to receive further commands by using CTRL-A. You can exit back to the VMS command level by typing EXIT at the command prompt.

This program may be run within a VMS command file; that way, an instrument can be run through a standard command script and its responses recorded for further use or analysis.

File Structures

The command and listing files are ASCII files that can be created and edited using EDT. Commands are terminated with carriage return/linefeed sequences, inserted using the EDT SPECINS command.

Data returned from the instrument and placed in a listing file may be used in turn as a command file to set up the instrument at some later time. Tek Codes and Formats compliance guarantees that query responses may be turned back to the machine as commands, and commands may be turned back as queries. Where queries do not have corresponding set commands, the instrument responds with a syntax error message that's ignored during setup.

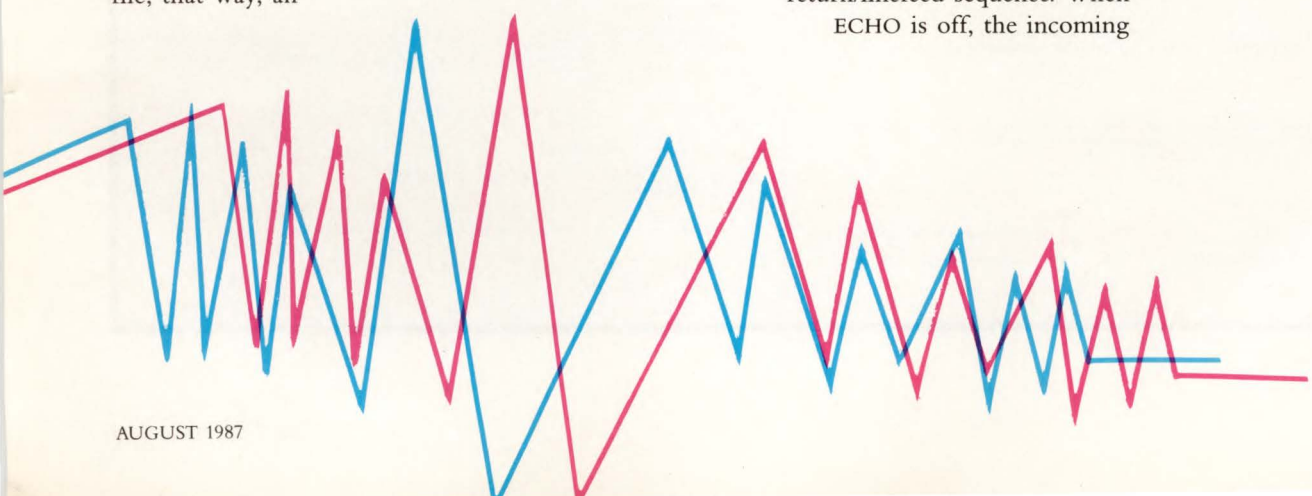
Note, too, that the instrument's response may be a long string terminated in carriage return/linefeed. For instance, a 10K point waveform may contain more than 70K ASCII characters. Although EDT can handle such strings, other text editors may not.

Instrument RS-232 Setup

The 11401 or 11402 RS-232 parameters should be set up (from the front panel) to the following values:

```
FLAGGING — SOFT
EDL — CB/LF
VERBOSE — ON
ECHO — OFF
```

The FLAGGING parameter allows the instrument to respond to DC1/DC3 control from VMS, and to send those control characters to the VAX. The EDL parameter sets the command terminator to the carriage return/linefeed sequence. When ECHO is off, the incoming



PROGRAM.

```
/* SYSTEM WIDE DEFINITIONS */

#include stdio.h
#include iodef
#include stsdef
#include descrip
#include assdef
#include dcdef
#include ttdef
#include tt2def
#include prvdef
#include file

/* PROGRAM SPECIFIC DEFINITIONS */

#define BUFSIZ 72000     /* big enough for a 10240 point wfm */
#define ERROR -1

unsigned char terminal_port[16];

FILE *vfd, *fd;                          /* File descriptor for list */
int TTCHAN;
int SYS$CANCEL(), SYS$GETDEV(), SYS$ASSIGN(), SYS$QIOW(), SYS$ALLOC();
int cfile, lfile, tterm, dolist, doprint;

int at_prompt;

struct dsc$descriptor_s port_desc;       /* Terminal Port String Descriptor */
static struct    {                       /* TERMINAL MODE/CHAR BUFFER */
                 char class;
                 char type;
                 short int buff_size;    /* page width */
                 unsigned basic_tt_chars:24;
                 char page_len;
                 unsigned extended_tt_chars:32;
                 } TT_chars;

static struct iosb {
        short   status;
        short   count;
         int    dev_dep;
} io_block;


char instring[BUFSIZ], outstring[BUFSIZ];

main(argc, argv)
int argc;
char *argv[];
  {
  unsigned char  lfilespec[30], filespec[30];
  char *ptr;
  int index;
  int read_count;
  int i;
  int check;

  dolist = lfile = cfile = tterm = FALSE;
  doprint = TRUE;
at_prompt = FALSE;

if(argc == 1) {
  printf("\nUSAGE: talk -pport -ccmdfile -llistfile\n");
  exit();
} else {
  for (i = 1; i < argc; i++) {
      ptr = argv[i];
      ptr++;
      switch (*ptr++) {
              case 'p':
                      strcpy(terminal_port,ptr);
                      tterm = TRUE;
                      break;
              case 'c':
                      strcpy(filespec,ptr);
                      cfile = TRUE;
                      break;
              case 'l':
                      strcpy(lfilespec,ptr);
                      lfile = TRUE;
                      break;
              default:
                      printf ("\nInvalid option specified");
                      exit();
      }
  }
}

/* verfiy options, open required files */

if (!tterm) {
      printf ("\nPort must be specified");
      exit();
}

  if (cfile) {
     if ((fd=fopen(&filespec, "r", "rfm=var")) == NULL) {
         printf("\n\007Error in opening file %s",filespec);
         exit();
     }
  }

  if (lfile) {
      if ((vfd=fopen(&lfilespec, "w", "rfm = var", "mrs = 80")) == NULL) {
          printf("\n\007Error in opening %s", lfilespec);
          exit();
      }
  }

control_trap();

setup_instrument_port();                        /* allocate and assign port */

if (cfile)  setup_instrument(fd);               /* send cmds from file */

do {                                            /* main loop */
    printf ("> ");
    at_prompt = TRUE;
    gets (&instring);                           /* get string from input */
    at_prompt = FALSE;
    if (strcmp (instring, "exit") == 0) break;  /* graceful exit */
    send_buffer (strlen(instring), instring);   /* send to instrument */
    read_count = in_buffer (outstring);         /* get string from inst. */
    if (doprint) puts (outstring);
    if (lfile && dolist) fputs (outstring, vfd);
} while (1);                                    /* do forever */

restore_port();                                 /* redefine port
                                                   characteristics */
release_port();                                 /* undefine channel */

if (cfile) fclose(fd);                          /* clean up files */
if (lfile) fclose(vfd);

exit();
}
                        /* End of MAIN */


/*\
|                           ===========
|                           PERFORM_DCL
|                           ===========
|ACTION:
|       Handle control chars from terminal; Do DCL or listing on/off
|       or terminal listing on/off:
|
|               Character       Action
|                ^-A            Toggle file listing flag
|                ^-B            Send DCL to instrument
|                ^-D            Toggle screen listing flag
|
\*/

perform_dcl(trap_char)
int     trap_char;
{
        int sstat;
        int read_count;

    /* received control-A:  enable/disable listing */
    if (trap_char == 1) {
        if (dolist) {
            dolist = FALSE;
            printf ("Listing disabled\n> ");
        } else {
            dolist = TRUE;
            printf ("Listing enabled\n> ");
        }
        return;
    }

    /* Control-D: toggle listing flag */
    if (trap_char == 4) {
        if (doprint) {
            doprint = FALSE;
            printf ("Output disabled\n> ");
        } else {
            doprint = TRUE;
            printf ("Output enabled\n> ");
        }
        return;
    }

    /* received control-B: perform DCL */
    sstat = SYS$CANCEL (TTCHAN);
    if (sstat != SS$_NORMAL)
        {
        printf("Unable to cancel pending I/O\n");
        exit(sstat);
        }

        /* Set port for low baud-rate */
    sstat = SYS$QIOW(0,TTCHAN,
                     IO$_SETCHAR,  /* for testing use SENSEMODE  */
                     0,0,0,
                     &TT_chars,
                     12,
                     (int)(TT$C_BAUD_300 << 8 | TT$C_BAUD_300),
                     0,0,0);

    if (sstat != SS$_NORMAL)
        {
        printf("Unable to alter port speed\n");
        exit(sstat);
        }

        /* Send a null character to simulate a break */
    send((unsigned char)0);

        /* Reset baud rate */
    sstat = SYS$QIOW(0,TTCHAN,
                     IO$_SETCHAR,  /* for testing use SENSEMODE  */
                     0,0,0,
                     &TT_chars,
                     12,
                     (int)(TT$C_BAUD_9600 << 8 | TT$C_BAUD_9600),
                     0,0,0);

    if (sstat != SS$_NORMAL)
        {
        printf("Unable to alter port speed\n");
        exit(sstat);
        }

    /*  Deal with instrument's reply (DCL), if necessary */
```

Continued . . .

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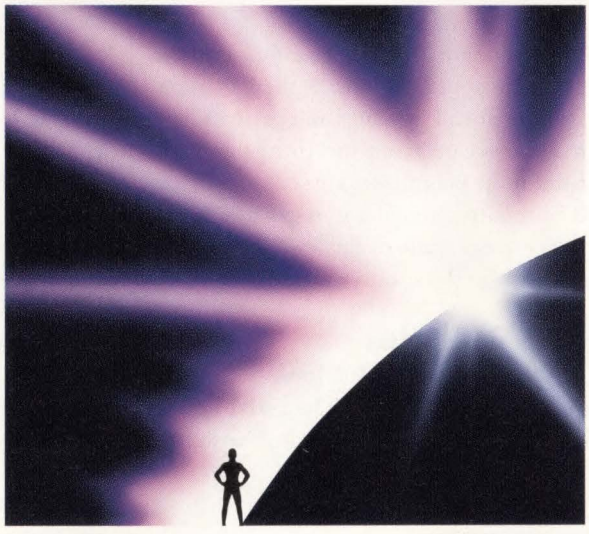

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ENTER 377 ON READER CARD

commands are not sent back, character by character, to the TALK program; this is essential to keep TALK from confusing instrument response with the user's commands. When VERBOSE is ON, the instrument generates a response for each command or query; in the case of a successful set command, the 11401 and 11402 send the string OK back to the user. This response is used as a handshake by the TALK program. If OK is placed in a listing file and sent back to the instrument during setup, the instrument's response will be a harmless syntax error message.

The standard RS-232 communications parameters must be set to match the VAX serial line. These are baud, stopbits, and parity. These also may be set up from the front panel.

After these parameters are set up, they are stored in the instrument's non-volatile RAM; if no other use is made of the RS-232 port, this setup has to be done only once.

VAX/VMS Port Setup

To VMS, the 11401 or 11402 looks like a terminal tied to a serial port. The serial line to the instrument should be set up with the following attributes:

```
World Access
Hostsync
Interactive
TTSync
```

World Access allows the TALK program to connect to the port to which the instrument is tied. Hostsync allows the terminal driver to send DC1/DC3 to the instrument; Interactive mode allows this to operate. TTSync allows the instrument to send DC1/DC3 sequences to the port.

Again the port parity, baud rate, and stopbits must be set to match the instrument's. The VMS SET TERM command can be used to set these parameters of any serial port.

The TALK program requires the PHY_IO privilege because it connects to the serial line and alters its operating characteristics (DCL is sent as a null at a low baud rate). This privilege can be granted to the program's users or the program can be installed in VMS with the privilege.

This program was designed to allow the user to set up an 11401 or 11402 from a VMS file and to send commands from a VMS terminal. Thus, it forms the basis for more complex instrument test or measurement routines. The program easily could send command sequences to perform complex measurements and query for results or waveform data. This could be used in conjunction with other instruments also tied to VAX serial lines (power supplies, signal generators, programmable multiplexers, etc.).

Binary transmission of waveform data or setups could be accommodated if hard flagging is used in the VMS terminal driver and if the writes to the listing file were done in binary rather than ASCII strings. Further data analysis routines — for example, a routine to plot aquired wave form data on graphics terminals — also could be invoked by special keyboard commands.

Author's note: Thanks to Rob Perry and Ron Odenheimer from whom I received the skeleton of the program, and to Greg Friend and Clark Morgan who gave invaluable assistance in configuring the VMS and instrument RS-232 ports. *—James Stanley is principal engineer in the Laboratory Instruments Division of Tektronix Inc. in Beaverton, Oregon.*

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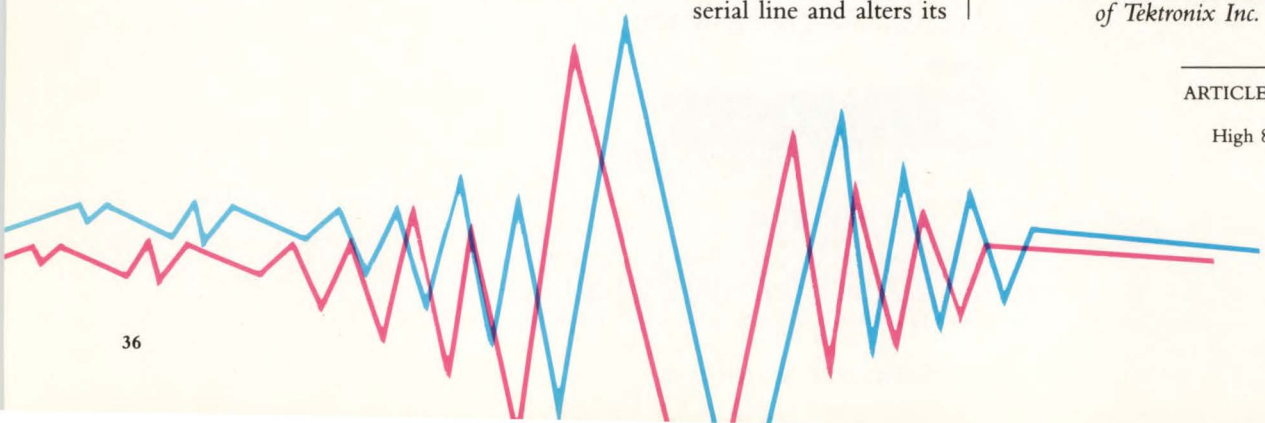

PROGRAM. . . . continued

```
    if (at_prompt) {
        read_count = in_buffer (outstring);
        if (doprint) puts (outstring);
        if (lfile && dolist) fputs (outstring, vfd);
        printf ("> ");   /* still at prompt; redo prompt */
    }

    return;

    /*\
    |                              ================
    |                              SETUP_INSTRUMENT
    |                              ================
    |ACTION:
    |       Send commands from command file to initialize instrument
    |
    \*/

    #define MAX  10000

    setup_instrument(fd)
    FILE    *fd;
    {
          int read_count;

          while ( fgets (instring, (int)MAX, fd) != NULL ) {
              send_buffer (strlen(instring), instring);      /* send to instrument */
              read_count = in_buffer (outstring);            /* get inst. answer */
              printf (".");                                  /* let user know */
          }
          printf ("\n");                                     /* print prompt ok */
    }


    /*\                             ============
    |                               CONTROL_TRAP
    |                               ============
    |ACTION:
    |       control_trap() - Creates a system trap of ^A, ^B & ^D
    |       This is VMS dependent.  The system calls a service routine
    |       in response to the trapped character.
    |
    \*/

    control_trap()
    {
      extern perform_dcl();
    {  int sstat,func, parm1, parm2, parm3, parm4;
       int aiosb[4];
       int mask[2] = {0,0x00000016}; /* control A, control B, control D */
       $DESCRIPTOR(sys_desc,"SYS$COMMAND");

       sstat = SYS$ASSIGN(&sys_desc,&TTCHAN,0,0);
       if(sstat != 1) LIB$STOP(parm4, sstat);

       func = IO$_SETMODE | IO$M_OUTBAND;
       sstat = SYS$QIOW(0, TTCHAN, func, aiosb,0,0,
                   &perform_dcl, mask,0,0,0,0);
       if(sstat != 1) LIB$STOP(parm4, sstat);
       if(aiosb[0] != 1) LIB$STOP(parm4, aiosb);

       return;
    }
                            /* End of CONTROL_TRAP */

    /*****************************************************************
    *                                                                *
    *       THE FOLLOWING ROUTINES ARE VAX H/W DEPENDENT             *
    *                                                                *
    *****************************************************************/
    /*\
    |                                 ====
    |                                 SEND
    |                                 ====
    |ACTION:
    |       Send routine outputs 1 character to the instrument.
    |
    \*/

    send(chr)
    unsigned char chr;

    {
        int sstat;                          /* Status Return Word */

    /*  output char to instrument */

        sstat = SYS$QIOW (0,TTCHAN,
                          IO$_WRITEVBLK,
                          &io_block,0,0,
                          &chr,             /* Character to write */
                          1,                /* Number of characters to write */
                          0,
                          0,0,0);

        if (sstat != SS$_NORMAL)
            {
            printf("\nWrite to instrument failed");
            exit(sstat);                    /* Let VMS terminate */
            }
        return TRUE;
    }
                                /* End Of SEND */


    /*\                                 ===========
    |                                   SEND_BUFFER
    |                                   ===========
    |
    |ACTION:
    |       This will send the number of bytes in the buffer using the system
    |       service QIOW routine:
    |
    |PARAMETERS:
    |       buffer          Pointer to a buffer (8-bit bytes)
    |       count           Count of bytes in buffer to send.
    |
    \*/

    send_buffer(byte_count, byte_buffer)
        unsigned int byte_count;            /* Bytes in buffer */
        unsigned char *byte_buffer;         /* Buffer to print */
    {

        int sstat;                          /* Status Return Word */
        unsigned int send_count;            /* Bytes to send */
            /* append cr/lf sequence and alter byte count */
            *(byte_buffer + byte_count) = '\r';
            *(byte_buffer + byte_count + 1) = '\n';
            byte_count += 2;

        do
            {
            if (byte_count > 512)           /* Maximum size block */
                send_count = 512;           /* Max count */
            else
                send_count = byte_count;    /* Available bytes */

            sstat = SYS$QIOW (0,TTCHAN,
                              IO$_WRITEVBLK,
                              &io_block,0,0,
                              byte_buffer,          /* Buffer to write */
                              send_count,   /* Number of characters to write */
                              0,0,0,0);
            if (sstat != SS$_NORMAL)
                {
                printf("\nWrite to instrument failed");
                printf("\nCount = %x",byte_count);
                exit(sstat);                        /* Let VMS terminate */
                }
            byte_count -= send_count;       /* Amount left to send */
            byte_buffer += send_count;      /* Update buffer pointer */
            }                               /* end of DO */
            while (byte_count > 0);         /* Until all bytes sent */
        return TRUE;
    }

    /*\                                 ==============
    |                                   GET_PROTO_CHAR
    |                                   ==============
    |
    |ACTION
    |       get_proto_char() - reads 1 character from the instrument.
    |       If successful it returns the character received from the prototype.
    |
    \*/


    char
    get_proto_char()

      {
      int sstat;                        /* Status return word */
      int read_char[2];                 /* Character read from prototype */
      char c;
      unsigned long p4[2];              /* terminator mask */
      unsigned long IO_RD;

      IO_RD = IO$_READVBLK;
      p4[0] = 0;
      p4[1] = 0;
      sstat = SYS$QIOW (0,TTCHAN,
                        IO_RD,                  /*   TTYREADALL  */
                        &io_block,0,0,
                        &c,                     /* Put data here */
                        1,                      /* Read only 1 character */
                        0,                      /* 0 second timeout */
                        p4,                     /* Standard terminator */
                        0,0);
```

PROGRAM. . . continued

```
    if (sstat != SS$_NORMAL) {
        exit(sstat);
    }
        return (c);
}
                        /* End of GET_PROTO_CHAR */

/*\                              =========
|                                IN_BUFFER
|                                =========
|
|ACTION
|       in_buffer -- gets a string from instrument.  Fills in string
|       the address of which is given as parameter; returns string
|       length in bytes.  Note this also fills in a 0 at the end of
|       the string (string has terminal cr/lf from instrument).
|
\*/

in_buffer (array)
char *array;
{
        char    cc;
        int     i;


        i = 0;
        do {
                cc = get_proto_char();
                *array = cc;
                array++;
                i++;
        } while (cc != '\n');

        *array = 0;

        return (i);
}
                /* End of IN_BUFFER */


/*\                              ====================
|                                SETUP_INSTRUMENT_PORT
|                                ====================
|
|ACTION:
|       Initialize the VAX serial port
|       connected to the instrument to allow binary
|       9600 baud transmission.
|
\*/

setup_instrument_port()

  {
  int sstat;
  int priv_mask[2];

/* SET UP STRING DESCRIPTOR OF PORT TO USE */

    port_desc.dsc$w_length  = strlen(&terminal_port);
    port_desc.dsc$a_pointer = &terminal_port;
    port_desc.dsc$b_class   = DSC$K_CLASS_S;
    port_desc.dsc$b_dtype   = DSC$K_DTYPE_T;

/* ALLOCATE PORT */

    sstat = SYS$ALLOC(&port_desc,0,0,0);
    if (sstat != SS$_NORMAL)
        {
        puts(" Allocate FAILED\n");
        exit(sstat);
        }

/* ASSIGN CHANNEL TO PORT */

    sstat = SYS$ASSIGN (&port_desc, &TTCHAN,0,0);
    if (sstat != SS$_NORMAL)
        {
        puts (" Channel assignment FAILED\n");
        exit(sstat);
        }


/* SENSE THE CHARACTERISTICS OF THE PORT */

    sstat = SYS$QIOW(0,TTCHAN,
                IO$_SENSECHAR,      /* for testing use SENSEMODE only  */
                    0,0,0,
                    &TT_chars,          /* Address of buffer */
                    12,                 /* Length of buffer */
                    0,0,0,0);

    if (sstat != SS$_NORMAL)
        {
        printf("\nUnable to read port status");
        printf("\nError status is:%d\n",sstat);
        exit(sstat);
        }

/* CHANGE PORT CHARACTERISTICS */

    TT_chars.basic_tt_chars = TT_chars.basic_tt_chars | TT$M_NOECHO;
    TT_chars.basic_tt_chars = TT_chars.basic_tt_chars & (~TT$M_WRAP);
    TT_chars.extended_tt_chars = TT_chars.extended_tt_chars | TT2$M_SETSPEED;

        /* Set characteristics */
    sstat = SYS$QIOW(0,TTCHAN,
                    IO$_SETCHAR,  /* for testing use SENSEMODE  */
                    0,0,0,
                    &TT_chars,
                    12,
                    0,
                    0,0,0);
/* CHECK STATUS OF ATTEMPTED PORT CHANGE */

    if (sstat != SS$_NORMAL)
        {
        printf(" UNABLE to set-up port\n");
        exit(sstat);
        }

    return;
  }
                        /* End of SETUP_INSTRUMENT_PORT */

/*\                              ============
|                                RELEASE_PORT
|                                ============
|
|ACTION:
|       Deassign and deallocate the terminal port.
|
\*/

release_port()

  {
  int sstat;

    printf("Releasing port %s ",terminal_port);

/* DEASSIGN CHANNEL TO PORT */

    sstat = SYS$DASSGN(TTCHAN);
    if (sstat != SS$_NORMAL)
        {
        puts(" Deassign FAILED\n");
        exit(sstat);
        }

/* DEALLOCATE PORT */

    sstat = SYS$DALLOC(&port_desc,0);
    if (sstat != SS$_NORMAL)
        {
        puts (" Deallocate FAILED\n");
        exit(sstat);
        }

    return;
  }
                        /* End of RELEASE_PORT */

/*\                              ============
|                                RESTORE_PORT
|                                ============
|
|ACTION:
|       This is necessary because the port characteristics are changed
|       in such a way as to seem unusable.
|
\*/

restore_port()

{
  int sstat;                    /* Status return word */
  int read_char[2];             /* Character read from prototype */
  unsigned long p4[2];          /* terminator mask */
  unsigned long IO_RD;


/* CHANGE CHARACTERISTICS BACK TO NORMAL */


TT_chars.extended_tt_chars =
            TT_chars.extended_tt_chars | TT2$M_SETSPEED & (~TT2$M_ANSICRT);

    TT_chars.basic_tt_chars = TT_chars.basic_tt_chars & ~TT$M_EIGHTBIT;
    TT_chars.basic_tt_chars = TT_chars.basic_tt_chars & ~TT$M_NOECHO;

    sstat = SYS$QIOW(0,TTCHAN,
                    IO$_SETCHAR,
                    0,0,0,
                    &TT_chars,          /* New characteristics */
                    12,
                    0,
                    0,0,0);

    TT_chars.basic_tt_chars = TT_chars.basic_tt_chars & (~TT$M_PASSALL);
    TT_chars.basic_tt_chars = TT_chars.basic_tt_chars | TT$M_WRAP;
    sstat = SYS$QIOW(0,TTCHAN,
                    IO$_SETCHAR,
                    0,0,0,
                    &TT_chars,          /* New characteristics */
                    12,
                    0,
                    0,0,0);
    return;
}
                        /* End of restore_port() */
```

■

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SCIENCE

THE FLYING VAX

A State-Of-The-Art Solution For Simulating Air Traffic Control.

By Michael Suchko

Aircraft instrumentation traditionally has evolved through the replacement of outmoded instruments and controls with more advanced and sometimes radically different designs. This frequently produces ergonomic chaos that results in high crew workload and reduced efficiency. Rather than go through the time-consuming and expensive methods of the past whereby a prototype aircraft was be configured and flown to reveal these problems, it was recognized that a far better solution would be a full-mission flight simulator that also would simulate air traffic control.

As a result, a joint team from NASA and Lockheed-Georgia Company set about designing a generic air transport with a technology cut-off date of 1990. Based on analysis of future needs, the aircraft is to have the capacity to carry 200 passengers for up to 2,500 miles at a speed of .78 Mach. The aircraft is to include such advanced features as fly-by-wire active flight controls, composites for primary and secondary airframe structures, and all-electric (non-hydraulic) flight control actuators.

One each of these Advanced Concepts Flight Simulators was built at the Man-Vehicle Systems Research Facility at the NASA Ames Research Center in Mountain View, California; at Lockheed in Marietta, Georgia; and at the NASA Langley Research Center in Hampton, Virginia. At Ames, two experiments were performed. One major U.S. aircraft company conducted a study of side stick displacement, and another performed an experiment concerning priority and feedback between the pilot's and co-pilot's side sticks and between the autopilot and the side stick controllers.

Digital Equipment Corporation VAXs figure prominently in running these simulators. Not only are they a major part of the simulation at run time, but they also serve as the principal development machines for applications running on several of the other processors.

Distributed Processing

At the time of initial construction, there was no single VAX CPU fast enough to run the entire simulation. By breaking up the processing tasks into logical units and assigning them to individual processors, this problem was overcome. Most of the devices in the cockpit contain a microprocessor. Furthermore, the aircraft models are split between a VAX 11/785 and a Gould SEL 32/77.

The VAX also serves as the interface for a number of devices. For the VAX to fulfill its simulation requirements, hardware is important. Due to real-time constraints, two UNIBUSes are used; a single UNIBUS would suffer from bus contention. Adequate memory also is important because disk I/O is too slow and paging is out of the question.

The SEL 32/77 handles the aerodynamic computations. It also serves as the interface to the visual system, the air traffic control

Photos by Joe King

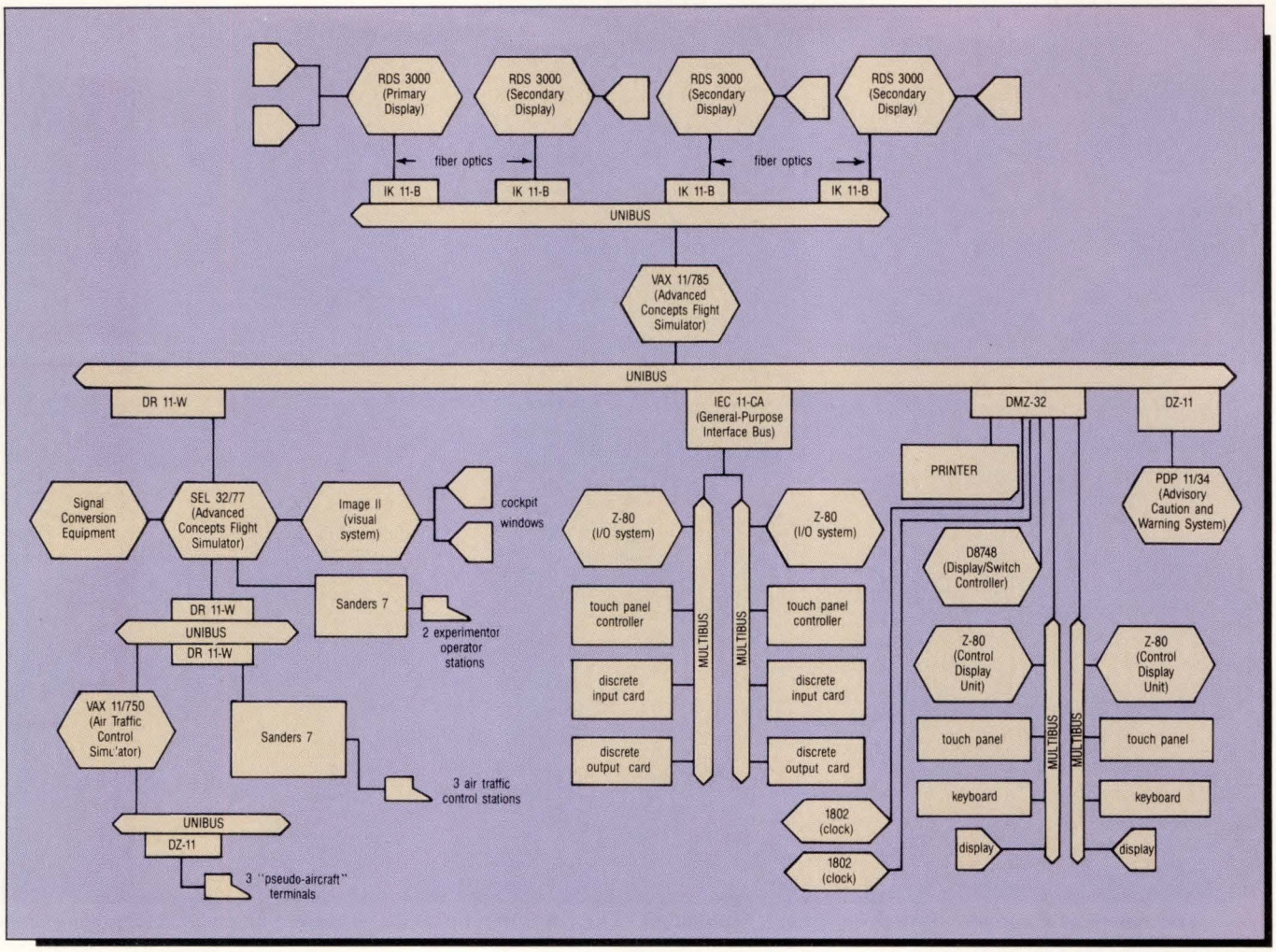
The Advanced Concepts night flying cockpit simulation. The red illumination helps pilots maintain their night vision.

simulator and the signal conversion equipment.

Primary displays consist of an Adage RDS 3000 running at high resolution (1024 x 1024 pixels refreshed at 30 Hz). The top half is the flight display and has two modes: velocity vector and attitude. The lower half is for navigation information. Pilots can choose between a variable scale moving map display or the conventional HSI or RMI formats. To build the displays, a VAX process retrieves information such as air speed and sends a block of data to Ikonas Display Language (IDL2) programs on the RDS 3000.

The RDS 3000s in low resolution mode (512 x 512 pixels refreshed at 60 Hz) comprise the three secondary displays. Overlaying each monitor's face is an Elographics touch sensitive membrane providing the ability to change display pages. Page choices include various Jeppesen charts, electrical, environmental and fuel systems, weather radar, engine status and a complete set of checklists. The software for the secondaries is written in Ames' Interactive Dynamic Display Editor (AIDDE), a utility authored by Sterling Software at Ames. The AIDDE compiler produces IDL2 code that's downloaded to the RDS 3000 and VAX resident C language code which is compiled to produce two executable images per display. One of these images writes information to the RDS 3000 to generate the picture while the other reads from the touch membrane.

Console buttons and the touch membranes are serviced by a microprocessor-based I/O system. Discrete inputs are received over a MULTIBUS by one of two Z-80s and transmitted to the VAX via the General Purpose



The final complex design.

Interface Bus (GPIB), an 8-bit parallel interface, using the IEEE-488 standard. On the VAX, a process receives the information and places it in a shareable image organized into queues for the different devices. The target processes poll the appropriate queues. By reversing the sequence for discrete outputs, activated buttons can be back-lit.

The display/switch controller is the interface to the guidance control and communication/navigation panels. A D8748 microprocessor handles lighting the alphanumeric LEDs to display the mode of the autopilot and to inform the VAX of button hits.

Realistic dusk or night window scenes are generated by a Singer Link-Miles Image II visual system. With the ability to change databases in flight, a mission scenario could begin by taxying around the distinctive restaurant at Los Angeles International, departing, switching to an inflight database, and making an approach and landing in San Francisco with the lights of the city visible in the background.

Greenwich Mean Time is displayed by a pair of liquid crystal display clocks. The time can be set by sending ASCII characters over an RS-232C line.

The two control display units (CDU) each consist of a Z-80 processor, lighted keyboard, alphanumeric display and infrared touch-sensitive surface joined by a MULTIBUS. As the interface to the flight management computer, the CDU permits the display and editing of the flight plan, weight and balance calculations

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An airborne view from the "window" of the Advanced Concepts night flying cockpit simulator, showing the San Francisco Airport.

and other information. When data for these pages is required from the VAX, the Z-80 requests it. A small on-board printer allows duplication of pages.

The advisory, caution and warning system (ACAWS) is an aural generator already installed in airliners. There are C-language programs running on a PDP-11/34 under RT-11 used to annunciate warnings such as "MAX AIRSPEED EXCEEDED."

The signal conversion equipment (SCE) is a Singer Link Flight Simulation Division product that handles the analog devices: the side stick, rudder pedals, flap handle and the few conventional gauges. For analog input, the voltage is converted to a floating point number between 1 and -1 and sent to the SEL computer where it's placed in global memory for reference by programs. For analog output, a floating point number is sent to the SCE where it's translated to a fixed point number and converted to a DC analog voltage that's distributed to the appropriate device. All of this is done at 30 Hz.

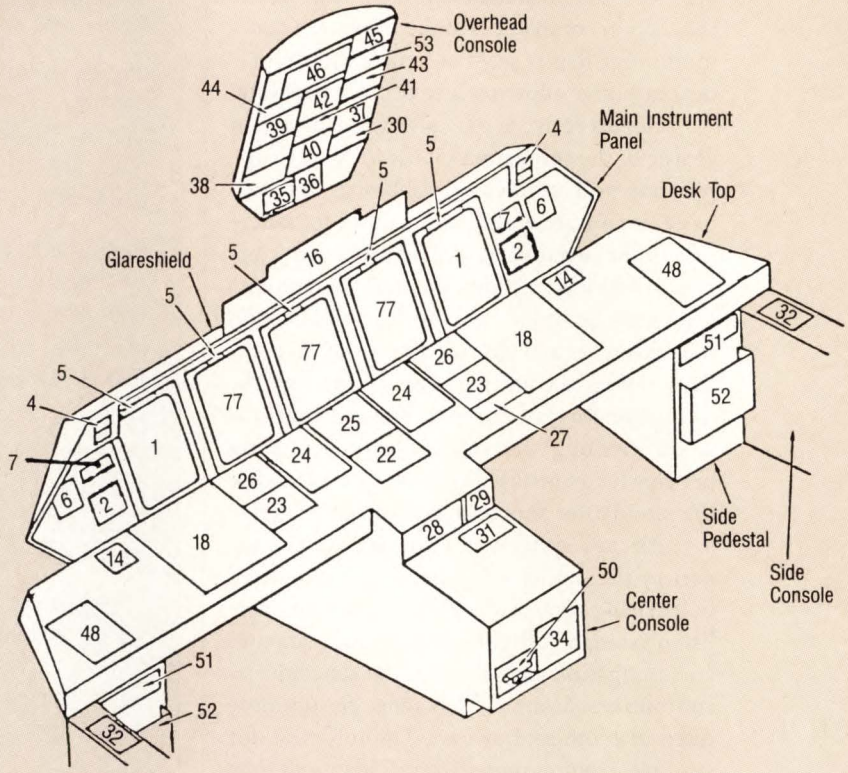
Experimenters must have the ability to monitor and control the simulation. In a study of pilot reactions, for instance, they may wish to induce an engine flame-out and observe the crew. For ease of use, Sanders 7 graphics stations have been set up with numerous menu displays allowing such control with only a few keystrokes.

Air traffic control is run on a VAX 11/750. Sanders 7 displays mimic radar screens allowing controllers to monitor and advise the simulator crew. The sky around the simulator is populated by "pseudo-aircraft" flown using terminals. These aircraft not only register on the controller's screens but also are visible from the cockpit via the Image II visual system.

Communication And Control

Data transfer must be accommodated with two computers running the simulation. The DR11-W provides an excellent interface; however, because of extensive error checking, I/O on a VAX is very compute-intensive. Running the simulation at 30 Hz would swamp the CPU just doing the intercomputer transfer. To circumvent this problem, the standard DR11-W device driver was modified to continue doing read/write pairs after only one initial QIO call.

FIGURE 1.



Main Panel And Glareshield
1. Primary display
2. Clock
4. Master caution, master warning lights
5. CRT alternate page control
6. Master CRT brightness knob
7. Inclinometer
16. Guidance and control panel
77. Touch sensitive secondary display

Desk Top
14. Side stick controller
18. CDU keyboard and display
22. Comm/Nav frequent entry
23. Transmit/monitor control
24. Throttles
25. Comm/Nav control
26. Nav display control
27. Acars and Selcal control
48. Nose wheel steering, parking brake & rudder pedal adjust

Overhead Console
30. Flap and fuel indicators
35. Landing lights and WX advisory
36. Landing gear control
38. Flight control SYS control
39. Engine start/stop
40. Landing gear and brake panel
41. Cabin advisory lights
42. Interior lighting control
43. APU and external power
44. Oxygen and emgergency depress
45. Cockpit voice recorder
46. Fire control panel
53. Emergency circuit breakers

Center Console
28. Alternate trim control
29. Wing flap control
31. Radar control
34. Printer
50. Emergency gear release

Side Console
32. MIC and headset panel

Side Pedestal
51. Storage drawer
52. Map case

In each cycle, the SEL converts its real numbers to VAX format and sends them and other data to the VAX. After reading the data directly into an installed shareable image, the VAX transmits its data from this image to the SEL. Upon completion of the transfer, a common event flag is set that wakes the simulation executive allowing it to begin scheduling.

The executive is a C language program in charge of the simulation on the VAX. Each application process has a special header designed to communicate with the executive. Initialization of the executive (as for all processes) consists of locking itself into memory and inhibiting swapping. It then goes into an infinite loop of waiting for and clearing the common event flag, doing accounting and examining the simulation for state changes. These changes include "freezing" the simulation on command perhaps for an in-flight critique, or terminating the simulation should a vital process abort.

Aircraft systems not run on the SEL are part of the model scheduler. Models written in RATFOR, such as the electrical system, collision avoidance, flight management computer and navigation are called by the scheduler as subroutines. Some models must be run more often than others, however. The autopilot, for example, requires more frequent iterations than the model that determines the prevailing winds aloft. By dividing each simulation cycle into 16 frames, the model scheduler can call each model as many or as few times as necessary.

Processes occasionally will be required to write error or informational messages. Because the number of messages could be voluminous, the best solution is to write them to a disk file. So that these messages will be stored in chronological order in one file, real-time processes perform memory writes to an installed shareable image that's monitored by a process running at a normal priority. This process removes the entries and writes them to disk.

A fast mechanism for interprocess communication is the installed shareable image. Using a combination of RATFOR and *DATATRIEVE* procedures that allow easy manipulation of the 4,000 variables referenced across processes, image creation is convenient. To begin, programmers define variables with a menu-driven utility. FORTRAN common blocks then are generated, compiled and linked

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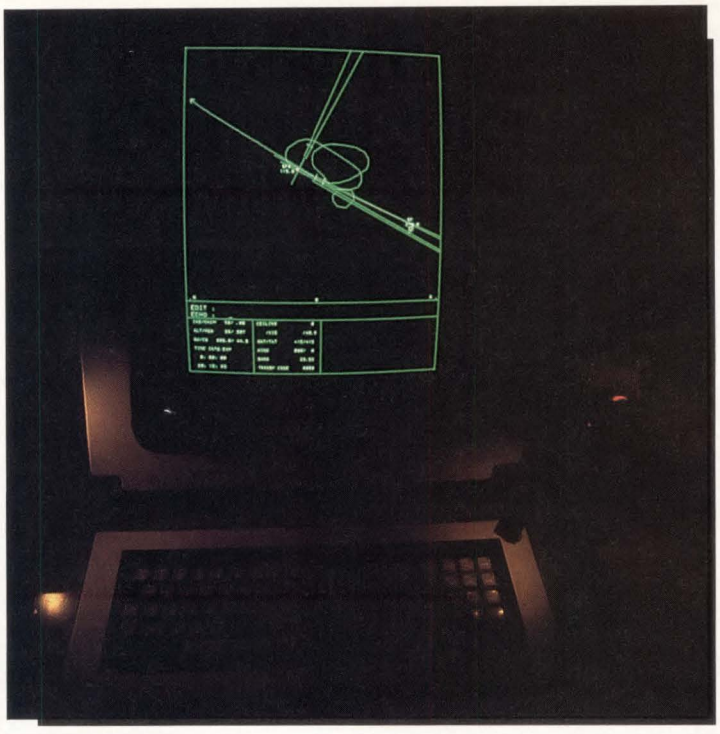

A simulated flight approach pattern.

into a shareable image. Simulation programs are linked to this image, which is installed at the beginning of each simulation run.

To access these variables, users specify an acronym such as "$.altitude." A preprocessor resolves them by inserting an INCLUDE statement for the appropriate common blocks and replacing the acronyms with the common blocks and actual names. The normal C or RATFOR compiler then can be used.

Development Environment

Thanks to the user-friendliness of VMS and its utilities, the VAX is used for a substantial amount of the work. Development for most processors is conducted in whole or in part on the VAX. In the case of the SEL, RATFOR code is preprocessed on the VAX and the resulting FORTRAN code is ported to the SEL for final compilation. Using cross-compilers and linkers, programs for the various Z-80s and RDS 3000s also are composed on the VAX. A utility enables users to download these programs or even interrogate the microprocessor's resident monitor programs.

Offline processing is also extensive. *DATATRIEVE* is used for tracking simulator problems. Forms Management System provides windowing for an interactive flight plan utility. With many programmers working different shifts, MAIL is an important means of interoffice communication. DECNET allows fast and easy sharing of programs between the Lockheed and Langley sites.

While the current configuration was sufficient for much of the initial development, experiments have revealed problems. Both compute-bound and I/O-bound bottlenecks mean that the simulation cannot run at 30 Hz, which is necessary for a faithful reproduction of the flight environment.

After an in-depth study, a VAX 8800 has been chosen to replace both computers. The internal organization of the simulation will be changed extensively because of the rehosting of the SEL's programs and to make use of the 8800's dyadic architecture. *—Michael Suchko is currently a flight simulation and visual systems staff consultant for McDonnell Douglas Electronics Division in St. Louis, Missouri. At the time of this writing he was a systems engineer at the Singer Link Flight Simulation Division of the NASA Ames Research Center, Moffett Field, California.*

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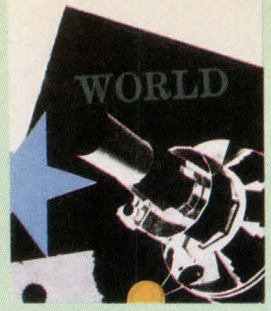


INSTRUMENTATIONS

ECHOing VAX

By Ron Levine

The VAX And ECHO Have Been Combined To Form A Powerful, Capable And Inexpensive Development Tool.

Today, the microprocessor appears in practically everything — from refrigerators and microwave ovens to automobiles and wristwatches. Products containing microprocessors affect our lives in more ways than we can imagine.

The engineers who design these products are faced with ever-increasing difficulties as processor hardware and software become more and more complex, and the tasks of designing, developing, and testing an embedded microprocessor product become more and more cumbersome. During this initial phase, the critical elements that must come together are manpower, the right equipment, and a well thought-out plan. High-powered engineering labor is a scarce resource and is expensive. Likewise, equipment money is hard to come by. Rapid development time, from concept to market, makes development schedules critical.

Given these critical issues, a successful development program requires the right tools. In a VAX environment, a very good tool for microprocessor design and testing can be created by combining the power of a VAX with the ability of a first-rate development "box."

VAX Development Environment

A typical VAX development environment consists of the following:

1. VAX workstations for code writing
2. A text editor program (typically "vi" if operating in UNIX)
3. A code writing workstation or another terminal, accessed to compile and link using the VAX mainframe
4. An emulator box
5. A terminal for downloading, usually dedicated to supporting the emulator box
6. Target hardware attached to the emulator via an emulation cable.

This configuration varies slightly from vendor to vendor. (Some provide their own terminal, etc.) It doesn't matter if the VAX is operating in UNIX or VMS; the basic system configurations and general operation remain similar.

One of the most important functions performed on the VAX is source code control. A standard UNIX system uses SCCS, a utility that tracks revisions allowing you to check out the source code for any given module, log it back

> . . . a very good tool for microprocessor design and testing can be created by combining the power of a VAX with the ability of a first-rate development "box."

in when finished, keep track of the changes from one revision to the next, and maintain a revision history. It also permits any one of several engineers to download a copy of the latest revision of all project code, including all modules as well as those currently being processed. VMS has similar facilities for software configuration control.

A typical example of an on-site development system implementation consists of a VAX connected to an Arium Corporation's ECHO Microprocessor Development System. Let's look at some of the unique features of this instrumentation setup.

Local compile for source debug: Because it's vital that turnaround time be kept to a minimum, there's frequently an advantage to enhanced local capabilities. For instance, if the VAX is busy, the ECHO box can be used for modifying source code if only a local debug is necessary (see Screen 1). Most other emulation systems don't permit this type of operation.

If the source code is downloaded to the ECHO and a local compile is performed, the source code-compatible indicators are present in the object code to be emulated. The trace memory and previewed code functions can be viewed in high-level source code, classic assembly language and state mode displays.

Stack relative trigger: Because modern processors create more code than their predecessors and make extensive use of local variables, a necessary feature for most 16-bit processor debugging sessions is the ability to stop emulation according to values of stack relative quantities. For example, you could tell the emulator to stop the processor the 20th time an index (i), which is only used inside a loop in some functions, is written to the value six.

Code preview: After a local compile has been performed, the ECHO has access to all of the source code. Therefore, you don't have to go through the tedious process of making listings and thumbing through them to view coding. After loading the linked and object file to be emulated, you merely type a label name or address and depress the Preview key. The code at this location, in source format, is displayed immediately on the ECHO's screen; i.e., an electronic listing. In this manner, any code in the source file can be displayed at any time with a few keystrokes and it appears rapidly because it's held in the ECHO RAM.

Also the code preview feature allows you to "what-if" the code. The Preview function can be used to create branches, enabling you to watch where the code will go if a particular branch is taken. The system is capable of nesting up to 99 levels of preview code. The previewing can be reversed at any time, either one level back, all the way back, or anywhere in between.

Trace memory: Executed code can be examined easily via the trace memory func-

The ECHO unit that connects to any type VAX.

tion. Code may be viewed directly in the high-level language or in an expanded mode where the assembly language is mixed in between each line of source code. Also data can be viewed in a state display format, as in a logic analyzer, with each bus cycle of the processor shown. Any position within the trace buffer can be directly accessed by inputting a few simple keystrokes.

Another unique trace memory feature is Timestamp (see Screen 2). This function allows the time counts in microseconds to be displayed either back to or forward from a breakpoint selected in the trace. Therefore, you easily can determine the execution times for specific pieces of code. It permits comparing the efficiency of operating time for pieces of code created by the compiler. This cumulative Timestamp mode is useful when two or more independent processors are being emulated. They can be cross triggered, and then Timestamp indicates relative timing between various activities on the different processors.

Another mode within Timestamp shows the total number of microseconds used by the processor to execute a particular instruction or bus cycle when the display is in the State mode.

Modifying and working with memory: A major function of any emulator is working with memory. A good emulator provides emulation memory, usually called "overlay memory," to indicate its relationship to the target circuit's memory, also used by the emulator. Emulators also permit the user to "map" the overlay and target memories as different types. For example, the ECHO allows mapping to:

1. Read/write (RAM)
2. Read only (ROM), where write accesses are ignored or where accesses cause breakpoints in the processing
3. Guarded, where any access causes a breakpoint
4. Target read/write, and
5. Target read only with write ignored or write causing a breakpoint.

VAX/ECHO configurations allow code within memory to be examined or modified either by use of a memory window or directly on the command line. The code (data) can be displayed in hexadecimal, octal, decimal,

binary, and ASCII. ASCII data can be displayed in additional widths so that string text can be viewed in a useful way. Data can be altered right on the screen and then the emulator can be restarted. Data also can be moved within memory directly from the command line.

Stopping the processor: The ECHO employs two different methods of halting the processor, Trigger breakpoints which depend on "fetch" cycles, and Trap breakpoints which are related to execution cycles.

Trigger breakpoints view the voltages on the lines (data and address buses) and compare them against a given user-selected pattern to halt processing. This process is the same one used in logic analyzers.

Trap breakpoints are inserted into the code at specified addresses and stop the processor when this address is executed. Thus, stop conditions can be set for both fetch and execution cycles.

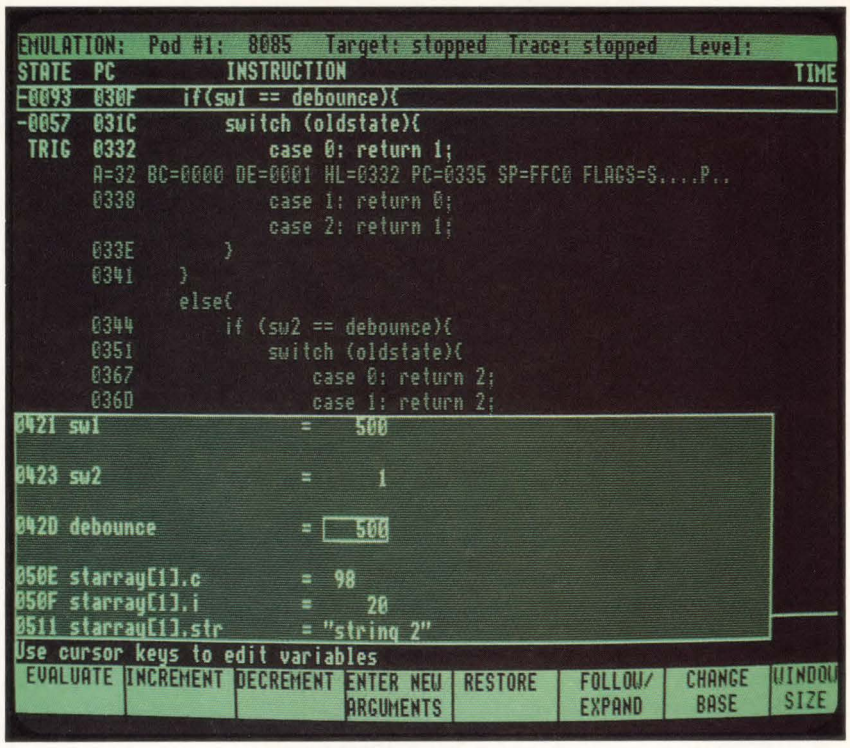
Analyzing captured data: Data can be analyzed in a number of display modes, including C language, assembly language, and state format. The Timestamp function can be activated so you can measure the length of specified pieces of code or determine the execution time of each instruction or bus cycle.

For a more detailed analysis or comparison, it's often desirable to print out some of the trace memory.

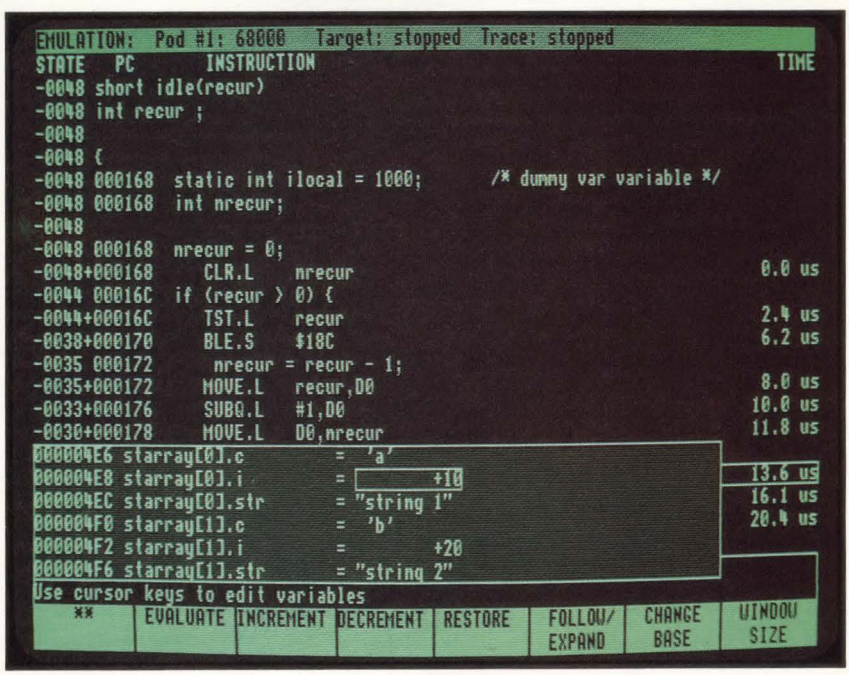
VAX/ECHO implementations allow the printing of disassembly type display, state display, preview display, memory sections, etc. For additional analysis of captured data, there's a rather extensive search facility for use in identifying and comparing various pieces of code.

Some VAX Development Environment Problems

VAX microprocessor development system implementations, however, also may have some limitations. Many development environments consist of a large VAX used as a code generating platform and a series of emulator boxes at the target processor sites. Usually, a number of engineers, perhaps 10 to 20, are supported by this tool, so each one ends up with 1/10th or 1/20th of the VAX's available computing power. Depending on the workload of the individual, this leads to long turnaround times for any CPU or disk-intensive application (such as C compiles).

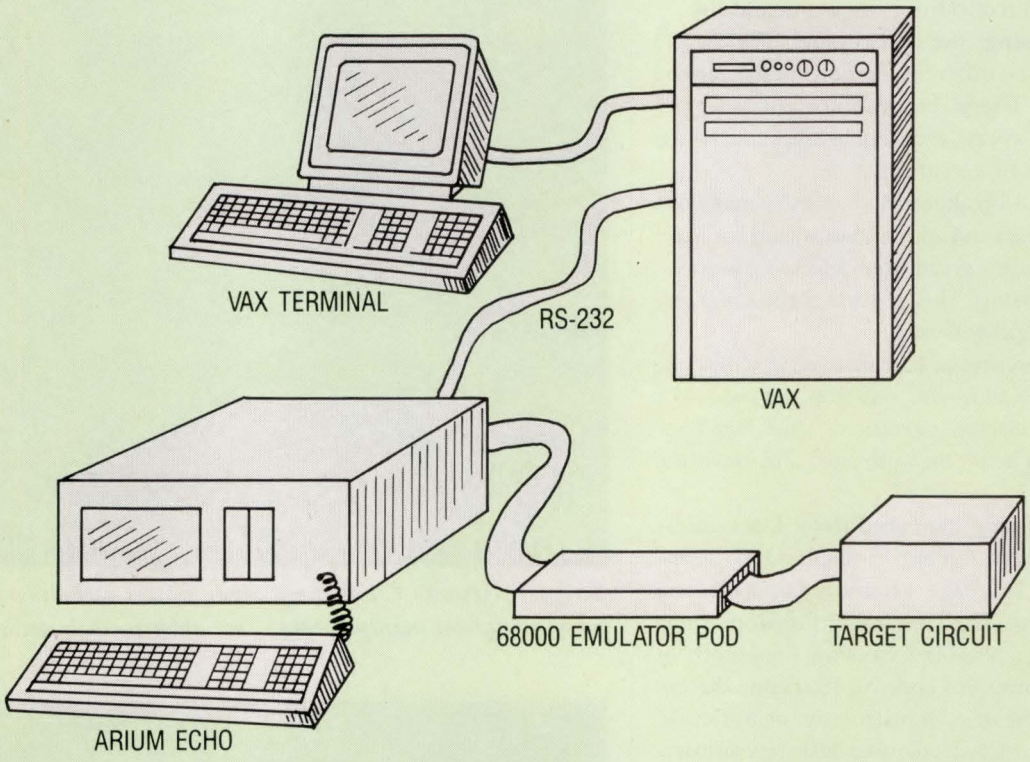


Screen 1: Arium's C Language debug feature including a "variable window" for viewing and manipulating C variables in their declared format.



Screen 2: Timestamp and variable display, showing two instances of a structure in array "starray."

FIGURE 1.



A typical VAX and Arium ECHO system configuration.

But after an engineer has been emulating for a while and has made several patches, it can take a very long time to go back to the source code, recompile, relink, and reload the entire code. If it takes a few minutes to get back into the emulator, you can take a coffee break and maintain concentration on the task at hand. But, if it takes 30 minutes, an hour or more to relogon to the VAX, call the editor, change the source code, rerun the compiler, rerun the linker, rerun the loader, download the code to the emulator box, and be ready to emulate, you'll have trouble maintaining concentration on the debugging session.

In theory, an engineer could work on another task while waiting to return to the debug session. However, it's quite difficult to move from task to task when the code and hardware are complex and require careful thought. Shifting gears is possible but it affects productivity.

Another problem affecting efficient use of VAX emulation environments is the lack of good production quality compilers and assemblers. Sometimes compiler generated code executes slowly. But, C compilers have improved a great deal over the years and modern ones are optimizing and producing code within shouting distance of the best hand coding.

Another support tool weakness pops up when there's a need to write in a high-level language, most often C for embedded microprocessor applications. Typically emulator boxes don't couple well enough to the VAX in the actual emulation environment to provide good C source debug tools.

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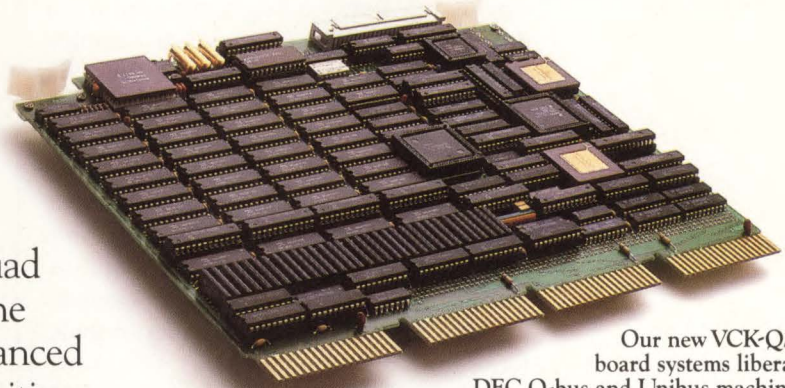

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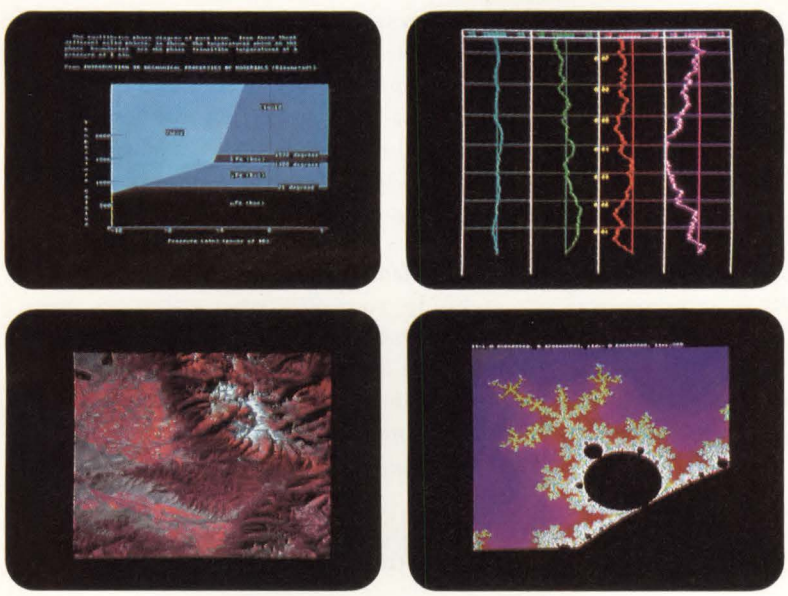

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Many boxes don't let you view the emulator's trace memory in C source code on the screen as it's emulated. Sometimes they don't let you look quickly at variables, arrays, and structures on the screen in their declared format. Most boxes don't allow expansion of the viewed code into mixed C and assembly language displays. Still, many other emulators don't allow a look at assembly code in true source form; i.e., with comments on the screen next to each line of executed operational code.

It's important to have the ability to employ true source debug, having the actual lines of source code in either C or assembly language shown on the screen, with each operation code executed by the processor. After debugging by this method, it's very hard to go back to ordinary emulation tools. It's easier to find a bug when you can actually see your code execute and watch it go off "into space" to search for a non-existent address. This is a more powerful superset of a symbolic debug, where breakpoints are set (in symbolic form) to trace execution.

One additional difficulty in today's emulation environment is the trend toward multiprocessor applications, requiring multiple emulation. Not only must you emulate the processors but also cross trigger between them and cross time stamp. Adding these capabilities to the development system enables each of the processors to be viewed and evaluated regarding which one needs to go faster, slower, or when time coordinates are needed.

New Processor Limitations

It's harder to emulate the bigger processors. Modern 16- and 32-bit processors are more difficult to design around, write code for, emulate, debug, etc. than their eight-bit predecessors. The newer processors, Intel 80XX6, Motorola 680X0, National Semiconductor 320XX and TI 99XXX, address more memory — at least 16 MB — and most real applications have MMUs, sometimes chip versions including a cache. This complicates the emulation environment because merely looking at the address lines may not guarantee the identity of the real physical address being accessed at any given time.

All of these processors are capable of supporting, and many applications utilize, true multitasking, multiuser operating environments. In other words, the code you're examining may be several levels deep in interrupts from the task you thought you were watching.

Also, all of these processors require code to be written in a high-level language, such as C, and the executable code will have been generated by the compilers. Thus, there will be a large number of local variables and stack relative quantities used. Many emulators that operate in a VAX environment handle these quantities poorly. When selecting an emulator make sure it permits easy triggering on such stack relative variables.

Be aware of your own special needs, project requirements, and of the various levels and types of features available on emulation/development boxes and choose an instrument vendor capable of supporting a DEC environment hookup. Then the VAX can make a first-class development system without the financial, training, and loss-of-productivity burdens associated with installing and learning to use a new, unfamiliar system.

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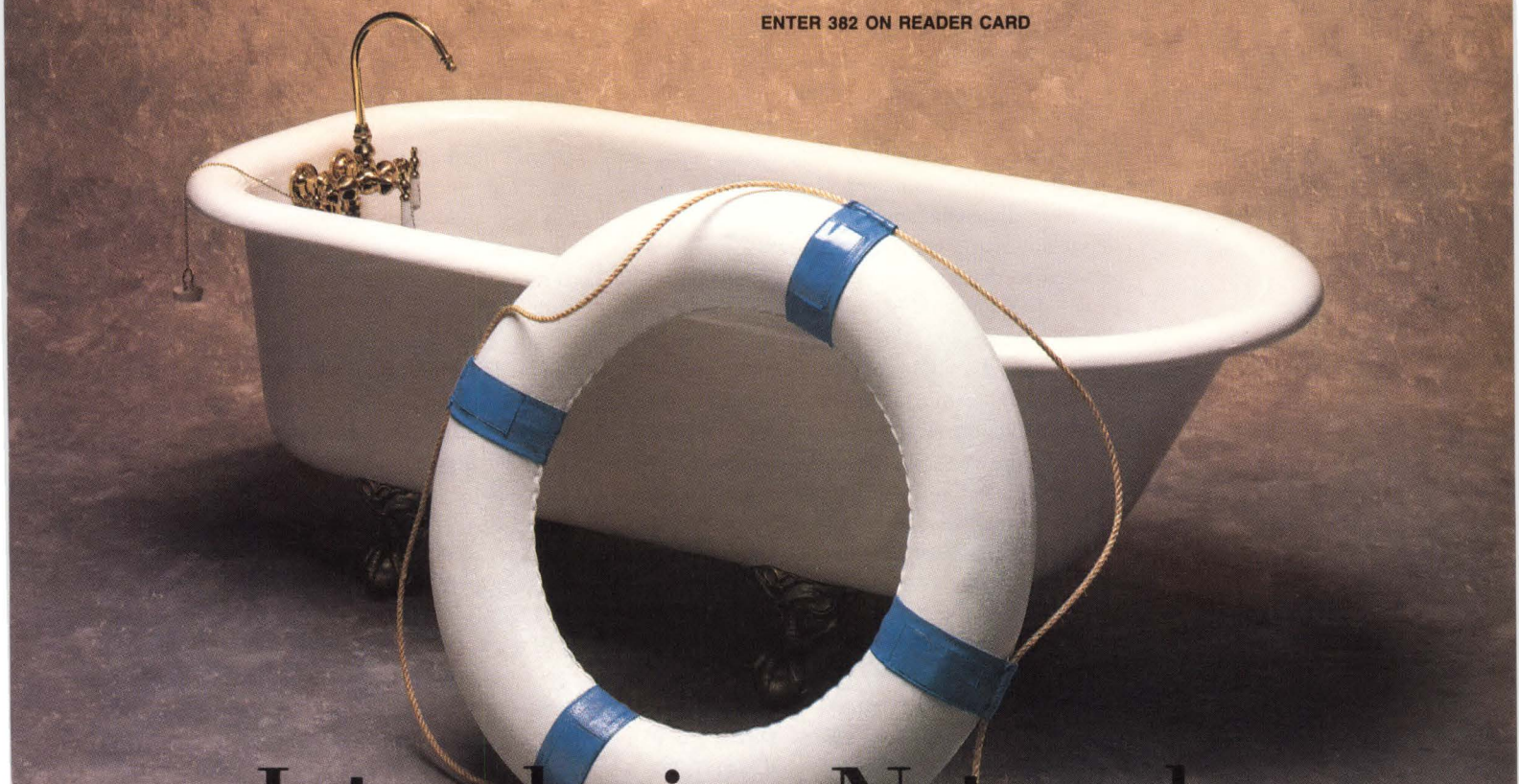


Introducing Network Communications Software For Skeptics.

MAC/VAX

DECing APPLES

By Carl B. Marbach

Has Apple Found Its Way Into Corporate Computing?

When I attended an early Apple Macintosh Developers conference in San Francisco, I heard the audience complain, "We're not able to share data." "I can't send messages to another Macintosh." "We want to share the LaserWriter among all of us." And, "How do we tie all these computers together?"

I stood up among all these Apple devotees and said, "What you need is a VAX in the middle of all this." Stares. Blank looks. I was, as they say, a wine before my time. The idea of hooking a Macintosh to a VAX seemed preposterous, and even if it could be done physically, what software would support it? I sat down and waited. This year, my wine has aged to drinking level.

In the PC world, we have seen many connectivity packages for both asynchronous and networked use. These software packages began as simple terminal emulators and developed into full connectivity programs that allow you to use the VAX as a file server for the PC. AST Research Inc. recently introduced a hardware add-in for PCs and compatibles that handles two hosts simultaneously, including file transfer and VT-220 emulation all done in hardware on the add-in board with its own 80186. (We'll review this product in the next issue.) There are enough packages and options available that now connecting PCs to VAXs is an accomplished fact. (The Macintosh to VAX connection isn't as well covered yet, so that's the genesis for this series.)

Munching Macintoshes

The issues before us are not so much *how* we connect, but *what* will we do with the connections all around us. What should we do with all these workstations? To what types of software do they lend themselves? When do we use a mini (mainframe) and when do we use a workstation? Can we use both?

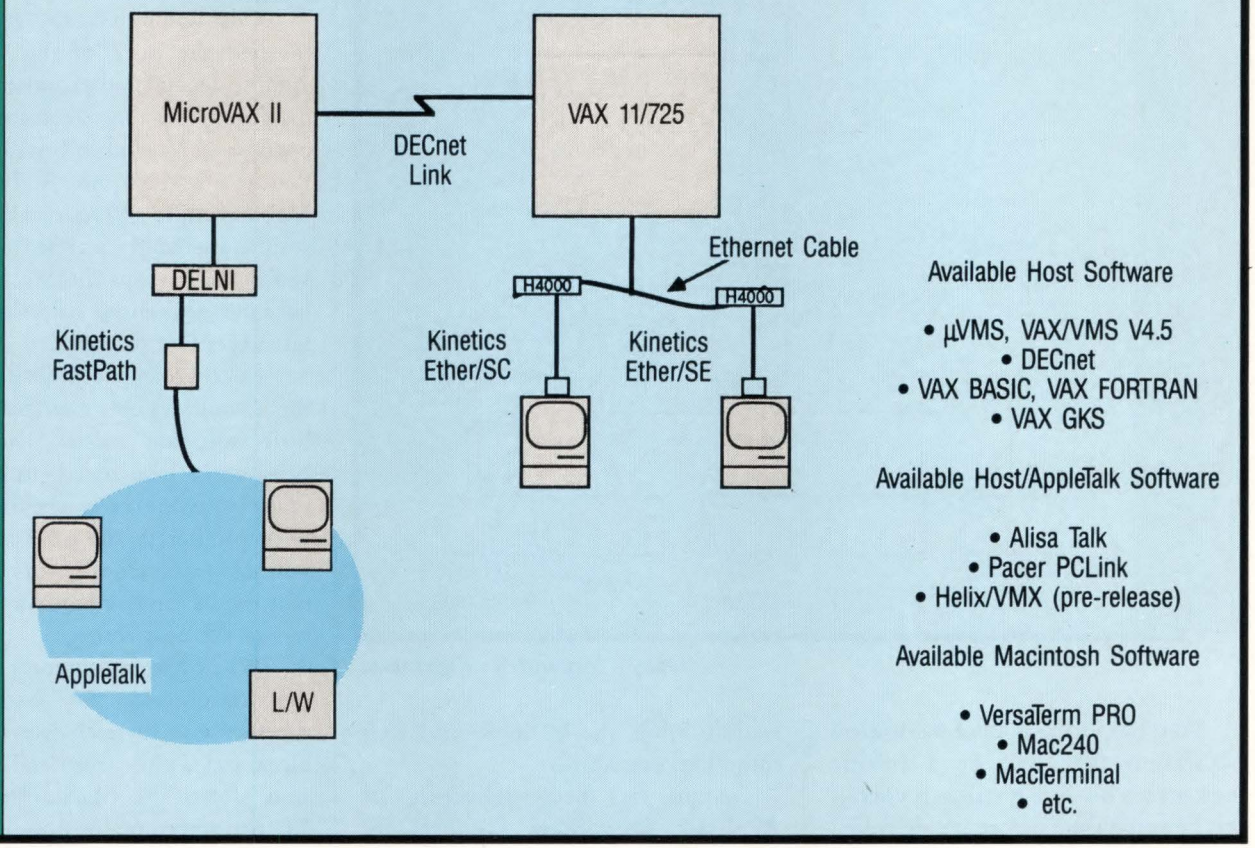
There are four areas of personal productivity usually associated with PCs (now called workstations): word processing, spreadsheets, interactive graphics and personal (read: small) databases. All of these exist with some terrific software on the VAX as well as on PCs. So when do we use the VAX and when do we use a workstation?

A financial planner alone in his office doesn't need a VAX to use a spreadsheet. The traveling executive with a portable computer can't use a VAX to work on his favorite spreadsheet model. Distributing computing power to remote locations and for a small number of individuals makes standalone PC/workstation computers a viable possibility. The value of a personal workstation is *not* the way it feels. Too many people mistakenly have thought that the personal computer's user interface is unique.

For IBM mainframe users, the really unique item for most first-time micro users has been the immediate response and the "interactiveness" of the computer. For large IBM users, this was new; for most DEC users, the PC was very familiar. CTRL-C still works! The Macintosh, however, has given us a different interface from what we've seen before on minis or mainframes.

A properly configured, non-taxed VAX gives good response time for any of the spreadsheet packages that run on it. Conversely, when the VAXs are overloaded and response time suffers, the longer response time is annoying; users get used to rapid response

FIGURE 1.



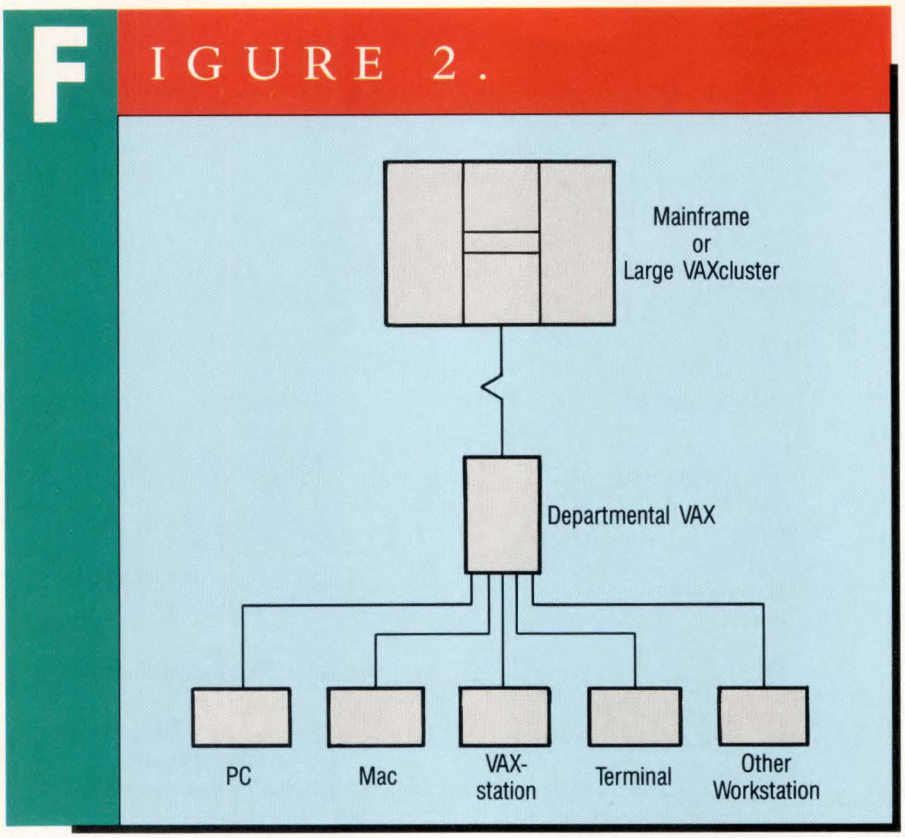
Our Testing Lab.

and feel cheated when they get less. Distributing the processing to a workstation-like PC will help this situation.

A personal workstation can do some things better than a terminal, even a graphics one, on a VAX. True bit mapped graphics are faster on a standalone workstation. The new PS/2 computers from IBM offer improved graphic performance, and the Macintosh's graphical ability is well known. Interactive graphics almost always will be more accessible on a workstation.

Programmers are beginning to exploit workstation capabilities to enhance their own productivity. Multiple windows executing multiple tasks, and the ability to move things from one window to another enhance programmer time. It isn't unusual that the first people to utilize workstations fully are programmers. After all, they can write programs and systems to help themselves. The rest of us will exploit this new technology later on.

But most of us work in so-called "workgroups"; that is, there are several of us who share the same data and work on similar projects. Separating us from each other doesn't help our common productivity. We can be linked via a package that runs on the VAX. If we want to use a workstation package, it must be networked with others in the workgroup and that isn't always an easy task to accomplish. This same reasoning for networking on a common VAX versus standalone processing also holds for word processing, databases and graphics applications.



Today's corporate configuration.

DEC has just announced a diskless VAXstation that will be a terrific workstation because it will run VMS. It will be some time before it's delivered and the proper software is available, but its promise is bright.

Polishing Apples

For now, the two most complete low-end workstations are the IBM PC and the Apple Macintosh. Of the two, only the Macintosh offers a unique interface and operating system. The possibilities of the Apple to VAX connection are exciting. Already several application products (databases first) have been set up to run using the Mac's interface and the VAX's data storage and connectability. More will come soon. The idea of using the VAX power and the Macintosh usability is exciting. Front-ending a VAX with a Macintosh promises to bring the MAC kicking and screaming into real corporate data processing. The Macintosh looks and feels like a workstation, while the PC looks and feels more like a terminal.

Apple has been delivering its Appletalk networking products for some time, but only recently has it become possible to connect Appletalk and Ethernet. A junction box from Kinetics Inc. has Appletalk coming in one end and Ethernet going out (or in) the other. A single Macintosh can be configured with an Ethernet interface externally with a similar box. The new Macintosh II, which has been announced recently, will have expansion (add-in) slots that will accommodate an inboard Ethernet card. In other words, Macintosh computers can be physically linked to existing DEC networks easily.

Several vendors have begun to supply products that use this connectivity in innovative ways. The VAX now can fulfill my suggestion to the Apple developers. The connections, both physical and logical, are merely tools in the hands of clever and industrious developers. Software to support various uses of VAX computers will come pouring in. The VAX will be a server, a host, a multiplexer, an arbiter and much more. The Macintoshes will be terminals, workstations and personal productivity centers.

Cost will be a factor. DEC recently lowered the price of the VAXstation 2000 to $5,400 and promised a $4,600 diskless version by December. A fully configured Macintosh II will cost more than the diskless VAX. Right now, the Mac has more software and that software is incredibly inexpensive by VAX standards. Perhaps the Macintosh will have more expensive hardware, but run less expensive software.

DEC workstations are likely to use the X Windows user interface for which little software exists. The familiar Macintosh icon-based interface has many software products. As VAXstations proliferate, the price of software will drop dramatically. It's also likely that the Macintosh hardware will cost less in the near future.

When Macintosh computers were first introduced, they had 128K of memory, one 3½-inch disk, a nine-inch black and white screen and no expansion slots. The Macintosh II has a 13-inch screen (color optional), an internal Winchester disk, a 3½-inch disk, 1 MB standard with much more available and expansion slots; it looks like a computer.

By becoming workstations on a VAX computer, Apple may find its way into the world of corporate computing where it has been trying to go for some time. As for DEC, it now has connectivity up to the CRAY supercomputer or to its own mighty VAXCLUSTERS and down to the Macintosh workstation or PCs. With the help of VAX Editor Al Cini and Computer Methods Corporation, we'll try to help you sort out how to use all this connectivity and let you know how workstations will appear in the future.

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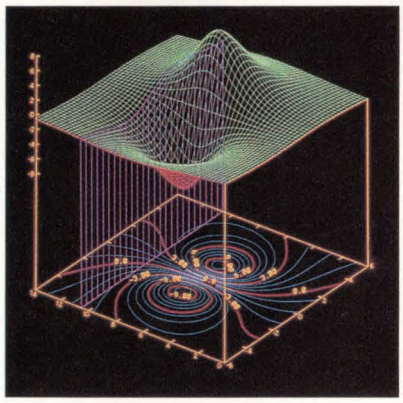

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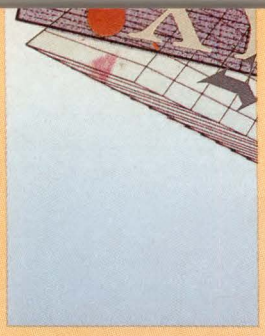

IBM vs. DEC

TRANSACTION PROCESSING

By John Biazzo

DEC/ACMS vs. IBM/CICS, Part 2.

This is the second in a series of articles comparing the IBM/CICS transaction processing environment to the DEC/ACMS transaction processing environment.

Differences in the two types of COBOL you say? Absolutely! Back in school, your instructor undoubtedly stressed the fact that COBOL is COBOL is COBOL, and once you learned how to use this wondrous language in which the vast majority of all business applications were written, you'd have the world by the tail. Well, in the real world when you try to take source code from one machine and compile it on another, you learn quickly that not everything you were taught is true.

Starting with basic syntactical differences, there's the EJECT command in IBM COBOL that creates a form feed when the program source code is printed on a line printer. While there's no such verb in VAX COBOL, if a programmer wants a form feed in his program listing, he just enters the ASCII equivalent. If EDT is used, typing a CTRL-L inserts a form feed character in the source file.

Remember the four divisions that comprise every COBOL program? In case you forgot, there's the IDENTIFICATION DIVISION, the ENVIRONMENT DIVISION, the DATA DIVISION and, last but not least, the PROCEDURE DIVISION. If these aren't spelled correctly you can count on getting compilation errors. IBM COBOL allows you to abbreviate IDENTIFICATION DIVISION to ID DIVISION. VAX COBOL goes strictly by the book and only accepts the full spelling.

In IBM COBOL, when a GOBACK or EXIT PROGRAM statement is encountered in a subprogram, control returns to the calling program at the next executable statement following the CALL. The GOBACK statement doesn't exist in VAX COBOL.

Another subtle difference is the manner in which source text files are copied into a program at compile time. With IBM COBOL, the programmer issues a %INCLUDE statement. On the VAX side, a COPY command is used. Basically, there are two variants of the VAX COBOL COPY command. One that references a quoted filename will copy in a source text file at compilation time. A COPY FROM DICTIONARY command under VAX COBOL copies the named record from the Common Data Dictionary (CDD).

Logical testing also is handled differently with IBM COBOL. IBM COBOL contains the reserved words TRUE and FALSE. This allows the programmer to perform a test of the value of a variable as either TRUE or FALSE. To accomplish the same test under VAX COBOL, the programmer must define string variables that correspond to TRUE or FALSE values. He then may perform the test by checking the value of the variable as a string.

Continuing with testing syntax, the very foundation of most COBOL tests, the IF statement, also is different. The differences arise when one variable is compared to two others. For example, the statement IF STATUS EQUALS (FULLTIME OR SALARIED) is completely valid under IBM COBOL. VAX COBOL, on the other hand, requires the programmer to be more

verbose (and redundant); i.e., IF STATUS EQUALS FULLTIME OR STATUS EQUALS SALARIED.

Another difference between the two languages occurs with the EXAMINE verb. EXAMINE is used to look at a string variable and count or replace specified occurrences of a particular character or pattern of characters

IBM COBOL contains the reserved words TRUE and FALSE

within that string. The verb EXAMINE doesn't exist within VAX COBOL. Instead, the same functionality is provided through the verb INSPECT, which also is available under IBM COBOL.

One last difference occurs in the PROGRAM-ID statement that appears in the IDENTIFICATION DIVISION. On the VAX COBOL side of the fence, there's an additional qualifier, INITIAL, which immediately follows the program name. INITIAL causes the internal data in the program to be initialized each time the program is run. IBM COBOL doesn't use this qualifier. The reasoning behind the initialization is explained below.

For those still not convinced that these two brands of COBOL really are different, let's take a look at some variations in the program flow control styles. First, IBM COBOL implements what's known as a SECTION, which can contain one or more paragraphs that begin with a label such as 100-READ-NEXT-RECORD SECTION.

The section of code then is executed when the program comes across a perform statement. For example, the previous section would be processed by issuing a PERFORM 100-READ-NEXT-RECORD. All the code within the sec-

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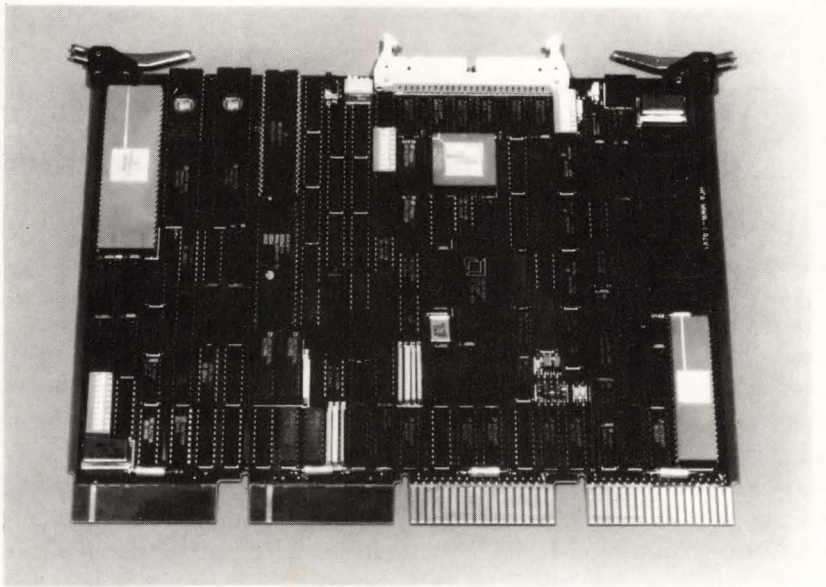

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tion would be executed and, when finished, control would return to the line immediately following the perform statement. The end of the section most likely would be indicated by the beginning of the next section.

On the other hand, VAX COBOL doesn't allow the use of SECTIONS. Instead, VAX COBOL requires a more structured approach to accomplishing the same task. For every portion of code that must be executed in this manner, the programmer must include a label at the beginning of each section. Also, at the end of each section of code, he must include another label followed by an EXIT statement. The EXIT statement effectively marks the end of the logical section of code.

To execute this logical section of code, the programmer uses a PERFORM THRU statement. For example, if a section of code begins with the label RECORD-UPDATE and ends with the label RECORD-UPDATE-EXIT, the code would be executed by issuing a PERFORM RECORD-UPDATE THRU RECORD-UPDATE-EXIT. When the section of code completes, control returns to the statement immediately following the perform statement.

On the whole, VAX COBOL is stricter than its blue brother. One such area is with unreachable statements. An unreachable statement is just that — a statement within a program that can never be executed. An example might be a PERFORM statement that immediately follows a GOTO statement. No matter what happens in the program, the PERFORM never will occur. While the IBM COBOL compiler merely issues a warning, the VAX COBOL compiler receives a fatal error and aborts.

Another difference between both brands of COBOL occurs in the WORKING-STORAGE SECTION. Because VAX COBOL is designed to be used with the VAX ACMS transaction processing system, there's one very different inherent feature. ACMS relies heavily on shareable code and retains the values held in memory unless specifically initialized. This means that if a user executes a program that stored some information in WORKING-STORAGE, and then re-executed the same program, it's possible that some of the variables would retain the values computed during the first execution of the code.

While this memory preservation design increases response time and overall throughput, it can cause devastating effects unless the programmer specifically wishes to take advantage of this functionality. In most cases, whenever a program is run, the programmer wishes to start with newly initialized variables in WORKING-STORAGE. Therefore, with VAX COBOL, it's very important that the INITIAL clause be put in the PROGRAM-ID statement of the IDENTIFICATION DIVISION. The INITIAL clause ensures that all variables except those passed through the LINKAGE SECTION will be initialized. As previously mentioned, IBM COBOL doesn't use the initial clause on the PROGRAM-ID.

The remaining difference between the two COBOLs is a result of the inherent design differences between CICS and ACMS. Technically, the differences are not evident in the compilers or the syntax of either language. Instead, the differences appear in the style of code developed under each system.

CICS contains error handling logic within. This logic performs the equivalent of a GOTO within the COBOL program. Under CICS, the use of GOTOs and "fall through" logic is encouraged. Today, VAX COBOL as well as most other versions of COBOL, stress that good programming practice requires never using a GOTO statement unless it's unavoidable. Hence, COBOL programs developed using VAX COBOL under ACMS tend to be more highly structured.

Additionally, CICS COBOL programs tend to be quite large. CICS programs may contain several pieces of very distinct functionality. But, because of the overall design of CICS, it's best to keep these modules together within one main program. ACMS, on the other hand, encourages modularity. Each portion of a task should comprise a separate program if possible. The modular design of ACMS is intended to make system maintenance easier and faster.

In Part 3, we'll discuss terminal I/O processing with CICS as compared to ACMS. *—John Biazzo is a senior software specialist with Digital Equipment Corporation in Meriden, Connecticut.*

VAX COBOL is stricter than its blue brother. One such area is with unreachable statements. An unreachable statement is just that — a statement within a program that can never be executed.

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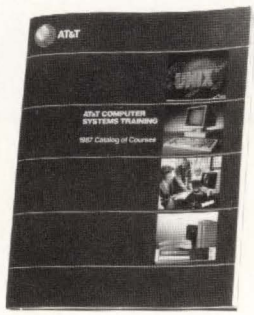

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COMMUNICATIONS

CROAK PROOF KERMIT

By Gerald W. Cichanowski

This Tip Is One You'll Want To Save For Quick Reference The Next Time You Need To Transfer A File.

Past articles in *DEC PROFESSIONAL* have discussed the utility of using KERMIT to transfer files between computers. Many of our users at Winona State University, Winona, Minnesota, have IBM PCs in their offices, which they use both standalone and as terminals to our VAX 785. It seems that whenever they create a file on the VAX, they want it on the PC, and vice versa. KERMIT nicely obliges by allowing easy transfers between the VAX and PCs.

The novice user, however, cringes when presented with the KERMIT manual. So, we have prepared *The Croak Proof KERMIT Manual*. It gives step by step instructions on how to use KERMIT to transfer from the VAX to a PC, and from a PC to a VAX. The transfers are limited to text files, because a novice user can seldom use a binary file on one machine created on the other. Figure 1 gives the instructions for sending a text file from a VAX to a PC; Figure 2 gives the instructions for going from a PC to a VAX. Be sure to refer to the accompanying legend for specifics on case sensitivity. *—Gerald W. Cichanowski is director of the computer science program at Winona State University, Winona, Minnesota.*

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Legend

Capital letters indicate PC session, small letters indicate VAX session.

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kermit-32>	is VAX Kermit prompt
A>	is PC DOS prompt
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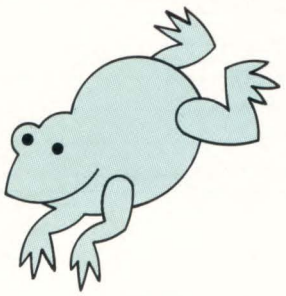
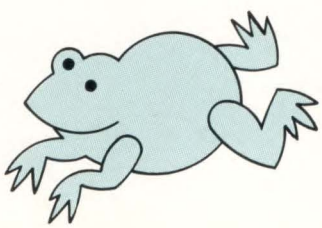
^] c	is control/right bracket followed by the c key





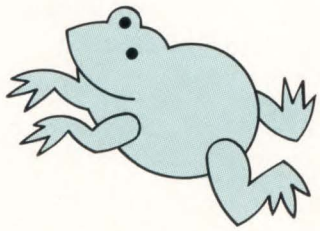


FIGURE 1.

```
A> MSIBMPC
KERMIT-MS> SET BAUD 9600        (insert appropriate line speed)
KERMIT-MS> CONNECT
^] B                            (sends break to login)

   - log onto VAX -

$ kermit
kermit-32> set delay 30
kermit-32> send foo.bar
^] c                            (takes you back to PC)

KERMIT-MS> RECEIVE

   - wait for file to be transferred -

KERMIT-MS> CONNECT              (back to VAX to sign off)

kermit-32> exit
$
   - logoff VAX -

^] c                            (done on VAX back to PC)

KERMIT-MS> EXIT
A>
   - all done -
```

Send file from VAX to PC.

FIGURE 2.

```
A> MSIBMPC
KERMIT-MS> SET BAUD 9600        (insert appropriate line speed)
KERMIT-MS> CONNECT

^] b                            (send break to start login on
                                 VAX)

    - log onto VAX -

$ kermit
kermit-32> receive
^] c                            (return to PC)
KERMIT-MS> SEND FOO.BAR

   - wait for file transfer -

KERMIT-MS> CONNECT              (go back to VAX to finish up)

kermit-32> exit
$
   - logoff of VAX -

^] c                            (back to PC)
KERMIT-MS> EXIT
A>
   - all done -
```

■

Send file from PC to VAX.

WORD PROCESSING

WORD-11 V4.1

By Bruce Feldman

GREEN And GOLD And New All Over.

WORD-11 V4.1, from Data Processing Design Inc. (DPD) of Anaheim, California, is a state-of-the-art, shared-logic word processing package for the VAX including a number of special features, such as a scientific equation capability, a thesaurus, list processing and the ability to create and edit multiple columns on the screen simultaneously as in a Macintosh environment.

With its V4.1 release, *WORD-11* stated that it intends to keep abreast of a highly competitive market by incorporating the next wave of word processing features into an already rich piece of software.

The first rush of business-oriented word processing software made use of control sequences for most of the editing functions. The Control key, outside the range of letter keys used by business writers, was the most convenient key to designate for commands, especially because programmers already used it in this manner. When numeric keypads showed up on keyboards, editing functions began to hang out there too. Most word processing packages, from then on, found the convenience of the keypad enticing. It was a blocked-off area, separate from the typewriter keyboard and, therefore, ideal for command functions.

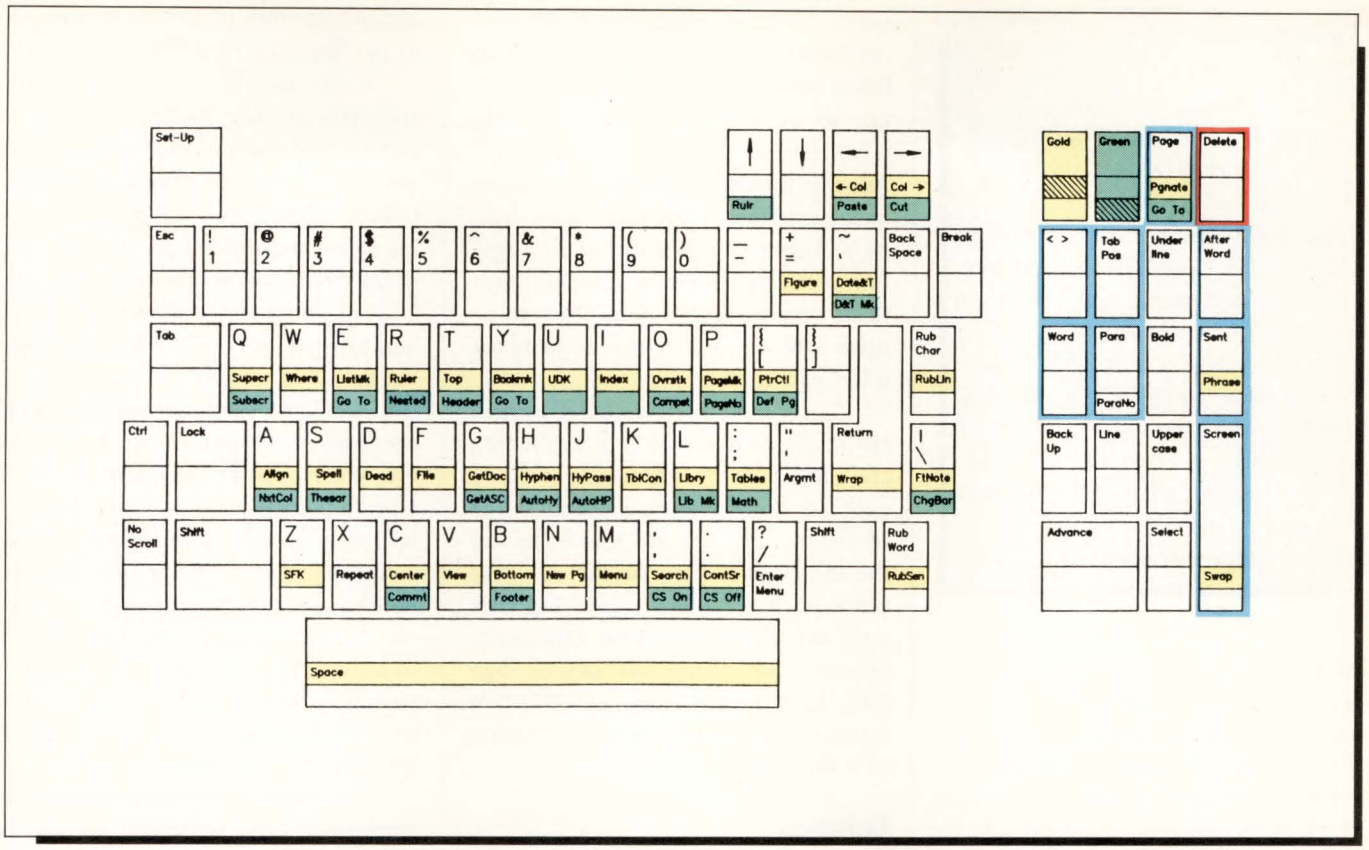
As the need for competitive advantage among software houses grew, and as the capability of personal and business computers grew, more functions were added to the arsenal of weapons against the word. Where to place these functions on the standard keyboard became a problem. The Shift key in conjunction with the keypad was one solution. Function keys alone and in association with the Shift, Control, Alternate, and Escape keys were other popular solutions.

The disadvantage was that editing became a two-fingered exercise. This made editing more cumbersome, and sometimes violated the ideal of software transparency — that a user shouldn't have to take his eye off the screen to manipulate the text. One direction was for hardware manufacturers to add more keys that could be pressed independently, at least solving the simultaneous command entering problem. But this made the number of keys on some keyboards exceed the number found on some pipe organs (although I've yet to see that three-tiered keyboard setup, thank goodness!).

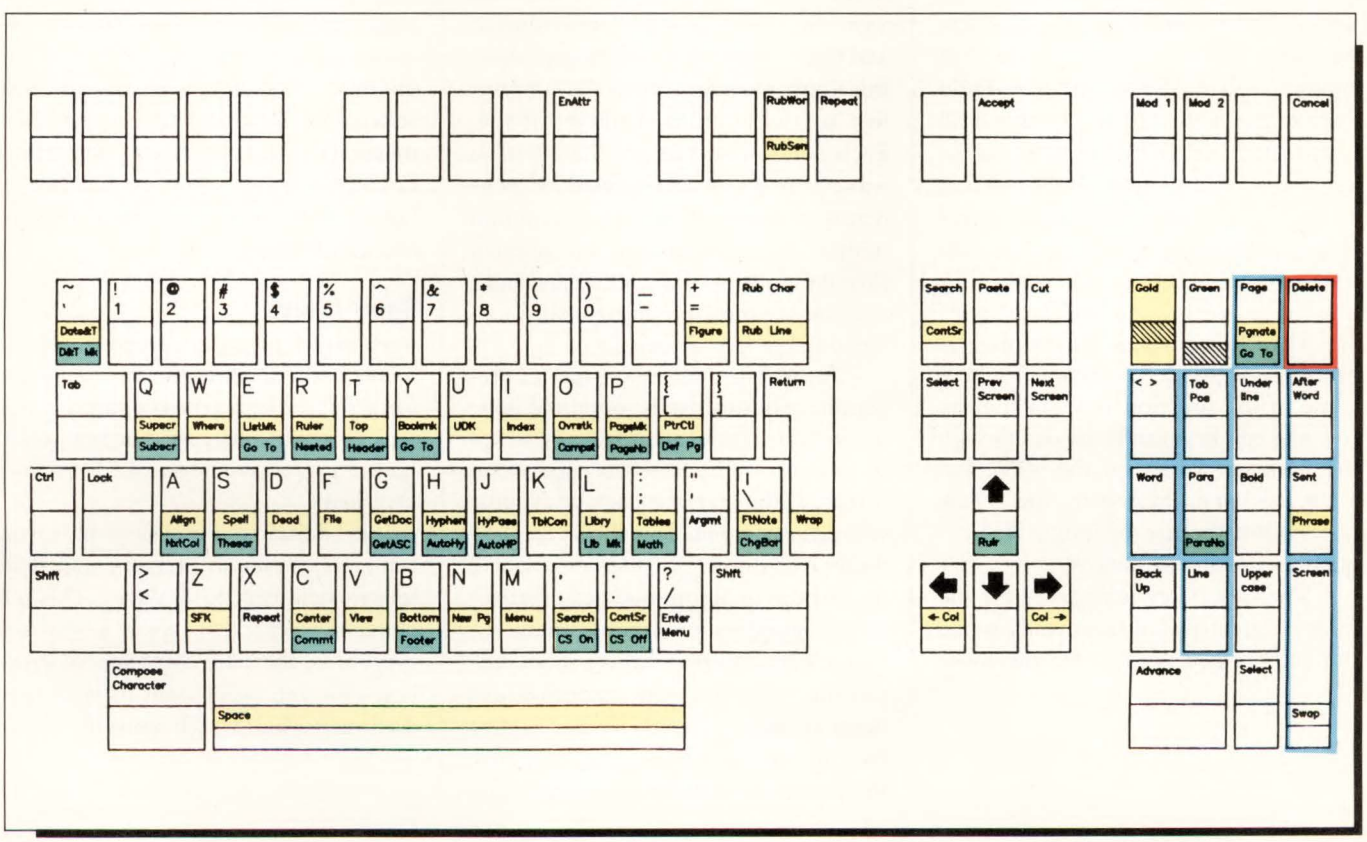
One successful approach was the concept of the wildcard key or GOLD key as revealed in the old DEC standalone word processors and in the WPS word processing software. The advantages were that it used a key on the keypad and took over the functions of the Shift key, thus eliminating the two-handed coordination problem for most commands.

There was a limit to the number of functions that the keypad alone could handle in this way, even in combination with letters on the main keyboard. As the number of functions grew because of the rising expectations of users, the growth of knowledge in the field and the need for software companies to establish competitive advantage, the child quickly outgrew his clothing. A simple way to extend the range of commands had to be found.

The command system in *WORD-11* represents the most logical next step. This



The VT100 WORD-11 keyboard.



The keyboard for VT200 users.

WORD-11
Data Processing Design Inc.
1400 North Brasher Street
Anaheim, California 92807
(714) 970-1515

Hardware Environment: VAX/VMS, RSTS, RSX and P/OS operating systems. DEC-compatible terminals necessary.

Price: From $795 for the PRO-350, to $13,500 for the VAX 8800. Limited use licenses — from $3,500 for up to four users, to $7,500 for eight to 10 users.
Enter 608 on reader card

package actually uses *two* master keys: a GOLD key, the most "precious" key and, the one always pressed first, and a GREEN key, obviously implying the command "Go!". These keys either work in sequence or independently to produce many permutations.

There are functions that use a combination of the two master keys along with other keys; other functions use certain keys twice. It's a system with enough capacity for *WORD-11* to build on over the years. The GREEN key (PF2) is adjacent to the GOLD key (PF1) on the keypad, so there's never any fumbling around. It's a fine innovation, unless you're color blind. (I'm told that DPD tested the colored key stickers on color blind users with good results.)

The key sequences lend themselves best to a VT200 series terminal where some of the function keys on the top row and edit keys can be used, although the package works on the VT52 and VT100 as well. However, the VT100 necessitates the use of longer key sequences in some instances.

The GOLD key is reserved for the most frequently used commands, while the GREEN key is used for the more esoteric functions. The incorporation of the GREEN key has the disadvantage of being confusing. "Do I use the GOLD key to prompt for a list processing record marker or the GREEN key?" Another problem is that the system overcomplicates some procedures with more keystrokes than other packages find necessary. Of course, in some cases, that's because there's more that can be done with *WORD-11* than with many other packages.

There are three user-chosen keypad layout alternatives: *WORD-11*, *DECWORD*, and EDT. Switching layouts is an easy process. For navigating through the *WORD-11*-style keyboard, you either use the cursor pad keys or the Advance (KP0) or Reverse (KP1) keys together with either the Word (KP4), Line (KP2), Sentence (KP,), Paragraph (KP5) or Page (PF3) keys. GOLD-T(op) and GOLD-B (ottom) quickly get you to these parts of a document.

Columns

With version 4.1 of *WORD-11*, you now can edit up to 16 columns side by side in true "print what you see" style. Each word in a column wraps individually, and there's automatic column positioning across the page so that the columns line up without mechanical forcing. Each column and its continuation on subsequent pages can be edited independently of columns next to it. Column widths and positioning are selected through multiple pairs of left and right margins on the same horizontal document rulers (see Screen 1).

A capability for newspaper or serpentine columns also is supported now, whereby a column automatically wraps to another column(s) to the right when it reaches the end of a page or at some other chosen point. This allows the flexibility of bumping a column elsewhere in a format to accommodate advertisements, graphics or other content requirements. When working with serpentine columns, the continuations never are displayed side by side as they are in the non-serpentine columns. Rather the formatting takes place during the printing process, a small price to pay for such flexibility.

Columns also can be paginated automatically like single-column text, and the page markers used as landmarks when scrolling through the document. Column align commands make it possible to set one column according to the characteristics of another. For example, a list of ingredients followed by cooking instructions could be formatted like the previous recipe.

A column view command turns off the display of columns other than the one you're editing currently, to focus you on your work area. This also significantly speeds up the editing of the column you're working on. You can now use the Select command to isolate text in one column for cut and paste, or to select text in several columns simultaneously for a global operation. Side-by-side columns also can be used in *WORD-11* list processing.

In addition to the library of column commands, there are several commands dedicated to traditional tabular columns as used in mathematical tables and the like. You can cut, paste and perform mathematical functions on tabular columns, parts of tabular columns, individual table entries or on any text selected by the special table-select command. For math functions, operations can be performed vertically in columns, horizontally in rows, or by matrix in blocks of values.

Spell Check

Version 4.1 includes several improvements in the spelling checker. You now can scroll through a file and skip a word, replace it with a suggested or new word, ignore a word and add a word to a user dictionary.

In addition to a user dictionary, you can create an *unuse* directory, called an ignore dictionary in *WORD-11*. This is a clever concept that saves keystrokes every time there are some special symbols that you don't want in your user dictionary, but which you also don't

want to steer around every time you do a spell check. In spell-check mode, you also can quit the mode without continuing to the end (as is required in some word processing packages).

A thesaurus is a valuable addition to *WORD-11* that provides synonyms, antonyms and even definitions of the targeted word and all of its synonyms and antonyms! New automatic hyphenation breaks up words according to their syllables as delineated in the *WORD-11* spelling dictionary. If the word is not found, the software attempts to hyphenate according to an algorithm, and communicates that fact to you, so you can check it out. Or, you can perform one hyphenation at a time throughout a document.

Utilities

WORD-11 permits conversion to and from DECMATE and PC documents. Cluster support includes common system disk and across-node printing. You can store boilerplates, signature blocks, or document formats in library documents, which users on a system then can share.

In graphics integration with the company's *GRAPHICS-11* sister package, *WORD-11* resizes figures to fit within the text parameters.

Data processing files can be converted into *WORD-11* files to combine applications on the same system. Documents up to 254 characters wide can be created.

Character set support includes ASCII, DEC Technical, Diablo Scientific, DEC Supplemental, and DEC Special Graphics character sets.

Support And Training

There are more than 2,000 *WORD-11* sites worldwide in major corporations and educational and research institutions. The software was first marketed in 1977 and is updated continually.

Support and training are packaged with the software and include telephone assistance for six months, and two days of basic on-site training (excluding travel and per diem costs). Annual support contracts also are obtainable and include software and documentation updates, telephone assistance and a newsletter. There's also a dialup support line for new releases. A user-paid advanced training class is available at Data Processing Design facilities in Anaheim, California, or Bethesda, Maryland.

The documentation includes two separate tabbed loose-leaf binders: a *Handbook* encyclopedically incorporating the *WORD-11* commands and characteristics, and a *Training Manual* for the novice user. For the system manager,

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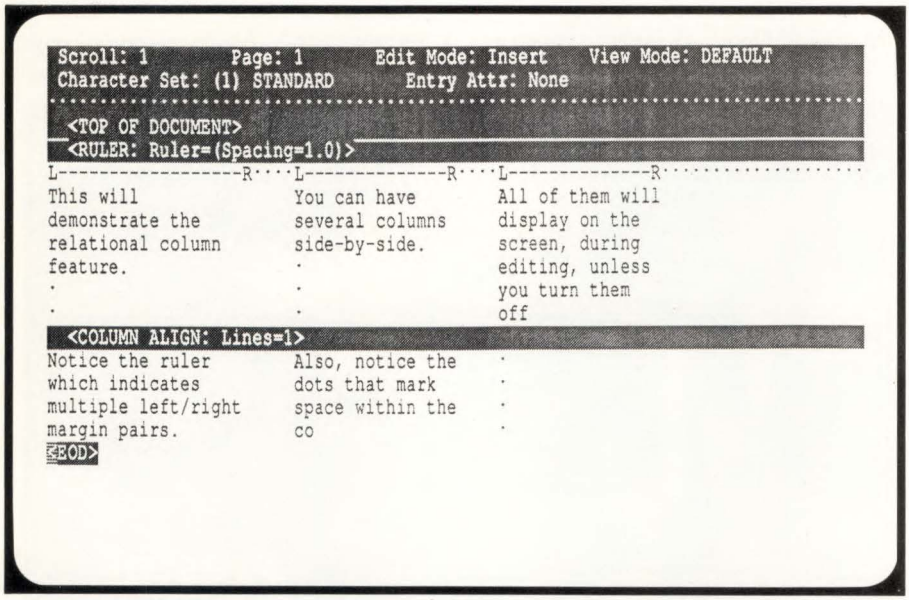
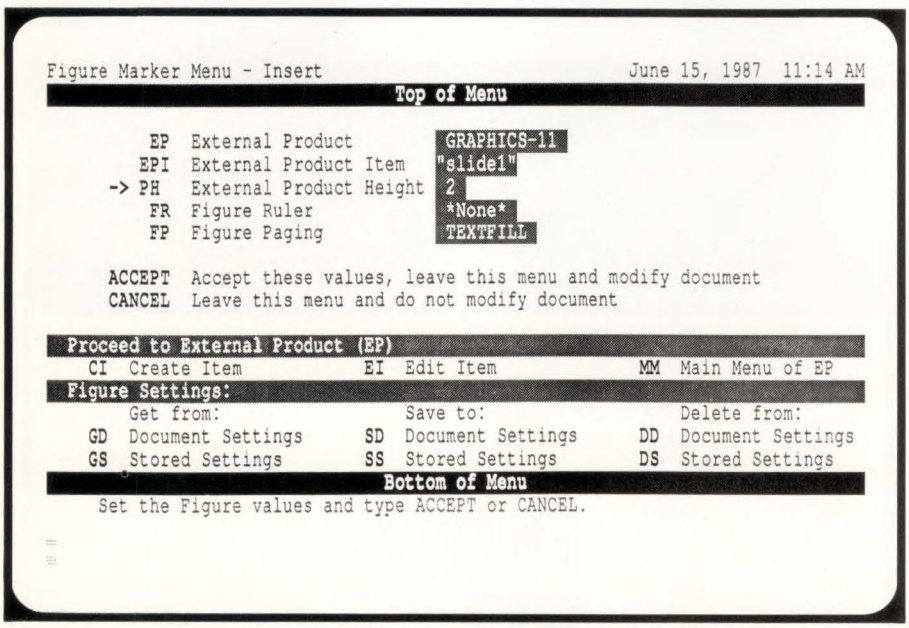
there's the *Manager's Notebook,* which contains V4.1 release notes, an installation guide, a system manager's guide and a patch list for the spooler, spell checker, list processing and main menu. Finally, the package comes with a short *Guide*, a *Pocket Guide* and keyboard stickers for quick reference.



Screen 1: An example of* WORD-11*'s on-screen column formatting capability.



Screen 2:* WORD-11*'s external products access capability allows the integration of graphics with text.

The *WORD-11* documentation is succinct, an important value; overly verbose documentation is a hindrance. The well-written *WORD-11 Training Manual* provides novices with the guidance they require. The *Handbook* is mercifully free of added weight. Each command is treated separately under a separate heading, in alphabetical order.

An on-screen help utility is included in the software, although *WORD-11* makes extensive use of menus (there are over 20) to assist users who may not know a direct route to where they want to go. For many, this might be a better alternative than online help, because you can choose your operation from the menu directly; this may be all the help you need.

Installation

Installation is quick and simple. There are roughly 10 questions to answer, which takes five minutes. Approximately 9,000 blocks of disk space are required for installation. By default, the software is installed in directory [word11.v41] on the system disk (sys$sysdevice:). The company recommends installing the product on a public disk so that each user doesn't have to logically mount a private disk.

On the VAX, most of *WORD-11*'s executable images are installed with a specific privilege using the INSTALL utility. Non-privileged users can thus execute *WORD-11* images without the VMS privileges required by the software.

WORD-11 allows multiple readers of a single file through RMS file sharing features. Multiple *WORD-11* users can work in the same directory on the same device and, therefore, share access to documents and stored settings. VMS operating system table space is required for file sharing. A system lock is necessary for each open file shared using RMS.

VAX/VMS permits the sharing of native mode executable images among multiple image users. Sharing of *WORD-11* code is desirable for multiple user systems. All modules can be shared, although the real workhorses (i.e., the

front end, main menu, editor and spooler) are the most likely ones to be shared.

WORD-11 does not share images by default. Rather you must alter the appropriate command file. The *WORD-11 Manager's Notebook* provides the details. Note that you'll pay the price of having to use global sections and global pages when you share images. If your system has the capacity, fine. If it doesn't, you'll have to budget your resources against the necessity of shared images.

The *WORD-11* Manager's Utility controls the setup, system access and print spooling system. It mostly uses the same commands and structure used in the other *WORD-11* operating environments. The utility comes with an on-screen help file, but has no menu system.

WORD-11 can integrate 2-D drawings, charts and logos created by its optional *Graphics-11* package into text documents. To create new figures or modify existing ones, enter *Graphics-11* from the *WORD-11* document's editing menu. You then specify a figure and the desired size (see Screen 2). You also can request a caption; it's automatically included within the text when the document is printed.

Two essential questions to ask of a word processor are what it can do and how easy it is to do it. While *WORD-11* must be considered a state-of-the-art VAX word processor, there have been some omissions. Split-screen editing for displaying two documents simultaneously isn't supported currently, although it's expected in version 4.2. With this feature, users will be able to cut and paste from one document to another while viewing both. Deleting multiple documents would be another nice feature to have.

Still, *WORD-11* has many conveniences not found in some of its competitors: being able quickly and easily to stop printing if necessary; the ability to enter only the first letter of a document at the menu to edit it; and a "redlining" or "change bar" feature as *WORD-11* calls it, to record your editing changes visually in a separate document for comparison with the original.

You also can bring an ASCII file directly into the document you're editing with one command, and without having to convert it first to the *WORD-11* format. This is great for sending text from a different word processing package or from a home computer sending an ASCII file online to a host VAX running *WORD-11*. The ASCII file

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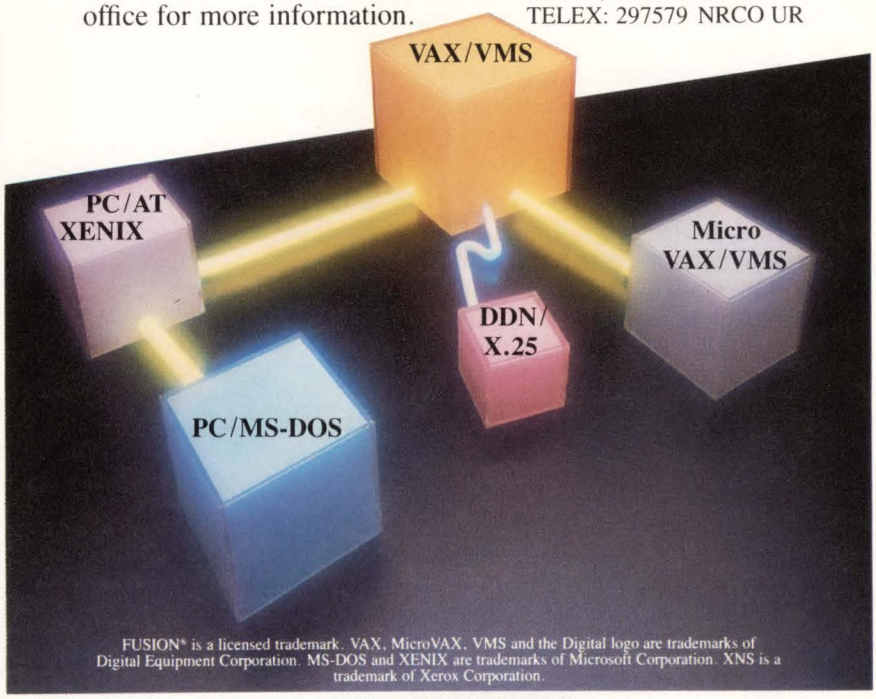

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can be included wrapped or unwrapped.

From within a document, the user has access to several menus. There's an editing session menu, for instance, where the user can change editing defaults, and there's a library menu where the user can have a slew of boilerplates ready to include. This is in addition to the UDKs that users can define for the number keys.

One nice *WORD-11* feature is the ability to display various levels of information on the screen at once, including formatting characters. It's also possible to display text exactly as it will be printed. And when printing a document, it's possible to display the print queue printer status.

The market for word processing software is competitive. When a new feature is introduced, it's mimicked almost immediately. To compare packages feature by feature, then, is virtually meaningless unless your application requires a specific feature that you need right away and can't wait until the next version.

Where the market entries differ most is in the ergonomics, although even here multiple keypad configurations now are available on many of the most popular packages. Features are discrete, identifiable entities that either exist or don't. Their value usually is obvious. When deciding which command system is easiest to learn, remember, live with and grow with, there often are significant differences to consider. This is the subjective area that creates loyalties to some packages, distances us from others and leaves the field open to a tremendous amount of fadism, emotion and ennui over "first loves" and the like.

These considerations aside, *WORD-11* stacks up extremely well in all of the above areas. If you're familiar with standard word processors, it's a package you can put to use today, from a company that seems committed to accommodating your needs in the future.

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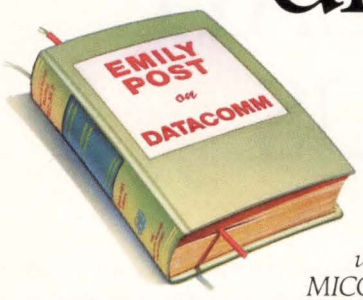

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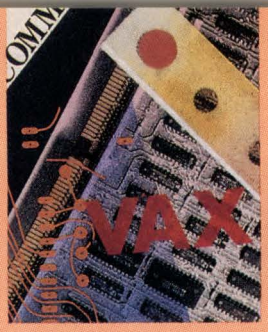

VAX

USING FMS TO CREATE MENUS

By Damon D. Judd

VICEDIT Enhances The Friendliness And Efficiency Of The Idaho Department Of Water's In-House Software.

One problem that frequently is encountered by users of home-grown applications software is the difficulty in locating the most current version of the correct program for a particular task. That problem generally is complicated by a lack of programming standards which often leads to excessive customization of the user interface.

Inevitably, this causes confusion, ambiguity, and occasionally some terse discussions between programmers and users. One way to eliminate such difficulties involves the development of a standard set of software "tools" for terminal I/O. VICEDIT is a software system, developed at the Idaho Image Analysis Facility within the Idaho Department of Water Resources, that was designed to incorporate such an approach.

The application for which VICEDIT specifically was written includes a series of procedures to assemble, edit, and analyze multispectral scanner (MSS) data that is collected by satellite in the form of digital images. The image data subsequently is used to determine the real extent of irrigated land in Idaho. This approach is based on a methodology embodied in the EDITOR software system that was developed by the U.S. Department of Agriculture for the purpose of estimating acreages of various crop types by geographic area.

VICEDIT uses a menu-structured user interface to group certain frequently used FORTRAN application modules into sets of related tasks. The menu structuring is achieved by using DEC's Forms Management System (FMS), currently operating under VMS version 4.3 on a VAX 11/750 with VT100 and VT220 series terminals.

The FMS software provides the capability for designing forms, improving the ease and quality of data input and for enhancing terminal output. FMS simplifies error checking, provides subroutine calls that replace complex escape sequences (e.g., for bold, reverse, or double-size characters), allows for scrolling and windowing and makes online help accessible with a single keystroke. Forms are created interactively with the Forms Editor, or by using Form Language Statements in batch mode. The forms can be stored in a Form Library or compiled as memory-resident code. The forms can be tested outside an application program using the Form Tester. Form Driver subroutines then are used to manipulate the forms within an application program.

VICEDIT was written using FMS-created forms primarily to enhance the friendliness and efficiency of our in-house software by organizing scattered FORTRAN programs into groups of meaningful tasks. When VICEDIT is invoked, a menu of general task types is displayed (Figure 1). A selection is made by entering the number of the task desired. A new menu (form) is displayed containing subtasks (Figure 2). The subtasks may include execut-

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FIGURE 1.

VICEDIT

This is the main menu for the collection of software tools that will be used for determining crop estimates from MSS data according to the USDA methodology used at IDWR. Just select a primary task and these menus will lead you to the appropriate program. Type PF2 at any time for help, and PF4 to exit.

1) Digitize
2) Geometric Registration
3) Rasterize lines or polygons
4) Clustering and Classification
5) Report Generation (Total acreages)
6) Display utilities
7) Processing Help

Which task (1-7)?

FIGURE 2.

Geometric Registration

This menu lists the steps required to perform geometric control of Landsat MSS scenes. For more help: type PF2 once for scene-to-map, type PF2 twice for scene-to-scene.

1) Convert IIS control point file to VICAR format (CPFILE)
2) Convert lat/long points to UTM (CCOR)
3) Convert UTM points to line, sample coordinates (POLYREG)
4) Reformat scene-to-map GCP file for PICREGZ (ZREFO)
5) Reformat scene-to-scene GCP file for PICREGZ (SREFO)
6) Build PICREGZ job
7) Reformat edited PICREGZ file for TIECONM (TIEREFO)
8) Build TIECONM job
9) Build MGEOM job

Which option (1-9)?

> . . . infrequent or inexperienced users are guided easily through the system.

able modules or another nested menu of sub-subtasks. At any time, help text can be requested by pressing the PF2 key. If more than a single line of help text is required a new form is displayed containing detailed support documentation. These can be chained together if necessary (Figure 3).

When the selected subtask invokes an executable task (actually just another subroutine) a new form is displayed to obtain all required input parameters (Figure 4). File names, user-supplied variables and any other data required by the application subroutine are requested before the subroutine is called. This allows for validation of input fields, or for user action routines (UARs) to be invoked prior to any CPU-intensive operations.

Using a form to accept user input to an application subroutine has other advantages. For example, if a particular application requiring a large number of user-supplied parameters is to be run repeatedly with only one or two changes each time, the form can be used to "remember" all the other parameters. Similarly, if a large number of parameters need to be entered and a typing error was made at some point along the way, a change can be made without necessitating a complete restart of the program. Furthermore, infrequent or inexperienced users are guided easily through the system. It is no longer necessary for the end user to keep track of the name of an executable image that performs a certain task, or to try to decipher cryptic messages asking for input (assuming the forms are well

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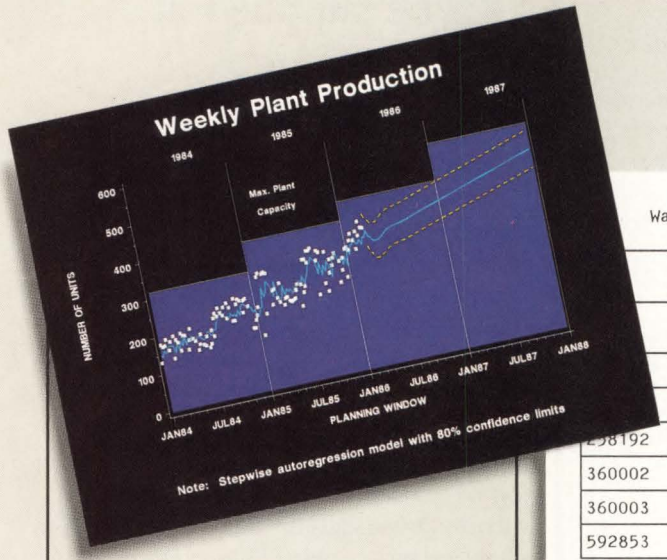

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	Quantity on Hand	Quantity on Order	Projected Reorder Date
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	89450	5000	FRI, FEB 20, 87
298192	20110	1000	MON, MAR 30, 87
360002	8585	0	TUE, FEB 10, 87
360003	15985	500	TUE, FEB 10, 87
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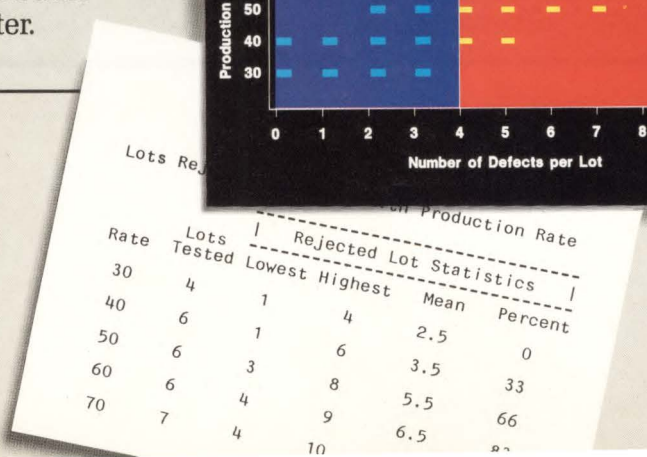
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Rate	Lots Tested	Rejected Lot Statistics			
		Lowest	Highest	Mean	Percent
30	4	1	4	2.5	0
40	6	1	6	3.5	33
50	6	3	8	5.5	66
60	6	4	9	6.5	
70	7	4	10		

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FIGURE 3.

Processing Scenario for Geometric Control of LANDSAT Data

I. Scene-to-map control

A. Create a tie-point file called XXXX.REG using UTM corners for INTIE, and line, sample corners for OUTTIE.
B. Pick Control Points for scene-to-map warping using "PNTS" program in CI.
C. Run CPFILE (in GEOMETRIC REG. menu) to convert to VICAR format.
D. Digitize Control Points from map using DIGGCP (in DIGITIZE menu) — file name will be XXXXGCP.LAT, where XXXX is the scene code (e.g., SUNV).
E. Run CCOR (in PROJECTION CONVERSION menu) to convert lat./long. to UTM — file name will be XXXXGCP.UTM.
F. Convert UTM values to line, sample with POLYREG (in PROJECTION CONVERSION) — output file name will be XXXXGCP.OUT.
G. Reformat XXXXGCP.OUT for PICREGZ using ZREFO (in GEO. REG. menu) — output file will be XXXXZ.NUM.
H. Run PICREGZ job (in GEO. REG. menu).
I. Edit bad points from the XXXXGCP.LAT file, then rerun E thru H.
J. Reformat edited XXXXZ.NUM file for TIECONM using TIEREFO (in GEO. REG. menu) — output file will be XXXXTIE.NUM.
K. Run MGEOM (in GEO. REG. menu).

FIGURE 4.

Parameter Menu For Display Program

Use the TAB key to move forward one field; use BS key (F12) to back up a field. Type RETURN to begin the display; type PF4 to end the program and get back into VICEDIT. Type PF2 for help.

What is the name of the vector file to display?
What is the name of the centroid file? (not required)
Enter "U" if file is in UTM, "L" for lat/long: L
Latitude of SW corner of window: 42-00-00
Longitude of SW corner of window: 117-00-00
Latitude of NE corner of window: 44-00-00
Longitude of NE corner of window: 111-00-00
What UTM zone? (11 = W. of 114, 12 = E. of 114): 12

. . . default values for various input parameters can be supplied at run time . . .

designed). Also, default values for various input parameters can be supplied at run time by including them when the form is created.

The VICEDIT system also includes a mechanism for separating "released" code from developmental code. A new application is written initially as a standalone executable. It is debugged and tested outside the VICEDIT environment. After it has been adequately tested it is rewritten as a subroutine with FMS Form Driver calls for terminal I/O and inserted into an object library. The form that will be used for accepting user input is designed with the Form Editor, tested and inserted into the form library. The main program is recompiled and relinked to pick up the new subroutine and form. The new application then becomes accessible to users. —*Damon D. Judd is an applications programmer in the Timberland Resources Information Systems division of Boise Cascade Corporation, Boise, Idaho. At the time of this writing he was a remote sensing analyst at the Department of Water Resources in Boise.*

REFERENCES

Morse, Anthony, "Same-year Crop Acreage Estimation for 8 Idaho Counties Using Digital Processing of Landsat MSS Data" in *Proceedings of Fourth Pacific Northwest Conference on Digital Technologies*, Jan. 29-31, 1986, Boise, Idaho.

Ozga, M., S.R. Faerman, and R. Sigman, "EDITOR Multitemporal System," *U.S. Dept. of Agriculture, ESCS*, November 1979.

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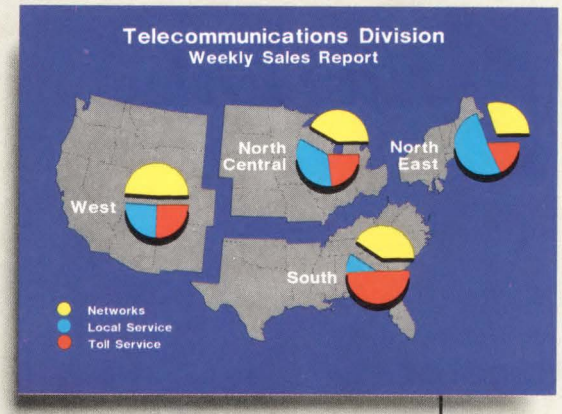

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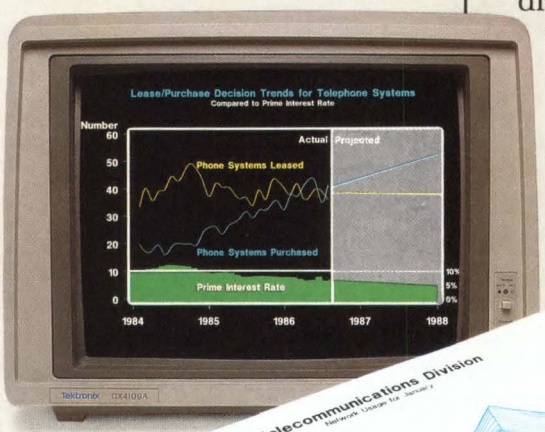

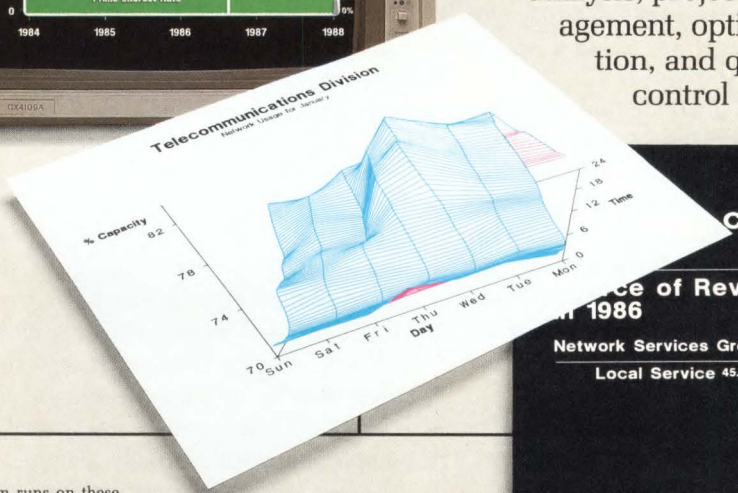

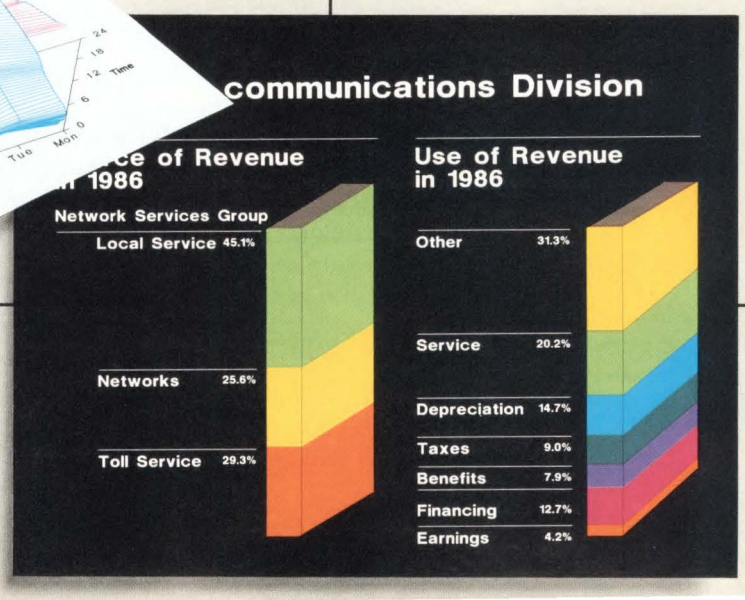

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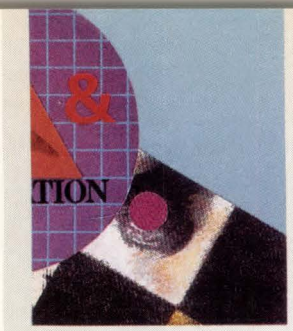

DBMS

InterBase

A DSRI-Compatible Distributed Database.

By Philip A. Naecker

If you're in the market for a database product to run on your VAX, you're likely to start the search with the question, "Should I consider non-DEC database products?" There are many facets to this seemingly innocent question, but even if you consider non-DEC database systems, you may not have to lose compatibility with DEC's database and query products if you select a third-party database that's Digital Standard Relational Interface (DSRI) compatible.

DSRI is an architecture for communicating with relational databases. (See "DSRI," April 1987, page 92.) DEC uses the DSRI interface in its own products that need to communicate with relational databases, like DATATRIEVE and VAX SQL. If a software product uses the DSRI interface to communicate with the underlying database system properly, you then can replace one DSRI database with another with almost no changes in the application.

InterBase, from Interbase Software Corporation, Tyngsborough, Massachusetts (previously known as Groton Database Systems) is a DSRI-compatible relational database system with associated utilities and query and reporting tools. *Interbase* works with other DSRI-compatible tools from DEC such as DATATRIEVE, and with tools from third-party vendors, like *SmartStar* from Signal Technologies of Goleta, California.

What's more, *InterBase* is available on many non-VMS systems including various flavors of UNIX, ULTRIX, and Sun and Apollo workstations. Thus you'll be able to distribute your database applications to the most appropriate machine and environment rather than restricting them to the VAX. And because *InterBase* is a fully distributed database system incorporating a two-phase commit, you can perform simultaneous updates to databases on different machines in a network, even if those machines are from different manufacturers and are running different operating systems.

Atomic Transaction Model

There are many so-called "relational databases" on the market today. Some of them are truly databases, and others aren't. Many are simply data management systems or file systems with a relational "look" or "feel." *InterBase* is a full-fledged relational database management system, built from the ground up with the relational model in mind. The richness of features available in the database component of *InterBase* makes it an attractive development environment.

Like all good databases, *InterBase* provides applications with transaction control, the means to ensure that a group of database updates either occur in their entirety or not at all. This type of control won't permit "partial updates," even if the computer system crashes in the middle of a transaction. Because the transaction either will be completed or not completed, never partially completed, it's called an atomic operation in the database.

In addition, *InterBase* provides for two-phase commits, thus allowing the atomic

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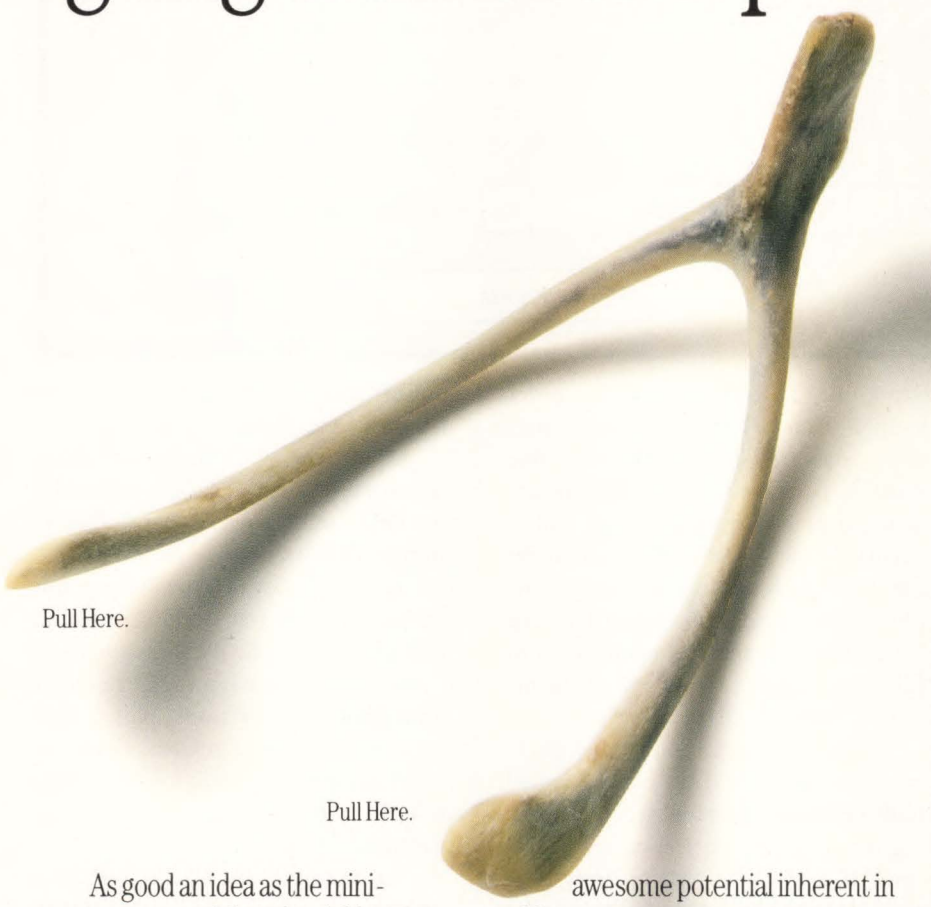

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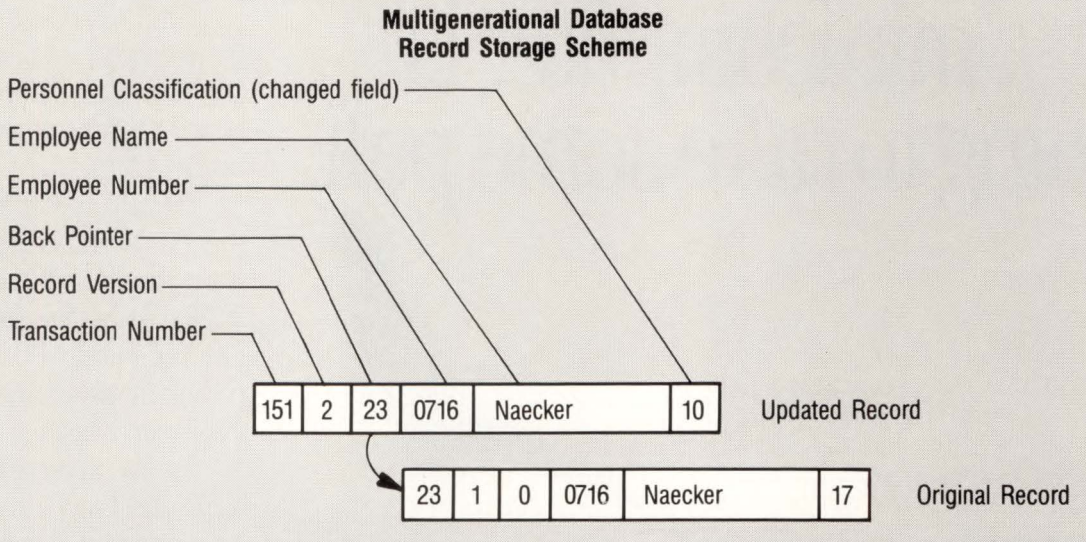
FIGURE 1.



operation to span two or more databases, even if those databases are on different nodes in a network. *InterBase* imposes no restrictions on the number or combination of databases, types of transactions (read, write, update, delete), types of systems or physical communications method used between the network nodes participating in the transaction.

You conceivably could construct a database transaction spanning a VAX/VMS cluster, a VAX running ULTRIX, an arbitrary machine running UNIX 4.3 BSD, a Sun workstation and an Apollo workstation, and be assured that a series of updates to databases on all those machines either would take place as a unit or not at all. Furthermore, *InterBase* allows multiple simultaneous transactions per process although some other database systems are limited to a single simultaneous transaction per process.

The difficulty for the database implementer in providing this sort of transaction control is that a database transaction either can be committed (made permanent) or rolled back (removed, as if it had never happened). Thus, the database system can never simply "change" the value of any part of the database because the old value must be preserved in case the transaction needs to be rolled back. Other database systems use various techniques for accomplishing this, including complicated journaling procedures that keep a log of every transaction and snapshot files that contain a copy of all "committed" data in the database.

InterBase uses an innovative internal structure for data storage called multigenerational data structures (see Figure 1). In this model, a new "version" of a record is written every time any part of the record is modified. If the transaction is rolled back, the transaction relating to the new version is never modified to reflect the fact it was committed. If the transaction is committed, the old record simply is left around until it isn't needed anymore.

The problem of concurrent access by multiple users is thus reduced to knowing the relative time of two transactions. For example, if user A begins a transaction before user B, A won't see any records modified by B, even if B commits his transaction. This type of access control is implemented in *InterBase* through the use of a transaction number plus a few flags that are used to determine the status of a record.

Compared with traditional database systems such as DEC's Rdb/VMS, *InterBase*'s multigenerational design is simpler for some operations, more complex for others. Because the information needed for most transaction control is found on disk in the database file itself (in the form of time stamps and a list of "interesting" transactions) plus a little bit of state embodied in locks, there's no need for a database monitor process to perform access control and database maintenance duties.

For example, in DEC's Rdb/VMS, a process called the RDMS_MONITOR is created whenever the database is accessed. It performs the operations necesary to recover from an inconsistent state such as might occur when a system or a process is stopped mid-transaction. In the multigenerational model, the database is always in a consistent state. On the other hand, it's a little harder to use indices to respond to queries in a multigenerational database, because it's not clear which version of the record is referred to by an index entry.

Because there are new records created whenever the database is modified, how does *InterBase* prevent the database from growing continually? Each process that reads a record is responsible for cleaning up any "old" records lying around. First it determines the "oldest interesting transaction," the one for which there are no older pending transactions. Any records that have been superseded and are associated with transactions older than the oldest interesting transaction are no longer needed and may be deleted safely. In the typical case, there will be at most one extra record per modified record. In an extreme case with many users simultaneously updating the same record, it's possible that many record versions must be deleted, but this is rare.

Database System Features

InterBase has many interesting features, some common to many database systems and some rarely found.

The database system is fully relational, so the data dictionary is tightly integrated. Database metadata is stored in a relational format, and you can use the same data manipulation statements to access the metadata as you use to access the data. Because the metadata is treated like data, you can do metadata changes the same way you do data changes, rolling back changes to the metadata or make changes to the metadata while the database is in use by others.

Although the multigenerational structure of *InterBase* means that short-term journaling isn't required to support rollback/commit or to recover from system crashes, it's still possible that a disk crash will destroy the database file itself. To allow recovery from these types of disasters, *Interbase* plans to support after-image journaling which writes database modifications to another disk or tape. (After-image journaling is not available currently in the VMS version of *InterBase* but is planned.)

Like DEC's Rdb products, *InterBase* supports global field definitions (domains). You can define validation criteria

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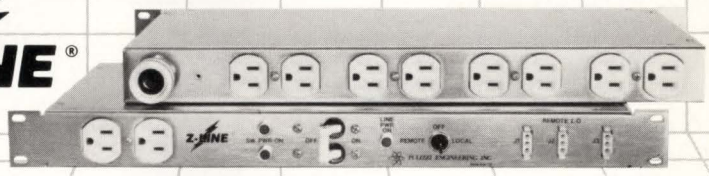

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for a global field (for example, require the field LENGTH to be greater than zero) and those validation criteria will be applied wherever the field is found. Validation criteria also can be very complex and involve relationships between many fields or many relations. *InterBase* also supports virtual fields, a concept familiar to users of Rdb or DATATRIEVE. Virtual fields (also called "computed by" fields) do not represent actual storage in a relation, but instead describe the operations to be performed on other data to yield a result.

Blobs (basic large objects) will be familiar to Rdb users, who know them as segmented strings. Blobs are useful for storing either very long text strings or arbitrarily large quantities of data of some binary format, such as CAD graphics files, scanned images or bitmaps, or large program arrays. Blobs in *InterBase* can be manipulated much like other data items, and take full advantage of the journaling and transaction control provided by the database system.

Database Security

Protection of all database objects, including the database itself, is implemented with user-defined security classes, each class containing one or more identifying clauses and their associated access rights. The resulting structure is similar to an access control list in VMS or in Digital's Common Data Dictionary, with the important difference that you then can use the entire structure (i.e., the entire security class) to define access to any number of database objects.

This abstraction results in fewer database entries and in easier security system maintenance. For example, you can construct the security class "MANAGERS_ONLY" and then use that same class to restrict access to particular relations, views, or even to particular fields within a relation or view. Thus, the access rights granted in the MANAGERS_ONLY security class would determine if the current user could read, write, protect, control, or delete the given database object. The ability to control access to fields within relations as well as to specific relations is very valuable and exceeds the capability provided by most other database products.

FIGURE 2.

***InterBase* Documentation Uses BNF Notation**

```
start_transaction [transaction-handle]
    [concurrency | consistency]
    [read_write | read_only]
    [wait | nowait]

    [reserving-clause]
    [on-error]

    reserving-clause ::== reserving reserved-relation-commalist

    reserved-relation ::== [database-handle.]relation-name
                for [protected] {read | write}

      on-error ::== on_error statement . . . end_error
```

Triggers And Referential Integrity

Referential integrity is a key property of relational databases. In relational terms, referential integrity requires that "for each distinct non-null foreign key value, there must exist a matching primary key value from the same domain" (E.F. Codd, *Computerworld*, October 14, 1985). In English, it means that every value in the database that can be used as a key into a table must exist as a key in that table. For example, referential integrity requires that an employee record must exist (and the employee number be assigned) before that employee is defined as the supervisor of a department or the manager of a project because the supervisor employee number is used as a foreign key into the employees relation.

One way to meet the referential integrity requirement is via constraints, the method used by DEC's Rdb. In a constraint definition, a REQUIRE clause defines the relationship between two or more relations. For the supervisor example just mentioned, the Rdb Relational Data Management Language (RDML) constraint might look like this:

```
DEFINE CONSTRAINT
  SUPERVISOR_EXISTS
    FOR D IN DEPARTMENTS
    REQUIRE (ANY E IN
      EMPLOYEES WITH E.EMPLOYEE_ID =
        D.SUPERVISOR_ID).
```

The power of this constraint is that it enforces referential integrity from both directions—you can't store a supervisor who first isn't an employee, nor can you delete an employee who's a supervisor without first removing him as supervisor. This guarantees referential integrity. Pretty nifty. (Unfortunately, constraints also can be the source of performance problems, because you'll need to do a lot of work to test some REQUIRE clauses.)

InterBase doesn't implement constraints; rather, it gives you the tools to implement constraints and more. Trig-

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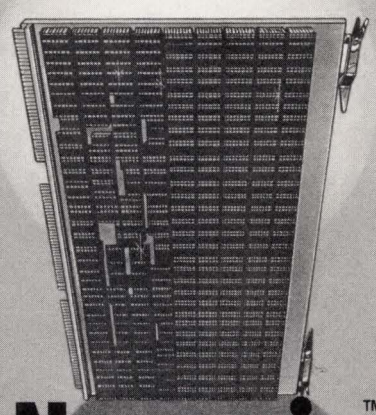

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PROGRAM 1.

```
      PROGRAM UPDATE_GUIDE

      INTEGER*2           STATE_COUNT
      PARAMETER           (STATE_COUNT = 9)
      CHARACTER*2         STATE_LIST (STATE_COUNT)

      !  It's time to update and print the tourist information we have
      !  for New England and the Pacific Northwest.  This program
      !  prints and optionally modifies the tourist information for
      !  each state, then creates a database that is a guide to
      !  northern us seacoasts.

      DATABASE ATLAS = FILENAME 'atlas.gdb'
      DATABASE GUIDE = FILENAME 'coastal_guide.gdb'

      DATA (STATE_LIST(I), I = 1, STATE_COUNT) /
     + 'ME', 'NH', 'MA', 'RI', 'CT', 'OR', 'WA', 'AK', 'XX'/



      ! ***************************************
      ! *
      ! *   M A I N
      ! *
      ! ***************************************


      ! *
      ! * Functional description
      ! *
      ! * The main routine establishes a list of states from the main
      ! * atlas database.  Its subroutines allow the user to update
      ! * guidebook descriptions of those states, and store them in
      ! * a separate database.
      ! ***************************************


      READY ATLAS
      CALL CLEAN_UP (STATE_LIST)
      READY 'north_coast_guide.gdb' AS GUIDE
      CALL TRANSFER_DATA (STATE_LIST)
      FINISH ATLAS
      FINISH GUIDE
      END



      SUBROUTINE CLEAN_UP (STATES)

      CHARACTER*2         STATES (*)
      CHARACTER*40        FILENAME
      CHARACTER*4         CHOICE
      INTEGER*2           I
      INTEGER*4           UPDATE_TR
      CHARACTER*2         STATE
      INTEGER*4           STAT
      INTEGER*2           STRING_SIZE
      INTEGER*2           STATE_COUNT
      PARAMETER           (STATE_COUNT = 9)

      DATABASE ATLAS = FILENAME 'atlas.gdb'

      ! ***************************************
      ! *
      ! *    c l e a n _ u p
      ! *
      ! ***************************************
      ! *
      ! * Functional description
      ! *
      ! * At the users' choice, edit the tourism blob for selected
      ! * states, load a new one from a named file, or accept text
      ! * from standard input
      ! ***************************************


      ! start a named transaction for update, reserving the necessary
      ! relations

      UPDATE_TR = 0
      START_TRANSACTION UPDATE_TR CONCURRENCY READ_WRITE RESERVING
          ATLAS.TOURISM FOR WRITE,
          ATLAS.STATES FOR READ

  100 DO 110 I = 1, STATE_COUNT
      STATE = STATES (I)
      FOR (TRANSACTION_HANDLE UPDATE_TR) S IN STATES
          CROSS T IN TOURISM OVER STATE WITH S.STATE = STATE
      PRINT *, 'Here''s the information on ', S.STATE_NAME
      CALL BLOB_$DISPLAY (T.GUIDEBOOK, ATLAS, UPDATE_TR, 'GUIDEBOOK',
     +    LEN ('GUIDEBOOK'))
      CALL LIB$GET_INPUT (CHOICE,
     +    'Is this information up to date? (Y/N) ',
     +    LEN (CHOICE))

      IF (CHOICE .NE. 'Y' .AND.  CHOICE .NE. 'y') THEN
          MODIFY T USING
              CALL LIB$GET_INPUT (CHOICE,
     + 'Enter F to update from a file, E to edit the description ',
     +                LEN (CHOICE))

              IF (CHOICE .EQ. 'F' .OR. CHOICE .EQ. 'f') THEN
                  CALL LIB$GET_INPUT (FILENAME,
     +                'Enter full name of input file ',
     +                LEN (FILENAME))
                  STRING_SIZE = INDEX (FILENAME, ' ')
                  CALL BLOB_$LOAD (T.GUIDEBOOK, ATLAS, UPDATE_TR,
     +                FILENAME, STRING_SIZE - 1)
              ELSE IF (CHOICE .EQ. 'E' .OR. CHOICE .EQ. 'e') THEN
                  CALL BLOB_$EDIT (T.GUIDEBOOK, ATLAS, UPDATE_TR,
     +                'GUIDEBOOK', LEN ('GUIDEBOOK'))
              ELSE
                  PRINT *,
     +    'Enter new information from standard input.  Terminate with ^Z'
                  CREATE_BLOB NEW IN T.GUIDEBOOK
                  NEW.LENGTH = LEN (NEW.SEGMENT)
  150             READ (*, '(A)', IOSTAT = STAT) NEW.SEGMENT
                  IF (STAT .NE. 0) GOTO 160
                  PUT_SEGMENT NEW
                  GOTO 150
  160             CONTINUE
                  CLOSE_BLOB NEW
              END IF
          END_MODIFY


      END IF
      END_FOR

  110 CONTINUE
      COMMIT UPDATE_TR
      END


      SUBROUTINE TRANSFER_DATA (STATES)

      CHARACTER*2         STATES (*)
      INTEGER*2           I
      INTEGER*4           TRANS_TR
      CHARACTER*2         STATE
      INTEGER*2           STATE_COUNT
      PARAMETER           (STATE_COUNT = 9)
      DATABASE ATLAS = FILENAME 'atlas.gdb'
      DATABASE GUIDE = FILENAME 'coastal_guide.gdb'



      ! ***************************************
      ! *
      ! *   t r a n s f e r _ d a t a
      ! *
      ! ***************************************
      ! *
      ! * Functional description
      ! *
      ! * Move the tourism information for selected
      ! * states to the guide_book database.
      ! ***************************************

      TRANS_TR = 0

      START_TRANSACTION TRANS_TR CONCURRENCY READ_WRITE RESERVING
        ATLAS.TOURISM FOR READ,
        GUIDE.TOURISM FOR WRITE

      DO 210 I = 1, STATE_COUNT
        STATE = STATES(I)
        FOR (TRANSACTION_HANDLE TRANS_TR) S IN ATLAS.STATES
            CROSS T IN ATLAS.TOURISM OVER STATE WITH S.STATE = STATE
            STORE NEW IN GUIDE.TOURISM USING
                NEW.STATE_NAME = S.STATE_NAME
                NEW.STATE = S.STATE



                NEW.CITY = T.CITY
                NEW.ZIP = T.ZIP

              ! One way to copy a blob
              CREATE_BLOB N_ADDR IN NEW.OFFICE
              FOR O_ADDR IN T.OFFICE
                  N_ADDR.SEGMENT = O_ADDR.SEGMENT
                  N_ADDR.LENGTH = O_ADDR.LENGTH
                  PUT_SEGMENT N_ADDR
              END_FOR
              CLOSE_BLOB N_ADDR

              ! another way to copy a blob
              CALL BLOB_$DUMP (T.GUIDEBOOK, ATLAS, TRANS_TR,
     +            'TEMP.TMP', LEN ('TEMP.TMP'))
              CALL BLOB_$LOAD (NEW.GUIDEBOOK, GUIDE, TRANS_TR,
     +            'TEMP.TMP', LEN ('TEMP.TMP'))
            END_STORE
        END_FOR
  210 CONTINUE
      PREPARE TRANS_TR
          ON_ERROR
              PRINT *, 'Error preparing a multi_database transaction'
              PRINT *,
     + 'Please manually rollback limbo transactions in GUIDE and ATLAS'
              ROLLBACK TRANS_TR
              RETURN
          END_ERROR


      COMMIT TRANS_TR
        ON_ERROR
              PRINT *,
     +    'Error committing a prepared multi_database transaction'
              PRINT *,
     +    'Please manually commit limbo transactions in GUIDE and ATLAS'
        END_ERROR
      END
```

gers are activated by a store, modify or erase operation on a relation. Program 2 shows a trigger definition that creates a log record of every activity on the WIDGETS relation. In this particular example, the trigger always stores a record in a transaction log. However, there are few limitations on the statements that can be used in the trigger. They can include statements to modify any number of other relations or to abort the transaction that activated the trigger.

Besides the transaction log, triggers can be used to preserve referential integrity in the database. Using our supervisor-employee example discussed above, triggers might be defined to prevent deletion of the employee record if the employee is still a supervisor, and to prevent storing a supervisor record unless the employee record is stored first. Thus, two triggers (one on the EMPLOYEES relation and another on the DEPARTMENTS relation) would be required to accomplish the same action performed by a single Rdb constraint.

On the other hand, triggers can perform much more complicated functions than can be accomplished by constraints (which can basically only allow or disallow a function). Some *InterBase* users have defined cascading deletes (where the delete in one relation causes records in other relations to be deleted, which in turn cause other records to be deleted, and so on) more than 10 levels deep.

The biggest advantage of triggers is that they allow the integrity of the database to be defined in and implemented by code in the database, not to depend upon code in a program. This assures that the referential integrity will be preserved even if the database is modified by a query language instead of using the appropriate program. (If you've ever had your database "fixed" by someone using DATATRIEVE and had to recover from the ensuing disaster, you know how important this is!) On the down side, however, triggers require more statements than do constraints to accomplish the same function. Also, triggers can't communicate with the user to verify the action to be performed, so there's a limit to their functionality for automatic updates.

Triggers are so powerful that *InterBase* uses an internal form of them to perform database housekeeping duties when the database metadata is modified. For example, you can change the metadata for the type of a field (say, convert an integer field to a real number) using your favorite DSRI-compatible query-language. *InterBase* then fires off a trigger to change the data type for that field, all on the fly. This is very useful because it allows you to use all the same data maintenance tools on the metadata that you like to use on the data. In fact, *InterBase* even documents which metadata items you can change and which you can't, and the effects.

Data Manipulation And SQL Support

A precompiler allows an application program to imbed database data manipulation commands directly in the third-generation language source program (see Program 1). The precompiler in *InterBase* supports C, FORTRAN, PASCAL, PL/I and COBOL. Unlike the precompiler in Rdb/VMS, there's no need for any special indicator (like &RDB&) to identify the data manipulation language statements, and you can mix GDML and SQL statements in the same source module.

DB2-like SQL is supported in *InterBase*, both interactively in the Query Language Interpreter (QLI) and in precompiled form. This provides for portability between applications developed using *InterBase* and using other database management systems that support the DB2 flavor or SQL, including DEC's VAX SQL.

Note, however, that all SQLs are not necessarily the same. VAX SQL, for example, supports non-DB2 statements. If you use those, you may not be able port the application directly to *InterBase*'s precompilers.

InterBase also supports its own data manipulation language, GDML. Like

PROGRAM 2.

```
define database "AUDIT_TRAIL.GDB";

define relation WIDGETS
   NAME          char [10],
   NUMBER        short;

define relation TRANSACTION_LOG
   NAME,
   WHAT          char[6],
   OLD_NUMBER    based on NUMBER,
   NEW_NUMBER    based on NUMBER,
   WHEN          date;

define trigger for WIDGETS
   store:
   { Insert a TRANSACTION_LOG record for each new WIDGET. }
      store X in TRANSACTION_LOG
            X.WHAT = "STORE";
            X.NAME = new.NAME;
            X.NEW_NUMBER = new.NUMBER;
            X.WHEN = "TODAY";
      end_store;

   modify:
   { Insert a TRANSACTION_LOG record for each WIDGET modified. }
      store X in TRANSACTION_LOG
            X.WHAT = "MODIFY";
            X.NAME = new.NAME;
            X.NEW_NUMBER = new.NUMBER;
            X.OLD_NUMBER = old.NUMBER;
            X.WHEN = "TODAY";
      end_store;

   erase:


   { Insert a TRANSACTION_LOG record each time a WIDGET is deleted. }
      store X in TRANSACTION_LOG
            X.WHAT = "ERASE";
            X.NAME = old.NAME;
            X.OLD_NUMBER = old.NUMBER;
            X.WHEN = "TODAY";
      end_store;
end_trigger;
```

TABLE 1.

The *InterBase* Product Set	
Component	**Function**
QLI	The Query Language Interpreter. QLI supports intermixed SQL and GDML statements. GDML looks a lot like VAX DATATRIEVE and includes a report writer.
GBAK	Backup/restore of databases. The backup form is more compact than the on-disk database.
GFIX	Sweeps the database for unused records.
GDEF	Metadata definition tool. Defines database objects such as fields, relations and indices from a definitional SQL and GDML statements. GDML looks a lot like VAX DATATRIEVE and includes a report writer.
GPRE	Precompiler. The *InterBase* precompiler will accept source code containing both *InterBase* GDML data manipulation statements and SQL intermixed. The precompiler supports FORTRAN, PASCAL, COBOL, and PL/I.
Pictor	An icon-based query system.
QBF	A query-by-forms system.
FRED	A forms editor for use with QBF.

SQL, GDML can be used either in precompiled programs or in QLI. GMDL looks a lot like VAX DATATRIEVE, and includes a report writer with capabilities very similar to those of the report writer in VAX DATATRIEVE. GDML supplies many functions beyond those available in SQL that provide the user with more control over the transaction environment (such as multiple transactions) and provides access to features not found in DB2 and thus not needed in SQL (such as blobs, global fields, security classes, and the like).

Note that GDML doesn't have an interpretive interface analogous to RDB$ INTERPRET or DTR$COMMAND. This sort of functionality can be accomplished using the dynamic SQL interface, however. (See "VAX SQL," May 1987, page 76.)

Performance

When it comes to relational databases, performance definitely is in the eye of the beholder, or at least in the hands of the benchmark builder. It's possible to create a benchmark that will make almost any relational database outperform almost any other relational database. Rather than mislead you with a limited set of benchmarks, I'll give you a few facts about the performance of the *InterBase* system.

1. The performance appears to be quite reasonable in a variety of applications. I tested various kinds of queries, stores and a number of odd-ball updates, and in none of them did I detect what I would have called poor performance.
2. Because *InterBase* is a DSRI compliant database, it was trivial to construct side-by-side tests of *InterBase* (a pre-beta version 2.0) and Rdb (version 2.2). In general, I found performance of the two products to be roughly comparable *for single user access*. I did not test multiuser access, and if you're interested in that, create a benchmark and try it.
3. I found that certain queries were performed much faster on one database system or the other. I did not test a wide variety of other types of operations, however, such as stores, modifies, and deletes. Those operations worked with roughly equivalent performance for the relatively simple cases examined, but the systems weren't heavily stressed by my test cases. If performance is extremely important to you for a particular workload, benchmark that workload on the database systems you're investigating.

There have been some very smart things done in *InterBase* to make it a good performer. First of all, the multigenerational record structure contributes to good performance by improving locality of reference and minimizing locking. *InterBase*, like Rdb/ELN, has two modes of operation, consistency mode and concurrency mode. In consistency mode, operations to the database are serialized; i.e., they happen sequentially in time. If there are two operations that intend to update the same relation, one has to wait until the other completes. In concurrency mode, the multigenerational record structure guarantees that simultaneous updaters will both get consistent, if not identical, views of the data and that they can proceed concurrently without waiting for locks on one another.

In fact, there is minimal locking overhead in *InterBase*. A lock is taken out on the entire database, and if no one else

is using the database, locks are tracked but not asserted. If locks need to be asserted, they're used to keep transaction IDs of active transactions (so other processes are notified if a process dies suddenly while it's performing transactions of interest to others), on relations (to serialize access) and on page buffers. The company claims that, in general, *InterBase* uses less than 100 locks for most applications, not very many when compared with other database systems.

There are other performance superlatives in *InterBase*, too. One is a bit-mapped multi-index retrieval for when you have two or more available keys for a single relation and you can use them all in the query. Another is the sort-merge join for cases when the join terms are not indexes. This little puppy turns a problem of order NxM into a problem of order (N Log N) + (M Log M)—a big win in certain limited cases. The size of the database also contributes to improved performance by minimizing I/O and cache requirements.

The *InterBase* Product Set

InterBase consists of a DSRI-compliant database system and associated utilities for database maintenance, backup and query. Table 1 shows the components of *InterBase*. Although the components work well together, it's not necessary to use them that way. You can use the database without using the company's query tools, instead using DEC's DATATRIEVE on either the local node or a remote node to access the data. You also can run third-generation language programs developed using the precompilers of DEC's Rdb/VMS, although the company supplies perfectly good precompilers as part of the product set. Similarly, you can use the company's query tools to query an Rdb/VMS, Rdb/ELN or DEC VIDA (VAX IBM Data Access) database on either the local machine or a remote node.

PICTOR is a nifty utility that's not currently available in *InterBase* but will be released in V2.0. It's a full-screen workstation-based tool that uses icons and a mouse for retrieving and updating data stored in any DSRI database. There were a few bugs in my pre-Beta V2.0 version but it's still very nice.

PICTOR divides the screen into two parts, the catalog and the selections. The catalog lists the commands available, the relations in the database, the fields in the relations, and so forth while the selection screen basically shows the status of the query being constructed. When data is retrieved from the database, a window pops up with the output.

The interface makes heavy use of the mouse, using pull-down menus and

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icons for most operations. For example, printing an item using PICTOR involves "dropping" the icon for the item on the "print" box.

Joining two relations couldn't be easier: The fields desired from the two relations are dropped in the "print" box and the foreign key fields are automatically placed in the "predicates" box, awaiting the user's selection of the join criterion. Sorting a record stream is accomplished by dropping the sort field onto the sort box, and Presto! It's sorted. Someday, all relational database products will have a similar interface.

The company also intends to release a query-by-forms facility and a forms editor for Version 2.0 of the *InterBase* product, but these functions were not working in the pre-Beta version I was testing.

Also scheduled to be released with Version 2.0 is a DSRI interface to RMS files. This product has had considerable interest in the DEC database community for some time, and is one that DEC doesn't offer. In its first version, this feature only operates on sequential files (and on ISAM files sequentially). However, the company has indicated it would like to enhance *InterBase* to perform general DSRI functionality on RMS files. The current functionality is intended primarily as a load mechanism to input data to the database from flat files.

Documentation

The documentation for *InterBase* is easy to read and very complete (see Table 2). The manuals generally follow the UNIX model rather than the VMS or DEC model. Each command, language element or utility has a "manual page" that provides the name, syntax, description, arguments, an example, a "see also" section and a diagnostics section. Every chapter ends with a "for more information" section that provides guidance on locating detailed or related documentation.

The syntax diagrams are presented in a modified Backus Naur Form (BNF) notation. In this style of grammar definition, a word or phrase enclosed in angle brackets indicates a metasymbol in BNF notation. Each metasymbol can be broken into simpler components, a process that's continued until there are no more metasymbols to be defined. Figure 2 shows a BNF diagram for the GDML statement start_transaction.

Don't read the *InterBase* documentation closely if humor in computer software documentation upsets you. Every so often, the documentation is sprinkled with wry comments or outlandish examples. The chapter describing access control is based upon President Lincoln's cabinet. The manufacturer field in another example has a validation clause excluding the manufacturers "Sleazola," "Shodtech" and "Schlockhaus." It's not comedy-for-the-masses, of course, but it *is* funny. I might not want to have all my computer manuals written this way, but for those of us who read computer documentation every day, it's a welcome change.

The *InterBase* product is a robust database system that takes full advantage of the DSRI and SQL standards. If you need a fully distributed database, and especially if you need to run in multiple environments, take a look at *InterBase*.

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TABLE 2.

***InterBase* Documentation**

***The System Overview* provides a general introduction to the software system.**
The *Installation and Operations Manual* describes the installation of *InterBase* on each of the supported operating systems, including any required changes to the user authorization files and SYSGEN parameters. It also describes the database backup facility.
The *Data Definition Guide* describes the utility used to describe database metadata.
The *QLI User's Guide* describes the use of QLI, the DSRI-compliant fourth-generation language and report writer.
The *SQL Programming Guide* describes SQL.
The *GDML Programming Guide* describes the use of GDML, a relational data manipulation language that can be imbedded in third-generation language programs.

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Terminal Servers As Underachievers

NETWORKING EDITOR

Bill Hancock

I got into an argument the other day with one of my sanity-checking friends. These important people are there to say "I told you so!" when you goof and "You are out of your mind!" when you suggest something radical or different. In my case, this happens frequently.

The argument started over terminal servers. Being an "elderly" RSX hack (you don't call RSX users disparaging things lest they retaliate in a physical way), my friend still has trouble with descriptions of *virtual* things, including terminal connectivity. Terminal servers, which allow virtual connectivity to VMS and RSX systems, fall into one of those categories that allow traditionally-minded DEC users the opportunity to rise above the physical and "get virtual." The argument started when I suggested that terminal servers could be used for things other than distributing terminals.

"Look, I just bought off on the idea that gray spaghetti doesn't have to be run all over the building, but now you're telling me that I can use the terminal server to allow remote printers?"

"Of course."

"You've lost it again," he said, vehemently.

Then I really heated up the argument:

"You also realize, of course, that the new DECserver-200 can be downloaded with a different kernel and become a DECNET router/server for async-to-Ethernet and async-to-async."

"Right. Sure."

There was no point in continuing the argument because he started yelling about how APRs lived and that he couldn't understand why DEC ever got rid of RSX-11D. When people start talking like that, they're either going off the deep end or they have a significant point, neither of which is going to help change the situation.

DECservers have a place in the world and connecting terminals to them is but one capability. Connecting printers is another. Sharing printers among multiple host systems is yet another. But the one I like is the use of the DECserver-200 as a DECNET router/server.

> ***". . . the one I like is the use of the DECserver-200 as a DECNET router/server."***

THE CONCEPT OF a DECNET router isn't new. DECNET has been able to route traffic to another DECNET node since Phase II of DECNET (called "poor man's routing"). Phase III introduced adaptive routing which allows DECNET to pick another path to the destination should a link fail. It also allows dissimilar network technologies to be connected to a routing node and the routing node to route traffic transparently between the technologies. DEC also has had the DECNET router/server, based on the PDP-11/24-based DECSA packaging, available for some time. But routing is a CPU (and sometimes I/O) hog. To figure out which packet goes where requires CPU time that isn't dedicated to servicing the needs of processes running on the routing system. By placing routing overhead in a separate system, expensive resources like a VAX aren't taxed with the necessary routing overhead that may be imposed by the network design. For instance, if 10 percent of your $500K VAX system is tied up in routing overhead, then you're talking about $50K of routing overhead. Using a $5K box to provide the routing functions and offloading the host can result in a significant cost savings and less hassle from users complaining about system slowness.

Interesting Possibilities

In the realm of DECNET routing, the DECrouter-200 provides some interesting possibilities. First, the routing services are provided on a DECserver-200 system, which means that there are eight asynchronous terminal ports with modem control and one Ethernet port on the system.

Because of this, up to eight systems can be connected asynchronously to the router at speeds of up to 19.2K baud for each port. In the case of PCs, this is attractive because it allows PCs to become DECNET nodes without directly connecting to a host system (e.g., a VAX) and causing excessive host overhead due to interrupts, host routing and many other associated nasties. Also, practically all PCs have at least one serial port that can be used with DECNET-DOS, effectively precluding the need to run out and buy a ton of Ethernet controllers for the PCs that will be connected to the network. Because the router also provides routing for any node connected to it, PC-to-PC communications are possible without the need for any host system to assist.

The DECrouter-200 also provides the capability to support a routing feature not previously available in other

routing implementations, called *path splitting* — the DEC term for multiline load balancing. The DECrouter allows up to four lines to be connected between the DECrouter and a single system. Adjusting the PATHSPLITS parameter on the DECrouter provides load balancing between the multiple connections. Through this mechanism, available bandwidth much higher than a single 19.2K baud link is provided efficiently.

A second benefit is increased availability. If a MICROVAX II were connected asynchronously to a DECrouter, the network designer might place two async lines between the two systems. That way, if one link fails, the MICROVAX still may be reached through the second link. Use caution, however. If two links are used, they should be set up so that one async line is on one terminal controller and the second is on another terminal controller on the MICROVAX. This way, should one of the terminal controllers fail, the network still may be operational. If both links were run off the same terminal controller and the controller failed, the network to the MICROVAX would be terminated.

BECAUSE THE DECROUTER-200 does not have a disk system (it's a DECserver-200 system) or any other type of storage device, it must be loaded from a VMS or ULTRIX system using the downline systems loading feature of DECNET. To set up the load properly, DEC provides the command procedure RTRCONFIG.COM, which allows configuration of the basic download of the kernel in a manner similar to the DSVCONFIG.COM procedure used to set up DECservers for downloading. Following the download setup, the network manager uses a program called DRCP to configure the permanent database for the DECrouter (line speeds, executor parameters, circuit characteristics, line characteristics, etc.). Using DRCP is similar to using NCP, except an OPEN statement must be used to open the image file that will be operated on and a CLOSE is used to save the modified parameters. If a network manager wishes to change the online parameters, the NCP utility on a VMS or ULTRIX node is used (TELL command or SET EXECUTOR command) to set parameters. A neat feature of the DRCP program is the ability to save sessions in a command procedure for later modification or execution.

Frequently, it's difficult to monitor the line use or performance of a DECNET node. Not so on a DECrouter-200. A terminal may be connected to the first asynchronous port and, using DRCP, the DECrouter permanent database can be configured to fire-up a network monitoring display on the first async

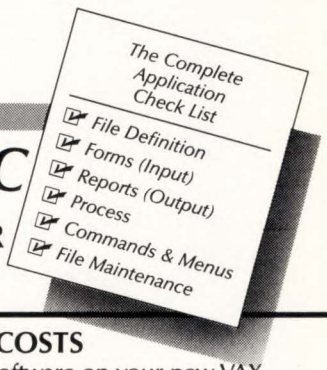

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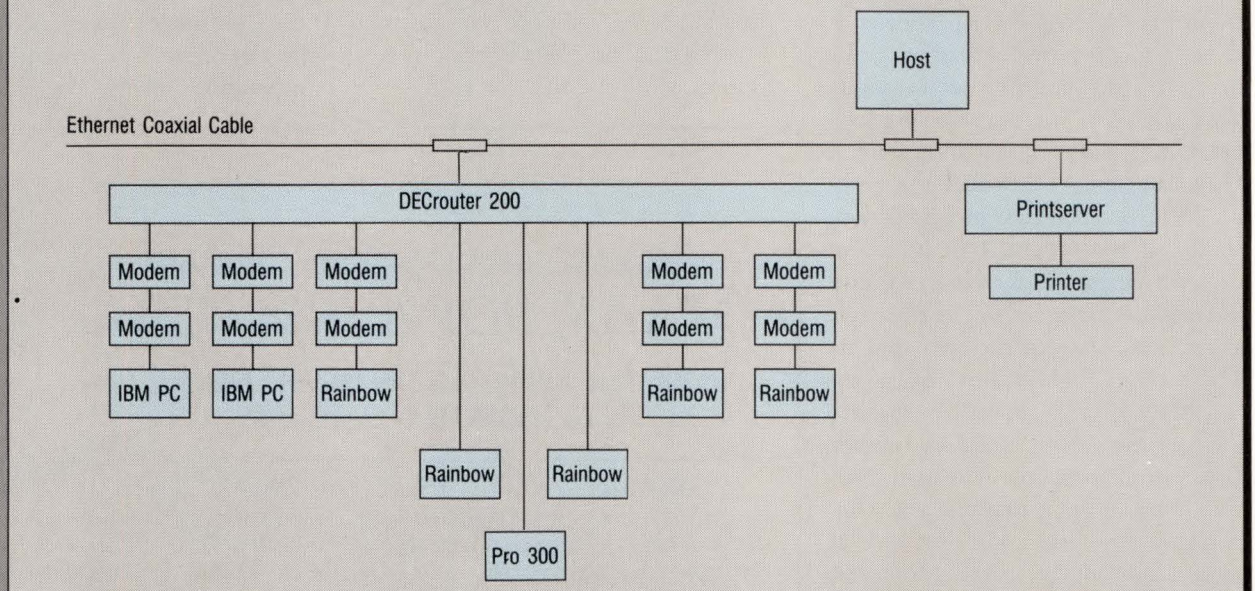
FIGURE 1.



Courtesy Digital Equipment Corporation

The DECrouter 200 connects up to eight Digital and IBM PCs, both local and remote, to Ethernet-based resources.

port when the server is loaded. To do so, the network manager gets into DRCP (it's located in SYS$SYSROOT:[DECSERVER]) and executes the following commands:

```
DRCP> SET LINE
  ASYNC-1 SPEED 9600
DRCP> SET CIRCUIT
  ASYNC-1 STATE MONITOR
```

At this point the node must be reloaded by the NCP TRIGGER or LOAD NODE command, or simply by powering down/powering up the router. Upon reload, the display automatically will activate on the terminal (if one is connected) and provide the network manager with information such as individual line use, CPU use, packets per second, buffer use, adjacent node information, etc.

One difference is the use of more coherent line and circuit identification terms. Rather than the standard cryptic designation of UNA-0 or something similar, the designation ETHER-1 is used. Similarly, the async ports are called ASYNC-1 through ASYNC-8, which is easier to remember than the traditional TT-0-1 or TX-0-7.

The DECrouter-200 software is capable of supporting level I routing and designated router functions on an Ethernet. Level II area routing is not supported on the DECrouter-200. By the support of designated routing functions, the DECrouter may function as a routing node for attached devices and also offload the DR duties from another unlucky node.

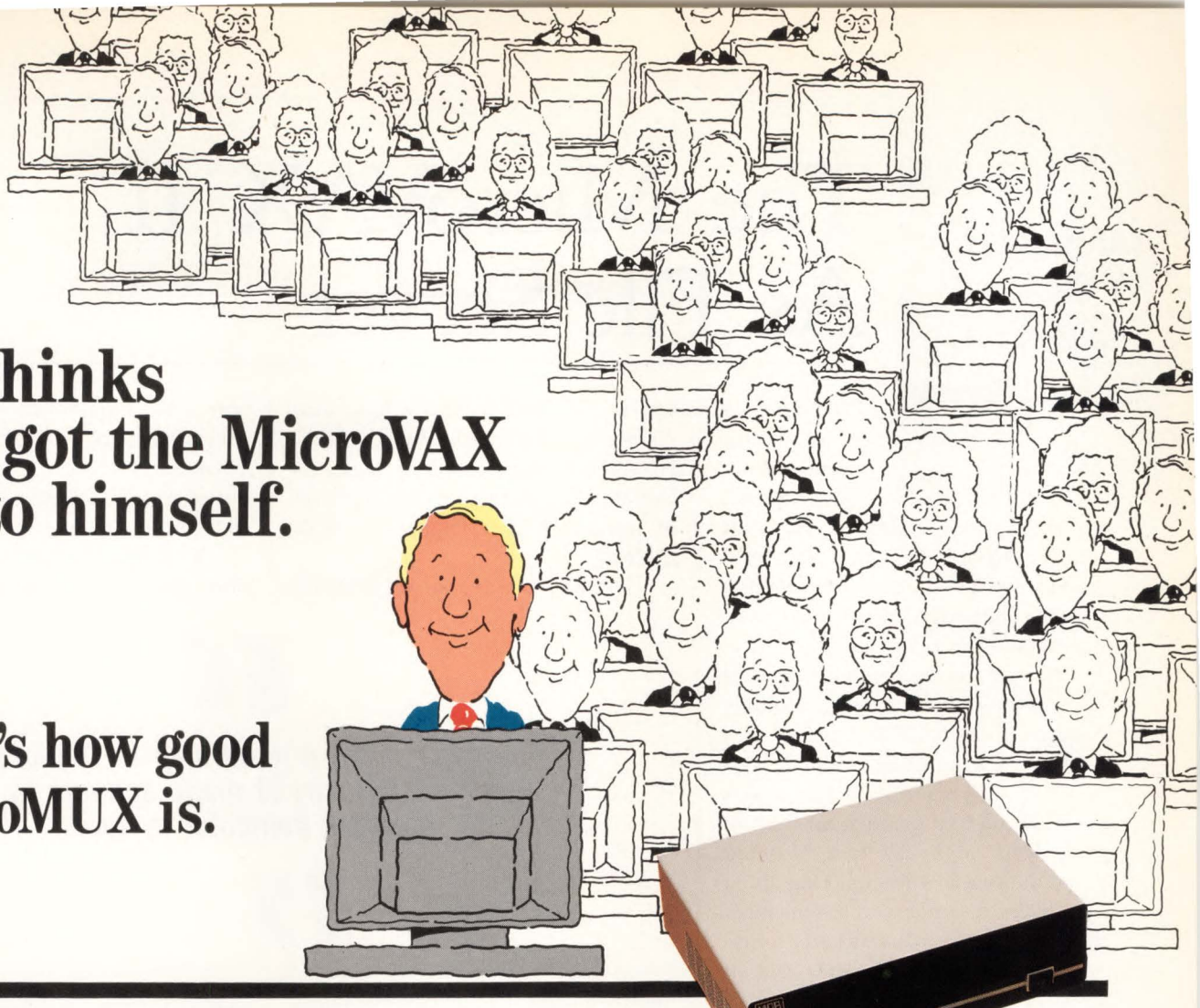
Documentation

The DECrouter-200 documentation is a noticeable improvement over previous documentation kits. Sections describe DECNET routing parameters fairly explicitly and provide a wealth of examples on how to configure and manage the router software. A troubleshooting section provides a step-by-step guide to troubleshooting the hardware and software. The DECserver/DECrouter hardware has four LEDs on the back (a great improvement over the DECserver-100's single LED) to help identify and diagnose various network ailments that may occur.

The DECrouter-200 is a valuable addition to the DEC arsenal of DECNET product offerings. The potential uses are interesting and exciting and it provides a reasonable way to offload the sometimes necessary routing overhead from expensive VAX nodes. Of note is the support for path splitting, which also will be included in future versions of DECNET.

The bottom line? DEC has produced a winner. The best part is that when or if the servitude of the router has elapsed, it can be reconfigured as a DECserver-200 terminal server. Simply reload the software. *—Bill Hancock is an independent systems and network consultant in Arlington, Texas.*

ARTICLE INTEREST QUOTIENT
Enter On Reader Card
High 821 Medium 825 Low 829



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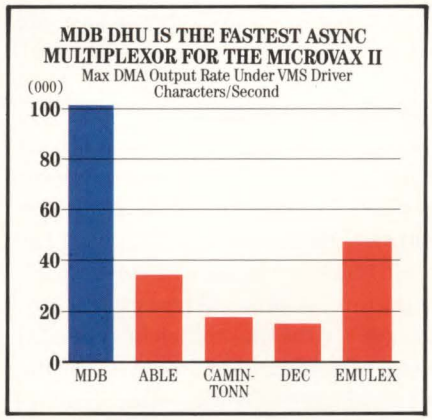

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MANAGING YOUR MICROVAX

The MicroVAX II As File Server

David W. Bynon

There's been a lot of hoopla recently about "file servers," and rightly so. File servers are a giant step in Digital's (and the industry's) grand scheme to decentralize computer systems. File servers are in their infancy, but WOW what a beginning!

File servers are computer systems with hardware and software specifically designed to provide data access, in a native format, to other computer systems; e.g., a group of PCs. File servers generally are configured as the heart of some form of Local Area Network (LAN), however, when thinking about file servers, it's important to remember that they come in many different forms.

For example, a VAXCLUSTER or Local Area VAXCLUSTER is a group of systems serving each other. My old S100-bus microcomputer system with four slave processors and one master, was also a file server system. It ran an operating system called TURBODOS, and the network was the computer bus. The systems just described are groups of processors located in close proximity to one another; it's possible to have file server systems that span a wide area.

Layers Of Success

One of the greatest things about Digital is its high-quality product consistency: VMS, DECNET, VIA products, etc. It's no surprise, then, that DECNET is at the heart of all of Digital's PC-to-VAX integration efforts. Whether or not DECNET is the most efficient system in terms of performance should not be the predominate issue. Yes, other vendors will produce faster PC-to-VAX file servers. Yes, other vendors will produce file servers with flashy functionality. However, no other vendor has the compatibility (up and down) and the level of integration that Digital has with DECNET.

DECNET-DOS is Digital's DECNET implementation for the IBM PC XT/AT. It's a robust set of DOS drivers, load-and stay-resident programs and utilities that allow IBM PCs (and most true compatibles) to participate in a DECNET network as an endnode (non-routing) system. DECNET-DOS supports asynchronous (DDCMP) and Ethernet communications. It has some limitations, however, which stem from the fact that the Intel 8088/8086 microprocessors and MS-DOS don't handle multiprocessing well.

DECNET-DOS Utilities

Like DECNET-VAX, DECNET-DOS uses a Network Control Program (NCP) to configure and manage the node's (local system) network components and to obtain information about the network. The DECNET-DOS NCP commands are similar to those of the VAX version, however, to the casual observer there seems to be a lack of continuity in the commands (see Screen 1). Unlike DECNET-VAX, DECNET-DOS doesn't have a matching volatile and a permanent database of network information. Therefore, DECNET-DOS doesn't support corresponding CLEAR/PURGE and DEFINE/SET commands.

To facilitate network file manipulation, DECNET-DOS provides a utility called Network File Transfer (NFT). NFT affords you the same network file access as with other DECNET systems; i.e., COPY, DELETE, DIRECTORY, TYPE, APPEND, etc. Numerous switches are available for NFT commands to control how files will be handled (see Screen 2). This is important because of the difference in file systems between DEC systems and PCs. NFT works perfectly; I routinely copy executable files from a PC to the MICROVAX, then back to another PC.

> ***"File servers are a giant step in Digital's (and the industry's) grand scheme to decentralize computer systems."***

To support file access to the networked PC, DECNET-DOS has two utilities: File Access Listener (FAL) and the Job Spawner (SPAWNER). FAL, like the VAX version, listens for incoming connect requests from remote systems. If a valid request is received, FAL transforms the request into the appropriate DOS function; i.e., DEL, COPY, DIR, etc.

As you might expect, FAL is security minded; only requests with the cor-

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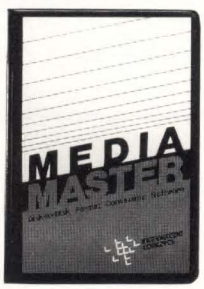

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```
C: / DECNET > NCP SET NODE 1.1 NAME BIFF USER BYNON PASSWORD NEVERTELL
C: / DECNET > NCP SHOW KNOWN NODES

Node Summary as of 4-MAY-1987 12:47:11

Executor node                          = 1.8 (JEFF)

State                                  = On
Identification                         = Young up and coming processors

Node        Node        Active     LAT        Account
Address     Name        Links                 Information

1.1         BIFF        1          L          /BYNON/...
              .
              .
              .
1.6         LIZ         0          LM         /SYSTEM/...
1.7         MUTT        0

C: \ DECNET > SET ACCESS USER RASOR PASSWORD WHOOPS ALL
```

PC Screen 1: Example DECnet-DOS NCP commands.

```
C: / DECNET > NFT COPY BIFF"BYNON NEVERTELL"::DUB1:[PUBLIC]*.*
C: / DECNET > NFT DELETE BIFF"BYNON NEVERTELL"::DUB1:[PUBLIC]*.*;*
C: / DECNET > NFT DIRECTORY/BRIEF BUFFY::SYS$PUBLIC:

Directory of: BUFFY::SYS$PUBLIC:

NEWS.TXT;3 AGENDA.DIR;1 PROCEDURES.DIR;1

C: \ DECNET > NFT SUBMIT CHAZ::BACKUP__ALL.COM
```

PC Screen 2: Example DECnet-DOS NFT commands.

rect access information (User/Password) are granted access. The Job Spawner, as its name implies, is a utility used to execute DOS applications from a remote system. It allows the PC to act as a server for performing any number of special applications, which must be developed by you. The FAL and SPAWNER utilities are useful for unattended access to your PC, but I don't like the idea that you lose all other use of the system.

Another useful feature of DECNET-DOS is its SETHOST utility. SETHOST is a virtual terminal service that allows the PC to connect to DECNET host systems. SETHOST supports two protocols: CTERM and LAT. CTERM is a wide area virtual terminal protocol that provides access to all types of DECNET networks. As an added benefit, CTERM supports multiple host sessions, much like a DECSERVER. LAT, on the other hand, is a local area transport protocol (Ethernet) and only supports one host session at a time. SETHOST emulates a VT102 terminal with limited advanced video support.

Two of the drivers supplied with DECNET-DOS permit PC users to use VAX systems as a shared resource for printing and disk storage. This capability is configured through the DECNET-DOS Network Device Utility (NDU). NDU allows the PC user to configure and control the use of remote printers and disks as if they were resident on the PC. The only apparent difference to the user is the access time of these devices; access to a DECNET-DOS virtual disk on a MICROVAX is about what you'd expect from a PC floppy drive. The only serious limitation I found is that multiple users can't have simultaneous read/write access.

A mail utility that allows the PC user to send, but not receive, mail to other nodes in the network is supplied with DECNET-DOS. The utility is useful, because it saves the PC user from having to log onto a VAX host to do the same. The utility is full featured, allowing the user to choose his own editor. It also has distribution list support, a personal message feature, carbon copy, default node address, and more.

DECNET-DOS Changes

I've been a DECNET-DOS user since version 1.0 hit the street. Back then it was limited to asynchronous DDCMP connections (which was better than nothing) and was sluggish. Version 1.1 was a big improvement because it introduced support for Ethernet, using 3COM and MICOM controllers, and added a truck load of new functionality. The newest version is not nearly as exciting; DECNET-DOS version 1.2 adds support for Digital's new DEPCA Ethernet/mouse controller and has some minor performance improvements.

What's missing in the DECNET to

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```
C> NET START REDIRECTOR
Network Kernel version 2.03
Datalink Version 1.1
DECnet DNP Version 1.1.16
DECnet Node Name 'JEFF' 1.8
DECnet Started
MS-NET/DECnet Session Version 1.5

DECnet LAT Version 4.27
MS-NET Redirector v1.09
Command completed successfully.

C> NET USE H: \ \ BIFF \ PCCOMMON
Command completed successfully.

C> NET USE LPT1: \ \ BUFFY \ SYS$PRINT
Command completed successfully.

C> NETTIME
  Time/Date serviced by node BIFF

  The current date is 06/07/87
  The current time is 17:46:49.00
Command completed successfully.

C>
```

PC Screen 3: Example MS-NET/DECnet-DOS startup/configuration.

```
                PCFS Administration Utility V1.1

                      Management Options

        1 - CREATE Client system Directory/Account
        2 - ADD a Personal Directory/Account
        3 - ADD a Node Registration Entry
        4 - ADD a Common Directory/Account
        5 - ADD an Application Directory/Account
        6 - ADD a Printer Queue Directory/Account
        7 - DELETE a Personal Directory/Account
        8 - DELETE a Node Registration Entry
        9 - DELETE a Common Directory/Account
       10 - DELETE an Application Directory/Account
       11 - DELETE a Printer Queue Directory/Account
  CTRL/Z - Exit from this Utility
Your selection?
```

MicroVAX Screen A: PCFS Administration Utility Menu.

DECNET-DOS link is the ability to provide transparent access to resources on the host systems. DECNET-DOS utilities simply don't feel like DOS (PC-DOS/MS-DOS) utilities. They force you to think in VAX file specification terms. Second, you can't use the virtual disk feature for shared file access. Sure, it's fine for PC users, but other systems (including the VAX hosting the virtual disk) can't get at the data. In short, DECNET-DOS is OK for the advanced user or for occasional access to organizational resources, but doesn't provide seamless integration.

Digital's Personal Computing Systems Architecture

To fill the PC-to-VAX integration gap, Digital developed a product for VAX/VMS systems called VMS Services for MS-DOS, also known as the Personal Computer File Server (PCFS). Complementing PCFS on the PC side is a software package called the VAXMATE operating environment. Collectively these systems form the Personal Computing Systems Architecture (PCSA).

PCFS consists of a standalone (detached) server program, an operations utility and an administrative aide utility. PCFS is not a big or even complex product, but what it does for PC users is fantastic. PCFS, the server, hibernates waiting for connection and service requests from client systems; i.e., the personal computers.

Once a client has connected successfully to a PCFS service, which simply is a matter of passing access control information for a VMS account, it then may access the established resource as if it were local. To support the client systems in their native MS-DOS environment, the PCFS server converts MS-DOS file I/O requests into VMS file I/O requests and translates the corresponding file and record structures (see Screens A and B). Translation of files and record structures is required because of the different way the two systems store data: VMS uses a 512-byte record structure while MS-DOS is based on 128-byte records.

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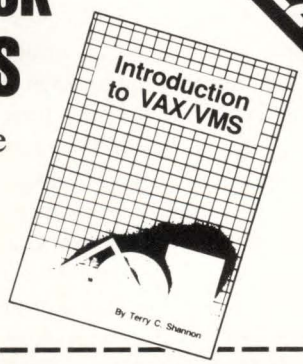

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```
PCFS> SHOW SESSIONS
  Workstation
          Id    Workstation     Connections     Open Files
           1    MUTT            1               0
           2    JEFF            2               4

PCFS> SHOW CONNECTIONS

Connection

Id          UIC          Alias       Workstation     Path

65536       [360,011]    ISWSYS      MUTT            SYS$SYSDEVICE:[ISSYS]
65537       [130,103]    BYNON       JEFF            DUB1:[BYNON]

PCFS> REFUSE CONNECTIONS
PCFS> CLOSE CONNECTION BYNON
Do you want to close the connection BYNON? [N]:Y
PCFS> SHOW CONNECTIONS

Connection
Id          UIC          Alias       Workstation     Path
65536       [360,011]    ISWSYS      MUTT            SYS$SYSDEVICE:[ISSYS]

PCFS>
```

MicroVAX Screen B: Example PCFS Operator Utility commands.

ment is a software package consisting of MS-WINDOWS, a subset of DECNET-DOS, MS-NET and numerous utility programs. The beauty of the package is how DECNET-DOS and MS-NET have been made to work in unison at the session layer, forming a transparent interface between the PC and one or more VAX hosts. With this software, any VAX directory structure can be defined as a local PC drive, and any VAX-based print device can be used as if it were connected directly to the PC. What's more, the VAX maintains protection of its directories and files from unauthorized users.

The Yuppies Get Visitors

In the May 1987 issue of *DEC PROFESSIONAL* (Vol. 6, No. 5) I wrote about our Yuppie Cluster (LAVC). It's here that I decided to install and test *VMS Services for MS-DOS* for future projects. As you may recall, the disk server (boot node) for the Yuppies is Biff, an overloved, underworked VAXSTATION II. Biff recently has been upgraded with a new chassis, high-capacity ESDI drives, and a cartridge tape subsystem (stay tuned for a feature article on: "A Day In The Life Of Biff"). The way I viewed it, he was just begging for more work.

The PCs I'm using for the test are an IBM PC with a hard disk and a very fast (Intel 80386 processor) IBM AT clone. Their names, respectively, are Mutt and Jeff. The reason for using two different systems was to test the effect they'd have on the server performance. What I found was distressing, but not unexpected.

One common misunderstanding about connecting PCs to larger host systems is that the PCs will help offload the larger CPU. Well, maybe. But in general, that's the wrong answer! The right answer is yes. If done correctly, PC-to-VAX integration provides unity and many other wonderful things, but has its price, especially if you don't think about what you're doing.

When running performance/load tests (as viewed from Biff) between the PCs, I found a significant difference in their requirements of the server. Because the PC is slow, it demands high CPU resources of the server. Reason: The server spends its time waiting for the PC to complete I/O operations. With the faster AT system, the role almost reverses; the Intel 80386 processor is powerful and can accept data as fast or faster than Biff can produce it. The latter case is preferred.

Mutt And Jeff Are Connected

Installing the VAXMATE operating environment on a PC is a simple operation. DEC has developed an almost foolproof installation procedure. This is fine because it hides the underlying system from the average user (unless you're like me, in which case it only stirs up your curiosity). In short, it's "user usable" and all that jazz.

At the crux of the system is a program called the MS-NET/DECNET command program (NET) and a handful of secondary programs and drivers that run in conjunction with it. It's here that the virtual magic is performed (MS-WINDOWS and the rest of the fluff has nothing to do with it). NET is used to start DECNET-DOS just as you would from AUTOEXEC.BAT, and to load the MS-NET/DECNET session layer (the link between MS-NET and DECNET) and the MS-NET redirector (see Screen 3).

The MS-NET redirector, REDIR.EXE, is a load- and stay-resident MS-DOS driver. Unlike most other MS-DOS drivers, however, the redirector is dynamic; the redirector can be commanded to establish and close logical

device connections on the running system. This is accomplished through the use of NET USE commands.

Biff Has The Final Word

To control and manage the PCFS server, Digital provides two utilities: PCFS_ADMIN and PCFS_OPERATOR. PCFS_ADMIN is a DCL command procedure that assists the system manager in creating and deleting PCFS accounts. It's

> ***"Digital's personal computing systems architecture is a jewel. It works, it's reliable and it's predictable. Best of all, it's just the beginning."***

nice in that it keeps you honest and makes sure all PCFS accounts are set up the same way. Be aware, however, that any VMS account can be used by the PCFS server if the PC user trying to connect to it knows the account name and password.

The PCFS Operator utility is used to control and monitor server connections. From this utility, the system manager can refuse or allow connection, show current connections, disconnect a current session, log events and more.

The Bottom Line

Digital's personal computing systems architecture is a jewel. It works, it's reliable and it's predictable. Best of all, it's just the beginning. Think of the possibilities: MACFS, IBMFS, WANGFS, etc. Whatever the future systems are, you can bet that Digital will provide a solution to pull them together. *—David W. Bynon is a VAX systems consultant in Washington, D.C.*

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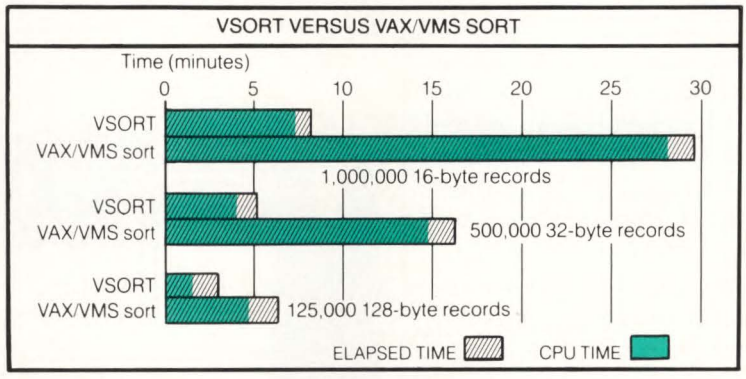

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DCL DIALOGUE

Kevin G. Barkes

Alarms And Excursions

The best feature of DCL is the ease of constructing useful utilities. This month's procedure, ALARM.COM, is a prime example.

The original version of ALARM.COM was written by James Robanske of U.S. West Network Systems Inc. in Bellevue, Washington. It arrived as I was preparing this month's column and trying to come up with a command file to demonstrate that you don't need hundreds of lines of code to perform meaningful tasks in DCL.

The procedure as it appears here operates identically to James'. I restructured the code to reduce the line count and to demonstrate the operation of several lexical functions. In such a small procedure, the "performance" increase gained by combining operations is almost negligible, and an excellent argument can be made against compacting code to the point of incoherence. There's also the matter of diminishing returns; i.e., is it worth spending several hours to optimize a command file that's executed infrequently and takes under a few seconds to execute in its original, expanded form?

ALARM.COM provides a handy method for sending yourself reminder notes via the VMS MAIL utility. The procedure has both interactive and batch "modes." When executed interactively, it builds a MAIL file and submits itself to the default system batch queue for execution. When executed in batch mode, it MAILs its message file to the user who submitted the job, then deletes the

TABLE 1.

Input Time	"Delivery Date"
+5	Five hours from the current time
+:5	Five minutes from the current time
17:30	Today at 5:30 p.m.
14-OCT-1987:2	October 14, 1987 at 2 a.m.
tomorrow + 12	Noon tomorrow
19-JUN	June 19 at midnight

PROGRAM 1.

```
! alarm.com
! original procedure by J. Robanske
! 11/15/86
! synopsis: alarm me at a certain time, and optionally
!           send me a personalized reminder note.
!
! syntax:   alarm [<time>] ["<message>"]
!
!           Time may be expressed in absolute or
!           combination time.
!
!           Absolute time:
!
!                dd-mmm-yyyy:hh:mm:ss.ss
!                TODAY
!                YESTERDAY
!                TOMORROW
!
!           Combination time:
!
!                An absolute time plus (+) or
!                minus (-) a delta time (dd-hh:mm:ss.ss)
!
!+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
!
$       IF F$MODE() .EQS. "BATCH" THEN GOTO DOIT
!
! Check command line for parameters 1 & 2
$       IF P1 .NES. "" THEN GOTO GOT_P1
!
$ GET_P1:
$       INQUIRE P1 "When"
$       IF P1 .EQS. "" THEN GOTO GET_P1
$ GOT_P1:
$       CHECKTIME = F$CVTIME(P1)
$       IF .NOT. $STATUS THEN GOTO GET_P1
$       ON WARNING THEN GOTO ERR_HANDLER
!
$ GET_P2:
$       IF P2 .NES. "" THEN GOTO FINISHED_P2
$       P2 = "You scheduled an alarm?"
$       INQUIRE MES "Any message (y/n) [n] "
$       IF .NOT. MES THEN GOTO FINISHED_P2
$       INQUIRE P2 "Message"
$       IF P2 .EQS. "" THEN GOTO GET_P2
!
$ FINISHED_P2:
!
! Build file name that message will be stored in.
!
$       TMPDIR  = F$TRNLNM("SYS$SCRATCH") + F$GETJPI("","PID")
$       RAWFN   = F$ELEMENT(1," ",F$TIME()) - ":" - ":"
$       FN = TMPDIR + RAWFN
!
! Write message to file:
$       OPEN/WRITE MFILE 'FN'
$       WRITE MFILE P2
$       CLOSE MFILE
!
! Queue alarm request
$       SUBMIT/NOPRINT/NOLOG-
        /PAR=('FN','F$EDIT(F$GETJPI("","USERNAME"),"TRIM")') -
        /AFTER = "''P1'" -
        'F$ENVIRONMENT("PROCEDURE")'
$ EXIT
!
$ ERR_HANDLER:
$       WRITE SYS$OUTPUT "Unable to queue alarm request..."
$       IF FN .NES. "" THEN DELETE/NOCONFIRM 'FN';*
$       EXIT
!
! Process the alarm request:
$ DOIT:
$       MAIL 'P1' 'P2'
$       DELETE/NOCONFIRM 'P1';*
$       EXIT
```

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message file. The "switch" controlling this functionality is the F$MODE lexical in the first line of the procedure. If the procedure finds itself executing in batch mode, it branches to DOIT:, the label preceding the mail processing command.

The command syntax for using ALARM interactively is:

```
@alarm [<time>] ["message"]
```

The first argument, time, can be in absolute or comparison form.

If you invoked the procedure with:

```
@alarm tomorrow "It's midnight"
```

you'd receive a MAIL message at midnight tomorrow containing the text, "It's midnight."
Table 1 shows a few other examples.

The F$CVTIME() lexical function checks the alarm time for accuracy and prompts the user if an invalid absolute or comparison time is specified.

If the user fails to supply message text at invocation or answers "NO" to the "Any message?" prompt, the procedure supplies the line, "You scheduled an alarm?" as the default message text.

Next, we need a file to contain the message to be mailed. The filename must be unique so the procedure doesn't grab the wrong file accidentally. See the code under the FINISHED_P2: label.

TMPDIR contains the current value of SYS$SCRATCH plus the process ID, such as DISK1:[USER]00002A1E.

The construction of RAWFN is a little trickier. The current time is returned by the F$TIME() call. A typical return would be:

```
17-MAY-1987 13:14:23.88
```

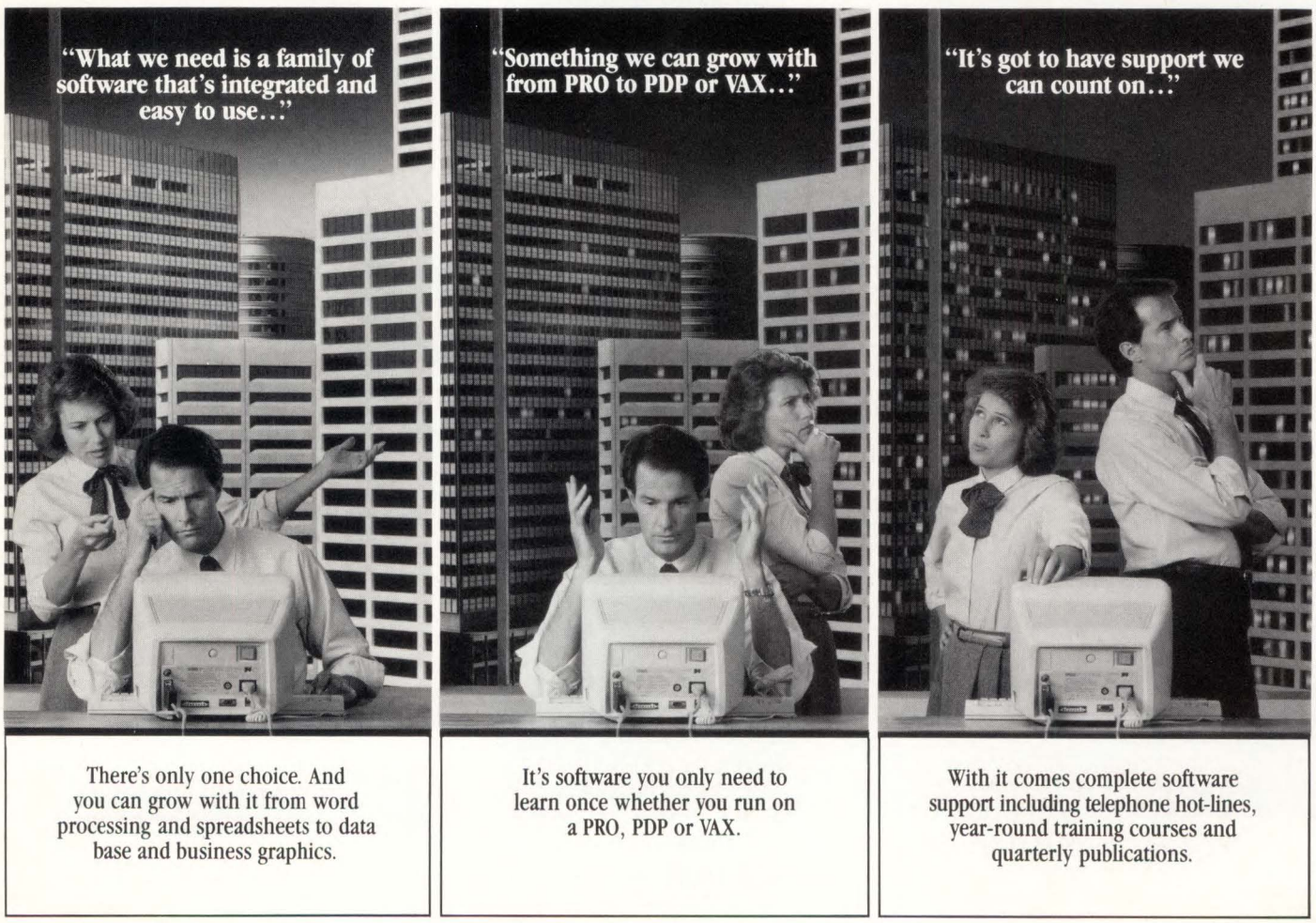
This string isn't usable as a VMS file spec because of the spaces and colons it contains. We solve that problem with the F$ELEMENT call, which returns 13:14:23.88. This is better, but the colons have to go. String reduction accomplishes this using -":"-":". RAWFN now contains the string 131423.88 which, when concatenated with TMPDIR, gives us:

```
DISK1:[USER]00002A1E131423.88
```

a perfectly legal and unique filename.

The message text then is written to the file, and the procedure submits itself to the default batch queue for execution. Note the parameters passed: FN, the symbol containing our unique filename, and the username of the process which invoked the procedure. Using F$EDIT to trim the trailing spaces off the USERNAME returned by F$GETJPI isn't really required; I included it just to show that it isn't necessary to use symbols to store the values used for supplying arguments and qualifiers to commands.

The last line of the SUBMIT command is the call to F$ENVIRONMENT ("PROCEDURE"), which returns the name of the command file currently being executed. A "hard-wired" filename,



such as SYS$LOGIN:ALARM.COM, also would work. The lexical call eliminates the need to re-edit the SUBMIT command should you rename ALARM.COM or relocate it to another directory.

One note on the SUBMIT command: It uses the VMS file identifier in locating the command file to be executed, not the filename. If you edit ALARM.COM and purge the old version, any jobs waiting in the queue will fail when they begin execution, because they will attempt to execute with the ID of the ALARM.COM file you deleted.

As mentioned earlier, James' procedure is a prototypical small MAIL utility. For something on the other end of the scale, see the August 1987 issue of *VAX PROFESSIONAL*, which contains a VMS MAIL message store and forward system (MSF). MSF is a handy thing to have around when you need to MAIL nasty messages to people, but would prefer they didn't receive them until you're safely out of the building.

Our reader comments this month come from ARIS, a great place to get rapid responses to inquiries on just about any DEC-related subject.

Tony Carter, a systems programmer at MIT Bates Linac in Middletown, Massachusetts, made an intriguing discovery concerning DCL efficiency while "mucking around in the microfiche."

"I found an interesting set of routines under the heading DCLDIET," Tony reports. The purpose of the routines, according to the comments in the code, is to "put a command procedure on a diet. They remove all comments and all unnecessary white space from a command procedure before actually running. So, other than the time spent reading in and then removing such things, comments and extra white space should not affect performance."

Tony piqued my interest with this one. Throwing disk quota considerations to the wind, I put together a massive command file. The first line wrote a message to SYS$OUTPUT; 14,000 comment lines followed, then a simple loop that executed twice before exiting, gathering and displaying CPU use.

When executed, the line written to SYS$OUTPUT appeared immediately. Obviously, the "diet" routines work as the file is read by the interpreter. It took 24 seconds of CPU time for DCL to whack through those 14,000 comment lines to the first CPU timing check; the second loop at the bottom of the ocean of comments took approximately .2 seconds, even though the label preceding the second loop was located at the top of the comment lines.

I've made a request to DEC for more information regarding the internal operation of the DCL interpreter. As soon as I hear something, I'll pass it along. *—Kevin G. Barkes is a specialist in VAX systems software, management, tuning and training, in Library, Pennsylvania.*

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LEGAL BUSINESS

Herbert Swartz

Louisiana Bayou

Thou shalt not overreach. This precept, long applicable to American businesses, applies equally to software manufacturers and other computer companies.

The teaching tool? A holding by a federal court in Louisiana that:

1. The shrinkwrap license, that omnipresent document included with new software for personal computers, is not a binding contract; and
2. Any state statute that attempts to legislate the shrinkwrap license violates federal copyright law.

No doubt software manufacturers will continue using the shrinkwrap license when selling their products. But to what legal avail? If the license isn't legally dead now, it's gasping its last few breaths.

Critics may contend that the demise of the shrinkwrap license is another illustration of excessive judicial concern for consumerism. Read, interference with legitimate business practices.

But software people have only themselves to blame. They boldly overreached. Consider the American system. You enter a store, select a widget, pay for it, and leave *owning* the product. The computer software purchasing system challenged that proposition. Software makers contend that the consumer is merely a licensee, not an owner of the software.

This contention is patent foolishness. No advertisement explained that you'll be paying but not buying. The store clerk didn't tell you and neither did a sign on the wall. In sum, you got less than you thought you were getting.

As rejoinder, software manufacturers claim you can return the package and get your money back when the shrinkwrap license pops into view; i.e., when you get home, unwrap the covering and discover the turgid legalese. If retailers operated that way, chaos would ensue, with vendors (and their lawyers, of course) striving to outdo each other in euchring the customer.

More cogent, that argument by software makers is beside the point. The issue involves two sections of The 1979 Copyright Act that software makers are trying to obviate.

Copyright laws provide creators a number of "exclusive rights" over their "works of authorship." Only the author can make copies, distribute or publicly display the works or copies of them. The exception is stated in section 109: "(T)he *owner* of a . . . copy (of a copyrighted work) . . . (may) without the authority of the copyright owner . . . sell or otherwise dispose of the possession of that copy . . . ." In other words, you can sell or give away a book you've bought, notwithstanding the rights of the copyright holder. A bookstore, owning the book, might choose to rent it ("otherwise dispose") rather than sell.

But, software makers don't want computer stores to rent software. They want to control the stream of commerce in which their programs are distributed. By declaring that you, the paying customer, are a licensee, not an owner as section 109 requires, software copyright owners tried to avoid the section and maintain control over the distribution.

Consider the American system. You enter a store, select a widget, pay for it, and leave owning the product. The computer software purchasing system challenged that proposition.

Likewise, they've tried to get around section 117, the computer-specific section of The 1976 Act. The section permits the owner of a copy of a program "to make . . . another copy or adaptation" as long as it's "an essential step" in "utilizing" the program or is for "archival purposes." But, a licensee isn't allowed to make copies.

Can software makers get away with this? For years they have, with the help of persuasive and expensive legal counsel. Legal theorists without clients to represent, however, have argued the

contrary but no legal case arose involving these legal issues.

Then Louisiana got into the act. It passed a *state* statute replicating the shrinkwrap license, thereby giving the force of state law to a private agreement. Thereafter, Vault Corporation, manufacturer of PROLOK, a computer-software security product, sued Quaid Software for violation of the Louisiana Software Enforcement Act.

The federal court said that a shrinkwrap license is a contract of "adhesion." Judges frown on contracts that are thrust upon the consumer, like the small print on the back of a parking ticket, a coat check and an insurance policy. The consumer never reads that print and the contract, therefore, isn't what the consumer understood, bargained for or agreed to. The shrinkwrap license falls into this category, ruled the court.

The statute, pressed upon the Louisiana legislature by software lobbyists, violates the doctrine of "preemption," the court continued. The doctrine holds that Congress is preeminent in certain areas, like declaring war, and states cannot diminish or alter what Congress hath decreed. When Congress passed The 1976 Act, it expressly legislated one copyright face for the nation and voided all existing state copyright statutes. The Louisiana statute, said the court, attempts to alter parts of The 1976 Act but "preemption" prevents any such attempt.

Legally speaking, the court hit a home run for the consumer but not a grand slam. It didn't declare flatly that the consumer is "an owner" and not a licensee, but in practical terms, what else can he be after he pays his money? If software makers still have a reed to wave, it's decidedly thin.

Another court decision is needed to say unequivocally that purchasing personal-computer software, at least as people now pay for it in computer stores, causes the passage of title; the paying party is the owner. No doubt such a decision can't be very far away.

The days of running to states for assistance have ended. When Louisiana legislated, similar bills were pending in a number of states and Illinois followed suit. Now all are negated. Let's hope that software makers have learned their lesson.

Parties can develop contracts under sections 109 and 117. The 1976 Act provides for situations in which both parties negotiate, explain their rights and concerns to each other, and understand and agree to what they're contracting for. Now they'll do the same with personal computer software. *—Herbert Swartz, a graduate of Harvard Law School, is a veteran writer on computer law.*

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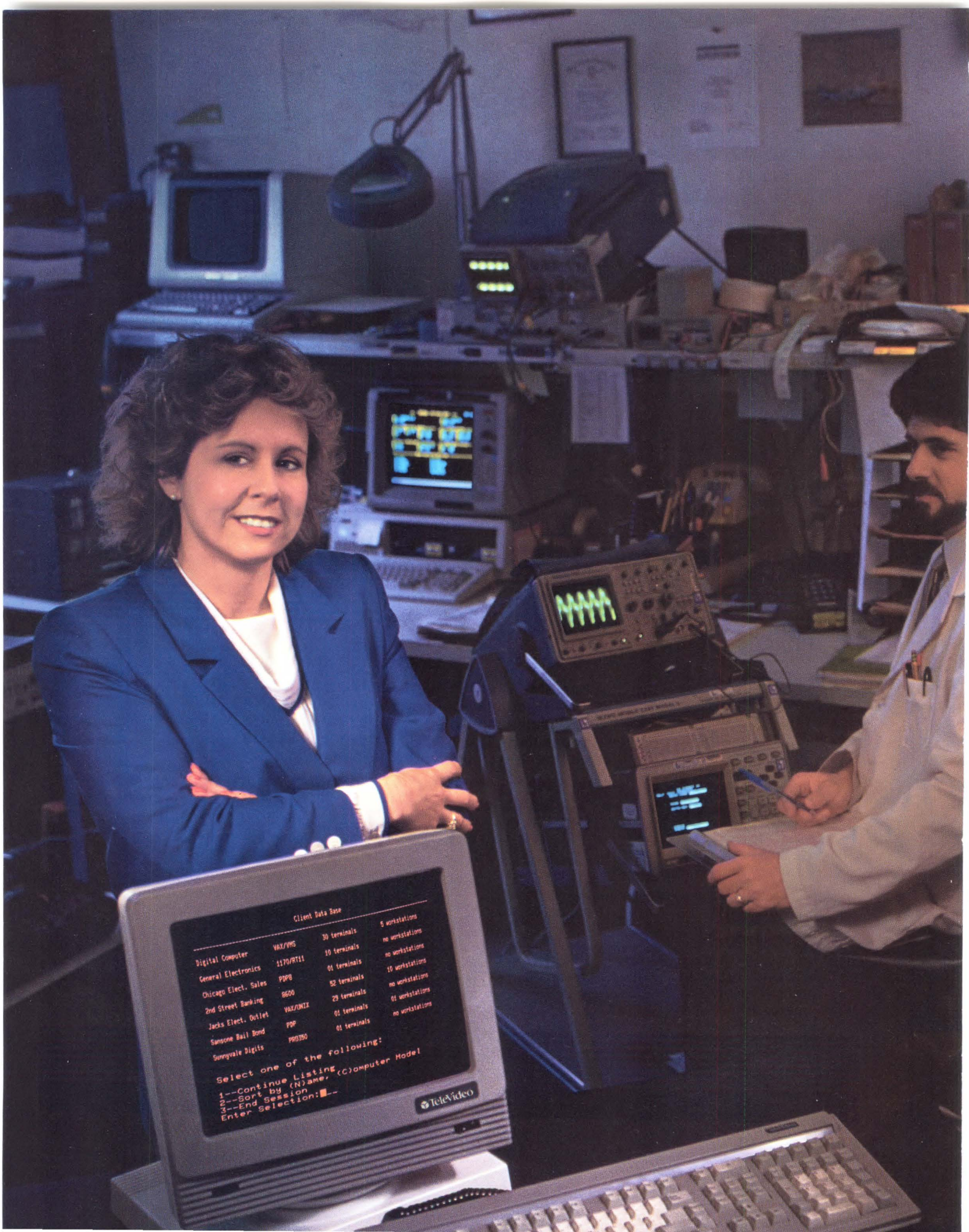
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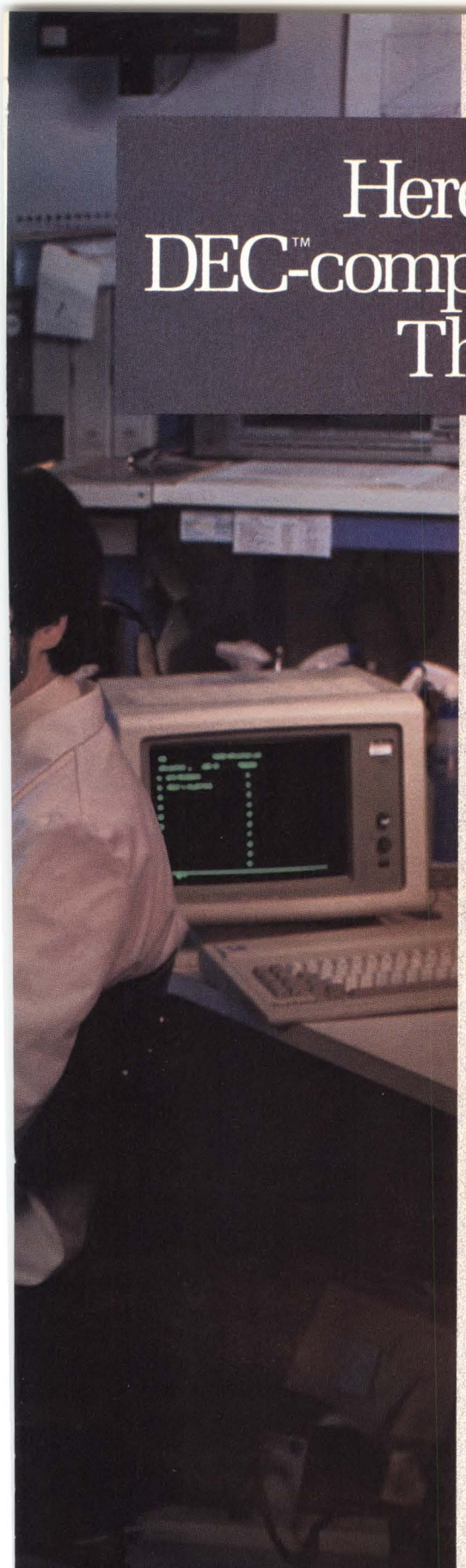
Select one of the following:
1--Continue Listing
2--Sort by (N)ame, (C)omputer Model
3--End Session
Enter Selection:
TeleVideo



Here's the most reliable DEC™-compatible terminal ever built. The TeleVideo 9220.

"Why do we own thousands of TeleVideo® terminals? Because we can't afford thousands of problems."

Susan Kennedy is a product analyst at Leasametric, a company that rents, sells, and services DP equipment all over the country. Including thousands of terminals. And if reliability is important to the average user, it's critical to Leasametric. Because everything they offer not only has to stand up to the rigors of shipping, but the extra wear and tear that rental equipment always takes. And if a Leasametric machine breaks down, so does the cash flow it generates.

So before Leasametric approves one unit, they tear it apart piece by piece. And give it an evaluation that makes an MIT exam seem easy by comparison. We talked to Susan recently, and these are just a few of the things she said:

"Too many terminals just don't measure up... I've seen machines with questionable ergonomics... keyboards that flex in the middle when you type... even cheap little diodes that could drop off... all these

9220 KEY FEATURES			
Super dark 14" amber screen (green optional)	✓	30 non-volatile programmable function keys	✓
Full VT 220 compatibility	✓	VT100 compatible keyboard	✓
DB25 connector for printer port	✓	Compose key disable control	✓
Tilt and swivel base	✓	Graphics model available	✓

"But with TeleVideo, the whole product is well designed. They start with solid engineering, and follow through with every detail, down to the steel brace in the keyboard. Overall, they've built the same quality into the 9220 that's made all their other terminals last so long. Obviously, we want to make sure that, two years from now, our equipment will still be working for us. That's why we feel so good about TeleVideo."

Of course, Susan is talking about quality and reliability. When you check the features you get for the money, we look just as good. As you can see from the chart above, the 9220 gives you full VT 220 compatibility. A 14" amber screen. And the best thought-out ergonomics around. All for only $619.

The TeleVideo 9220. If you'd like more information, or the name of your nearest distributor, call 800-835-3228, Dept. 131. In the meantime, we'd like to leave you with a quote from Susan Kennedy, "Keeping customers happy is what my job is all about. And TeleVideo definitely makes my job a lot easier."

FROM THE LAB

Dave Mallery

The Racal-Vadic 9600VP Modem

The way the extraordinary becomes the normal in our industry never ceases to amaze me.

My first contact with a sharable computer (an RCA BTSS) was done in 1967 at 110-baud dial-up over a KSR-33. That seemed blindingly fast compared to the 50-baud Telex machines that abounded then.

Recently, the world has adopted 2400 baud as the "new" cheap dial-in standard. We replaced all our ARIS modems with 2400s over the last few months. (ARIS is our online Automated Reader Information Service. See page 22 for information on how to dial in.) A rate of 2400 baud is enough for most full-screen applications, especially if you're price conscious. The time now between generations of modems is about the same as between generations of computers — about 18 months. Once a standard has been proved, casting it into cheap silicon is a matter of demand.

Life At 9600 Baud

The Racal-Vadic 9600VP is the second of a series of superperformance dial modems we've seen in the Lab. The high end now is filled with incompatible formats and protocols. It will take time for them to standardize. Meanwhile, if you need this kind of performance, you can afford the hardware. For instance, if you're habitually transmitting large amounts of data across the country, the phone savings alone will pay for your new modems in a few weeks or months.

The 9600VP intelligently switches between a lower-speed full-duplex mode (ideally suited to low-speed terminal interaction) and a half-duplex 9600 baud mode. The modem switches when it can't keep its buffer below 150 characters. A switch to 9600 rapidly remedies this by flushing the buffer down the line. This actually maps most interactive use typically found today (like working in a full-screen editor). Note that all this speed changing does not affect the speed at which your terminal is operating, or the speed of the connection to the computer.

The 9600VP offers high speed operation for rapid file transfer and lower line costs.

The modems include full error control. There's a small amount of overhead that always comes with error control. It's noticeable if your eyes are glued to the screen while you type; it's like the tiny delay you experience on statistical multiplexers. Like all lunches, you pay now and reap the benefits later when you need to paint the screen. It's annoying, but not enough to throw the product out.

There are three major areas of error control performed by the 9600VP. First, the modem monitors the number of retransmitted frames between modems. If a specific ratio of bad frames the speed is set back up. During error correction, the modem only requests retransmission of defective frames, rather than telling its mate to "go back n frames and repeat." In general, the Racal-Vadic implementation is suitable for consistent one-way transfers and interactive full-screen implementations, but not for small frame file transfers as in XMODEM and KERMIT.

I'm writing this from home at 9600 baud. Of course, most of the activity consists of my typing, and little screen painting. When I do it, the screen painting is a true 9600 baud. (Actually, a benchmark report sent with the modem claims a net 8800 baud, counting the overhead).

Installation Notes

I want to include a few notes on installing a new modem on your VAX. As usual, my only problems with the modem were in the installation of the unit on the computer end. The VAX has a wonderful assist in modem installation called $ SET HOST/DTE Txxx: where Txxx is, for instance, TXA0:

Through this simple expedient, you can verify that the connections are correct, the cables are the correct persuasion and the modem is really there by this simple expedient.

Once you've connected to the modem via SET HOST, you can configure it properly for auto-answer service.

The modem follows an extended AT protocol as well as its own proprietary conversation mode. I find the AT mode (Hayes) more convenient for configuration and the proprietary better for dialing and such from the other end.

The 9600VP Modem
Racal-Vadic
Corporate Headquarters
1525 McCarthy Boulevard
Milpitas, CA 95035
(408) 946-2227

Price: $1,495
Enter 604 on reader card

unit for auto-answer are as follows:

1. Make sure that the terminal port on the VAX is configured for MODEM, HANGUP and AUTOBAUD. This will allow the VAX to control DTR on that line, service several incoming speeds and allow the VAX to hang up.
2. Using the AT (Hayes) protocol, set up the following:
   a. ATS0 = 1 (Causing the modem to answer on first ring.)
   b. ATQ1 (No messages to computer like "ring," "connect," etc., that confuse the login.)
   c. ATE0 (No echo from modem.)
   d. AT&D2 (Makes DTR normal.)
   e. AT&C1 (Makes carrier normal.)
   f. AT*F1 (Sets flow control to send-only.)
   g. ATS2 = 127 (Prevents *this* modem from going into command mode via an echoed 'txt' from the remote modem.)
3. Then, when they're set (no more response), AT&W writes the configuration into the battery-backed configuration memory for safekeeping.

In fact, you can combine all of the above into a simple command line and do it en masse:

```
ATS0 = 1 Q1E0 & D2 & C1 * F1 S2 = 127 + W
```

Now the modem is configured to answer properly, and you've verified the correct connection to the VAX.

The modem has a memory for 15 numbers. All of the tricks needed in today's dial environment are there, including pauses, dial-tone wait, timed wait, memory chaining, etc. Once a number is in memory, you can dial it either by going into command mode (via CTRL-E <CR>) and giving the memory address, by the trusty old ATDT sequence, or by pressing the dial button on the front of the modem, followed by the memory slot number and the Enter key.

The physical package is small and attractive. It fits nicely under a phone, makes little heat, and requires no fan.

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High 869 Medium 873 Low 877

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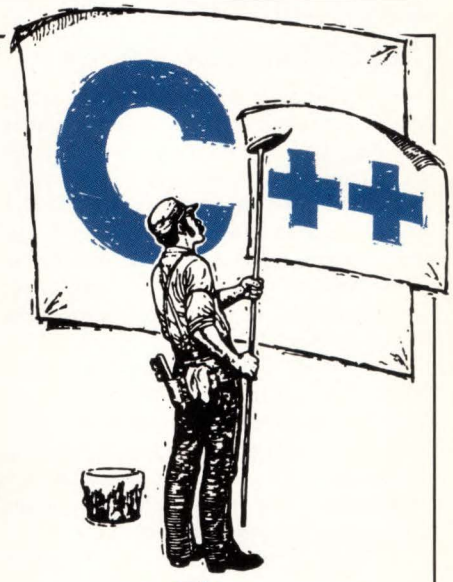

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ENTER 72 ON READER CARD

MARKETPLACE

Saxpy Introduces New Supercomputer Family

Saxpy Computer Corporation has introduced a new generation of supercomputers offering high-speed computing through matrix processing and integration into the VAX/VMS environment. The MATRIX 1 family is a series of four supercomputers that will serve the computational needs found in such areas as defense signal processing, seismic signal processing, image processing and numerical analysis.

MATRIX 1 software operates under VAX/VMS and includes a FORTRAN optimizing compiler, language-sensitive editor, simulator/debugger, signal-processing subroutine library, engineering and scientific subroutine library, primitive subroutine library and geophysical executive.

The MATRIX 1 family consists of four models: the MATRIX 1/250, 1/500, 1/750 and 1/1000. These modulars systems are priced from $896,000 to $4 million for a fully outfitted configuration.

Complete information is available from Saxpy Computer Corporation, 255 San Geronimo Way, Sunnyvale, CA 94086; (408) 732-6700.

Enter 907 on reader card

BBN Software Announces New DataProbe Package

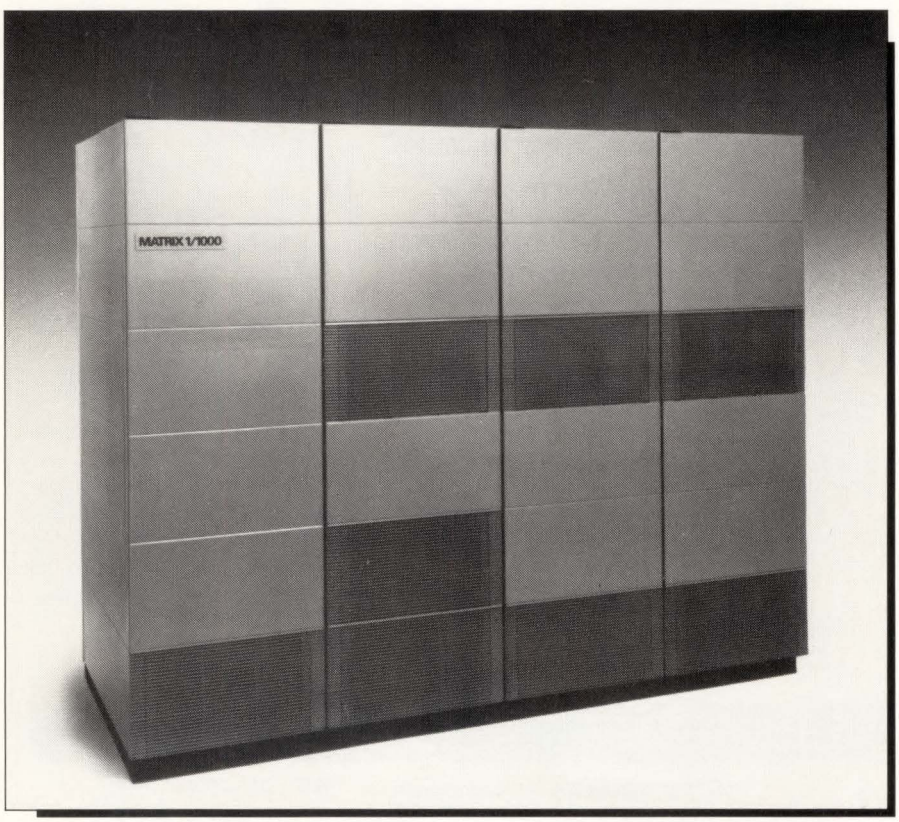
BBN Software Products Corporation announced the introduction of DataProbe software, a new interactive time series analysis and graphics system. DataProbe is designed for large-scale systems testing and time series analysis and gives analysts and engineers direct sharable access to gigabytes of source data. The system also contains its own high-level structured command language that allows users to create powerful, automated procedures for producing routine quick-look reports.

The DataProbe system can be used to analyze recorded data from a variety of sources, including telemetry and recording systems, wind tunnel tests, computer simulations and atmospheric testing.

The DataProbe system runs on DEC's line of VAX computers under VMS. Prices for a license range from $30,000 to $65,000 depending on VAX model.

For more information, write or call BBN Software Products Corp., 10 Fawcett St., Cambridge, MA 02238; (617) 864-1780.

Enter 905 on reader card



The MATRIX 1 family of four supercomputers from Saxpy Computer Corporation.

Battelle Software Tests For Chemical Hazards

A software program for companies to use in conducting safety analyses of hazardous chemicals is being offered by Battelle in a multiclient program. The software system, called Computer-Aided Safety Analysis (CASA), allows chemical companies, gas suppliers, and civil defense and licensing authorities to assess the consequences of potential chemical accidents by using simple computer codes.

The portable system, written in FORTRAN 77, is implemented on small computers such as the PDP-11, VAX and Apollo. For application it's sufficient to have a simple visual display unit and line printer.

Companies may participate in the one-year program for approximately $22,100, as of the April 1987 exchange rate.

To find out more, contact Battelle, 505 King Ave., Columbus, OH 43201-2693; (614) 424-3266.

Enter 903 on reader card

IES Aids The Explorationist

GeoQuest Systems Inc., which develops and markets integrated, interactive computer systems for seismic interpretation in the ex-

MicroVAX II Serves As Host To Pixar Computers

Pixar has announced new interfaces between the Pixar Image Computer and both the Silicon Graphics 3l00 series and DEC's MicroVAX II. These systems join Sun Microsystems' Sun-3 and Symbolics Inc.'s 3600 family as hosts for the Pixar Image Computer.

The Pixar Image Computer's new interfaces give MicroVAX II ULTRIX users in the medical and scientific community access to advanced image processing and computer graphics capabilities in one system.

The Pixar Image Computer's four-way parallel-processor architecture, integrated with a large picture memory, processes high-resolution digital data at 40 million instructions per second (MIPS) using one channel processor (Chap), and up to 120 MIPS with three Chaps.

The Pixar Image Computer is available for $79,000.

For further information, contact Pixar, P.O. Box 13719, San Rafael, CA 94913-3719; (415) 499-3600.

Enter 900 on reader card

ploration of oil and gas, has introduced its Interactive Exploration System (IES). With IES, the explorationist has the software and hardware necessary to increase his productivity by analyzing seismic and related data and identifying a potential oil drilling site five to 10 times faster than by conventional methods.

IES improves 2-D and 3-D analysis of seismic data, and its color graphics capabilities produce maps that pinpoint the most promising oil well locations before drilling takes place.

IES operates on the MicroVAX II and other VAXs. Its open-architecture structure permits IES users to integrate their own proprietary technology and interface with third-party applications and with corporation database systems.

To learn more, contact GeoQuest Systems Inc., 4605 Post Oak Pl., Ste. 230, Houston, TX 77027; (713) 622-8065.

Enter 904 on reader card

Chemistry Scan Expands Searching Capabilities

Western Union announced that it has expanded cross-vendor searching capabilities on InfoMaster online information retrieval service with the addition of Chemistry Scan.

Chemistry Scan encompasses 12 to 15 databases from different vendors to provide users with single-point access to most of the major chemical information databases. InfoMaster service bridges the gaps between online database vendors by scanning from all relevant databases in one operation.

Chemistry Scan offers fast, simple and economical access to an extensive source of chemical news and research for chemical engineers, physicians, scientists, researchers, insurance companies and other professionals requiring interdisciplinary information.

Most Chemistry Scan searches are charged at the regular InfoMaster service rate of $8.00, payable only if a search yields results. Online charges are 15 cents per minute ($9 per hour).

For more information, contact Western Union News Bureau, One Lake St., Upper Saddle River, NJ 07458; (201) 825-5000. Telex: 12452.

Enter 902 on reader card

LT/Care Plan Offered By Roeing Corporation

Roeing Corporation, a computer systems designer for the long-term care field, has introduced a new LT/Care Plan module for its complete LT/Family Of Software.

LT/Care Plan eliminates hand copying patient care plans from chart to chart. The new module allows multi-disciplinary teams to coordinate their interventions to each patient's problems, allows access to stored data on the facility's past approaches to problems, and quickens the amount of time it takes to maintain mandated documentation of patient care.

The LT/Care Plan module can retrieve stored historical data for review of past approaches to specific problems. It also allows a facility's administrator to group types of problems together to analyze trends. In addition it allows diagnosis of the patients to be done by ICD-9-CM coding or by the facility's own choice of coding or identifying the problems, interventions and goals.

The LT/Care Plan operates on DEC's PDP-11 line, the MicroVAX and the VAX. For additional information, contact Roeing Corp., 2433 S. Ninth St., Lafayette, IN 47905; (317) 474-5402.

Enter 901 on reader card

ARC Telecommunications Runs On DEC

System Analysis Corporation, developer of the Clini-CAL Laboratory Information System, announces a remote telecommunications software application that puts valuable laboratory information into the hands of physicians at remote locations. Automatic

Now! Optical Disk Mass Storage for VAX/VMS™ Users!

A Completely Integrated System Including Software.

The new Perceptics LaserSystem™ finally solves the mass storage problem for VAX/VMS users. Fully integrated, tested, and ready-to-use, LaserSystem features an OSI optical disk drive, SCSI host adapter, Perceptics LaserWare™ software, media, complete installation and on-site maintenance.

LaserSystem includes several advanced features, such as Direct Read During Write (DRDW) data verification, automatic bad block reallocation, and extensive self-diagnostics. A removable 12-inch cartridge is used to permanently store up to 2 GBytes of data.

Our revolutionary LaserWare software, which has become the industry standard, is completely transparent to your VMS utilities and applications. LaserWare requires **no changes** to your existing software.

perceptics

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Knoxville, Tennessee 37922
(615) 966-9200

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LaserSystem and LaserWare are trademarks of Perceptics Corporation.

...ox Subsystems ...vailable!

Result Communications (ARC) works within the framework of the Clini-CAL laboratory information system which runs on DEC computers.

ARC automatically transfers verified patient data to remote locations such as hospitals, physicians' offices and clinics. ARC stores user-specified telephone numbers and simultaneously transmits results over telephone lines using an auto-dial modem and an auto-answer modem.

ARC can transfer any type of Clini-CAL file over as many as 10 phone lines simultaneously. Printers set up at remote locations receive the results as they are generated.

Find out more by contacting System Analysis Corporation, One Hollis St., Wellesley, MA 02181; (617) 237-9500.

Enter 906 on reader card

Tektronix Introduces Gate Array WorkSystem

The CAE systems Division of Tektronix Inc. announced Gate Array WorkSystem, featuring automatic performance-driven layout.

The Gate Array WorkSystem provides the application-specific integrated circuit (ASIC) customer with a complete, highly integrated design environment for the creation of circuit designs on specific gate arrays. The system uses powerful design automation software to customize a gate array, from the schematic capture and verification stages through automatic, foundry-endorsed layout.

The Gate Array WorkSystem offers the designer and foundry an alternate path that streamlines and optimizes the gate array design process and gives the logic designer more control of the design process. It incorporates 100 percent automatic performance-driven layout in the gate array design process.

The Gate Array WorkSystem software is priced at $70,000 and supports a DEC or Apollo workstation.

For further information, contact Tektronix CAE Systems Division, 5302 Betsy Ross Dr., Santa Clara, CA 95054; (408) 727-1234, (800) 547-1512 or (800) 542-1877 in OR.

Enter 909 on reader card

Target Systems Unveils Target → Notify

Target Systems Corporation announced a new add-on software product for its Target → Calendar time and management software. Target → Notify is event notification software that automatically reminds users of their next important scheduled event.

With Target → Notify, each user defines the premeeting reminder time desired for the first event notification, and subsequent reminder time intervals if desired.

Price for the MicroVAX version is $395; the VAX 11/7XX is $595; and the VAX 8XXX is $795. The user also can override any individual meeting notification at any time, asking that no notification occur for that meeting.

An online demonstration of Target → Calendar is available by dialing (617) 481-8960 with a 1200/2400 baud modem and VAX-compatible terminal. Or contact Target Systems Corp., 33 Boston Post Rd., West Marlboro, MA 01752.

Enter 910 on reader card

PowerHouse Includes Relational And Graphics

PowerHouse 5.04 from Cognos adds support for DEC relational database to its exiting support for RMS files, includes graphics and offers performance improvements. The new PowerHouse Dictionary (PhD) allows a user

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Telephone: (713) 496-4004 for more information.
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to access Digital Rdb/VMS and RMS file structures and data.

Cognos also has embedded graphics in PowerHouse for high-quality business graphs. By learning five statements, users can create any combination of bar, line, point and pie graphs. Version 5.04 enhancements include an advanced terminal handler that supports online entry editing, single line entry recall and field-full signaling. These features shorten the time it takes to enter data. In addition, this version of PowerHouse supports files that have variable length records, and introduces 31 character entity names and 256 byte character strings for system filenames — standard VAX system characteristics. For further information, contact Cognos Corp., 2 Corporate Pl. I-95, Peabody, MA 01960; (617) 720-1503.

Enter 911 on reader card

Version 2.2 Enhances Reflection 2

Keyboard remapping and support of the IBM-enhanced keyboard now is available with version 2.2 of Reflection 2 terminal emulation software, announced developer Walker Richer & Quinn. Reflection 2 links IBM-compatible PCs with DEC minicomputers.

Version 2.2 comes with sample mappings for simulating the VT220 keyboard on IBM PC, XT or AT enhanced keyboard HP Vectra, and Key Tronic's KB-5151 keyboards. With a simple program for generating keyboard map files, users can create their own definitions to use with favorite applications or different hosts. Reflection 2 also provides accurate emulation of VT220, VT102 and VT52 terminals on IBM-compatible PCs.

Reflection 2 users can update to include the new features for $75, or at no charge if within their 90-day warranty period. Reflection 2 is priced at $199. The PLUS feature is an additional $50.

For more information, contact Walker Richer & Quinn Inc., 2825 Eastlake Ave. E, Seattle, WA 98102; (206) 324-0350.

Enter 912 on reader card

Gryphon Systems Creates The Temperature Sentry

Gryphon Systems has introduced the Temperature Sentry, a temperature monitor response-control device for VAX computer rooms. The physical unit is encased in a box that has four relays with status lights indicating their error level. The LED numeric display of the temperature in Fahrenheit or Celsius also shows error conditions, if present. The two control switches, one for Fahrenheit/Celsius and the other for program/reset/run mode, are located on the front panel.

There are four independent relays, each with separate logic and temperature trigger settings. Each relay can be programmed to send a string to the VAX, allowing a batch file to be run. This batch file could be used to signal the appropriate people and shut down the VAX. Four different levels of alarms can be activated because the relays are independent. A "program" switch lists the Sentry's current status.

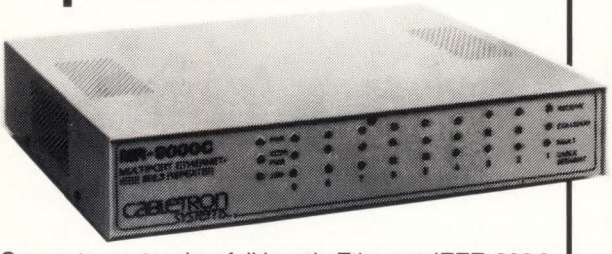
Temperature Sentry lists for $1,395. For further information, contact Michael Coleman of Gryphon Systems, 611 Wiget La., Walnut Creek, CA 94598; (707) 778-8808.

Enter 916 on reader card

SMS Controller Supports Optical Disk For MVII

A new multifunction controller designed to interface 5 1/4-inch optical disk drives to the

Ethernet Multiport Repeater MR-9000C



- Connects up to nine full-length Ethernet IEEE 802.3 segments together.
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- Compatible with Ethernet Versions 1.0 and 2.0 and IEEE 802.3 specs; also, UL-478; CSA 220; VDE 0806; VDE 0871 Class A; IEC 380; FCC Part 15, Subpart J, Class A.

In addition, Cabletron Systems manufacturers coaxial and fiber optic Ethernet/IEEE 802.3 repeaters, transceivers, multiport transceivers, LAN test equipment and in-stock, custom-length network cabling.

Ask for literature and prices.

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How many VAXes? _____ How many users total? _____

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MicroVAX II computer has been introduced by Scientific Micro Systems Inc. (SMS). The SMS 0109 provides a SCSI port that allows an optical disk drive to be attached to any MicroVAX II system running standard VMS software. The SMS 0109 supports one SCSI-compatible WORM-type 5¼-inch optical disk, two 5¼-inch ST412-compatible Winchester disk drives, or two ESDI-compatible drives with up to 760 MB of storage capacity, two 8-, 5¼- or 3½-inch floppy drives that support the following formats: RX50, RX33, RX01 and IBM PC XT/AT.

SMS also has introduced Optical System Software (OSS), a software utility and set of callable software routines that allow the VMS operating system to communicate with the Write Once, Read Many (WORM) optical disk.

The SMS 0109 controller is priced at $1,150 in OEM quantities, and the OSS carries a one-time charge of $2,000.
To find out more, contact Scientific Micro Systems Inc., 339 N. Bernardo Ave., Mountain View, CA 94043; (415) 964-5700.

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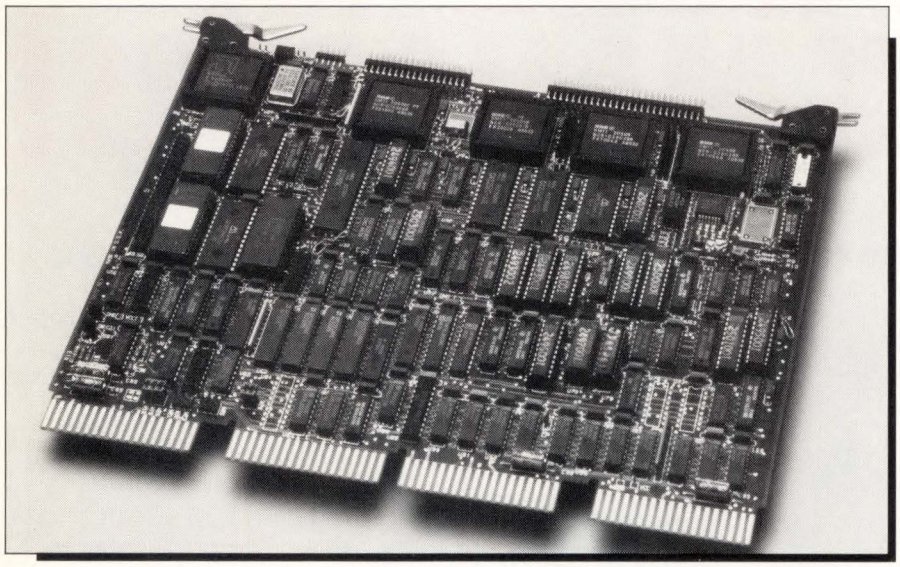

The SMS 0109 from Scientific Micro Systems Inc.

Megacard-MP Is For Q-bus/UNIBUS Machines

Imperial Technology Inc. announced the Megacard-MP, the second in a new generation of solid-state add-in random access disk emulators for DEC Q-bus and UNIBUS machines.

The Megacard-MP, packaged on standard DEC quad-size boards, plugs directly into existing system backplanes and is software and hardware compatible to MSCP protocol rotating disk drives.

The Megacard-MP system consists of

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- Call-Up Support Service
- Disk Corruption Recovery

James A. McGlinchey
(Author of "The RSX Clinic")
Software Engineering Consultant
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from one to four controller boards and from one to 16 memory boards. The memory boards each contain either 8 MB using 256K x 1 DRAM technology of 32 MB using 1 megabit DRAM technology. The total system capacity is, therefore, expandable up to 512 MB. An optional high-speed interface board provides a direct memory access port and allows data to be transferred at rates up to 12 MB per second to and from the Megacard-MP system.

For additional information, contact Jon B. Anderson, Imperial Technology Inc., 831 S. Douglas St., El Segundo, CA 90245; (213) 536-0018.

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ACT Announces Ada/1750 Compiler

Advanced Computer Techniques Corporation (NASDAQ: ACTP) announced the availability of a new release of its validated Ada/1750 Cross Compiler System. The release compiles programs faster, generates more efficient code, provides improved library management and facilitates debugging. The run-time executive also has been enhanced. The product runs on VAX series computers and generates programs for the MIL-STD-1750A — the 16-bit DoD standard computer used in real-time applications.

Host computer improvements include faster compilation speed and reduced resource use. This was achieved by reducing the number of processes, the amount of disk I/O, and the overhead of accessing the program library.

The library manager now includes sublibraries and symbolic debugging information, and provides enhanced security features. The library manager offers a tree-structured hierarchical database that aids development of large Ada systems.

Learn more by contacting ACT Corp., 16 East 32nd St., New York, NY 10016; (212) 696-3600.

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New Version Of Excelerator Introduced

Index Technology Corporation introduced a new version of its Excelerator systems analysis and design software for VAXstation models running the VAX/VMS operating system. The new software allows multiple Excelerator users to share data seamlessly in the VAX environment.

The VAXstation version of Excelerator provides a comprehensive and fully integrated commercial systems development environment for DEC users. Using Index Technology's XL/Design Integrator (XL/DI) software, teams of Excelerator users developing information systems on multiple VAXstations can share project and design data concurrently across a DECnet network, using the host VAX for storage, analysis and batch processing of reports and other documentation.

The VAXstation version of Excelerator supports all DEC laser printers and runs on all VAXstation models, including the VAXstation 2000.

It is priced at $8,400 per copy.

To obtain more information, contact Jessica Solodar, Index Technology Corp., One Main St., Cambridge, MA 02142; (617) 491-2100.

Enter 917 on reader card

Lexadica Offers NUCLEUS V1.0

Lexadica Software Inc. announced the release of Version 1.0 of the NUCLEUS Menu System. NUCLEUS enables a VAX/VMS

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system manager or software developer to build powerful and flexible end user menus in minutes. NUCLEUS menus also can be invoked from the DCL prompt.

A NUCLEUS menu is a DCL command procedure centered around a MENU command that specifies the allowed application and common selections and performs the menu display, user input, and help display. The application selections are processed in the menu command procedure with the complete power and flexibility of DCL. The common selections invoke general-purpose functions such as word processing, spreadsheet and electronic mail. The open architecture of NUCLEUS allows the integration of whatever software packages are desired to perform these functions. Different users also can access different packages of the same class under the control of the NUCLEUS User Authorization File.

Learn more by contacting Lexadica Software Inc., P.O. Box 22822, Lexington, KY 40522; (606) 269-6971.

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V120A Completes PC Connection Plus More

System 1022 DBMS version 120A, from CompuServe, includes more PC interface capabilities, System 1022 forms, and support for variable-length text attributes.

System 1022 users now can move PC data to the DECsystem. They also can download System 1022 data to a PC, manipulate it using PC software, and return the results to the mainframe. Applications can integrate PC and DECsystem data and programs to provide a computing environment that takes advantage of the strengths of both computers and frees up DECsystem resources.

Users can design System 1022 applications that make adding, updating, and exploring data easy. This is done using the System 1022 programming language and its new integrated forms facility. Users don't need to learn or use another language or software package.

A System 1022 license costs $22,500 to $72,000 depending on the hardware and software configuration.

For more information, contact CompuServe Data Technologies, 1000 Massachusetts Ave., Cambridge, MA 02138; (617) 661-9440.

Enter 919 on reader card

3-D Graphics Library For VAXstation

Flying Moose Systems announced that HOOPS, the company's 3-D graphics development system for engineering workstations, has been ported to the IBM PC and VAXstation 2000. Hoops 2.0 provides developers with an extensive set of 3-D graphics development tools not previously available. Main features of the system include an object-oriented structure, orthographic and perspective viewing, hidden line/surface removal, lighted surface rendering, and a hierarchical graphics database.

The new release contains high-level utilities that will enhance user interaction plus pixel arrays for image processing applications. In addition, the EGA, AT graphics boards (capable of real-time 3-D graphics), and an optimized X Window driver have been added to the list of supported devices.

Primary licenses are from $875 for micros to $3,000 for engineering workstations.

To learn more, contact Gary Wayne, vice president at (607) 273-3690.

Enter 920 on reader card

SYCO Systems Offers New And Upgraded Products

SYCO System Communications Inc. announced new products and major enhancements to its existing software package Automatic Backup. New products added to the After Hours Software line include automatic defragmentation, automatic modem controller, appointment calendar and phone book management, backup and restore by UIC or username, GIGI-backup, optical disk WORM's backups, tape librarian management.

Prices for VMS range from $70 to $1,250.

To find out more and get specific price quotes, write or call SYCO System Communications Inc., 165 Mechanic Street, Box 838, Leominster, MA 01453-0838; (617) 534-6499.

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Modgraph Announces 15″ Graphics Terminal

Modgraph recently announced GX-2000, the latest addition to its series of high-resolution graphics terminals. GX-2000 offers a 15-inch monochrome screen with display resolution of 1024 x 780 from a virtual address area of 4096 x 4096. Full graphics compatibility with Tektronix 4010/4010 is provided, as well as VT52, VT100 and VT220 alphanumerics.

The basic unit is provided with many standard features. Options include additional graphics memory, TEK 4631 hardcopy interface, mouse or data tablet. An enclosure houses the monitor, control electronics, and power supply. Standard I/O features include Host RS-232/20ma port, RS-232 Mouse/tablet/printer port and VT220-style keyboard. The Tektronix 4631 Hardcopy interface is available as an option on the GX-2000.

The basic unit lists for $1,495.

To find out more, contact Modgraph Inc., 149 Middlesex Turnpike, Burlington, MA; (617) 229-4800.

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Co-Pilot 140 Provides Power To PCs

Applied Research & Technology Inc. introduces the Co-Pilot 140, an online power system. A new technology, Continuous Parallel-Power System (CPS), provides a means to a comprehensive and affordable hardware and data protection system. This product protects against all power distribution problems, thereby ensuring the integrity of data and the protection of equipment.

The Co-Pilot CPS boots up and runs a fully loaded AT-type computer and most other personal computers for approximately two hours during an outage. It also protects your computer and data against brownouts.

The Co-Pilot CPS includes EMI/RFI filtration, surge and spike protection, thermal circuit breaker protection, plus AC distribution control.

More information can be obtained by contacting Applied Research & Technology Inc., 6400 Powers Ferry Road, Ste. 110, Atlanta, GA 30339; (404) 951-9556.

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WY-99GT Offers ANSI, ASCII Compatibility

Wyse Technology announced the WY-99GT terminal that offers full ANSI, ASCII and PC compatibility plus graphics in one unit.

The WY-99GT offers extensive flexibility with more than a dozen compatibility modes for text and graphics applications. Its multiple keyboard options allow users to work in the ANSI/DEC VT220, multiuser PC or ASCII terminal environments. In addition, the WY-99GT's dedicated graphics co-processor provides compatibility for the most popular graphics standards.

The WY-99GT is priced at $649.

Learn more by contacting Wyse Technology, 3571 N. First St., San Jose, CA 95134; (408) 433-1000. Telex: 371-9730, FAX 408 946 3496.

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MDB Announces New DR11-W Module

The new dual-size MLSI-DR11-W PLUS module enhances the system performance of DEC's MicroVAX II and other Q-bus computers where 16-bit DMA I/O data transfer is required. The DR11-W PLUS features the

MDB unique DMA Throttle plus block mode DMA transfer and double buffered I/O registers and will operate in either asynchronous or synchronous mode. The module also can be strapped to provide DRV11-WA operation, which is a functional subset of DR11-W.

The DMA Throttle is used to overcome surge conditions for data transfer to devices that "hog" the Q-bus. The DR11-W PLUS allows you to specify the average throughput rate of the DMA link or port, and then set the "throttle" to prevent the rate from exceeding the set peak rate.

Selection of Address, Vector, or Priority Interrupt Levels is accomplished by dip switch settings. I/O connection is by two 40-pin connectors.

The MLSI-DR11-W PLUS module has a list price of $1,050.

For more information, get in touch with MDB Systems Inc., 1995 North Batavia Street, Box 5508, Orange, CA 92613-5508; (714) 998-6900. TWX: 910-593-1339.

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Lucas & Lucas Announces LN02 Font Library

Lucas & Lucas announced the release of its library of downloadable type fonts for DEC's LN03 and LN03-PLUS laser printers. These fonts comprise a complete family of publication-quality proportionally spaced letterforms, including a comprehensive collection of technical, scientific and legal symbols.

Since LN03 font files consist entirely of printable ASCII characters, they can be used with DEC and non-DEC computers to which the LN03 can be attached.

The fonts are offered in sizes from six to 60 points, and in a variety of special renderings, including gray-shading and white-on-black styles. Fonts also can be ordered rotated to arbitrary orientations. These features give the document designer the flexibility of outline fonts combined with the speed and image quality of prerasterized fonts.

Prices range from $50 for single fonts, to $1,200 for a package containing more than 50 fonts and $1,600 for a comprehensive collection of more than 90 fonts.

For more information, contact Mark Ohlund, Lucas & Lucas, 351 Barclay Ave., Pittsburgh, PA 15221-4058; (412) 271-5845.

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New Graphics Terminal With VT-DRAW Software

VT-DRAW from Bunyip Software is a low-cost character-graphics screen editor that creates documents with orthogonal line drawing characters and text. Boxes, lines and other special symbols can be intermixed freely with standard ASCII or DEC multinational characters to produce professional-looking documents without need for a special graphics terminal or printer.

Full documentation is provided with online help for DCL invocation, screen editing and internal commands. The screen is a true representation of the output file. The input file may be any standard text file, or a file created by VT-DRAW. The output file may be displayed on the terminal with the DCL TYPE command.

Hardcopy may be printed on a LN03 laser printer or LA50, LA75, LA100 or LA210 dot matrix printers by means of three other support utilities. A simplified pure ASCII file can be created for output on a line printer. All keystrokes may be journaled for easy recovery from system crashes.

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Price is $250 including software support, documentation and associated printer utilities.
For further information, contact Bunyip Software, 10680 Minette Drive, Cupertino, CA 95014; (408) 725-8154.

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GURU Software To Run On VAX

Micro Data Base Systems Inc. (mdbs) has released GURU software to run on DEC's VAX series of computers. GURU is an expert system environment combining reasoning with familiar information management tools such as relational database, spreadsheet and forms management.

The VMS and ULTRIX versions include GURU's V1.1 features, and support full record and file-locking capabilities. GURU's compatibility with DECNET allows remote consultations and database access. Applications can be transported between minis and micros.

Depending on hardware configuration, prices for GURU VAX versions range from $17,000-60,000. GURU also is available for DEC VAXmate, IBM PC, and other popular computers.
For more information, contact mdbs, P.O. Box 248, Lafayette, IN 47903; (317) 463-2581.

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Tartan Validates Ada Compilers

Tartan Laboratories validated two Ada compilers — Ada implemented on the VAX and running the VMS operating system, and a cross-compiler from VAX/VMS to MIL-STD-1750A.

Tartan's Ada compilers translate the Ada programming language into instructions that computers can execute. Tartan has developed proprietary software tools that produce performance-oriented, high-quality compiler components. This technology uses sophisticated optimizations allowing the compiler to produce fast and compact object code, critical to real-time defense systems.
For additional information, write or call Tartan Laboratories Inc., 461 Melwood Avenue, Pittsburgh, PA 15213; (412) 621-2210.

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Jnet 3.1 Upgrades VAX/VMS Link To IBM Mainframes

Version 3.1 of Jnet, software for networking VAX/VMS systems to IBM mainframes, is available. Version 3.1 adds the bisynchronous Network Job Entry (BSC NJE) protocols used by IBM's Remote Spooling Communications Subsystem (RSCS) V2 and Job Entry Subsystems to the previously supported VM-to-VM bisynchronous (VMB) protocol.

Jnet permits file transfer, electronic mail exchange, and interactive communication on a peer-to-peer basis. By emulating IBM's RSCS Networking Program Product, Jnet allows VAX systems to become full routing members of IBM NJE networks.

Jnet runs under VMS V4.2 and later and is priced by VAX model; license fees range from $7,000 — $23,500.
To find out more, contact Joiner Associates Inc., 3800 Regent Street, P.O. Box 5445, Madison, WI 53705-0445; (608) 238-8636. Telex: 650-110-6813.

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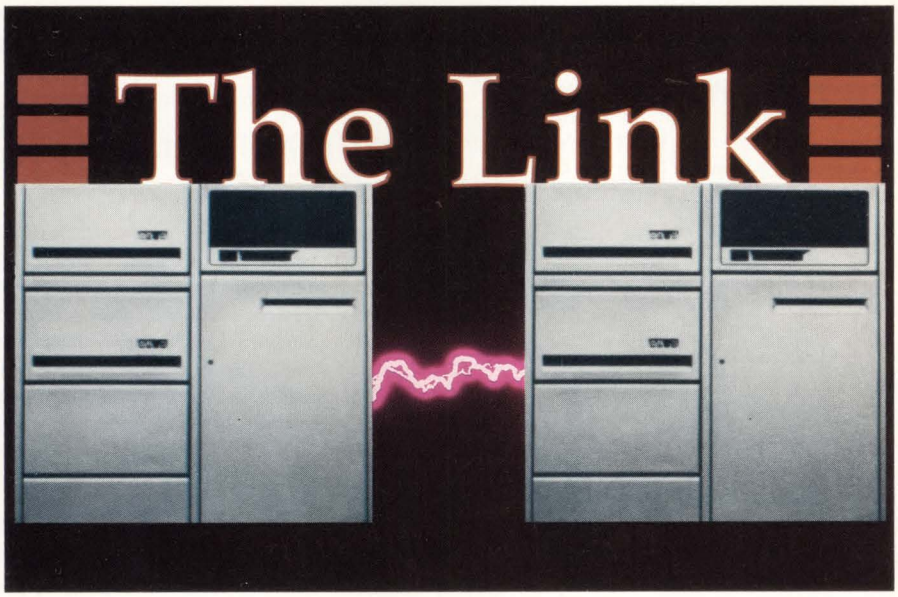

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Since its introduction, the PDP-11 has been one of the most reliable systems for data processing departments world-wide. Unfortunately, the CPU capacity of even the largest PDP-11 can't handle the growing needs of today's organizations. But now there's The Link, the solution to CPU bound PDP-11's running RSTS/E.

The Link gives new life to your system by enabling two interconnected machines to act as one. It actually doubles CPU power and allows your users transparent disk access (including full file protection and record locking). Best of all, The Link doesn't require any modification to your existing application programs and it uses standard DEC hardware.

The Link includes:

- Communication interface hardware
- Link system software
- Complete documentation

Long live the PDP-11!

For more information on The Link or for a 30 day free trial call:

Northwest Digital Software, Inc.
West 405 Walnut, P. O. Box 1797
Newport, WA 99156
Phone: 509-447-5631

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Linkware Unveils Mac Connection

Linkware Corporation announced the release of the Mac Connection for Macintosh XL, Macintosh 512 and 512E, and Macintosh Plus and Macintosh SE users. The Mac Connection works with host-based Linkware software to provide direct access to mainframe and minicomputer files.

With Mac Connection, communications can occur between a Macintosh and a host computer, two Macintoshes, and a Macintosh and an IBM PC or other personal computer. Information can be transferred in Macintosh format, in binary format, or in text format. Macintosh users now can connect to IBM, DEC and UNIX host computers.

The Linkware Mac Connection is priced at $300 in single quantities. Information Server pricing varies with host system type and configuration.

To find out more, get in touch with Linkware Corporation, 128 Technology Center, Waltham, MA 02154; (617) 894-9330.

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PC-Optical Subsystem Permits Files Of 200 MB

Optotech Inc. has enhanced and repriced the Laser Databank, its "plug-and-play" write-once optical storage subsystem for PC-compatible computers.

The subsystem's read-write device driver has been enhanced to overcome the 32-MB barrier in MS-DOS. Users can create files of up to 200 MB in size and use the entire surface of the 5.25-inch optical disk for a single file if needed.

The driver enables off-the-shelf PC-DOS software to write to and read from the optical drive as if it were a standard magnetic drive. The driver's functions are transparent to the end user, who uses standard DOS commands. Optotech data files are transportable between PC, VAX and UNIX environments.

Priced at $2,950, volume discounts are available to VARs and systems integrators. To obtain more information, contact Optotech Inc., 740-770 Wooten Road, Colorado Springs, CO 80915-3518; (303) 570-7500. Telex: 592966. FAX: 303 574 9891.

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Design/Routing System Ports To Prime Platform

Shared Resources has ported its high-end PCB design and routing package, the Koloa System, to the 50 Series line of 32-bit superminicomputers from Prime Computer Inc.

The Koloa PCB Design System can be ported to most hardware platforms with an electrostatic plotter interface and a FORTRAN 77 compiler. In addition to 50 Series computers from Prime, the Koloa System currently runs on all IBM mainframes, Elxsi 6400 Series systems, Multiflow's Trace series of minisupercomputers, Canann 5800 series computers, VAX 750/780 series computers and Apollo workstations.

To get more information, contact Shared Resources, 3047 Orchard Parkway, San Jose, CA 95134; (408) 434-0444.

Enter 946 on reader card

Touch Input Capability For DEC VT241

Interaction Systems Inc. announced capacitive touch input capability for DEC's VT241 terminals. By attaching a standard Interaction Systems 14.5-inch touch screen to the CRT, installing the associated Interaction Systems touch controller board inside the VT241 terminal and connecting the touch screen to the controller via a single cable, you can input and access data via touch. This design also incorporates the VT241 power supply.

Some features include: "skew compensation" for accurate registration of touch screen and raster image; "write default" for storage of touch system parameters in non-volatile RAM; and specification of touch response rates from 50 MS to 500 MS.

Prices in OEM quantities for the Interaction Systems touch screen and controller for the VT241 range from $295 — $395. For product and pricing information, contact Interaction Systems Inc., 130 Lincoln Street, Brighton, MA 02135; (617) 789-5900. Telex: 753 582.

Enter 947 on reader card

Security Dynamics Offers Access Control System

Security Dynamics Inc. announced expanded capability of their Access Control System (ACE) to include DEC's VAX/VMS product line. Now any user running VMS 4.4 (or more recent releases) can be assured of computer access control.

The system consists of two components. The software component runs under the VAX/VMS operating system and runs a time synchronized algorithm. The hardware component, the SecureID card, is carried by the user. It's a credit card sized device that contains a microprocessor, power source, RAM and ROM memory, and a visually readable LCD display. When a user wishes to log onto a system protected by Access Control System, he types the number on his card into the system and a brief secret Personal Identification Number (PIN) on the same line and hits return. If that number matches the number that the computer has calculated, entry is permitted.

Once into the system, the user will notice no changes in computer operations. The system is fail-safe because an individual's code number changes every 60 seconds. The card cannot be counterfeited. It self-destructs if tampered with. Old codes are worthless and the next code cannot be predicted. Observation or electronic evesdropping is useless. Passwords can't be loaned out.

To obtain pricing and other information, write or call Security Dynamics, 2067 Massachusetts Avenue, Cambridge, MA 02140; (617) 547-7820. Telex: 510-601-2924. FAX: 617-354-8836.

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Intellisys Aids End Users

Intellisys, from Genex Technology Group, is an intelligent menu-driven tool that allows end users and data processing professionals to develop custom database applications quickly and easily. No programming is required to develop, test or operate serious filing, forms management, accounting and manufacturing applications. First-time users can develop applications within a few hours. Experienced users, programmers and systems analysts can increase productivity and develop complex applications within a few days. Combining power and ease of use makes Intellisys ideal for developing personal and departmental applications for MicroVAX, VAX and PDP-11 Systems.

To find out more, contact Genex Technology Group, 224 King Street, Hamilton, Ontario, Canada, L8P 1A9; (416) 527-2191.

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CSS Releases RealWorld Accounting Software

CSS Inc. recently announced that it has converted the RealWorld accounting software (version 4.0) to operate on DEC minicomputers including VAX and PDP models under the TSX-PLUS operating system environment.

RealWorld accounting software is a comprehensive and powerful set of nine modules. Version 4.0 builds on the earlier versions with powerful new features.

All nine modules are available on an immediate basis and pricing ranges from $800 to $2,200.

Learn more by contacting Computer Systems Services Inc., 5 East 16th St., New York, NY 10003; (212) 242-5255.

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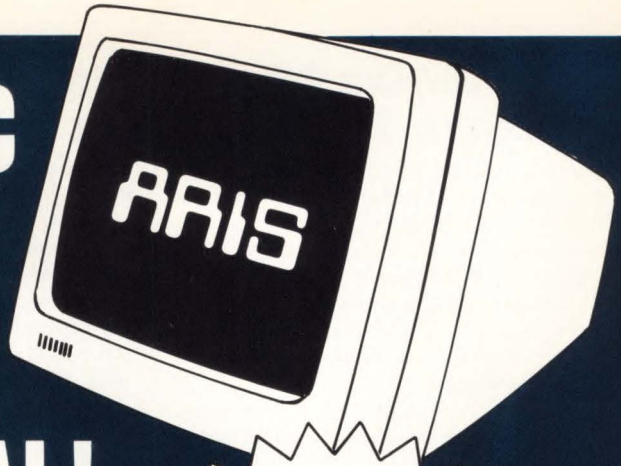

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Scicon Develops Software Engineering Tool

Scicon Limited has supplied to the Admiralty Research Establishment Portsdown a development version of a new software engineering product called EXPRESS. It's being used in connection with the Naval Command Systems Architecture Study which is concerned with the specification of future Command and Control systems for Royal Navy ships.

EXPRESS is designed to assist engineers in system development for medium- to large-scale projects where multiuser access is important. It supports the non-graphical aspects of the Structured Systems Analysis and Design Methodology modeling techniques which are promoted by the Central Computer & Telecommunications Agency of HM Treasury.

EXPRESS runs on the VAX range of computers.

For more information, contact Scicon Limited, Wavendon Tower, Wavendon, Milton Keynes MK17 8LX; 0908 585858. FAX: 0908 584620.

Enter 926 on reader card

Advantage Available For The Executive Market

Pilot Executive Software announced the introduction of the Pilot Advantage for the executive market.

Advantage is a software application that works with the Command Center advanced development system residing on a VAX or any IBM mainframe running VM/CMS, and other IBM PCs. The end user can interact with Advantage by using a mouse, touch screen or keyboard.

The Pilot Advantage automatically generates the three primary functions of Executive Information Systems. Users have a high-speed review path to drill down from summary level reports to the specific detail beneath. Advantage also scans its EIS database and automatically reports exception items based on predetermined triggers or benchmarks set by each user.

Pilot's executive information system includes Advantage and the Pilot advanced development system, Command Center. The complete Pilot system is priced at $110K on the VAX and $95K on the MICROVAX II. For more information, contact Pilot Executive Software, 40 Broad Street, Boston, MA 02109; (617) 350-7035.

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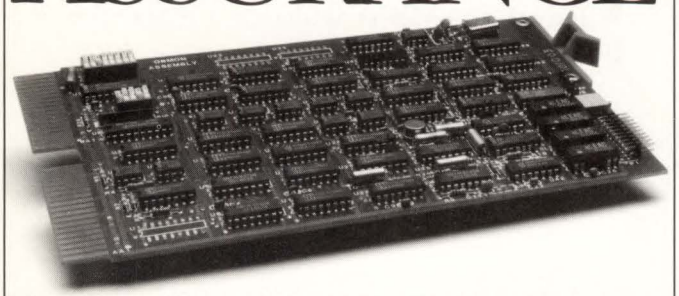
TECHLIB/STACS Triples Circulation Speed

Information Dimensions Inc. has issued a new release of TECHLIB/STACS that makes check-outs for circulating materials three times faster. TECHLIB/STACS, a menu-driven system for corporate and technical libraries, integrates the Release K enhancements from BASIS, its parent Text Information Management System, with many new library-specific features and capabilities.

Two alternate patron search menus containing extensive "help" functions permit patrons to locate bibliographic holdings more easily. Patrons now can enter requests for library materials from remote terminals, for check-out and mailing by library staff.

Improved data entry capabilities enable users to edit TECHLIB/STACS records before they are placed in a holding file for updating, and to retrieve records already in the queue file for editing. The system

Q-BUS LIFE ASSURANCE



The QBMon-11™ from Sector Systems monitors Q-Bus activity, power, and temperature on LSI-11 and MicroVAX processors. It will automatically re-boot your system after a power failure or a timeout interrupt—*even if your system is in a remote location.* All this for *half* the price of other monitors.

We're Sector Systems, developers and manufacturers of boards and software diagnostic tools—and specialists for the process control industry. Call us at **(206) 842-5612.**

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★ Utility Package for TSX-Plus™ ★

(You'll wonder how you ever got along without it!)

- Over 60 programs
- System management tools
- Security aids
- Hardware configuration/testing programs
- Program test & development tools
- Full documentation
- One or two of these utilities is worth the price of the entire package!

Here's a sample of what's included—

For use with TSX+ only:

CTRLC* Control-C another user's program when it hangs (instead of KILLing the job)
HANDMP* Write a snapshot copy of current handler memory to a disk file for later analysis
HANLOD* Load a fresh copy of handler ("fixes" some hung device situations)
LOSHDW* Show another user's logical disk subset (or subdirectory) mounts
PDUMP* Dumps out memory of TSX+ or of another user's running program
SETOP* Sets operator console (terminal that OPERATOR messages go to)
SHOFIL* Lists all open files: file name, size, date, for each running program with job number and program name
SQSY* Squeeze system disk from non-operator console terminal under TSX+
TSBOOT* Reliably boot RT-11™ from TSX+ (for unsupported TSX+ devices)
TTPEEK* Most wanted utility! Displays what is being output to another user's terminal. Invaluable for locating problems with dialup users
XSEND* Extended SEND command, sends to terminal whether or not logged on, time/date stamps message
USAS* Show another user's assignments

For use with either TSX+ and/or RT-11:

CMPRES Data compression program minimizes data transmission time or storage space
COPBLK Generalized copy utility. Copies blocks, or byte strings, optionally concatenates at high speed
CRSES* Adds a segment to a directory (use with ?PIP-F-Device full)
CS Compute CRCs of files on a disk, or display names of those files that have changed since last run
DIRBAK* Create a backup copy of a disk directory in case the directory becomes corrupted. A "must" program
DIRDMP* Display directory in dump format (Octal, ASCII)
DIRRST* Restore a disk directory from the backup copy made by DIRBAK

*The user must have sufficient privileges to use this program

Other Products available for TSX+ and/or RT-11 include:

MAIL A comprehensive & user-friendly electronic mail system
DE Driver The "Eagle" disk driver for adding a HUGE disk
DU+ Driver for a HUGE MSCP disk
TSX-NET "Transparent" communications between RT & TSX+
ARCHIVE Tape utility for saving and restoring disk files and subdirectories in convenient "save-sets"
CT*OS Full-featured word processor (now supports complete multi-national character set)
JSAM Coming soon: multi-key ISAM for DBL 2.2 users
TSX-Plus The user-friendly multi-user operating system
DBL Dibol compiler for RT-11 and TSX-Plus

DMPMAC Convert binary file (e.g., TRANSF.SAV) to MACRO for downloading to a remote system
DSKCOM High speed disk compare
FIXDIR* Patches an invalid directory to ignore bad segments
MTCOPY Copy between magnetic tape and disk files. Duplicate arbitrarily formatted tape. (IBM, ANSI, DOS, etc.)
MTDUMP Dump a tape. Necessary tool for tape analysis
NCRYPT Encrypt or decrypt a file with user specifiable encryption key for security of data
SDIR Search through (possibly nested) subdirectories without having to mount them
SEARCH High speed search and optional replace through wildcarded file(s) or devices. Many users' favorite program
SEGSCH* Search for a file through a selected segment in a fouled up directory
SET* Allows SET command of RT-11 handlers under TSX+ or TSX+ handlers under RT-11; also invaluable for debugging SET routines in handlers
SETSHO* Display device handler set option values, and handler statistics, and SYSGEN configurations
TRUNC Program to truncate a file to a smaller size
UNDEL* Undeletes files selected by wildcards. Preserves original date. Works when CREATE command fails. Optionally uses DIRBAK file to locate unlocatable files
YT Type a file backwards (for looking at the end of a file—where error messages are found)
ZFILE* Zeros a file/device/tape at high speed (for security reasons)

For use with RT-11 only:

BD Use BD to recover files on a disk when directory becomes unreadable (if DIRBAK has been run)
DLTEST Show CSR/Vector/Speed of DL-11's on system. Emit test pattern to a selected port
SR For debugging a program which traps to 4 or 10. Dumps registers, stack, and instructions
TC Display trace of EMTs when a program is run (decodes each EMT with directive name and argument values)
TERMSW Switch console to DL-11 port (no Multi Terminal Support required)
ZT Switch console to DZ-11 port (no Multi Terminal Suport required)

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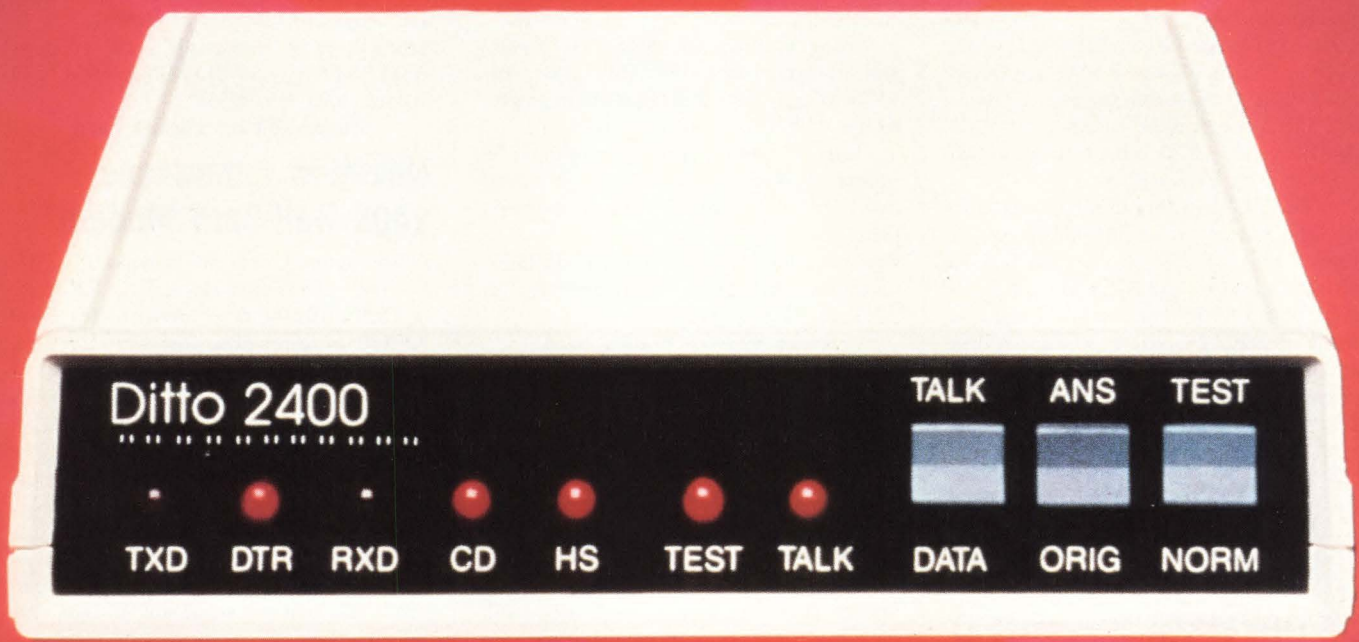
When Even One Error Is Too Many It's Time To Choose The Ditto 2400EC



When you're transmitting important data, even one error can be disastrous.

The Ditto 2400EC modem provides 100% error-free transmissions on even the worst phone lines . . . with hardly any degradation in its 2400 baud transmission speed. And with the 2400EC's built-in buffer you can run all your peripherals without the headache of continually changing parameters.

The Ditto 2400EC is built with the highest quality heavy-duty circuitry for maximum reliability in 24 hour operating environments. The unit is so durable that it comes with a lifetime warranty.

Speed, accuracy and reliability, all at an unbeatable price. When your data communications have to be 100% accurate, it's time to choose the Ditto 2400EC error-correcting modem. For more information and spec sheets, write or call Networx today at 1-800-531-0019 or (516) 754-2798 within New York State.

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DATA PRODUCTS COMPANY, Inc.

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operates on several mainframe and minicomputers, including DEC.

First copy license costs for the standalone TECHLIB/STACS version begin at $18,000.

For more information, contact Information Dimensions Inc., 655 Metro Place South, Dublin, OH 43017-1396; (614) 761-7300.

Enter 929 on reader card

Level Five Research Debuts PRL Version 3

Level Five Research Inc. announced the debut of PRL Version 3. PRL3 combines Level Five's hardware transportability and accessibility to external software and databases with the full power, connectivity and compatibility of the VAX/VMS computer system.

PRL3 can access databases without any external processes. Database access is integrated directly with the rules and context management system. Popular VAX databases, such as DATATRIEVE, RDB/VMS, DBMS, CDD and BBN Software's RS/1, can be accessed easily from within the expert system shell. PRL3 also provides access to any VAX RMS file via the CDD and is fully integrated with the VAX EDT editor.

The PRL3 software tool contains both an object library and a linkable library of utilities. The object library lets users build and access custom databases using PRL3's convenient database grammar. The linkable library of utilities manages mailbox or disk file communications between the expert system and any user-written application. PRL3 also can activate any VAX DCL command or process within the expert system shell.

To learn more, contact Level Five Research Inc., 503 Fifth Avenue, Indialantic, FL 32903; (305) 729-9046.

Enter 930 on reader card

CM-DRV11-WA Supports D And E Etch Levels

AST Research Inc.'s Camintonn/DEC Products Group (ASTA-NASDAQ) introduced an enhanced version of its high-speed direct memory access (DMA) controller module. Designated CM-DRV11-WA, this card supports DEC's newest card-level modifications, etch-level revision E, and etch-level revision D.

The DMA board features all the capabilities of AST's existing CM-DRV11-WA board. The dual-height board supports both DMA and controlled interrupt program I/O transfer modes. Three data transfer rates are available.

The CM-DRV11-WA is suited to industrial, scientific and engineering applications, where large amounts of data must be transferred rapidly between memory and I/O devices and from CPU to CPU.

The CM-DRV11-WA is priced at $750. Learn more by contacting AST Research Inc., 2121 Alton Ave., Irvine, CA 92714; (714) 553-0247.

Enter 932 on reader card

R/ST-50 To Be Developed

Star Technologies Inc. announced a three-year joint marketing agreement with Rugged Digital Systems Inc. to develop the R/ST-50, a ruggedized version of Star's high-speed ST-50 array processor. The R/ST-50 will be a high-speed, self-contained ruggedized array processor product available for the military/aerospace and geophysical markets.

Rugged will develop a ruggedized and/or TEMPEST-secure version of Star's compact ST-50 array processor. In addition, Star will provide a custom, high-speed interface, including hardware, software, diagnostics and documentation that will allow the R/ST-50 to operate as an attached processor to the VAX family of computers.

The ST-50 array processor delivers 50 million floating point operations per second (MFLOPS) performance in a compact package.

Find out more by contacting Star Technologies Inc., 515 Shaw Road, Sterling, VA 22170; (703) 689-4400.

Enter 927 on reader card

Liberty Electronics Enlarges Its Family

Liberty Electronics announces the addition of another Freedom Family product — the Freedom One ANSI terminal. Emulation of ANSI standard terminals includes DEC VT220, VT100, VT52, and Data General Dasher D210 and D211. This entry-level, high-quality terminal is available with an amber, 14-inch, flat screen, with full tilt and swivel. There are also three keyboard styles from which to choose: DEC VT220, ASCII, and PC.

The Freedom One ANSI terminal is priced at $499.

If you require further information, contact Liberty Electronics, 332 Harbor Way, South San Fransisco, CA 94080; (415) 742-7000.

Enter 931 on reader card

REAL ENVIRONMENT Has Transportable User Code

The REAL ENVIRONMENT, from Catalyss Corporation, is a 13-year-old data acquisition operating environment with real-time data acquisition, analysis, graphics and menu-generation capabilities. Currently running on IBM PCs (and clones) and MicroVAX II, it provides a transportable user code. Its major components are DAOS, the command language, and CHEF, the menu controller. The REAL ENVIRONMENT is suited to real-time process control, production automation, interactive experimentation in research laboratories or clinical departments and control of instrumentation.

The REAL ENVIRONMENT's DAOS commands are interactive. Although commands and macros can be written in a strict C syntax, DAOS will tolerate a less rigid syntax in order to simplify learning and usage.

THE REAL ENVIRONMENT features a high-level interpretative language that lets users present data graphically, including multiple on-screen graphs, plotting in Cartesian or polar plane, or conventional line and scatter graphs, annotation of graphs and axes, and output to screens and plotters.

Learn more by contacting Catalyss Corp., 7400 South Tuscon Way, Englewood, CO 80112; (303) 799-9955.

Enter 954 on reader card

Novation Announces 2400 Half-Card Modem

Novation announced the addition of a 2400 bps half-card modem to its new XE series of 1200 and 2400 baud modems. The 2400 XE/HC is compatible with the Hayes AT command set and provides a full range of intelligent modem features. Operation speeds are 0-300, 1200 and 2400 bps. It is Bell 103, 212A and CCITT V.22 bis compatible. The 2400 XE/HC operates in synchronous, asynchronous data formats and both full duplex and half duplex needs. Features include automatic equalization, a full range of automatic dialing and answering capabilities, audio call monitoring and built-in automatic test functions.

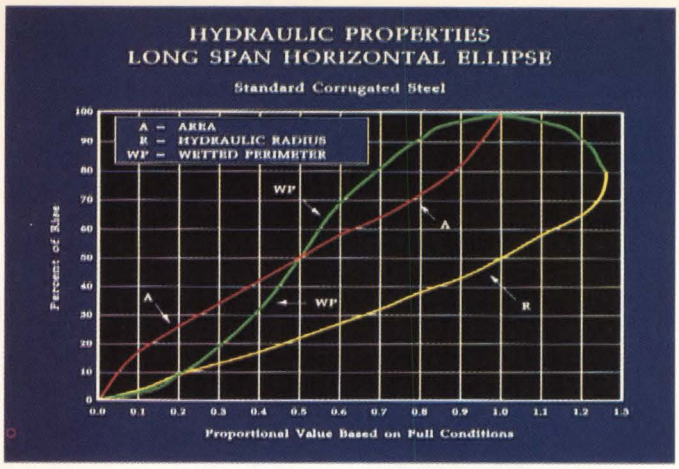
The 2400 XE/HC is supplied complete with MS-DOS compatible PROCOM software. The retail price of the new modem, including software, is $299.

For more information, write or call Novation Inc., 20409 Prairie St., Chatsworth, CA 91311; (213) 996-5060.

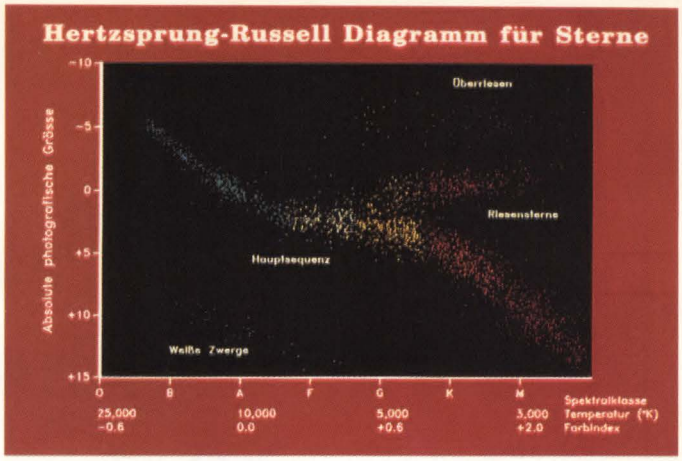
Enter 933 on reader card

ACC Enhances ACP 5250 And ACP 6250

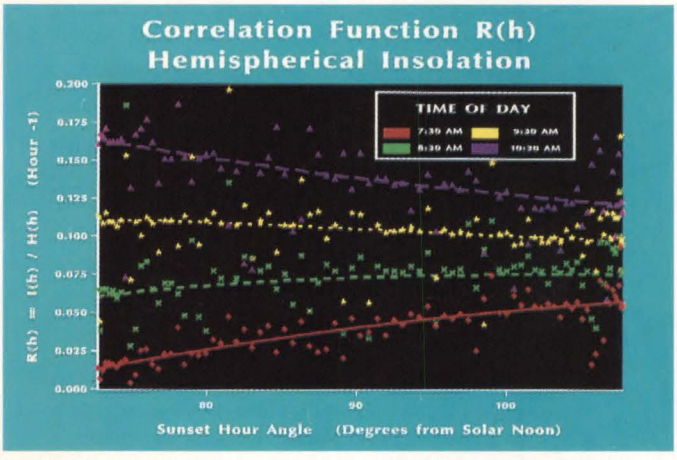
Advanced Computer Communications (ACC) has unveiled enhanced versions of its ACP 5250 and ACP 6250 communication processors for the MicroVAX and VAX. All versions are single board, front-end processors that perform X.25 protocol processing in firmware on the board. ACC's pro-



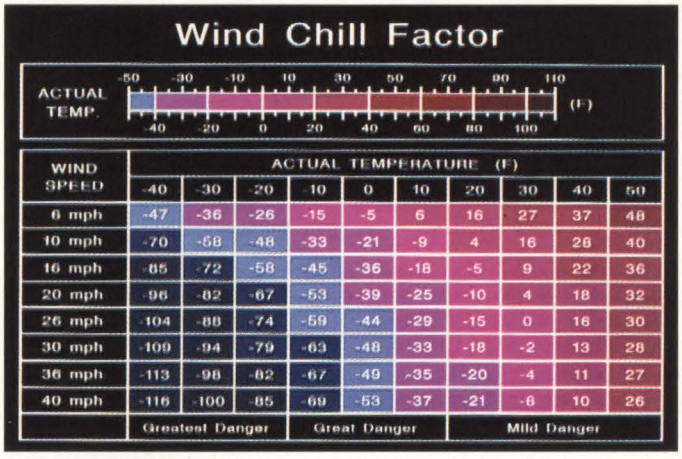
PicSure Plus' curve smoothing clarifies data representation. Shielding adds a professional look.



European text fonts offer a global graphics solution. Multiline annotations aid data interpretation.



Large datafiles can be read directly from disks. User retains complete control over all chart elements.



WIND SPEED	ACTUAL TEMPERATURE (F)									
	-40	-30	-20	-10	0	10	20	30	40	50
5 mph	-47	-36	-26	-15	-5	6	16	27	37	48
10 mph	-70	-58	-48	-33	-21	-9	4	16	28	40
15 mph	-85	-72	-58	-45	-36	-18	-5	9	22	36
20 mph	-96	-82	-67	-53	-39	-25	-10	4	18	32
25 mph	-104	-88	-74	-59	-44	-29	-15	0	16	30
30 mph	-109	-94	-79	-63	-48	-33	-18	-2	13	28
35 mph	-113	-98	-82	-67	-49	-35	-20	-4	11	27
40 mph	-116	-100	-85	-69	-53	-37	-21	-6	10	26
	Greatest Danger			Great Danger			Mild Danger			

PicSure Plus' menus allow easy data entry/editing. Extensive color table control for dynamic graphics.

Precision Visuals' PicSure Plus™

Practical Presentation Graphics for Your VAX

The Need

You need PicSure Plus™ if your work requires: ☐ Producing technical presentations or reviewing data ☐ Supporting a cross section of graphics users, from novice to expert ☐ Building custom user interfaces for specific applications ☐ Accessing and charting information from databases ☐ Pushbutton access to stored charts, datasets, command files, and metafiles ☐ Managing graphics production while maintaining device independence.

The Product

PicSure Plus is an interactive graphics system for producing charts and graphs. Prompting menus guide novice or occasional users in creating line, bar, scatter, pie, text, and table charts. Experienced users can access PicSure Plus features by entering commands, or building tailored menus for specific applications and environments. These user-interface options offer a flexible gateway to the most powerful set of charting functions available today.

The Features

☐ Powerful prompting menu interface speeds chart building for novice and occasional users ☐ Integrated command interface available for more advanced users ☐ Interactive positioning of all chart elements ☐ Directory keeps track of saved charts, datasets, command files, and metafiles—so users don't have to understand the computer's file system ☐ On-line tutorials and instant HELP facility for new users ☐ Easily combine multiple charts into a single image ☐ Draw charts simultaneously on multiple graphics devices for high production chart building ☐ Symbol creation for building flowcharts or illustrations ☐ Merge and annotate images created with other Precision Visuals products ☐ Read up to 10,000 datapoints from system files, or from other software packages ☐ Powerful numeric functions to perform arithmetic and statistical operations on your data ☐ Programmer's interface for accessing custom subroutines, databases, and the operating system ☐ Automatic layout and text sizing for word charts.

The User Interface

Users can move from prompting menu mode to command mode and back again, anytime. PicSure Plus also offers special commands for building prompting menu sessions. These user interface tools help you automate the production of frequently used charts, or design custom interfaces for end users.

The Environment

PicSure Plus runs on the entire VAX family, as well as a wide range of minicomputers and mainframes. Compose graphs on terminals and get hardcopies on laser printers, inkjet printers, pen plotters, and film recorders.

The Offer

PicSure Plus is the only graphics software solution with the range of features for even your most sophisticated charts, combined with user interfaces for the first-time user, occasional users, and experts. If you need functionality and ease-of-use in your graphics software, get the full story on PicSure Plus, and let us arrange a test drive.

Call Chris Logan at:
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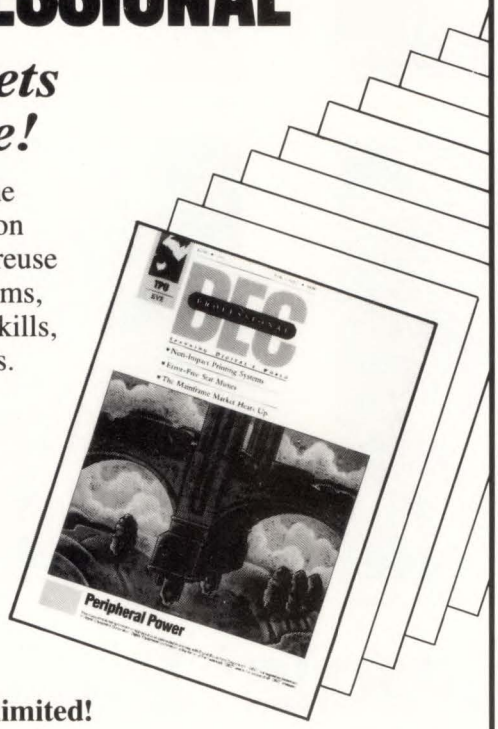

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cessors improve system performance, eliminate most network overhead in the CPU, and free application software space.

ACC has engineered three basic enhancements to both ACP boards, and one additionally to the ACP 5250. Larger data packets lengthen maximum data packet size up to 1024 bytes. The fast Select facility can pack up to 128 bytes of data in call setup and clearing packets. This results in savings for users who send many short messages.

The third enhancement is Flow Control Negotiation. Because packet size and packet window size may vary from one session to another, negotiation between ACP processors and other network sites to establish mutually acceptable sizes can result in more successful sessions.

The ACP 5250 costs $4,200, and the ACP 6250 costs $6,490.

To learn more, contact Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, CA 93101; (805) 963-9431. TWX: 910-334-4907.

Enter 934 on reader card

Perceptics Announces LaserStar

Perceptics Corporation has announced LaserStar, an optical disk jukebox subsystem for VAX and MicroVAX computers running the VMS operating system. LaserStar provides automatic VMS-transparent access to the massive storage capacity of optical disk jukeboxes. A variety of drive/media configurations are available to meet specific customer requirements.

Depending on the configuration selected, LaserStar can provide total online storage capacities of from 15 to 141 double-sided 12-inch optical disks. Each write-once disk can store up to 1 gigabyte (1,000 MB) of data per side. LaserStar also can be configured with up to five optical disk drives to accommodate a wide range of performance requirements.

Learn more by contacting Perceptics Corp., Pellissippi Center, Knoxville, TN 37922; (615) 966-9200.

Enter 955 on reader card

New Version Of TMS Has Increased Speed

HRL Associates Inc. announced its newest version of the TMS Total Maintenance System software. Now running on the VAX, the new version simplifies the job of converting a mass of maintenance data into useful information. Major enhancements to TMS include significant speed increases in data retrieval, preventive maintenance scheduling adjustments based on production planning input, and ease of data manipulation.

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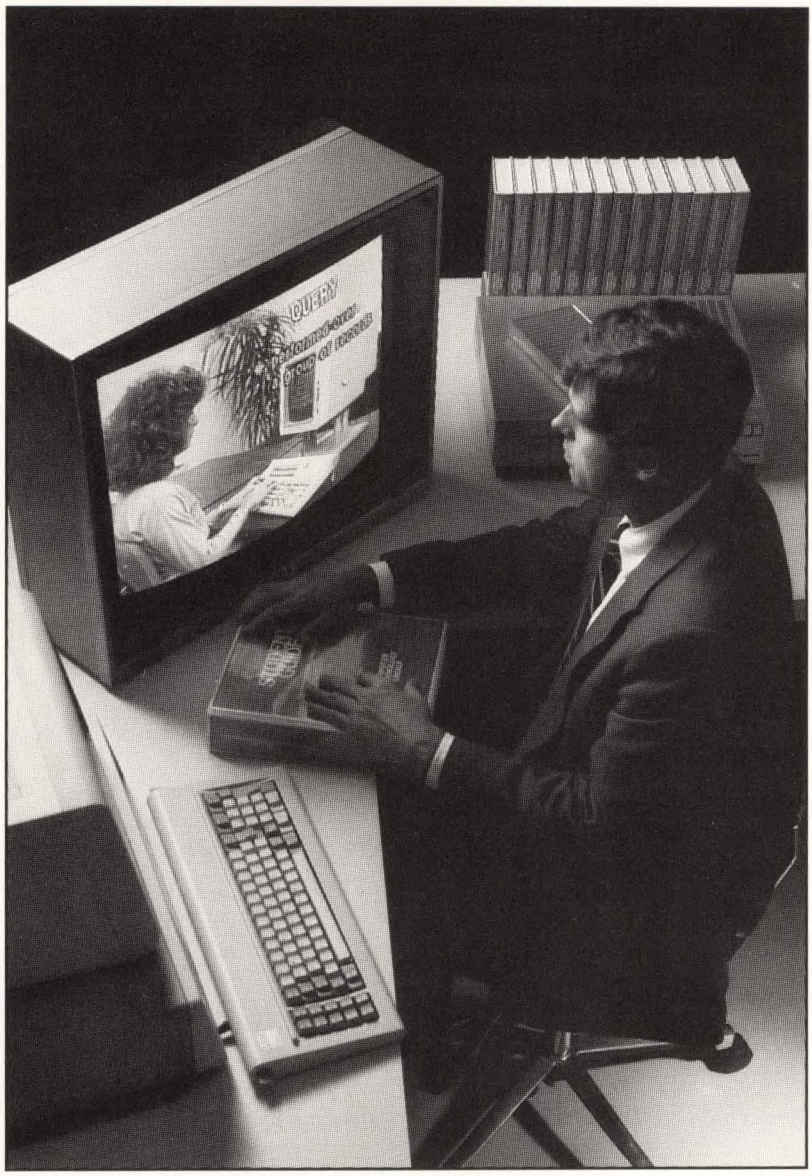

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AND
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Studies show 40-55% throughput gains when files are contiguous. Data base, CAD/CAM, word processing, and back up applications show significant improvement after fragmented files are "fixed" with ***RABBIT-7 Disk Optimizer.***

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Portland House, 21 Narborough,
Cosby, Leicester LE9 5TA
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The new TMS production/PM scheduling interface produces advanced schedules that may be used by production and maintenance to schedule repairs, overhauls and PM according to machine availability. This feature allows a maintenance scheduler to adjust PM schedules on-screen to optimize available labor resources.

For more information, contact HRL Associates Inc., South Tysons Office Park, 2102-B Gallows Road, Vienna, VA 22180; (703) 448-1442.

Enter 949 on reader card

WATCH Monitors VMS System Performance

Jager Computer Systems announces WATCH, a VMS performance monitor, for use by VAX systems managers. WATCH is a diagnostic tool that gives systems managers the information needed to manage their systems. Using it, novices and gurus can pinpoint resource limitations and performance bottlenecks.

WATCH runs all models of the VAX family including the MicroVAX II. No special hardware is required.

WATCH offers DCL-like commands, online VMS-style HELP, documentation and comprehensive VMS-style error messages.

WATCH requires VMS V4.0 or later and is available for $495.

For further information, contact Jager Computer Systems, 8835 MacLeod Trail SW, Calgary, Alberta, Canada T2H 0M3; (403) 259-0700.

Enter 951 on reader card

Sysgraph Announces CADPAK Product Family

Sysgraph Inc. announces the CADPAK family of products, now available for VAX and MicroVAX computers under the VMS operating system with Tektronix 4100 and 4200 series intelligent graphics terminals.

These products start with CADPAK-II, a complete multiuser Computer Aided Design and Drafting (CADD) system for drawing production and control. Additional layered products add CADPAK-DB, a bi-directional relational database interface that permits the direct association of non-graphic information with symbols on a drawing; CADPACK-FM, a facilities management application generator that permits an end user to generate the symbols and the required relational database structures; and CADPAK-AP, prebuilt FM applications that can be used as is or as templates for custom FM applications. These products interface with Oracle and S1032 relational database systems.

Pricing for the CADPAK-II and CADPAK-DB modules is based on the

number of simultaneous users, starting at $12,000 for a single user.
For more information, contact Sysgraph Inc., 6400 Auteuil, Suite 109, Brossard, Quebec, Canada J4Z 3P5; (514) 445-1921.

Enter 950 on reader card

HBO Announces Support Library

HBO & Company's Industry Group announced the availability of Decision Support Library (DSL). It provides business executives and managers with a single system to analyze and forecast financial position, sales and marketing performance, and manufacturing requirements.

DSL can be accessed by any operating group within a corporation, given appropriate security clearances. It consolidates individual operating groups' databases to perform company-wide analyses and provides the capability to design and generate reports based on each executive's reporting requirements. It simulates the impact of mergers, acquisitions, and other organizational changes before they are made.

It is installed exclusively on computer systems from DEC including the MicroVAX II. The system can be provided on an in-house, turnkey or timeshare basis.
To learn more, contact HBO & Company, 140 South Dearborn Street, Ste. 333, Chicago IL 60603; (312) 236-8180.

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EGH Offers KDSS 4.1 For Key-To-Disk Entry

Evans Griffiths and Hart Inc. released KDSS V4.1, a key-to-disk data entry software package that runs on DEC's VAX computers under the VAX/VMS operating system.

KDSS is a self-contained data entry subsystem with a set of facilities for entry, verification, and examination/modification of batches of records and for reformatting that data on output to disk or tape. A wide range of data validating and editing commands is available. To provide maximum flexibility, KDSS allows fields to be filled, validated or reformatted by user-written programs. In addition, KDSS contains a set of supervisor facilities for making and testing input and output format specifications and for monitoring and controlling the data entry process. A PDP-11 version of KDSS running under RSTS/E also is available.

The price for a single-computer perpetual license for KDSS V4.1 ranges from $7,500 — $10,500.
For further information, contact Evans Griffiths and Hart Inc., 55 Waltham Street, Lexington, MA 02173; (617) 861-0670.

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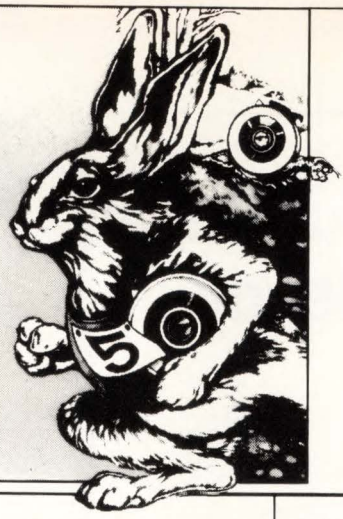

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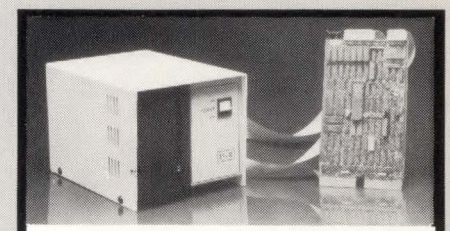

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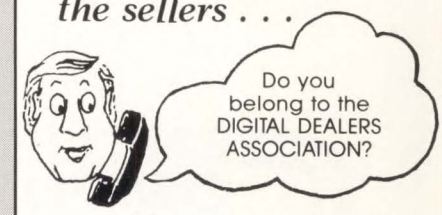

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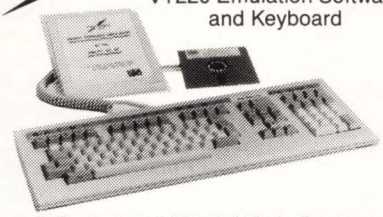

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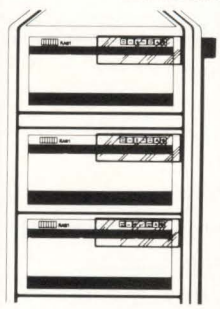

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Reader Service Number		Page
156	Access Technology	83
215	American Digital Systems	125
419	AT&T Training	65
435	Athena Systems	24
413	Cabletron Systems	120
456	CalComp	31
11	CCRI	120
361	CIE Terminals	29
100	Clearpoint, Inc.	9
114	Coefficient Systems Corp.	23
417	Compuserve Data Technologies	93
425	Computer Technology Group	135
237	Control Data Corp.	49
460	Corstar Business Computing Co. Inc.	123
217	Datability Software Systems, Inc.	19
	DEC PROFESSIONAL	134
17	Demac Software	8
149	DILOG	17
124	Eaton Corp. (DSSD)	85
391	EEC Systems, Inc.	126
398	Electronic Interface Assoc.	123
21	EMC Corporation	B.Cover
25	Equinox Systems	4
180	Evans, Griffiths & Hart	105
27	Exceptional Business Solutions	111
396	Executive Software	121
458	FTG Data Systems	71
461	H & E Concepts	103
82	Human Designed Systems	3
345	ICEX	61
384	Information Builders	13
34	Interactive Technology	95
307	Intermetrics, Inc.	74
98	Intersecting Concepts	99
91	James McGlinchey	122
99	Logicraft, Inc.	39
248	MDB Systems	97
297	MegaTape Corp.	107
	MICOM Systems	75
73	National Semiconductor	I.B.Cover
464	National Support Group	119
201	Nemonix, Inc.	87
326	Network Research Corp.	73
428	Networking Dynamics Corp.	130
45	Networx Data Products	47
451	Networx Data Products	131
208	Northwest Digital Software	127
72	Oasys	115
80	Perceptics Corp.	118
48	Peritek Corporation	55
160	Persoft, Inc.	7
431	Persoft, Inc. (DG Emulation)	7
438	Persoft, Inc. (HP Emulation)	7
50	Polygon, Inc.	145
51	Precision Visuals Inc.	133
	Professional Press	99,103
52	Pulizzi Engineering	85
89	QMS, Inc.	14-15
449	Raxco	136
407	Raxco	137
450	Relational Technology	101
377	Rhodnius Inc.	35
	SAS Institute Inc.	79
	SAS Institute Inc.	81
146	Saturn Systems, Inc.	108-109
224	Scherers	119
455	Sector Systems	130
183	SPSS, Inc.	43
284	Syntax	20
136	Talaris Systems Inc.	10-11
462	Talon Technologies	63
446	Technology Concepts	77
259	TeleVideo Systems	112-113
375	Texas Instruments Inc.	25
392	Vermont Creative Software	21
106	Virtual Microsystems	91
235	Walker Richer & Quinn	I.F.Cover
322	Windjammer Cruises	143
382	Wollongong (WINS)	57
52	Z-Line	85

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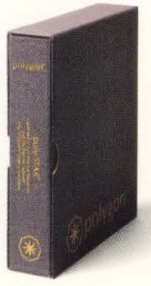

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BACK END

John C. Dvorak

New DEC PC?

The opportunity for DEC to move back into the microcomputer world is the best it ever will be. The Personal System/2 from IBM and the proposed OS/2 operating system from Microsoft has everyone confused.

At this juncture there's a golden opportunity for DEC, if it had any guts, to jump into the market and take the lead it should have taken years back. Let's call this new DEC machine the DEC PDP-386.

By looking at the tendencies and trends, we can put together an eclectic wish list that will deliver the perfect desktop computer for today's power-hungry user. First, it has to be an 80386-based machine. This is the best chip around and the one able to maintain compatibility with all the old PC software. The drawback is that Intel, in all its wisdom, will not second source the chip to anyone but IBM. If this policy continues, it may be risky to use the chip because the IBM-Intel axis could screw up supplies.

OK, Next.

Everybody is talking about "a real operating system" that isn't UNIX. OS/2, supposedly, is this real operating system. We all know, though, that Microsoft has trouble getting complex software like this out. Already, columnist Peter Norton in *PC Week* says that the announce date of first quarter, 1988, is fallacious and that the fourth quarter may be the true release date. These phony dates, he says, were to sucker the buyers into an early commitment. That all says 1989 to me. It's a ways off, 'eh? Meanwhile, all the hokey pre-publicity for the "real operating system" probably will create a market for a real operating system. This is especially true if the price is right — that means fifty bucks or less and not the $700 or so that the Microsoft offering will cost.

Onward.

This machine needs an advanced bus; something more than the old PC bus. But if the new IBM Microchannel is patented, then let's use something standardized. I'd hate to suggest that DEC implement the VME bus, but it should. There's also the advanced Future bus or even the NuBus used by Apple in its MacII. We need a bus designed for multiprocessors — ideal for use in a machine like this. To make it somewhat compatible with old cards, there should be three old AT slots. So let's say three AT slots and five new slots.

On board there should be all the parallel and serial ports needed, along with a VGA output circuit, so the new PDP-386 will be compatible with all the graphics ever done for the IBM and also compatible with the newest VGA graphics. Let's also put 2 MB of memory in the machine as standard, and a fast 40-MB hard disk.

OK, so far so good. Now the clincher. DEC should take its talented programming staff and have it port a subset of VMS onto the thing. Using NEWS as a windowing environment, it should be able, with NEWS or with some utilities, to run the old MS-DOS 3.X as a task. So the machine will have the much needed "real operating system" for the die-hards who secretly desire having a mainframe on their desks, and at the same time be completely compatible with the old PC software during the transition period. A real kicker would be having the ability to run OS/2 as a task under VMS. Ha ha ha. That would get IBM's goat.

Finally, DEC would have to swallow its pride and price the thing competitively instead of continuing its typical over-priced snob approach. Nobody could compete with such a machine and the multibillion dollar market would belong to DEC.

In addition to the above system, DEC could make hay with certain options aimed at the burgeoning VAR marketeers. The addition of a large 19-inch monitor of various resolutions would help the company eat into the Sun and Apollo markets because DEC doesn't take these guys seriously. Perhaps it should let others take them seriously with competitive DEC equipment.

DEC's biggest competitive threat is from IBM, who'd love to bury it once and for all. Here's an opportunity for DEC to do serious damage to Big Blue and make IBM reconsider its positioning and thus put DEC in the driver's seat that it holds onto only tenuously in the minicomputer market.

The way things stand, IBM owns the micro market for no good reason. This gives it time to attack DEC in the mini arena. DEC's approach is purely defensive, which only works until the opposition throws the long bomb for the game winning touchdown.

It should be a piece of cake to distract the big blue monster; it has no idea what it's doing in the microcomputer arena. Let's face it, uncreative mainframers run the joint. So distraction and confusion should be a snap. My scenario for the PDP-386 will do it.

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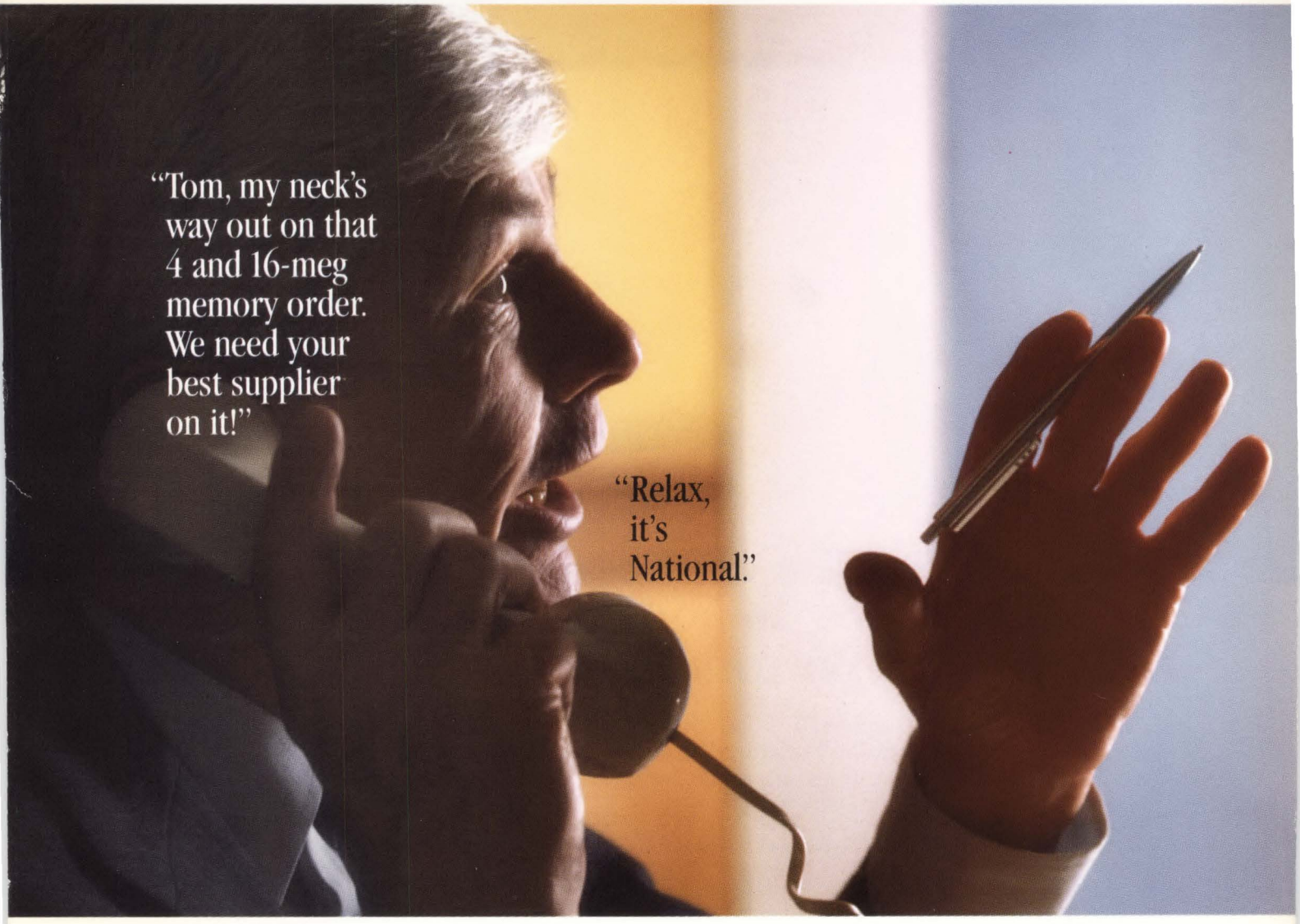

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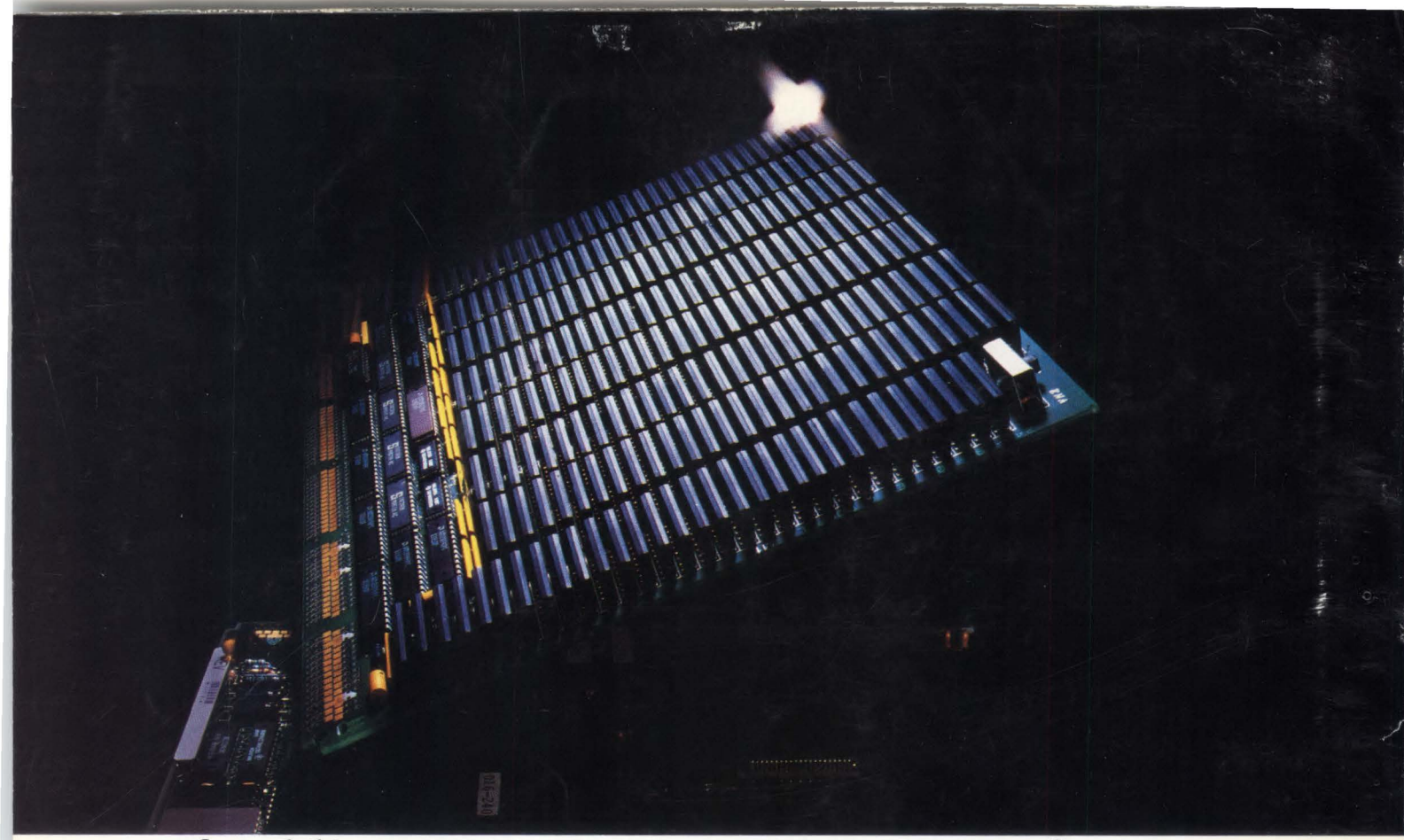

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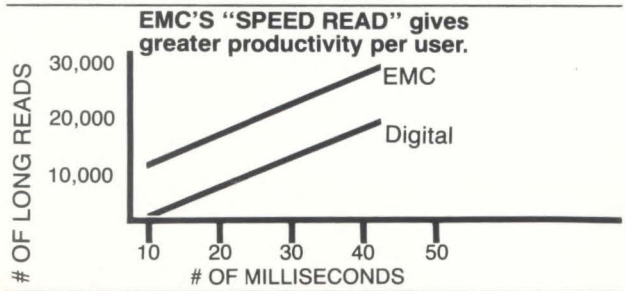

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