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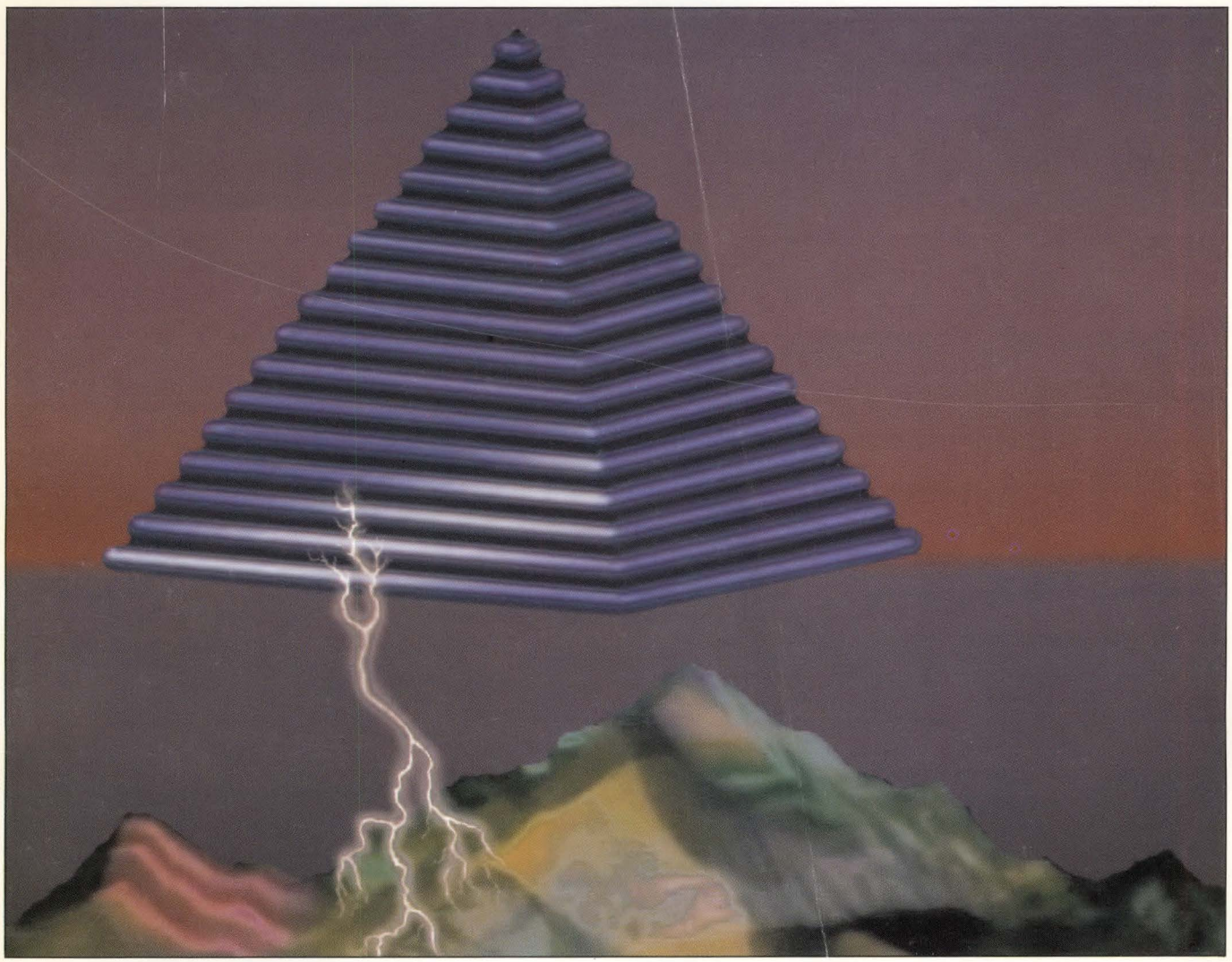

Graphics: Designing Information and Ideas

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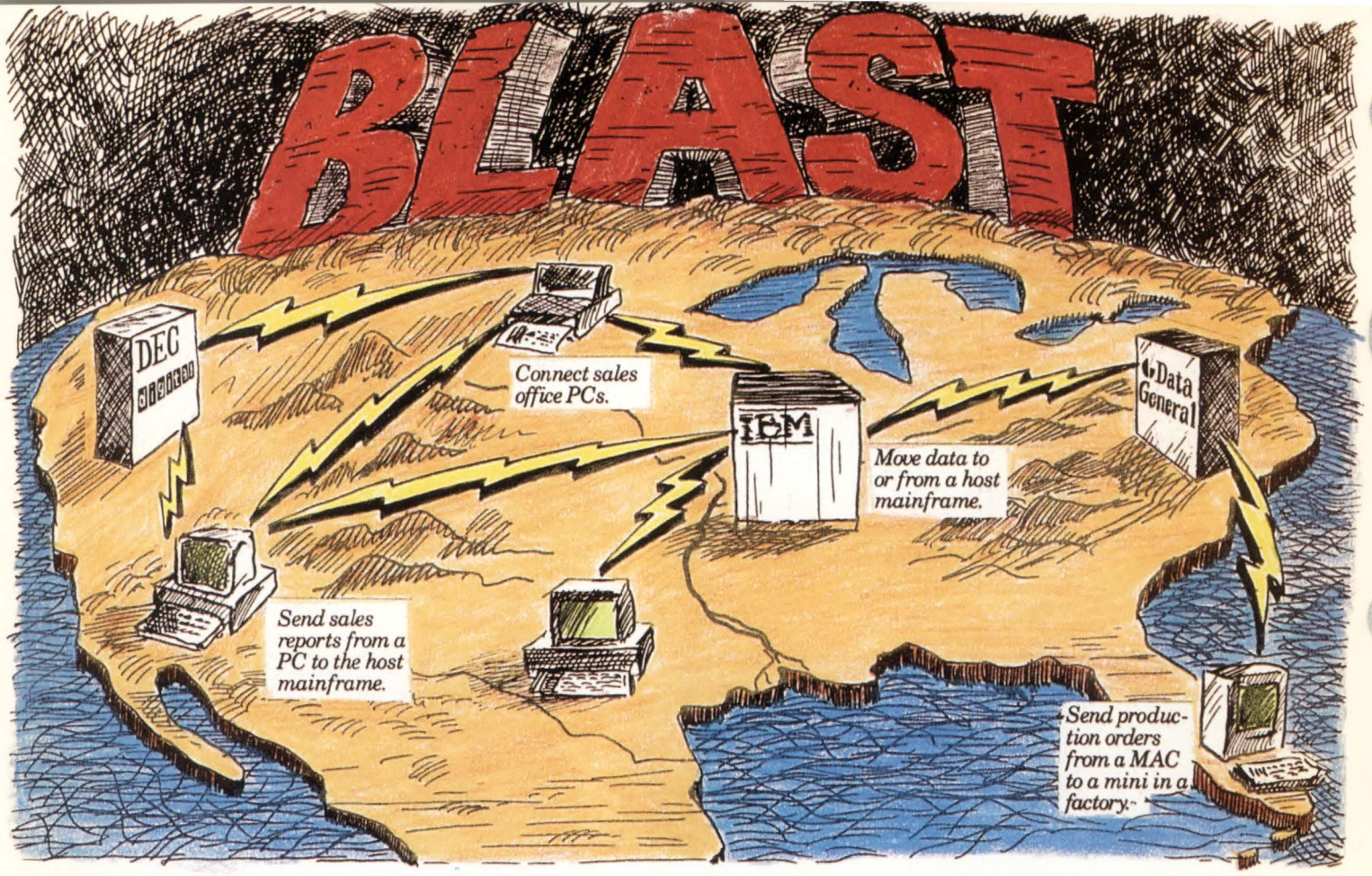

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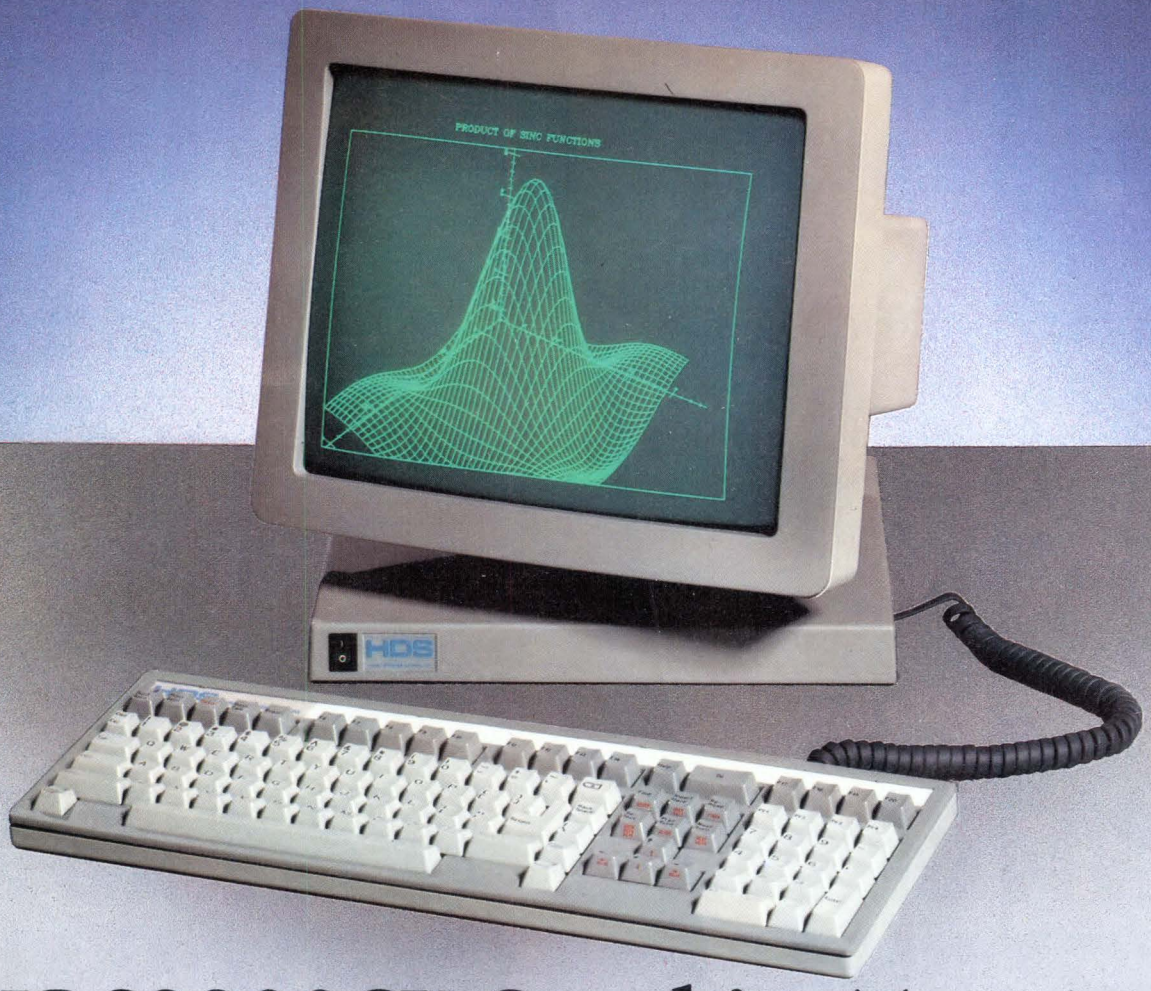

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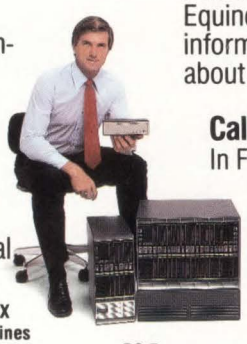

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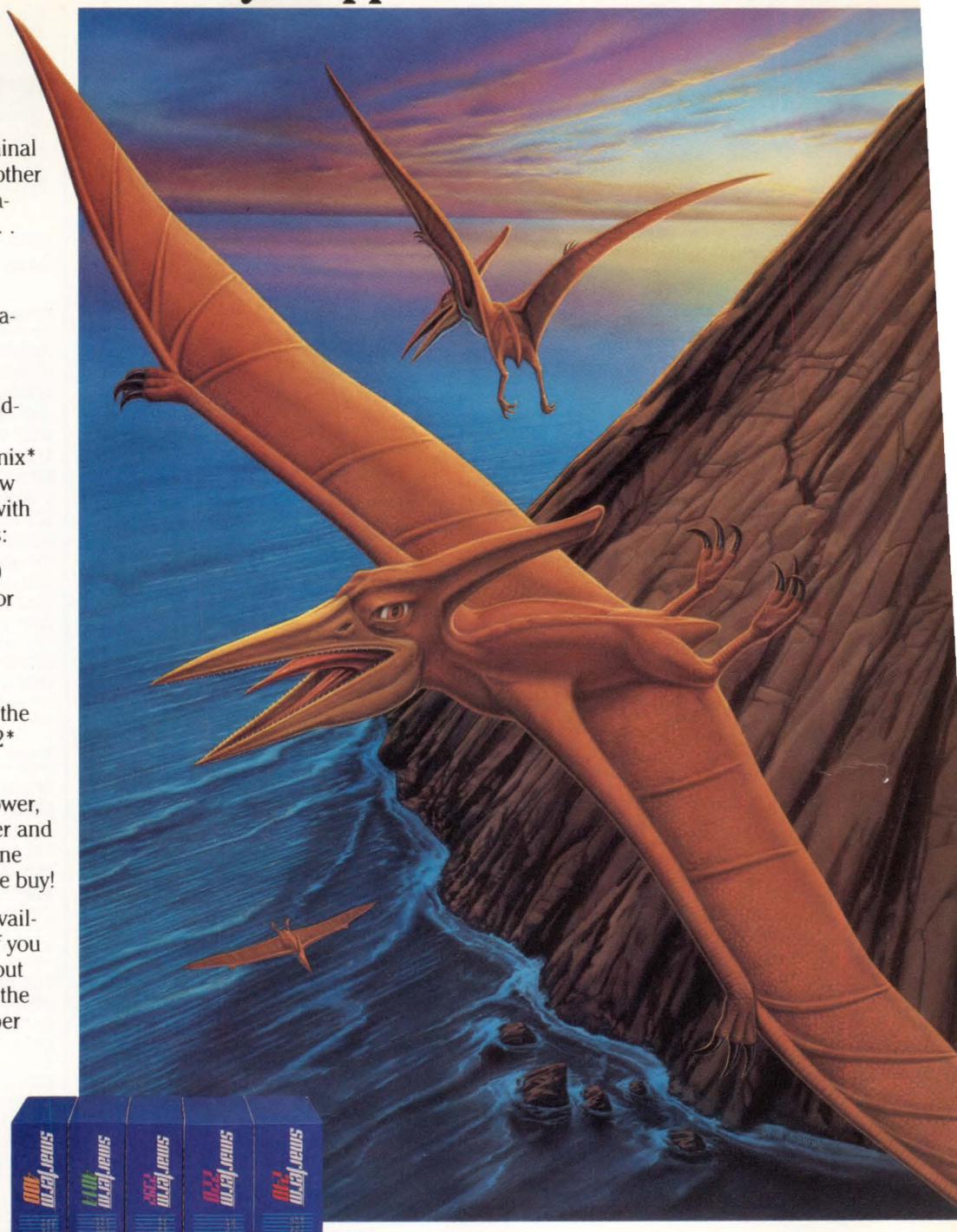

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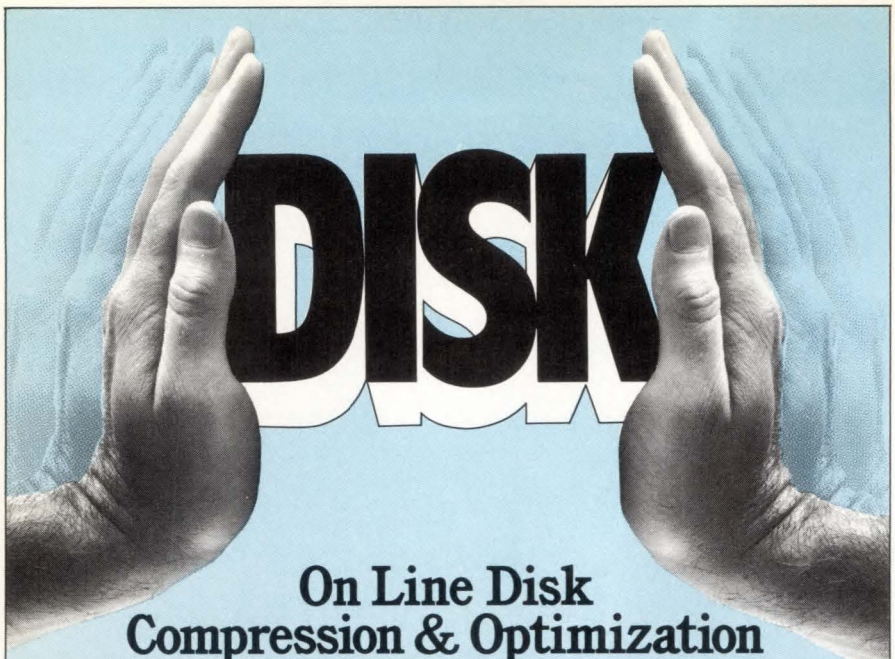

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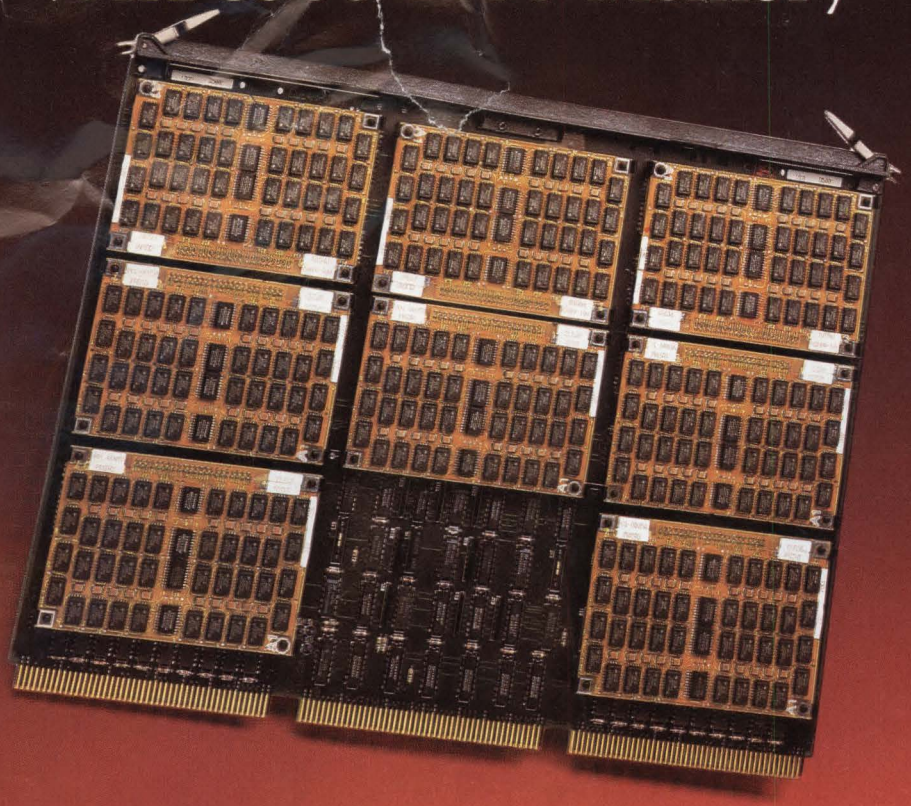

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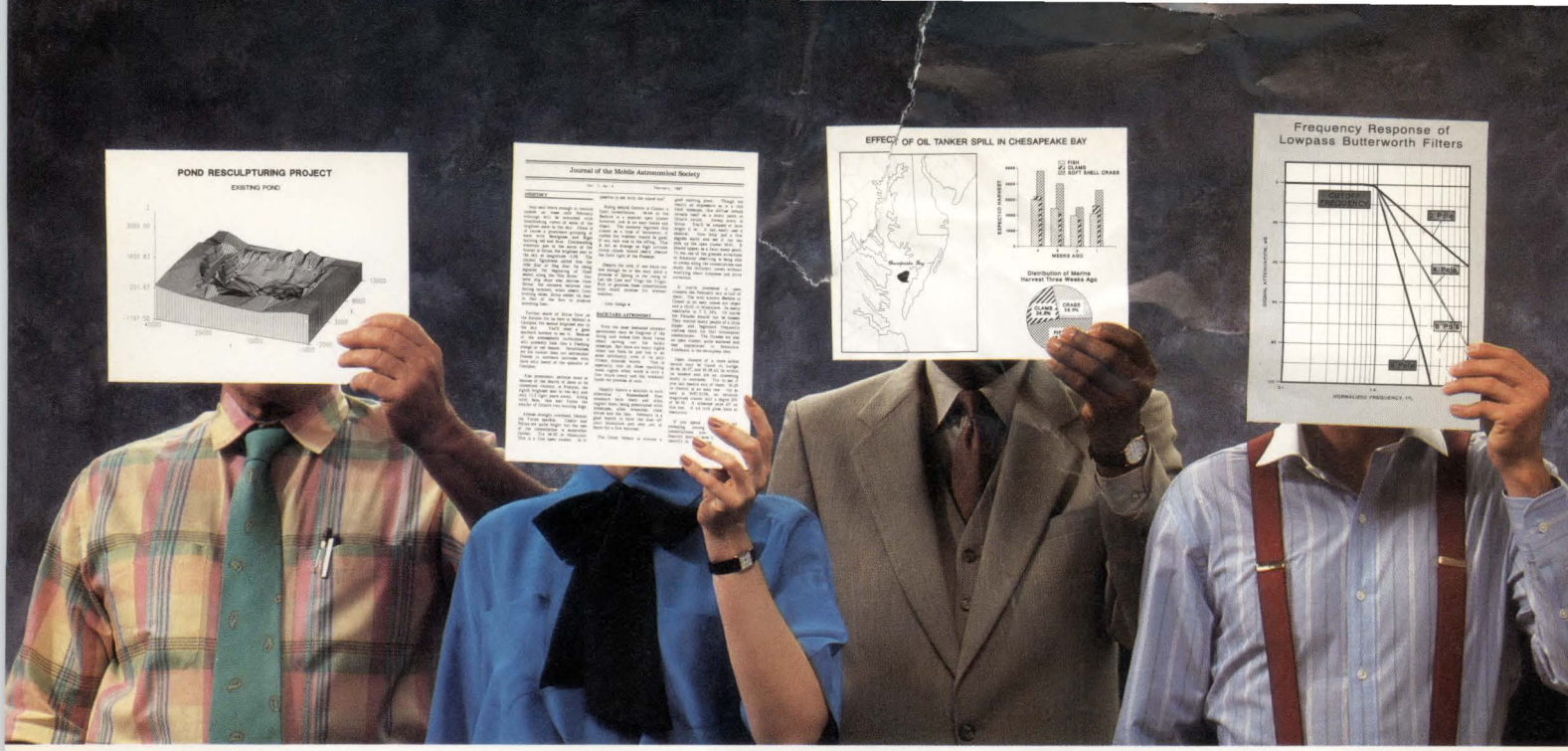

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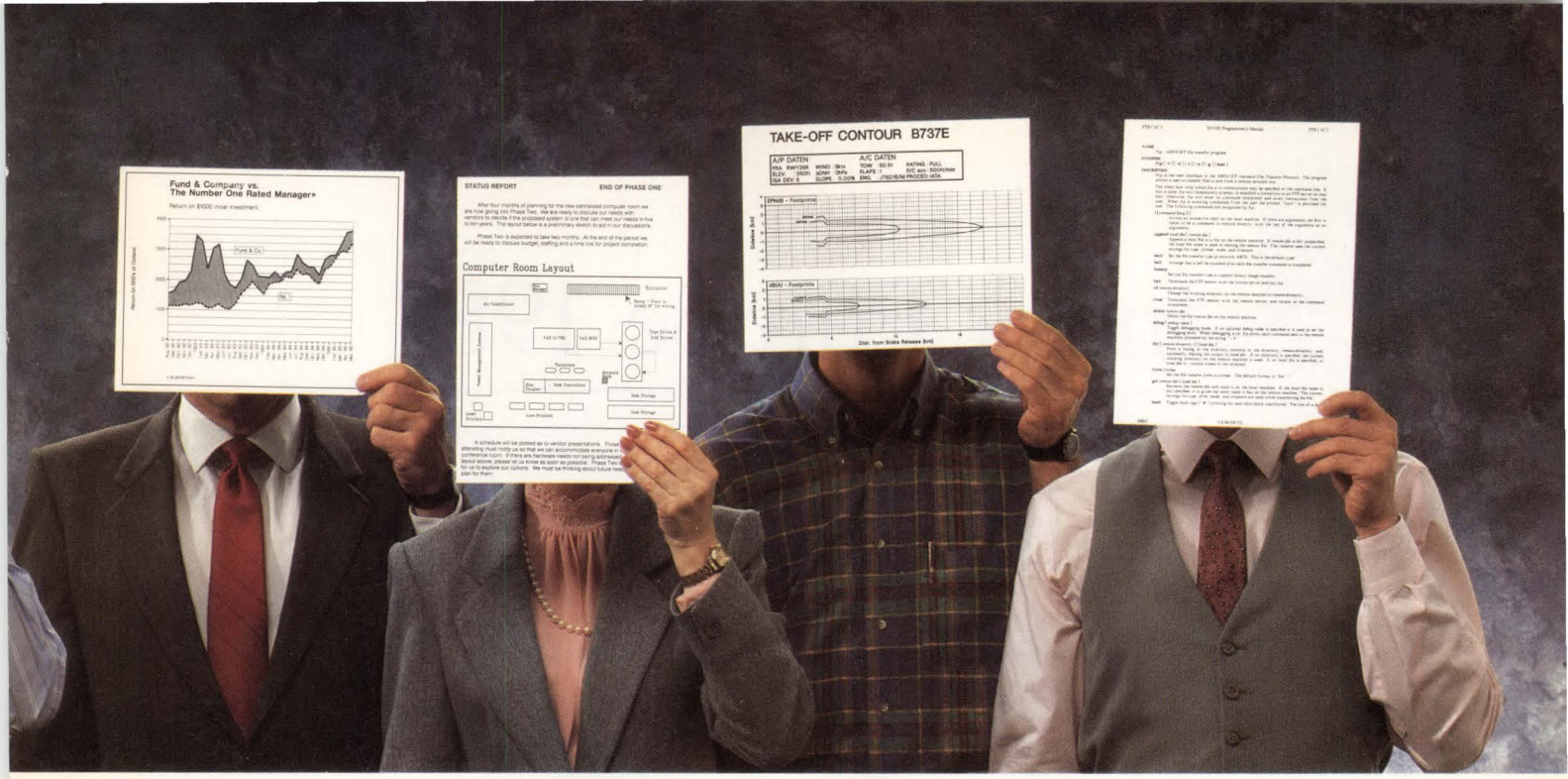

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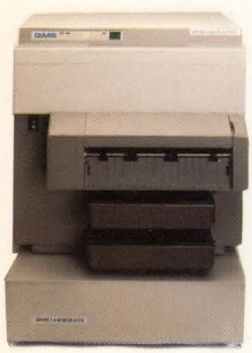

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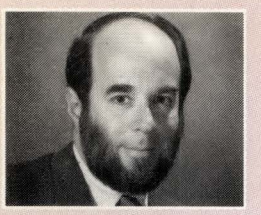

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Index Europe 1987

Index Europe 1987, the continental Europe DEC trade show and conference, began in Frankfurt, Germany, on May 25, 1987.

More than 100 exhibitors and several hundred attendees came to this central European city to talk about and look at the DEC market. The venue in Frankfurt was The Messe, a complex of eight buildings: one old performing arts building (where a PRINCE concert was staged that night), six convention buildings and one high-rise administration office to manage the facilities. The Messe is a large facility that would dwarf most facilities in the U.S. Frequent train and plane service to Frankfurt, its central location in Europe and the fine physical plant make it an ideal convention site.

The conference was organized by Arrik Wilkinson of Dundee, Scotland, and attracted more than 100 active participants on the first day alone. I was fortunate to be the first speaker to address this group talking about DEC's current product line and its future plans. I enjoyed the interaction with this dynamic group before, during and after my presentation.

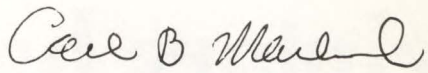
The Europeans are upset at the premium price they are forced to pay for DEC computer systems. Despite the falling dollar (it really isn't worth much over there), DEC computers are more expensive even after you subtract duties, import fees, shipping and administration. There is a middleman and it's DEC itself in the form of its many European subsidiaries. Each partner in the chain is a profit center, so there are more people to pay. Some companies buy direct in the U.S. and import the computers, saving considerable money. The users complain that DEC charges too much because "we can," while DEC explains the multilayers that products must go through before they arrive at a European site. While it isn't clear who's right, the Europeans feel that DEC is gouging them with artificially high prices.

The European community is as concerned about the closed architecture issues as the Americans. The BI problem and DEC's general direction on these issues are of great concern. Because DEC is an American company, Europeans feel that they have less influence than the U.S. customer base. In some cases, the third-party market is the only one that can serve customers and they feel that their existence is vital to the viability of DEC computing. The architecture issue is a world-wide concern and DEC should address it soon.

Most of the exhibitor "stands" (called booths here) were familiar U.S. companies represented by European distributors. There were several products not yet seen in America. Some of the specialized services have to do with the multilanguage capability needed there and others with the fact that the geography isn't as well covered as it is in the U.S.

Still DEC computers tie us all and I felt a comradeship with the people at Index. It's said that the reason grandparents and grandchildren get along so well is that they have a common enemy. Sometimes we wonder whether DEC is a friend or an enemy. But mostly DEC computers have fulfilled their promises over the years and, for me, they have made it possible to meet and talk with fellow DEC people all over the world.

It was 20 years ago when I first typed: CNTL-C...LOGIN. Thanks.



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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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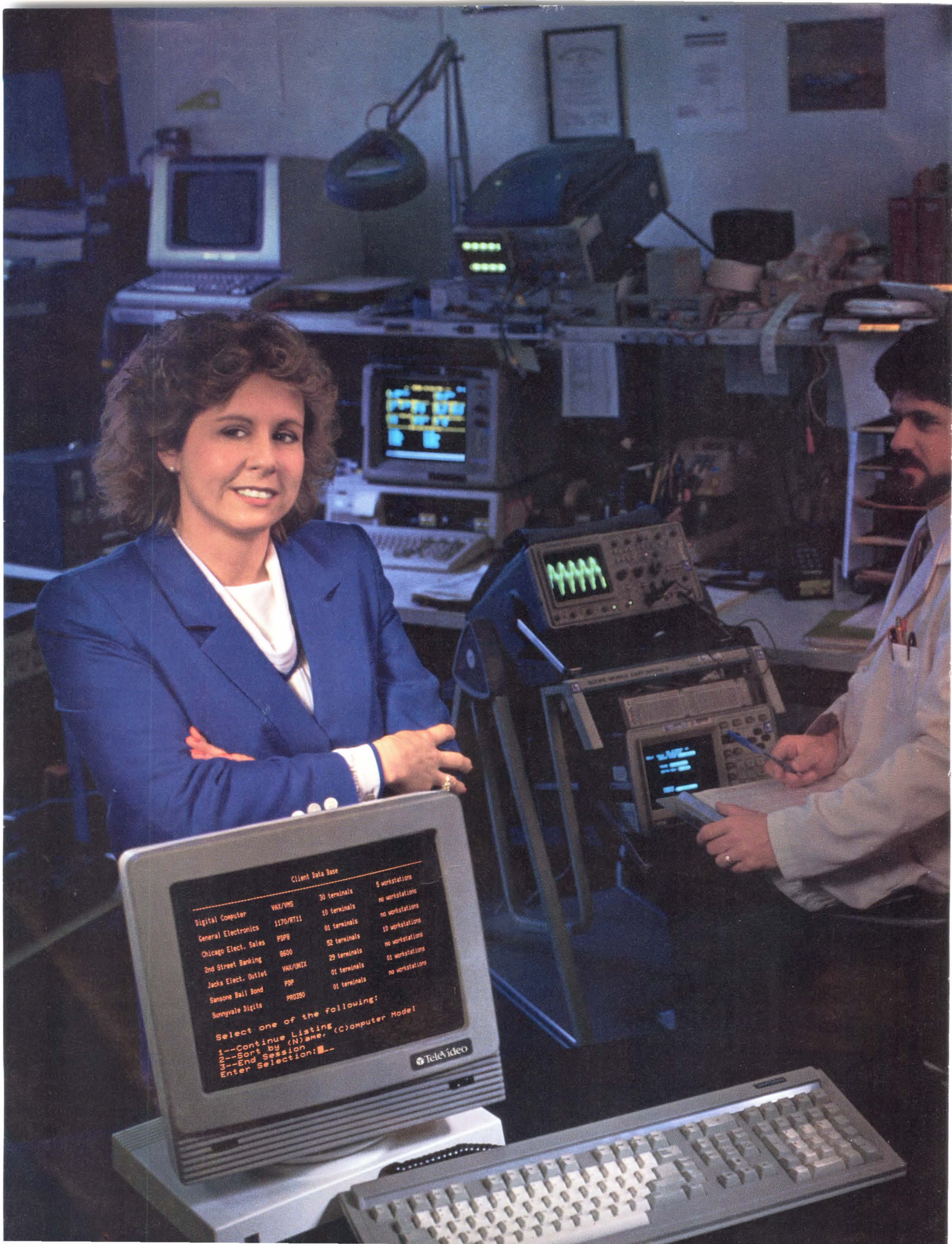
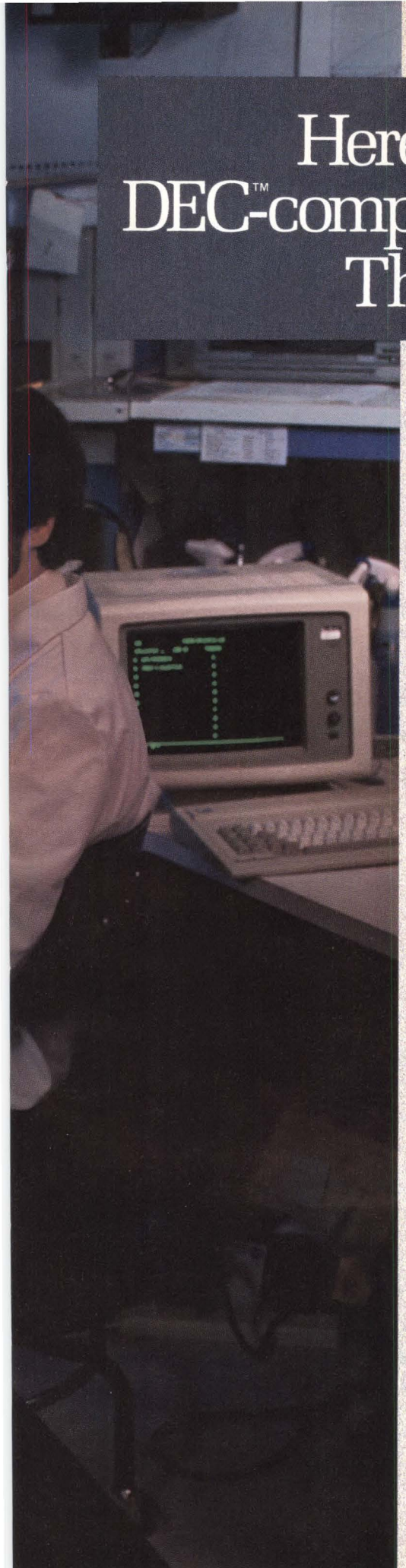

Client Data Base
Digital Computer VAX/VMS 30 terminals 5 workstations
General Electronics 1170/RT11 10 terminals no workstations
Chicago Elect. Sales PDP8 01 terminals no workstations
2nd Street Banking B600 92 terminals 10 workstations
Jacks Elect. Outlet VAX/UNIX 29 terminals no workstations
Sansone Bail Bond PDP 01 terminals 01 workstations
Sunnyvale Digits PRO350 01 terminals no workstations
Select one of the following:
1--Continue Listing
2--Sort by (N)ame, (C)omputer Model
4--End Session
Enter Selection:
TeleVideo



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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.

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"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 factors combine to make a product you either want or don't want in your product line...

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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."

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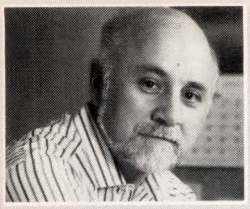

EDITORIAL

Dave Mallery

The Lion And The Lamb

There's an old saying that if the lion lays down with the lamb, the lamb won't get much sleep.

Ray Ball is one of the grand old men of the DEC industry (that means, one of the few who has been inside longer than Carl Marbach and I). Ray is attempting what can be described best as a convention of the lion and the lambs, united in the common need for unity in the face of a higher power. He is forging a DEC industry-specific trade association, the DATA Trade Association.

The primary goal of the association is to convene a compelling forum of corporate directors capable of gaining an "equity of respect" from top-level DEC policy makers. Another goal is to reacquaint DEC with the positive forces that gave rise to much of DEC's success: its third-party partners.

Such respect only can be obtained with unity and money. Unity among competitors only can be achieved in the face of compelling necessity and strong leadership. The necessity is obvious and Ray has my vote for supplying the leadership. Everyone understands money.

If you are a vendor active in the DEC market, you owe it to yourself to contact Ray at (805) 544-8588. Large users, especially volume buyers should consider joining. Users are included in the charter of the association. Anyone who doubts the clout of the user ought to examine the recent liberalized software licensing decisions and look for a trend.

DEC/CRAY Alliance

As we were going to press, I attended the joint DEC/CRAY announcement of the ability to "add" a CRAY to your cluster. Most of us don't have that problem, but there are some interesting observations to be made from the announcement.

The attachment itself is really a glorified DR11-W! They have taken an 8250 as a cluster node and dedicated it to doing memory transfers into a CRAY memory port. The hardware is fairly trivial, but the elegance of the solution it delivers is something else. Given the proper software, you now have a "seamless" union of another vendor's CPU, not only to the cluster, but to the entire network the cluster serves.

This same technique could marry certain blue-hue processors in the not too distant future.

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LETTERS

NEEDS HELP

Perhaps your readers may know the solution to a problem I have on the VAX. I want to use the Asynchronous Trap (AST) system service to allow for the interruption of program execution to perform certain tasks and then return to the interrupted program. The interrupted program generally will be sitting with an open read statement when the user decides to strike some key that will call the AST routine. Let's suppose that the AST routine must prompt the user for some information, and that the AST routine reads in with a read statement. Upon return to the interrupted routine, I've found that the open read statement has completed with null; i.e., the same as if I simply hit RETURN. Since in many instances a default to zero or spaces means something, the interrupted routine has no way of knowing that it was interrupted, and the read completed without the user typing in a response.

What I need is some way for the AST routine to either reinitialize the read of the interrupted routine, or cause the read to complete with an error so that the ERR= path (we are in FORTRAN: READ(*,10,ERR=8)) is taken to repeat the prompt. This last method may be preferred since I also have found that I must assign a different logical unit number to the terminal in the AST routine to prevent an error condition on the read from the AST routine.

Wendel D. Renner
Community Hospital Indianapolis
Indianapolis, Indiana

Readers???

AI CONTROVERSY

I found the Artifical Intelligence issue very interesting. Charles Connell's article, "Measuring Artificial Intelligence" (May 1987), defines the field as well as any magazine article that I've seen. However, the aspect of this issue that appealed to me most was the willingness of *DEC PROFESSIONAL* to take a stand on a controversial subject.

Gil Hoellerich
Fayetteville, Arkansas

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.

WHERE'S THE MANUAL?

I'm writing in reference to the review of the MICROVAX 2000 by Dave Mallery in the April edition. Specifically, I'm questioning the section of the review concerning the boot-up testing.

Has Mr. Mallery ever booted a MICROVAX II? Has he ever seen the manual? Every MICROVAX II I've ever seen starts testing at "F" and ends at "0." That would seem to be more tests than shown by Mr. Mallery during the 2000 boot. My MICROVAXs show me messages while testing that let me know they are self-testing, and then tell me, in plain English, when they finish. They do not output cryptic "diagnostic callouts," unless there's a failure of some sort.

In light of these facts, how can Mr. Mallery say that "Obviously the quantity and quality of on-board diagnostics has gone up"? A diagnostic that spits out cryptic success messages is certainly not better than one that uses English. At first guess, it would appear that the self-test shown in the article has failed. And by my count, the 2000 has one less diagnostic than the MICROVAX II.

Of course, I've not yet seen the 2000 manual, so I do not know whether Mr. Mallery is actually right about the quality or not. From Mr. Mallery's review, it's far from obvious that the self-test quality is better; in fact, they seem to have taken a step backward.

It seems that Mr. Mallery's objectivity has slipped. While that would be appropriate in a DEC-sponsored magazine, I don't expect to see it in a magazine that takes great pains to deny any connection to DEC. On the whole, *DEC PROFESSIONAL* is a well-written, useful magazine. Unfortunately, something like this casts a pall over the remainder of your information.

John D. Stanley
Sr. Software Engineer
New Methods Research Inc.
Syracuse, New York

Dave Mallery: When my MICROVAX II boots, it looks like this:

```
Performing normal system tests

7..6..5..4..3..

Tests Completed.
```

I detected a larger semantic content in the diagnostic callout on the MV2000, which I duly reported.

```
?? C 0080 000.1000

> > > (then you boot)
```

Indeed, I share your perception that at least one module of the diagnostic failed.

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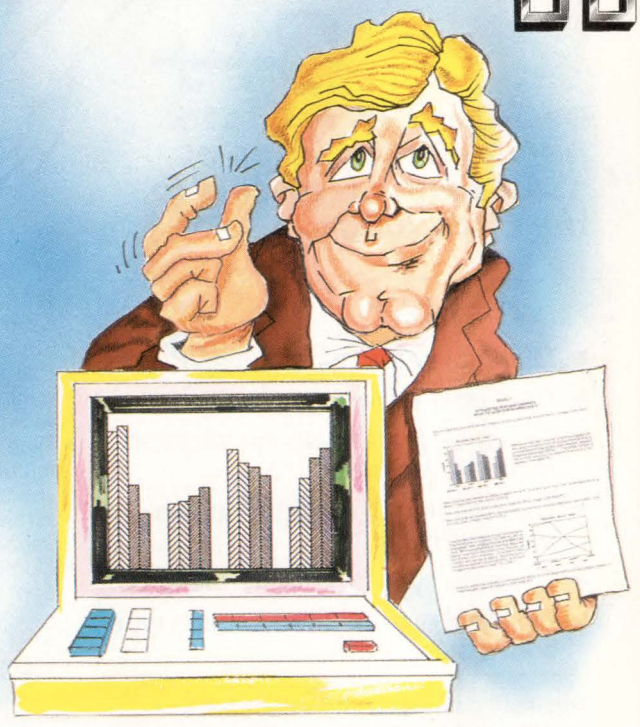

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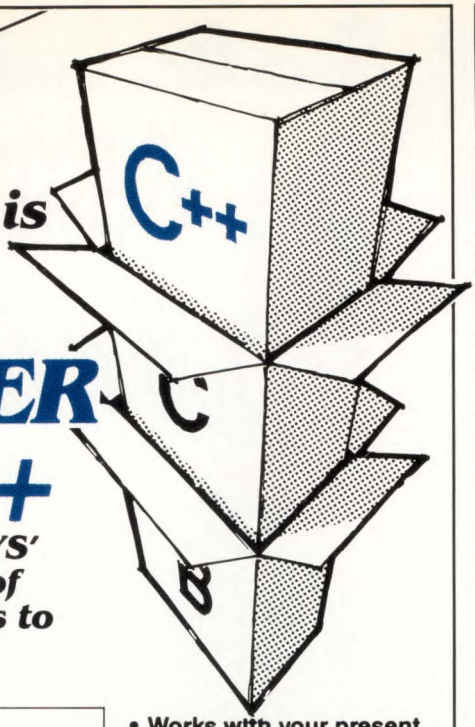

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However, the machine continued running in the face of adversity. My guess is that it was trying to tell me that there is an Ethernet port, but no Ethernet connected . . .

As to the meaning of it all, that will have to wait for the existence of a manual. Digital is free to write its diagnostics the way it chooses, and for its own purposes. It is a tribute to DEC's open-mindedness that it tells us anything about the diagnostic callouts. Another manufacturer simply would document: If it doesn't start, call this number . . .

FAILS TO EXECUTE

I am system manager for a local CPA firm using a VAX 11/750 and VAX 8200 for in-house accounting client timeshare applications. We have the two systems connected via DECNET and do some fairly sophisticated custom accounting programming in DIBOL and COBOL. My problem is somewhat embarassing since we feel we have achieved a high level of sophistication in the VAX accounting applications areas.

My problem is this: This system wide login command file fails to execute on login. I have set up the logical "sys$sylogin sys$manager:syslogin" in the startup command file and upon doing a "sho log" the command file should execute. We had hoped that the problem would go away as we installed VMS updates but we've been through three updates and currently are running 4.5 with the same nagging problem on both systems. As a temporary solution we have had to force execution of sys$manager:syslogin through the individual account login.com files.

William Vaughan
System Manager
Keiter, Stephens, Hurst,
Gary & Shreaves
Richmond, Virginia

Dave Mallery: Your logical should read:

define/system/exec sys$login
sys$sysroot:[sysmgr]sylogin.com

Note that sylogin has W:RE protection. ■

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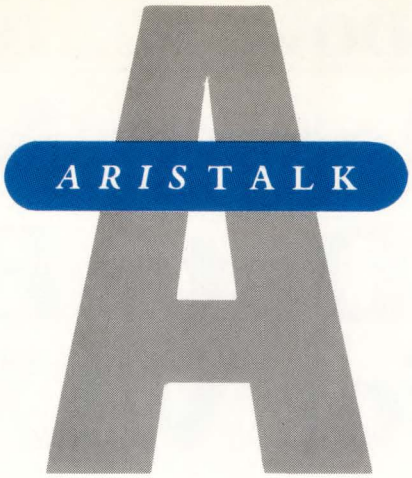

DECTALK AND THE DUKE

QUERY:

Jim Wood: We're having an open house soon and I'd like to make my DECTALK sing for our visitors. I'm looking for suggestions, code examples, even files of already DECTALKed songs.

REPLY:

Kelvin Smith: I'm pretty sure that the DECUS library has a tape of DECTALK demo materials. I got a prerelease copy while working for another company, that included several songs (including one quite credible imitation of Duke Ellington) and a demo program in BASIC. It was almost the same program written in C in the back of the *DECTALK Programmer's Guide* (I think). If you can figure out its use of 15 nested function calls (or so it seems), you might want to use that as a basis for your future programming efforts.

If you have problems finding the tape in the library listing, or you're not a member of DECUS, give me a call and I'll try to help. (Like everyone says, you really should join DECUS if you're not a member.)

PIRATE BROADCASTS

QUERY:

Mark Rief: Occasionally I have a peripheral on a DHV-11 continuously try to log into our MICROVAX. A SHOW USERS command will show the <login> username, and the PID will increment with each login attempt. If I'm quick enough with the right PID, the process can be stopped. This has happened on a dial-up modem and a plotter. Both are set to NOBROADCAST.

Contacts with DEC and the modem and plotter manufacturers have been useless. If anyone knows what causes this, please let me know.

REPLIES:

Kevin Barkes: The problem may be that your peripheral is generating CRS or other characters that the MICROVAX is misinterpreting as a login attempt. One way to handle this at the DCL level (what else would you expect from the DCL editor?) is to have a demon process allocate the terminal port when the peripheral isn't in use; the MICROVAX no longer will pay attention to the spurious login attempts because it figures the process that allocated the port is handling it.

A more elegant approach involves using a high-level language to set an AST that the demon watches. When the trap is "sprung," the demon de allocates the port. I hope this helps.

Phil Anthony: Mark, I've repeatedly had the same problem on a VAX-11/750 with — so help me — DZ-11s. The culprit? Line noise. Checking your connections and shielding your cable probably is your best bet.

Mark Rief: Kevin and Phil — thanks for such prompt responses! I did a keyword search and found messages 298 and 723 dealt with a similar problem. They suggested SET TERM/PERM/ALTYP and a larger TTY_ALTYPAHD buffer size. I've tried this and will see if it works. If not, I'll try your suggestions next.

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

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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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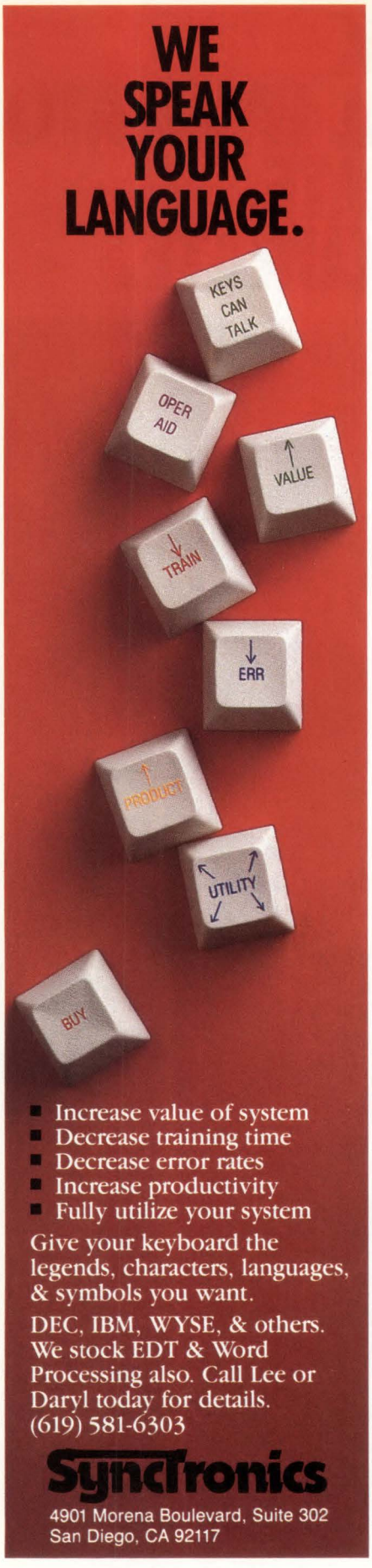

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Dave Campen: Mark, for the plotter, another thing you can do is SET TERM/PERM/NOTYPE. This will disable any login attempts on the port. You also can set its port SET TERM/PERM/NOTYPE. This will prevent any login attempts on that port. You wouldn't want to do this with the modem port if people are dialing in on it.

If you continue having trouble with the modem port you can define a system password and then set the modem port SET TERM/PERM/SYSPASS. Then, people will be required to enter the system password before getting the login prompt from the port. This will prevent noise from starting the infinite loop of the port issuing the login prompt, the modem replying with an error message and, then the port responding to the modem error report with another login prompt.

CATCHING VAXSTATIONS IN NET

QUERY:

Jack Spangler: I'd like to know how DEC is going to hook its VAXstation 2000s into an existing network that uses a DELNI to cluster the local machines together (VAX 780 and GPX MICROVAX). The DELNI allows a local connection to eight machines and also a tap to our campus Ethernet.

DEC recommends a maximum distance of 50 meters between machines, but I have some machines farther apart and would like to use ThinWire Ethernet cable to overcome the distance problem and hook into the DELNI. This would allow me to connect/disconnect the campus side when necessary. I realize that DEC has a device called DEMPR to do the above, but I'll only need one port not eight. Also, one ThinWire cable can support 30 small machines, so the reason for getting a DEMPR isn't clear.

REPLY:

Geoff Brunkhorst: DEC's been great to us in recommending DELNI purchases for the last three months, then saying "Well, what you need are networked VAXMATEs and VAXSTATION 2000s (needing the ThinWire/DEMPR)." Yes, DEC needs a Digital ThinWire Single Port Repeater (DTSPR), but it won't make or sell one.

Seems to me the marketing of ThinWire is for the explosion of business PCs and workstations in a modular office environment. In the existing laboratory environment, usually a few existing machines on a DELNI muck it up. (Remember, currently you can't hang a DEMPR off a DELNI.)

We hope to DESTA all our remote devices off ThinWire and use a DEMPR for tapping the backbone to our DELNI(s). DEC hasn't given me a clear answer for whether or not I can DESTA a VAXCLUSTER.

MICROVAX MULTIPLE CHOICE

QUERY:

Mark Salazar: We're buying our first MICROVAX II system and would like it to have a non-ST506 based disk subsystem. One of the local DEC authorized dealers has identified a good ESDI candidate, but according to him we also need to install a standard DEC disk controller for the MICROVAX to boot properly. I don't know enough about the MICROVAX to dispute his claim, so I'll put it to you. Is this dealer:

a. Correct

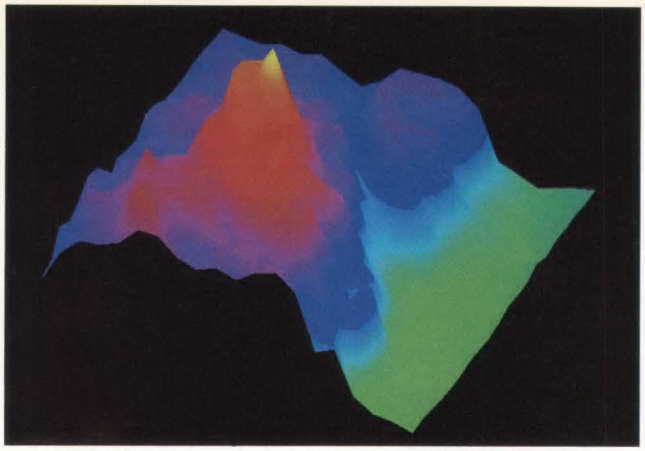
b. Mistaken/loose with the truth

c. Either (a) or (b), depending on the non-DEC disk subsystem in question?

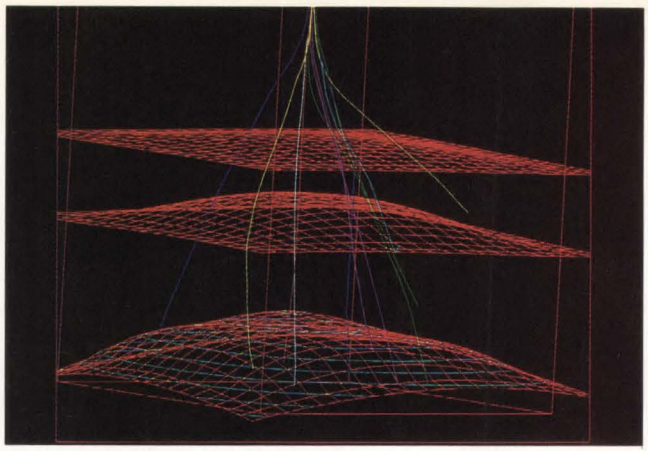
REPLIES:

Jim Ancona: I'm not very familiar with ESDI disks for the MICROVAX, but I suspect the answer is either (a) or (c). We use SMD disks with an Emulex QD-32 controller with no DEC disks on the system. It works fine. I believe that Emulex and several other companies make controllers that allow you to do the same with ESDI disks. Hope this helps!

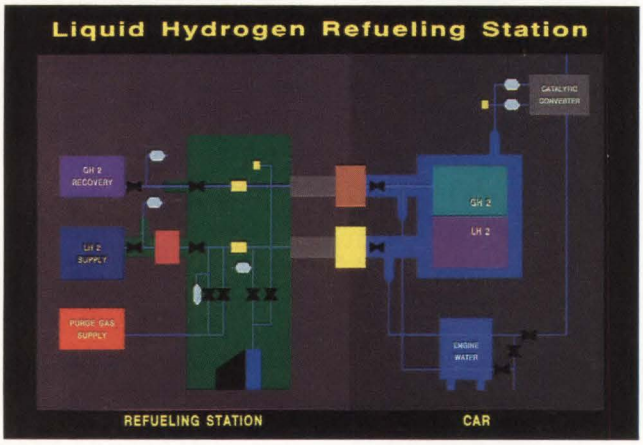
Mark Salazar: Jim, thanks for your response. If your MICROVAX system doesn't have a DEC disk controller in it, then the dealer I was talking to didn't know what he was talking about, because he claimed you need one. ■



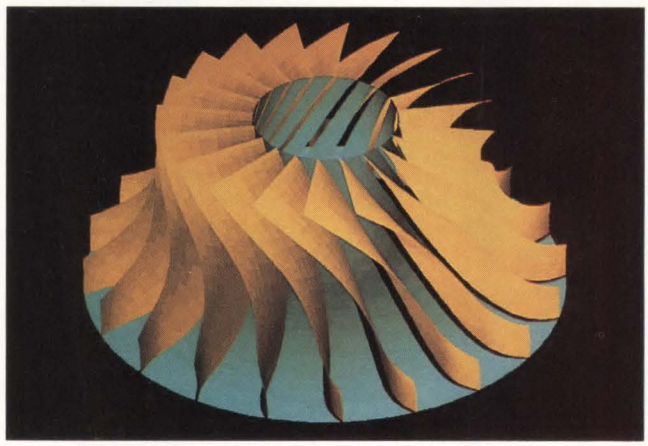
Local, interactive 3D manipulation of mapping data captured on a Tektronix 4129.



The 3D modeling capabilities of DI-3000 XPM are shown in this interactive drilling application.



The DI-3000 XPM graphics database excels at process modeling applications.



Using DI-3000 XPM, a turbine impeller is realistically rendered with local light source modeling.

Precision Visuals' DI-3000 XPM™

Graphics Modeling and Simulation Tools for Your VAX

The Product

DI-3000 XPM™ is Precision Visuals' flagship graphics tools product for creating 2D and 3D graphics application programs ranging from simple data display up to hierarchical graphics data management, and hidden line removal. DI-3000 XPM, which includes the powerful DI-3000® package proven by use at over 2000 sites, provides complete FORTRAN-callable subroutine tools for modeling and viewing. Industry-acclaimed documentation, product training, a HelpLine, and a team of Sales and Technical Support Engineers help speed your application development.

The User

DI-3000 and DI-3000 XPM are widely used subroutine libraries for developing engineering and scientific applications. DI-3000 XPM programmers have 2D or 3D applications that require: definition and repetitive use of graphics objects; updating of these objects and changing their relationships; changing spatial positioning, and manipulating selected subcomponents.

The Environment

DI-3000 XPM is machine and device independent, with initial support for the VAX/VMS environments. In the DEC environment, Precision Visuals' products install automatically as run-time shareable libraries, allowing run-time selection of device drivers and efficient use of machine resources. Over 100 graphics devices are supported, including graphics terminals and hardcopy devices from Tektronix, DEC, and HP, as well as PostScript-supported laser printers. Prices for DI-3000 XPM start at $5,500 on the DEC MicroVAX GPX; license fees scale up and down depending on CPU power.

The Features

DI-3000 XPM includes the entire DI-3000 2D/3D graphics subroutine library. For sophisticated development tasks, the XPM extension includes graphics data management based on the PHIGS output model, hidden line processing, and many extended primitives such as rectangles, ellipses, arcs, spheres, extruded polylines, extruded fill area sets, and solids of revolution. Graphics structures can be built, edited, and archived with or without images appearing on a graphics device. Output can also be displayed and rendered locally on Tektronix 41xx/42xx terminals by combining DI-3000 XPM with Precision Visuals' AddSys-3000™ software. DI-3000 XPM also supports a powerful name set filtering option for controlling the display and detectability of graphics picture components.

ENTER 51 ON READER CARD

The Applications

DI-3000 XPM is a tool for programmers building design, simulation, process monitoring, and other applications including: ☐ Transportation or Communication Networks ☐ Simulation of Flow Phenomena ☐ Manufacturing Simulation ☐ Molecular Modeling ☐ 2D Layout ☐ Architectural Modeling ☐ Any Simulation Where 2D or 3D Objects Change Based on Events. Less complex applications can be fully addressed with the basic DI-3000 package.

The Story

To get the full story on DI-3000 XPM, including technical information and a complete list of supported systems and users,

Call Chris Logan at:
303/530-9000.

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DATELINE DEC

Bridge Over Waters

DEC's New METROWAVE Spans Rivers And LANs

In describing DEC's new high-performance device to link geographically-separated Ethernet LANs, William E. Doll, marketing manager for Digital's Computer Special Systems group, said, "The METROWAVE bridge complements Digital's current LAN bridge capabilities by offering cost-effective, flexible network expansion features. It is ideal for environments in which cable cannot be used, such as across highways, lakes, or rivers, or where the cost of installing coaxial or fiber optic cable is not economical. "With Digital's METROWAVE bridge, users can effectively manage their network expansion requirements for extended Ethernet local area networks that reside in separate buildings across the street or across town," he concluded.

In a metropolitan or campus-like environment, the METROWAVE interface can connect Ethernet LANs between buildings up to a distance of 4.5 miles (7,340 meters) using a low-cost, easy-to-license microwave link.

In addition, the METROWAVE bridge dynamically manages traffic between geographically separated Ethernet segments to optimize network performance. It maintains full Ethernet throughput and supports multivendor networks using any Ethernet version 2.0 compliant protocol.

Digital's METROWAVE bridge provides high-performance throughput at 10 MB per second and can encompass an area of 22,000 meters, using the LAN Bridge 100. With the addition of the METROWAVE link, you now can connect these large Ethernet LANs to create an even more extensive multivendor network, supporting thousands of Digital and non-Digital computers, desktop devices and printers.

With Digital's LAN bridge device and new METROWAVE interface, users will have access to an extended Ethernet LAN that can utilize a combination of media, including baseband, broadband, ThinWire Ethernet and fiber optic cables, as well as microwave links. All are dynamically connected in a seamless multivendor network, making it easy to access critical information in a timely manner.

Because it's an intelligent, store-and-forward device, the METROWAVE bridge allows you to manage network traffic efficiently by identifying every computer, printer, or other device on an extended Ethernet LAN. Only information addressed to a remote location is forwarded over the microwave link to the other Ethernet segment. The METROWAVE bridge keeps local traffic local, reducing the amount of traffic over the entire network.

Initial shipments of the METROWAVE bridge began in May in the United States, with volume shipments slated for this month. METROWAVE hardware is priced at $28,000 for both ends of a link in cabinet configuration packages.

The microwave radio equipment, including the transmitter and receiver controllers, microwave radio frequency unit, antenna, and signal and power cables are supplied by M/A-COM Inc. through a joint marketing agreement.

DEC Supports Science Series By WQED/Pittsburgh

The Infinite Voyage *Will Air Over Three Years On PBS And Commercial Stations*

Digital Equipment Corporation joined with WQED/Pittsburgh in a multimillion-dollar project to bring a high-quality adventure series titled *The Infinite Voyage* to public and commercial television. The three-year series produced by WQED in association with the National Academy of Sciences, will capture the adventure of scientific exploration and discovery and

take viewers on journeys to the edge of space, the bottom of the sea, and to the interior of the human body.

The Infinite Voyage, a 12-episode series, will air on prime time, one program each quarter, starting in the fall of 1987.

"This is an imaginative approach to television programming and corporate sponsorship," said Winston R. Hindle Jr., senior vice president of corporate operations at DEC. "This new series will result in an exciting run of PBS-quality programming on commercial television, and a uniquely high quality environment for DEC to reach its critical audience. It creates an entirely new way for private organizations to fund public television."

The Infinite Voyage will be shot on location around the world using location footage, computer animation and special visual effects to tell the stories behind new ideas and technology, scientific revolutions, explorers and discoveries, and adventures and revelations.

The productions will build on the successful collaboration of WQED/Pittsburgh and the National Academy of Sciences that resulted in last season's Emmy award-winning PBS series, *Planet Earth*.

DEC Hits The Track

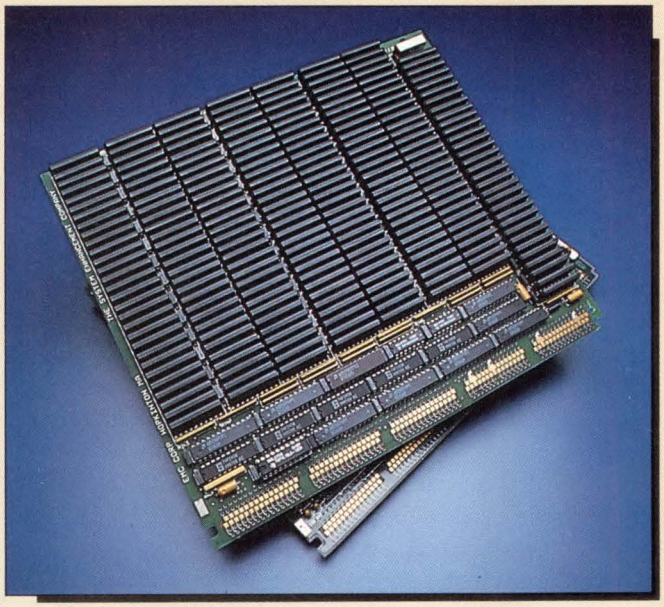
Sponsoring Corporate Championships

Digital's Jack Shields, a senior vice president and a member of the Digital track team, said that the company will be the sole sponsor of the 1987 U.S. Corporation Track Championships in Boston on July 25-26. "We believe this event will serve as a vehicle to encourage health and fitness within the company and throughout the corporate community."

The U.S. Corporate Track Championships will consist of relay races of various lengths, with categories for men, women, corporate executives, vice presidents and CEOs in various age groups.

Hosted by the New England Corporate Track Association (NECTA), a nonprofit organization devoted to organizing corporate running events in New England, it will take place at Boston University's Nickerson Field, the first time it's been held outside California. More than 50 teams are expected to participate from all over the United States.

"The primary purpose of the meet is to promote health and fitness among corporate employees and to foster competition of the fields of friendly strife," said Dick Joseph, the president of NECTA. He added, "There is not another similar kind of competition anywhere in the world."



Reverse Engineered BI Memory

EMC Introduces Faster, Cheaper Memory Systems

EMC Corporation recently announced reverse-engineered memory systems for VAX BI-bus computers (82XX and 83XX). This appears to give EMC the first third-party memory devices that crack the mystery of the BI.

The EMC memory subsystem comes in two sections: a controller card and up to five separate memory array cards.

EMC claims that its memory solution has several advantages over BI memory from DEC. One of the most striking is memory density. According to EMC, DEC's cards contain 2 or 4 MB each. EMC's boards, on the other hand, come with 8, 16 or 24 MBs per board. This gives the user a higher limit on total memory.

Also, according to EMC, its memory takes up less "logical space" on the BI bus. Controller and cards become one node on the bus, whereas, EMC claims, DEC's memory takes one node per memory card.

In addition, EMC asserts that its memory works more quickly than DEC's. They cite figures of 1,000 nanoseconds for a longword read from DEC's memory, and 800 nanoseconds from EMC's. This speed difference might be noticeable to a user, given an application that's bottlenecked by the memory cycle.

EMC is selling its memory for approximately 20 percent per megabyte below DEC's prices.

It will be interesting to see whether DEC takes legal action against EMC over this product. EMC says, however, that it doesn't anticipate a law suit from DEC about this memory. —*Charles Connell*

PDP Family Lives On

Exaggerated Reports Of Its Demise Unwarranted

On reading the obituary about himself, Mark Twain said, "The reports of my death are greatly exaggerated." DEC product managers for the 16-bit PDP line have made the same protest on behalf of their computers.

DEC PROFESSIONAL recently visited members of the 16-bit PDP group in Maynard, and DEC made it clear that it has no intention of dropping its 17-year-old PDP line.

There is some evidence to back this up. All four of the current PDP models — 11/53, 11/73, 11/83 and 11/84 — are less than three years old. DEC also is modernizing the installed PDP base. The company sells upgrade kits that convert an older 11/23 into an 11/73 or an 11/83. It also plans to introduce kits that upgrade the older "4 models" — 11/04, 11/24, 11/34 and 11/44 — into an 11/84.

In addition, they are maintaining their contacts with third-party software developers for PDP systems. DEC publishes the *PDP-11 Software Source Book*, a two-volume set listing approximately 2,500 programs available from independent sources. The volumes are divided into subject areas, ranging from accounting and agriculture to trade and transportation. The books also contain descriptions of third-party system software, including programming languages and operating systems. This book is updated every year and is now in its fifth edition.

Although this support is valuable to current PDP owners, why would a new customer buy one? Won't a MICROVAX do everything better for nearly the same price?

Product managers Lucien Philippon and Nicole Benecasa answered with gusto. "Not necessarily," Philippon said. "For many applications, a PDP is the correct solution. As the *Source Book* shows, there's a very strong software base for the PDPs, and a new user will often find that someone has already written the programs he needs."

"We offer a wide choice of operating systems," he said. "A user can choose from RSTS and RSX for general-purpose computing, RT-11 for dedicated real-time work, ULTRIX-11 for UNIX compatibility, DSM for MUMPS hospital applications, and several other special-purpose operating systems."

"There also can be a real cost saving with a 16-bit solution," Philippon went on. "The processor itself is often cheaper than a MICROVAX and so are the attached hardware and software."

Both Philippon and Benecasa noted a caveat to this enthusiasm, however. "For customers with a brand new application — a new type of software and new device interfaces — we often encourage them to select a VAX. VAX/VMS offers a more comprehensive set of software development tools than the PDP operating systems do," they said.

While they didn't mention it, another caveat is processing capacity. A customer who needs a lot of CPU power or who will be performing a high volume of I/O should consider a VAX over a PDP.

PDPs are the choice, though, for many kinds of laboratory applications, real-time control and processing embedded in other devices. Their use also goes beyond technical applications; satisfied PDP owners run business and office tasks.

DEC seems to be serious about staying in this product line. Given an understanding of a PDP's limitations, it remains an excellent choice for many new computer buyers.

—Charles Connell

DEC's New Video Terminals Work Like Workstations

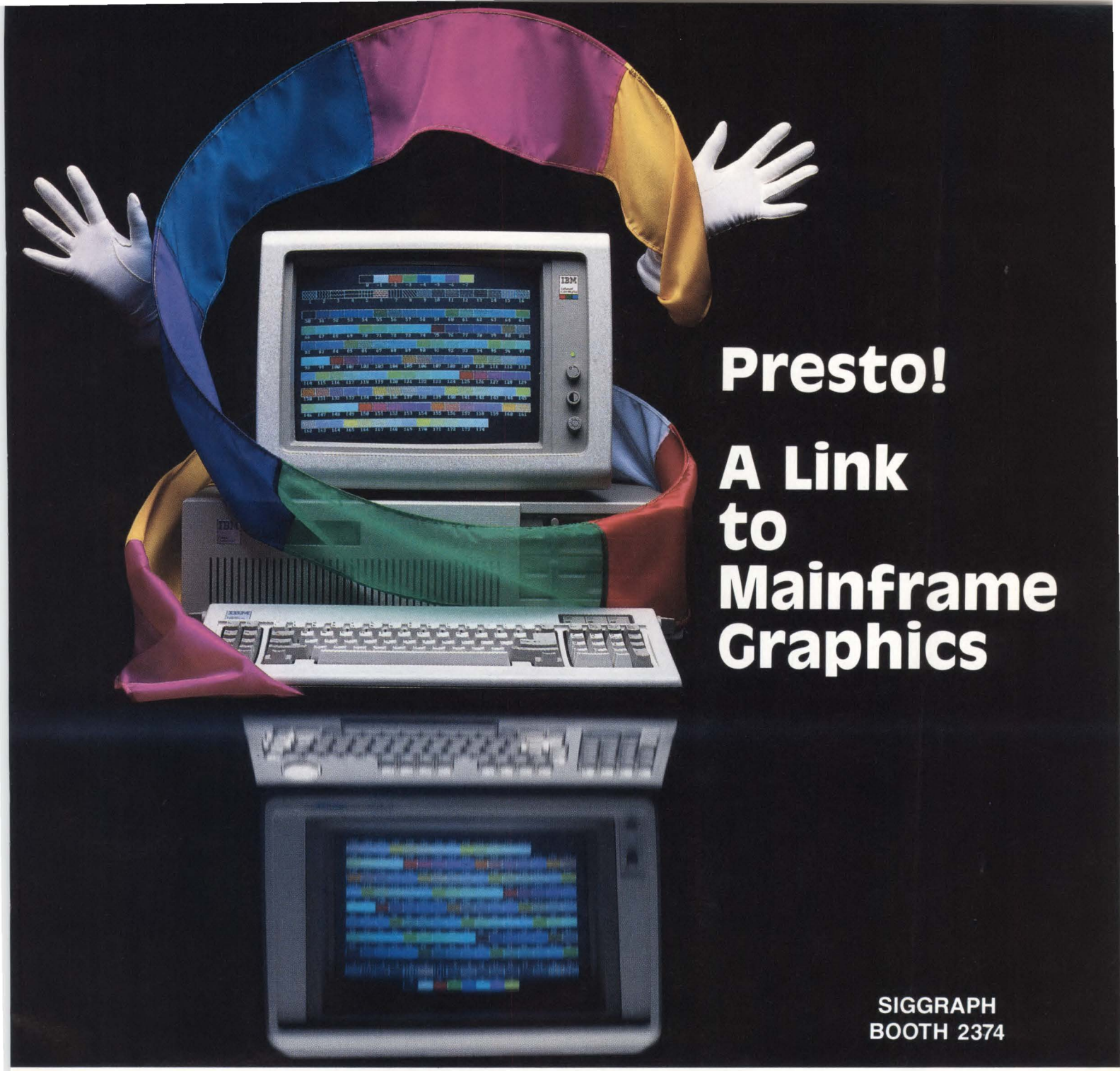
Dual Session Capability Permits Split Screen Operations

DEC's new generation of video terminals includes workstation-like features, allowing a single video terminal to manage two computing sessions simultaneously.

With dual session capability, a financial analyst, for example, can enter numbers into a spreadsheet in one portion of the screen and view a graph reflecting the spreadsheet information in the other portion.

"The VT300 terminals offer a combination of high-resolution, fast graphics performance, dual-session capabilities and an integral mouse or tablet port that allows users to get the most out of Digital's VAX computer systems and networks," says Don Murphy, video product manager for DEC's Terminals Business Unit. "Now users can work with information that resides on two systems at once — saving time and boosting productivity."

The VT330 monochrome and VT340 full-color text and graphics terminals have twice the resolution, up to five times the speed and are priced significantly lower than the earlier models, VT240 and VT241. Designed specifically for VAX customers and multivendor environments, the new terminals meet the needs of users in financial services, computer integrated manufacturing, office automation, applications development,



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and computer-aided design and engineering markets.

Fully compatible with, and designed to maximize the performance of DEC's networked VAX computer systems, the terminals also are compatible with DEC's popular VT200 and VT100 generation terminals and equipped to take advantage of DEC's DECCONNECT System.

Dual sessions can be accessed running over a two-wire setup or, on a VAX, with DEC's proprietary SSU, a software utility for session support. In this mode, VT330 and VT340 become the only terminals in the market capable of running dual sessions over a single wire. That means you can install the VT300 terminals for dual session computing without rewiring your office or facility.

VT300 terminals can store up to six screen pages (more than 19,000 characters) — three screens per session in dual session mode — or two full screens of graphics in resident memory, making them well suited for distributed computing environments. You can manipulate text and access graphics within the terminal and on the screen without burdening the host computer, thereby improving system capacities.

A built-in color editor on the VT340 allows you to display up to 16 colors from a palette of 4,096 colors, then save the settings for future use. VT330 graphics are displayed in up to four shades of gray. A local User Defined Keystroke (UDK) editor on both models allows storage and recall of frequently used keystroke combinations. You can, for example, designate a single key to perform the steps needed to access and read all unread electronic mail messages.

Advanced ergonomics make VT300 terminals easy to use and pleasant to work with. A built-in pedestal base with tilt/swivel capabilities allows you to adjust the terminal for maximum viewing comfort. A quiet fanless design employs convection cooling to minimize noise in the workplace. Power, contrast and brightness controls are located on the front of the terminal within easy reach.

Other features include letter-quality text in both 80- and 132-column mode; a 14-inch flat-face, anti-glare CRT display on the VT330; high-quality presentation graphics; and crisp, clear text. Full support for DEC's ReGIS and SIXELS graphics protocols, as well as Tektronix 4010/4014 protocols, makes VT300 terminals completely compatible with existing graphics applications for Digital terminals.

They are priced according to DEC's latest schedules and became available in May. The VT330 terminal is $1,895 ($300 less than the VT240) and the VT340 terminal is $2,795 ($400 less than VT241). You can install the terminal yourself and it comes with a one-year warranty on parts and labor. Extended warranties are available.

Clearpoint And EEC Agree To Market Turbo Disk Software

Package Contains VAX-Compatible Memory

EEC Systems and Clearpoint Inc., entered into a joint marketing agreement to sell each other's hardware and software, along with their own products.

EEC Systems provides a virtual memory device for the VAX called TURBO DISK/VMS, while Clearpoint manufactures high performance VAX-compatible memory boards.

Because the TURBO DISK/VMS package uses the system's main memory for storage of data instead of a standard disk, all transfers of data occur at high speed. The TURBO DISK/VMS package benefits applications with heavily accessed files.

Prices for TURBO DISK/VMS start at $1,500 and prices for Clearpoint memories start at $1,750 for 8 MB of MICROVAX II compatible memory. All Clearpoint memories are fully warranted for the lifetime of the system. A 24-hour repair/replacement policy is supported by a full customer service department at its manufacturing headquarters in Hopkinton, Massachusetts.

'Enterprise Computing' A Cooperative Effort

Cover Art Has Interesting History

What you see on our cover this month is a single frame from a video presentation entitled "Enterprise Computing," which was designed, produced and directed by Randall S. Dearborn, principal graphic designer, Media Communications Group, Digital Equipment Corporation.

The animated video graphics were first created using a PDP-11-based CGL Images II system, owned by Digital's Computerimages Group. These flat images then were taken to Broadway Video in New York, where they were "folded" into three dimensional animated images using the Quantel Mirage system and ADO. The video then traveled to Videotroupe in Windham, N.H., where additional effects were added using the Quantel Paintbox and NEC System-10 DVE.

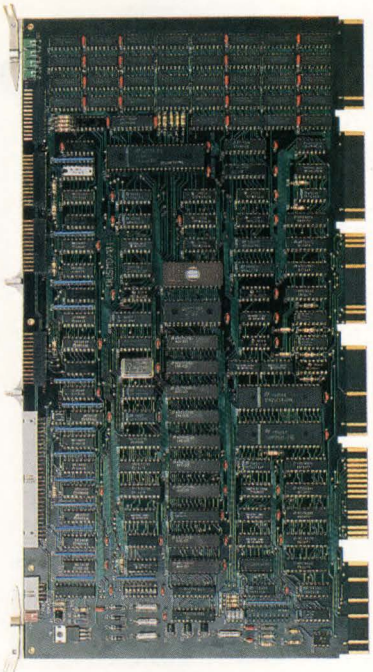
To create the graphics for the cover, a frame of the finished video was "grabbed" using the Images II. There it was retouched, increasing the resolution to 2000 lines. Finally, the image was sent to a Scitex color separation system which produced the negatives for printing. ■

Two Australians you're sure to know

THE WOMBAT, Vombatus hirsutus
The Wombat's territory ranges over the hilly and heavily timbered coastal regions of south-eastern Australia. Their ability to burrow long tunnels and bulldoze their way into the undergrowth has brought them into disfavour with farmers, yet they are inoffensive animals running for cover if disturbed. The young leave the pouch at four months.

WOMBAT is also an acronym for Webster Omnipotent Mass-storage Builder And Tester, a set of interactive, formatting and diagnostic utilities developed by Webster Computer Corporation and totally contained within firmware ROMS on Webster disc controller products.

. . . And one it will pay you to meet



The WUSMD SMD Unibus Cached Disc Controller

- ☐ *One Megabyte Cache*
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- ☐ *24 Megabit data rate*
- ☐ *Controls up to FOUR SMD Drives*
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- ☐ *Bad block replacement, ECC*
- ☐ *On-board boot, diagnostics, utilities*
- ☐ *Seek optimization*
- ☐ *Supports DEC Unibus computers*

Webster Computer Corporation, founded in 1970, is Australia's leading DEC-alike systems manufacturer.

The cached SMD Unibus controller is Webster's latest of many design firsts for the DEC-compatible world.

**ESDI Unibus version shortly available*

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GRAPHICS

SPEAKING WITHOUT WORDS

By Catherine Mink

How To Design Effective Graphics To Improve Your Application Software.

"Computer graphics" is used to describe everything from filtering satellite image data to using animation in TV commercials. For most programmers it means using pictures and symbols as part of an interactive application; i.e., displaying information to a user and making it easy for him to explore and respond to that information. There are several good texts on the techniques of graphics programming (getting a picture onto a screen), but not on the graphic design of programs: screen layout, menu, and the user interface. This article is an introduction to that essential but neglected art.

Why Graphics?

The value of graphics is in getting information across effectively, making simple things obvious immediately and complex things comprehensible. People have a tremendous capacity for processing visual information and a lot of the processing takes place at hardware speed with no conscious effort. Color and spatial relationships carry a great deal of "free" or "extra" meaning and icons are recognized more quickly than text. With graphics, we simply take advantage of this innate pattern-recognizing ability to make better use of the user's time and talents.

At the Computer-Aided Design Instructional Facility (CADIF), Cornell University, Ithaca, New York, we create and teach with interactive graphic design and analysis programs, in a variety of engineering fields (see Figure 1). We need programs that students can learn quickly and use easily, to study real systems and solve real problems. A good CAD program never slows the user down. It fits in so well with the problem-solving process that the program "disappears," letting the user concentrate on the task at hand.

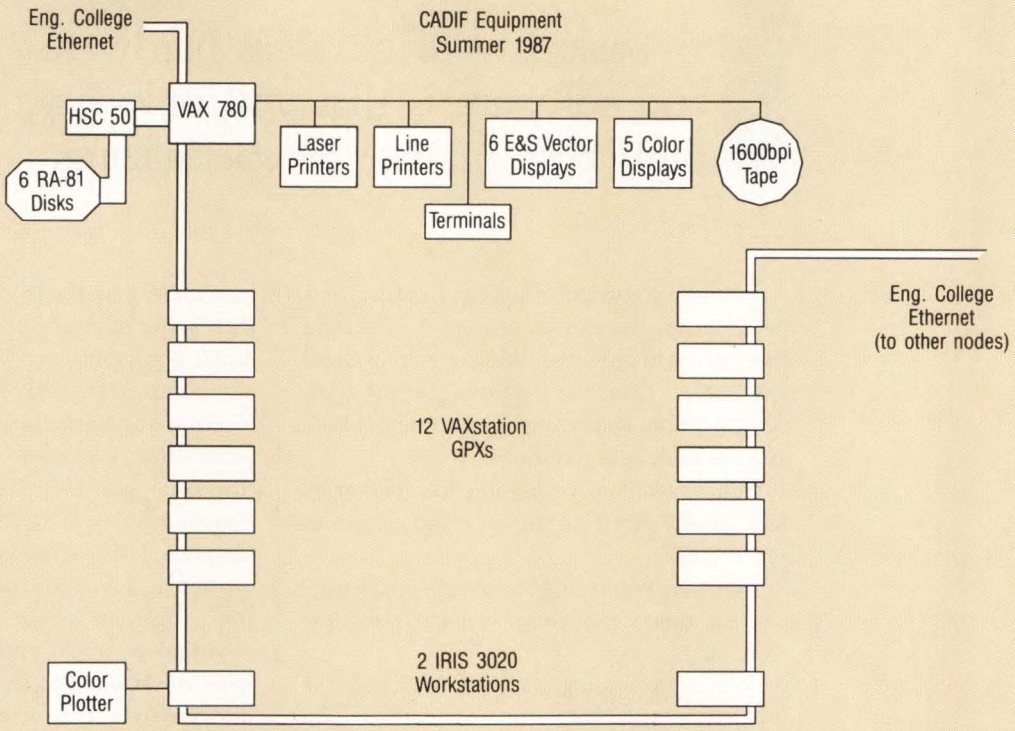
Most programs that are used repeatedly are, in some way, assisting in a design or problem-solving process. In addition, almost any problem that is complex enough to warrant using a computer to solve it also will benefit from using graphics to display data and streamline the user interface. This goes for any field — financial planning, scientific data analysis, etc.

What's So Special About Graphics?

To use graphics well, requires dealing with communications problems as well as the familiar computational problems. To solve them you need two different sets of data and two basic skills. You must know:

1. What you're trying to communicate and to whom.
2. The basic rules of visual communication.
3. How to use space or think visually.
4. How to use time or think sequentially.

FIGURE 1.



Current equipment configuration of the Cornell Computer-Aided Design Instructional facility.

FIGURE 2.

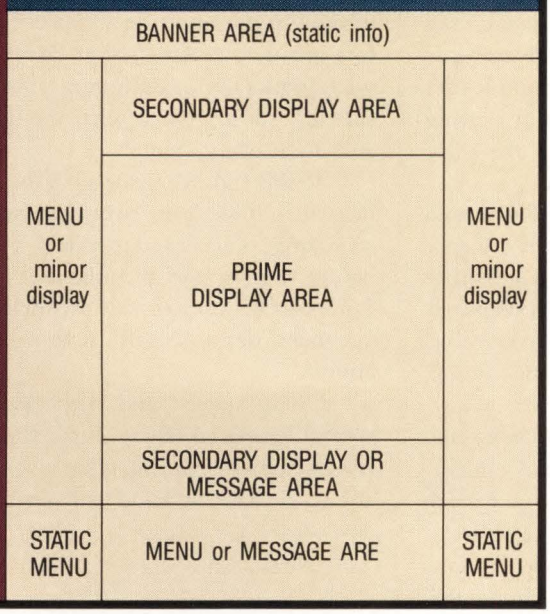
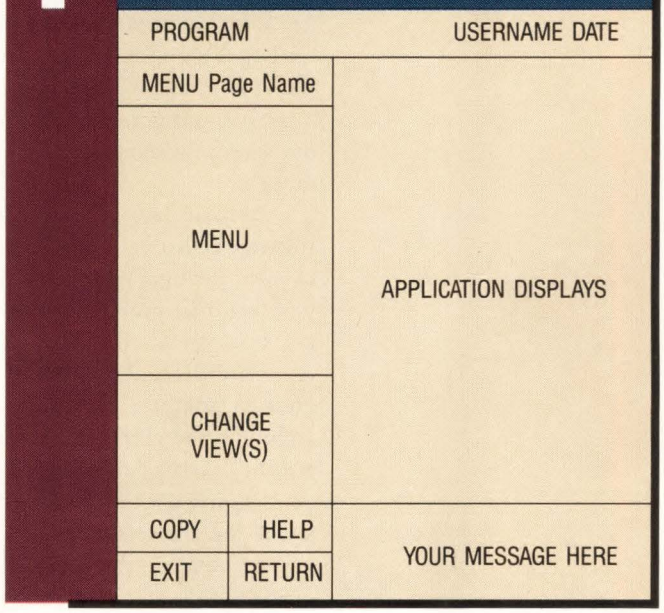


FIGURE 3.



Guides to laying out the screen for an interactive graphics application program. If you do a one-sided vertical menu you should provide a "mirror image" option.

A basic law of graphics hardware and software is that you only get high performance by specializing.

A lot of time and effort can be saved, and better programs can be produced, if certain (not necessarily obvious) things are known and approached from the beginning of program design. Before you do anything you should ask and answer these questions:

1. Who makes up your audience, market or user group? What do they want or expect to see and do?
2. What are you trying to do; e.g., image processing, object modeling, concept visualization, etc.?
3. Why are you using graphics? What will pictures do for you? What display features do you need? What features will you need in the next revision?

These have obvious implications for the selection of your hardware and graphics language as well as for program design. For example, if you want to create an educational game for children to run on a PC, you'll only have to design for one kind of hardware: one with low resolution. You'll need a simple user interface, and you probably won't be putting out a new revision of the software every few months.

A basic law of graphics hardware and software is that you only get high performance by specializing. (Vendors will try to convince you that their product is both the best and the universal standard; this is flatly impossible. Any standard is obsolete almost by definition.) Hence, graphics programmers are always arguing about efficiency versus portability, and stability versus performance. To make intelligent choices about those features, you have to know the answers to the questions above.

In general, the software (graphics language and development tools) you choose will have a greater effect on your product, and your happiness, than the hardware. Unfortunately, there's a lot of great hardware available and not much great software. We were unable to find any commercial package that came close to meeting our needs for performance, comprehensiveness, ease of use and portability, until the Hierarchical Object-Oriented Picture System (HOOPS) was written by Flying Moose Graphics, Ltd., Ithaca, New York. HOOPS was written in close cooperation with the Connell staff. Together, we specified a language with a natural grammar and world model so it's easy to learn and to teach, and an intelligent device driver system that maximizes speed on a wide variety of machines, so we can distribute our software as widely as possible (see Photos 1 and 2).

Designing Your Program

Graphics programs require careful attention to what the screen will look like at every point in the program both in terms of human factors and user interface design. We've found that what works best is designing "from the outside in," starting with what the user can see and do at every step.

To this end, we create all of the menus and help files first. Your program data (graphs, structures, objects and pictures) will, by their nature, suggest how they should be displayed. It's less obvious how menus should be done, yet menu design is critical to program useability.

Doing menus and help files first has several beneficial effects. First, the process is unequalled for exposing what you don't know about the task at hand and forcing you to

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*IDC 1986 U.S. Terminal Census.

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clarify your ideas. It's invaluable for keeping you from coding for a few weeks until you've lived with and thought about the problem. Second, you create a good functional specification of the program, and the most basic documentation of the way it works, from the beginning. You may have to rush into production without a manual, but at least you have those nelp texts (see Photos 3 and 4). Third, you soon have a visual simulation of the program — a set of linked menus without any action routines — that you can use to demonstrate, critique, ask other people for their opinions, etc. At this stage spend time walking through the menus, asking at every point what actions you want to be able to perform, what choices are natural and what information you need or want to see. This always leads to revisions and improvements.

If each menu has to be laboriously hand-coded, you can't revise and refine them much; you tend to use one simple standard menu for everything. We use an interactive graphic menu-creator utility (see Photo 5), developed at Cornell. I recommend this approach because it saved a fortune in programmer time and gave us a much better product. Ideally, a menu utility should come with every graphics package (we've authorized Flying Moose to distribute ours with HOOPS). If you don't get it that way, buy one or write one if you have to; it's also a great first exercise in interactive graphics, one that you can evaluate and improve on at length.

Guidelines

What follows are guidelines for avoiding most of the common, needless gaffes people make when writing interactive graphics programs. These were written assuming the use of a pointing device, such as a mouse, mapped to the screen display, and a keyboard for input, which is the standard workstation configuration. Many apply equally well to keyboard-only situations, especially if arrow keys are used for pointing. Similarly, rules for color and spacing are pertinent to data or figure displays, as well as for menus.

If each menu has to be laboriously hand-coded, you can't revise and refine them much . . .

1. Allocate screen space and use color to lead the user's attention to what's most important. This is usually the primary information display, followed by secondary displays, prompts and messages, and control information, such as menu[s], icons and valuators, in that order. If possible, keep the application display and the menu visible at all times. Figures 2 and 3 show the relative values of the areas of the screen, and Photos 6 and 7 show good basic layouts.
2. Have menu pages correspond to major program sections; use overlaid or pop-up submenus to reduce clutter and indicate organization.
3. Use a banner or diagram to find out quickly where you are in a multiple-page program; if possible use color and spacing as well (see Photo 8).
4. Keep menu layouts simple, uncluttered and compact. Never display anything that can't be selected reasonably. Always display EXIT, HELP, RETURN and HARDCOPY menu items; keep them in the same place on all pages.
5. Make your program comfortable to use. Minimize required hand and eye movement and avoid pull-down menus or actions that require keeping a mouse button depressed. Consider left-handers, and either run menus across the bottom or, less desirably, across the top of your screen. You also can provide a left side/right side option. Consider people of

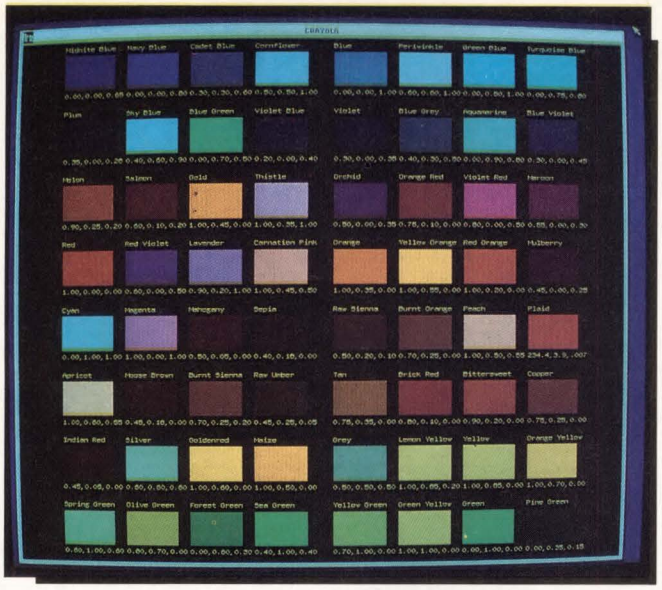


Photo 1: In HOOPS, you can specify colors in natural language ("Reddish Purple") rather than having to use numerical RGB values ("R = .8,G = 0.0,B = .6"), which are anything but intuitively obvious.

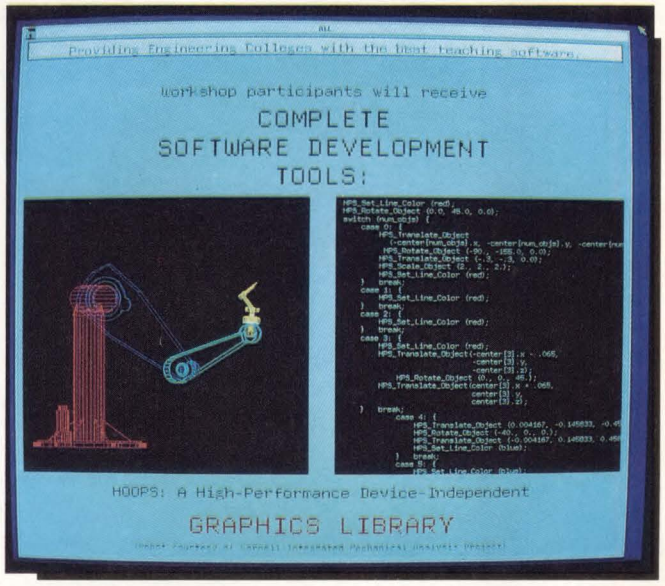
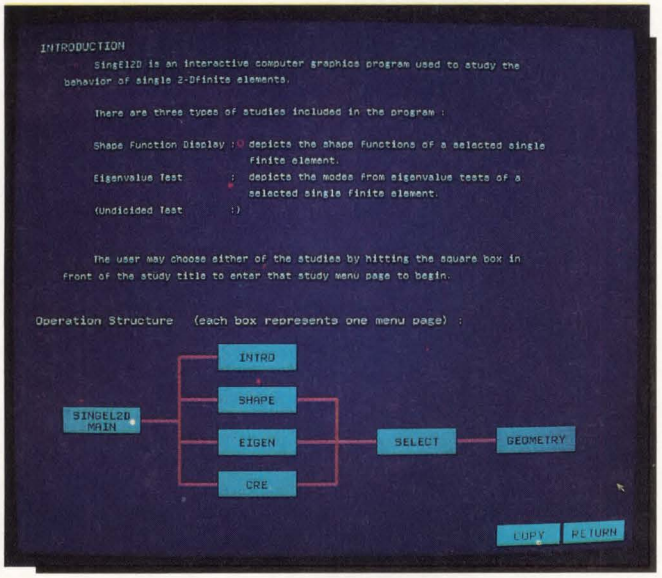


Photo 2: This promotional slide for CADIF's technology transfer workshops shows a robot modeled in HOOPS and a portion of the C code that generated it.



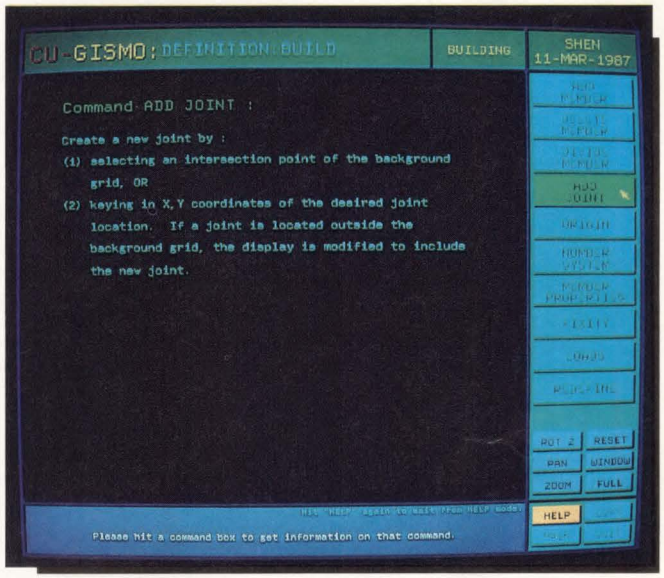


Photo 3 (left): The online HELP screen from CU-GISMO is from the introductory tutorial. Photo 4 (right): The HELP screen for a particular command on this page.

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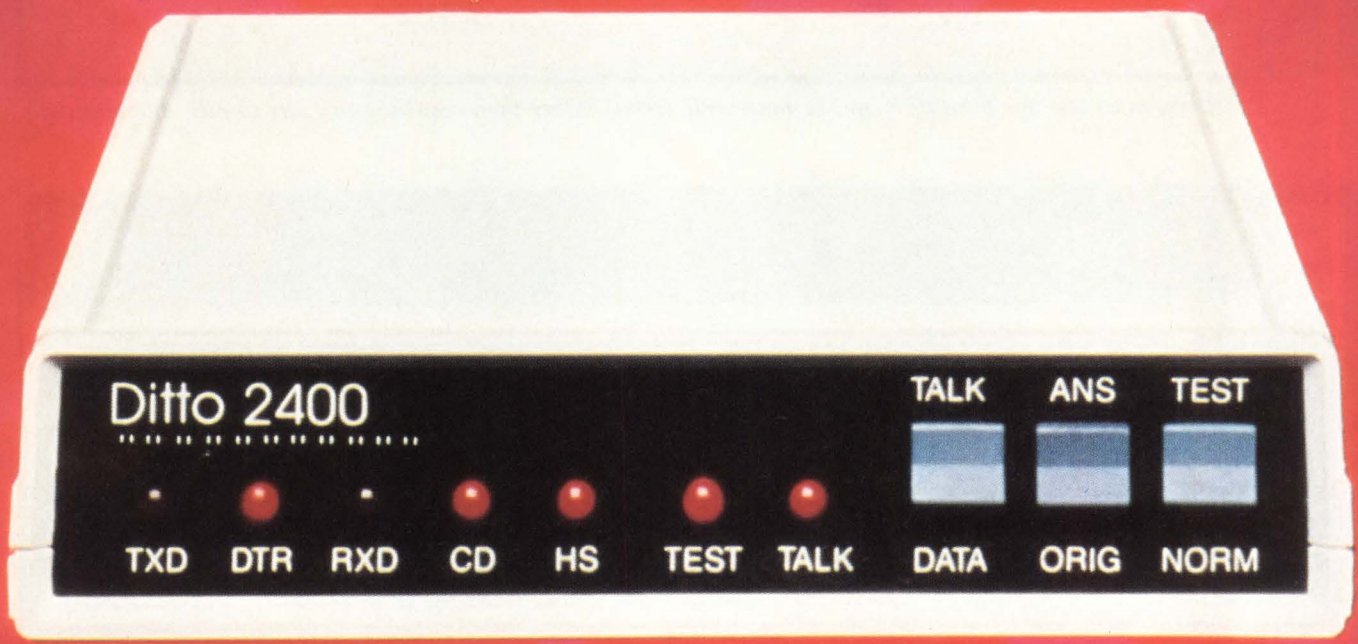

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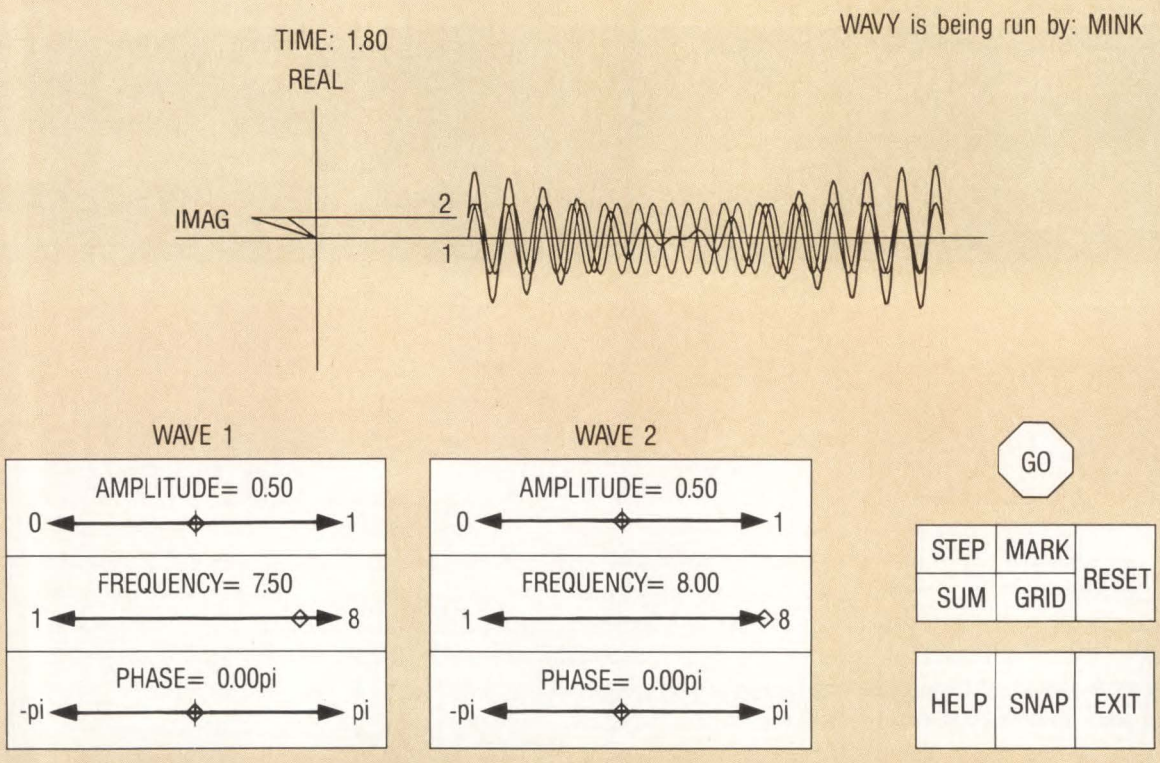
FIGURE 4.

MINIMAL MENUS

Choose an action:	What do you want to do?
(0) SAVE (1) CLEAR (2) MODIFY (3) COMPUTE (4) END	(S) et up a problem (A) nalyze a problem (F) ile operations (H) ELP (E) xit this program
BAD	BETTER

If you must use this form of menu, be mnemonic (right) rather than requiring the user to pick numbers (left).

FIGURE 5.



Potentiometers are useful for selecting or varying numerical values.

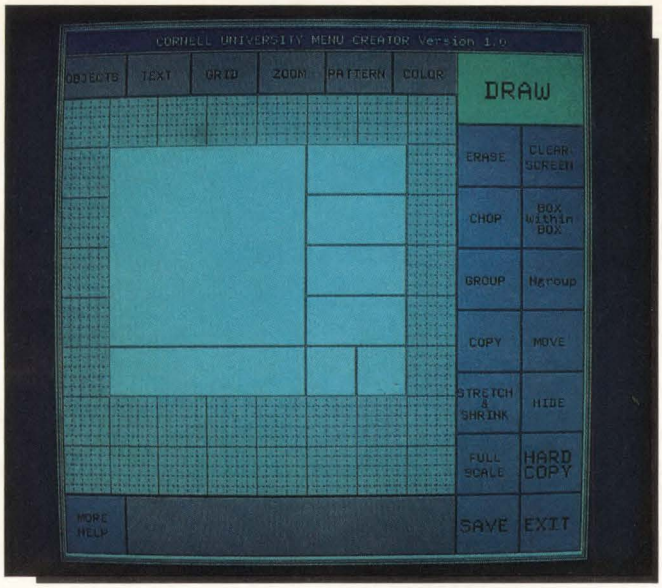


Photo 5: An interactive graphic editor to speed the design of menus.

Photo 6: An example of good, but not excellent, menu layout in a monochrome application (analyzing the response of a steel-frame building to loads).

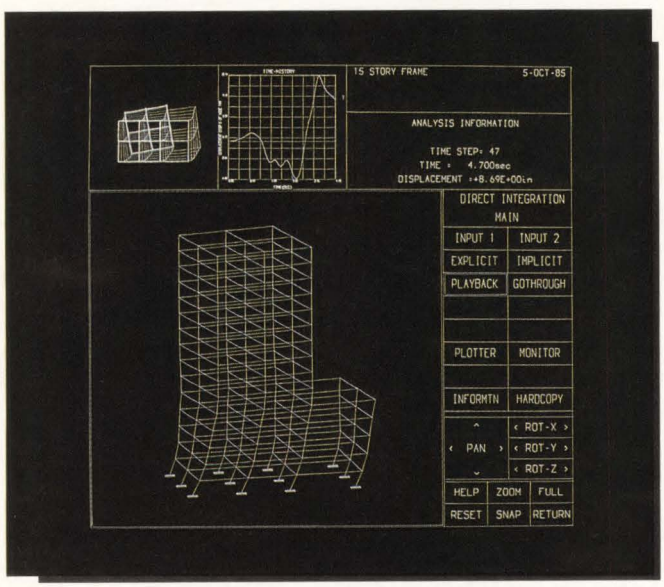


Photo 7: An excellent menu layout. The banner shows the user's name, date, problem name, and that he is running CU-GISMO in the LOADS submenu of the DEFINITION menu. This is another structural analysis tool. The highlighted menu item (in yellow) has just been selected. The only sub-optimal thing about this program is that the colors used for different types of lines (white, yellow and turquoise) are a little hard to distinguish.

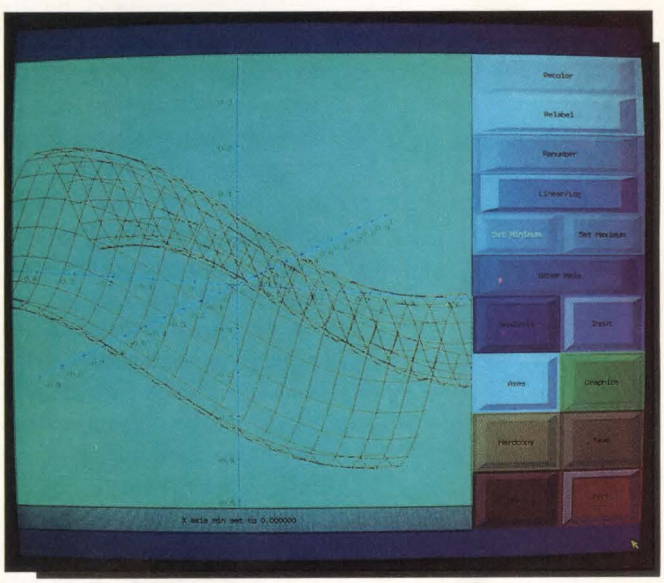


Photo 8: In GRAPHITI, an interactive graphing and curve-fitting package under development at CADIF, the main selectors are always visible at the bottom of the menu, and selecting any one of these brings up a color-coordinated submenu in the area above that. Here the user is designing the coordinate axes to be used for the graph.

Be verbose; if you must abbreviate, be mnemonic.

limited dexterity and don't make selectors too small. Approximately .3 inch by .3 inch is the minimum, however, .5 inch by .75 inch is preferable.

6. Be sure all text is readable. It should be large for the benefit of tired users, the vision-impaired and those at the back of the crowd when you demo. (Check the screen from three feet away.) Be sure data texts are distinct in size, color, font, and/or placement from menu items. Be verbose; if you must abbreviate, be mnemonic. Avoid selecting options by number (see Figure 4).

7. Use slider potentiometers (see Figure 5), keypads/calculators, and/or keyboard input for setting values. Make them reasonably sized and scaled; on sliders, be sure precise values can be selected easily. Don't require numbers for moving, scaling or changing point of view. Use pots, perhaps implemented over the main viewing window, that give a realistic sense of dragging things around, zooming in, etc.

8. Employ the known properties of colors. Blues, grays and many greens are unobtrusive; use them for backgrounds and avoid them for figures and text. Bright, saturated colors are fatiguing to look at; use them sparingly. If you can use only a few colors out of a large palette, *don't* select the standard red, blue, green, etc. Mix a few less common ones. Red indicates alarm, and yellow caution; use them for warnings and highlighting. Black and yellow, the most visible combination, also suggest an alarm condition and should be used sparingly. Changes in color always attract attention.

9. Make use of contrast. Pretend you're working in black and white. Different colors of the same brightness are difficult to distinguish, especially against a medium-bright background. Stand back from the screen in poor light or recruit a few color-blind people to test this.

10. Have every user action acknowledged by the program. When a menu item is selected, highlight it by either making its background or text brighter or drawing a box around it. Don't send out a beep; it becomes annoying. Provide clear, verbose prompts, error messages and "please-wait" messages.

In addition to these graphic requirements, our programs check all user inputs for format and value and supply reasonable defaults. They also allow the user to abort any command sequence without crashing and confirm all HARDCOPY, DELETE and EXIT requests.

An experienced graphics designer certainly can ignore many of these rules and still produce a program that works well. What's more important is that by following them, almost anyone can create consistently good programs from the start.

Author's note: Even though, or perhaps because, these are trendy topics, there aren't that many references to them. A week's research should give you an excellent grounding in the subject; the human factors articles in the last few years of *ACM SIGGRAPH* and *SIGCHI Proceedings* are a good starting place. I also highly recommend *The Visual Display of Statistical Information*, by Edward R. Tufte, a brilliant, comprehensive book. — *Catherine Mink is educational computing coordinator, Engineering College, Cornell University, Ithaca, New York.*

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GRAPHICS

DEC IN CAD/CAM SOFTWARE

By Michael Fallon

A Distribution Channel Conflict Looms As DEC Becomes More Of A Software Company.

DEC is riding the crest of a wave, but it's in danger of breaking. The wave is the minicomputer industry, which is maturing. DEC is primarily a vendor of hardware to resellers and large end users, in an industry where hardware is decreasing as a percentage of the system sale. Even in hardware, DEC's forte, minicomputers are a declining piece of the pie. The growth is in the workstation segment, an area where DEC has languished. Beyond the current euphoria over VMS, the MICROVAX II and the 8xxx line, DEC has some real business problems.

Ken Olsen, DEC's founder and president, has been saying recently that DEC is becoming a software company. Perhaps that's because it can't afford not to be. But DEC has issues to grapple with as it tries to get into the software business. DEC risks competing with its own best customers. The value that DEC resellers add usually is software. And in the $4.1 billion CAD/CAM market (a projection from Datatech, a Cambridge, Massachusetts-based CAD/CAM research firm), where DEC is the number one supplier of hardware, it can't afford to alienate, nor does it want to compete with, the market leaders, most of whom sell VAX-based systems.

Large CAD/CAM users have invested a fortune in software. They aren't about to forsake it because DEC has decided to become an applications vendor. And DEC isn't going to risk alienating a number of big-league CAD/CAM vendors by taking a chance with competing products. Besides, many of the largest users already have been wired with basic software for design.

But DEC's Software Services Group has been increasing its profile lately by introducing products for CAD/CAM. Its dilemma is to continue along this path without upsetting its resellers. DEC still needs to get to the application software level to help it maintain growth. Its problem is rationalizing which applications to advance.

Then it has to learn how to sell them; it needs to make some changes. Software is a tougher and more expensive sell than hardware. And the very concept of computer-integrated manufacturing that DEC and other vendors are promoting, of which CAD/CAM is but one segment, makes for an even more complex sale. It's lengthy and demands unflagging attention.

And that's one aspect DEC isn't known for. It doesn't have a great reputation for end user support. A lot of that work has been left

DEC's CAD/CAM software products aren't aimed at competing with its resellers' products, they're aimed at enhancing them.

to its resellers, enabling DEC to spare the expense of a support organization like IBM's. But a survey of DEC CAD/CAM users by the Yankee Group of Boston, indicates that while its strengths include VMS and the ease with which applications can be developed for it, its weaknesses include applications software support, the knowledge of its sales force and delivery. As DEC becomes more a software company, it needs to improve its support organization. Traditionally, software and customer support were only tools to move hardware.

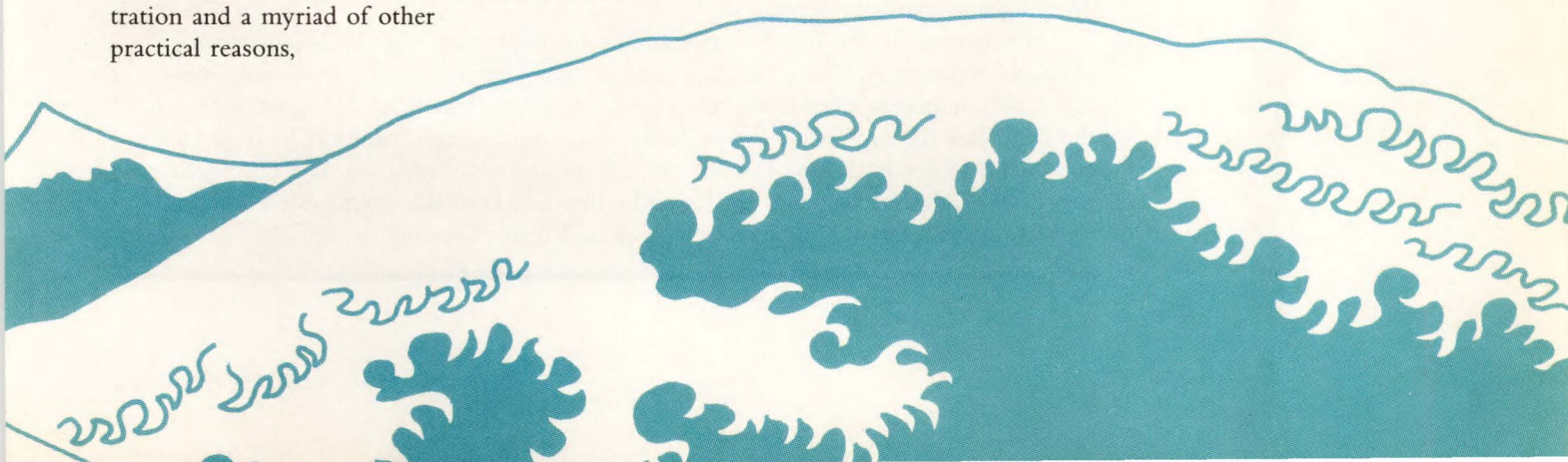
Luckily, in CAD/CAM, DEC speaks to an audience it knows well — engineers. And it's making an effort to recruit more people and marketing partners who understand the culture of its CAD/CAM clients. DEC also has learned a lot about CAD/CAM through its own internal experience. CAD/CAM is very application intensive; there's no generic factory. Every operation is somewhat unique, with unique software requirements. Manufacturers have had problems with commercial software. They've had to supplement commercial CAD/CAM software with internally developed software to optimize parts design. Simply put, in CAD/CAM systems are built, they aren't just sold.

And that's what DEC intends to do, help its users build CAD/CAM systems. Because of a distribution channel conflict, market penetration and a myriad of other practical reasons, DEC won't compete directly with suppliers of applications. Rather, it will try to offer solutions to problems other suppliers and manufacturers themselves have been reluctant to tackle, such as integration between design and manufacturing and database management issues.

DEC's CAD/CAM software products aren't aimed at competing with its resellers' products, they're aimed at enhancing them. Call them software application enablers. With VMS so suitable for applications development, DEC intends to be the application enabler in CAD/CAM.

DEC has been introducing software products that further increase the value to the end users of its resellers' products. These products help integrate CAD/CAM software with other manufacturing functions. In the CAD/CAM software sweepstakes, DEC's role emphasizes communications, programming and applications software development tools that simplify and speed up the process of achieving functional manufacturing systems. It's doing this by providing synergy in systems level software, networking and the support of standards (Initial Graphics Exchange Specification [IGES], Product Data Definition Interface, Product Data Exchange Standard, Manufacturing Automation Protocol).

For example, *BASEVIEW* is a Digital soft-



ware product that makes CAD drawings useful to people in manufacturing. It uses IGES to enable CAD drawings to be viewed and used by other departments. Graphics data can be sent via corporate electronic mail, included in DEC's *All-In-1* office automation product. This provides electronic access to design data via low-cost graphics terminals throughout a company or facility. With *BASEVIEW*, drawings created in the engineering department on expensive CAD terminals can be viewed on standard display terminals on the factory floor.

DEC is emphasizing integration products. With traditional system solutions inadequate for manufacturing, DEC wants to help manufacturers build the systems they need. DEC's CAD/CAM application software strategy entails attracting a variety of cooperative marketing partners for point solutions, OEMs for complete solutions for niche markets, and custom solutions developed by Software Services for leading-edge companies.

One of these products is its Engineering Data Control System (EDCS), developed by

New DEC Products For Industry

CAD/CAM is but one segment of a market that has come to be called Computer-Integrated Manufacturing (CIM). But it's really an industry with a lot of word games. Five years ago, CIM was virtually unheard of and the entire market was referred to as the CAD/CAM industry. And most supplier marketing organizations have evolved along with industry semantics. For example, DEC's Engineering Systems Group was superseded by its Computer-Aided Engineering and Manufacturing (CAEM) Group in 1984. But by 1986, the emphasis was on CIM and, hence, the CAEM Group was reorganized and renamed the CIM Group. These days CAD/CAM most often refers to systems used primarily for product design. The manufacturing capabilities CAD/CAM systems generally are limited to programming machine tools for numerical control.

Regardless of what it calls its marketing organization, DEC recently strengthened its presence on the factory floor with the introduction of a series of products and services. Included are industrial computers based on its VAX architecture, integration tools and services and marketing agreements with leading factory automation vendors.

With the introduction of two VAXs for manufacturing, the Industrial VAX 630 (IVAX-630) and the Industrial VAX 620 (IVAX-620), Digital extends its VMS operating system to the factory floor. The IVAX-630 is based on a MICROVAX II and is intended for cell or area control, supervisory control, data collection and communications functions. The IVAX-620 is designed for dedicated real-time operations. DEC management says it provides a lean, highly efficient run-time environment in a state-of-the-art 32-bit real-time system.

DEC also introduced the Industrial PDP-11, with the enclosure features of the Industrial VAX computers. It is intended to protect the DEC customer's PDP-11 software investment and provide continuity for the line in manufacturing applications. DEC customers have purchased approximately 300,000 PDP-11 computers.

All three computers include enclosures meeting the U.S. NEMA 12 standard requirements. The enclosures are designed for protection against dust, falling dirt and dripping non-corrosive liquids.

"Integration is the key to maintaining a competitive edge in manufacturing," explained Kenneth H. Olsen, DEC's president, "and it's based on excellence in networking." DEC announced three new products for integration: DECSCAN, VAX DEC/MAP and the *Distributed NC Applications Service*. It also announced enhancements to its *BASEVIEW* and *BASEWAY* products. Don Jenkins, DEC CIM product marketing manager said, "These new tools and enhancements are the links between Digital's compatible computing architecture and the unique requirements of each manufacturing department.

Software Services for General Motors, and now a commercial product. EDCS is designed to control the data of a variety of manufacturing applications provided by different vendors. It tracks, organizes and manages data files for manufacturers and eliminates the problem of working with inaccurate and obsolete data.

Fairchild Camera and Instrument of South Portland, Maine, a semiconductor manufacturing unit of Schlumberger Ltd., France, uses EDCS to maintain CAD files in a central, common database where they can be updated, automatically stored and retrieved by authorized users. Anyone who uses files maintained under EDCS knows that he has the most currently updated version of the file.

EDCS runs on a VAX under the VMS operating system, with VAX *Rdb/VMS* relational database software and various DECnet products that can operate in local or remote area networks. Information is handled electronically. DEC's electronic mail capability is used with EDCS to notify automatically any user of product changes as they occur. In keep-

DECSCAN is an open-architecture interconnect product for linking IVAX-630 systems with a variety of measurement and control devices. It provides an interface between the Q-bus of the industrial VAX and the BITBUS. DECSCAN enables VAX users to take advantage of the growing number of BITBUS-compatible devices. It also provides a software toolkit to aid users in developing data acquisition and control applications which access factory floor devices. DEC announced an agreement to market DECSCAN jointly with Honeywell Microswitch of Freeport, Illinois.

Manufacturing Automation Protocol support was announced for the IVAX-630 and the IVAX-620. Based on MAP 2.1, VAX DEC/MAP products enable the new systems to interconnect with devices on the plant floor also supporting MAP.

The third integration product, *Distributed NC Applications Service (DNC)*, is a companion to *BASEWAY*, DEC's programmable controller support product. It enables numerical control devices to be integrated into a DEC-based network. It includes server software to manage the interface to the NC tool, utilities for storing and loading part programs directly to NC controllers and a device connection service to provide custom protocol emulators for each unique NC device connection. *BASEWAY* also was improved to include support for the programmable controllers of Texas Instruments, and Siemans. Previously, only Gould, and Allen Bradley, support was available.

BASEVIEW, DEC's product that makes engineering drawings available to people in manufacturing, was enhanced to read the files of HPGL and CalComp. Its performance also was improved and now includes support for VAXSTATION windowing software.

DEC's third announcement concerned its "applications solution." "Manufacturers want to buy their control systems from the industry experts. To help meet this need we're extending our Systems Cooperative Marketing Program (SCMP) to the factory automation market for both discrete and process industry applications," said Jenkins. Under the SCMP program, DEC and its partners will combine their respective strengths to jointly sell solutions in the factory. The first SCMP agreement is with Rexnord Automation of Hunt Valley, Maryland, a supplier of distributed process control systems. Rexnord will market its process control systems with DEC's VAX and PDP-11 line of computers, including the new industrial VAX for manufacturing applications, in the process industries including chemical, pharmaceutical, food processing, metallurgical and petroleum.

DEC's final announcement was its Manufacturing Systems Integration Services (MSIS), a framework through which DEC will build manufacturing solutions with its customers and value added suppliers. It includes two separate products: MSI Design Service and MSI Integration Service. MSI Design Service will provide individualized consulting by teams of DEC manufacturing experts. MSI Integration Service will coordinate the delivery of manufacturing solutions, including custom hardware, software and network configuration.

With products like *BASEVIEW* and EDCS, DEC is in the curious position of adding value to the products of its value added resellers.

ing with the mindset that CAD/CAM systems are built not bought, EDCS requires that the user customize it with his own internal procedures.

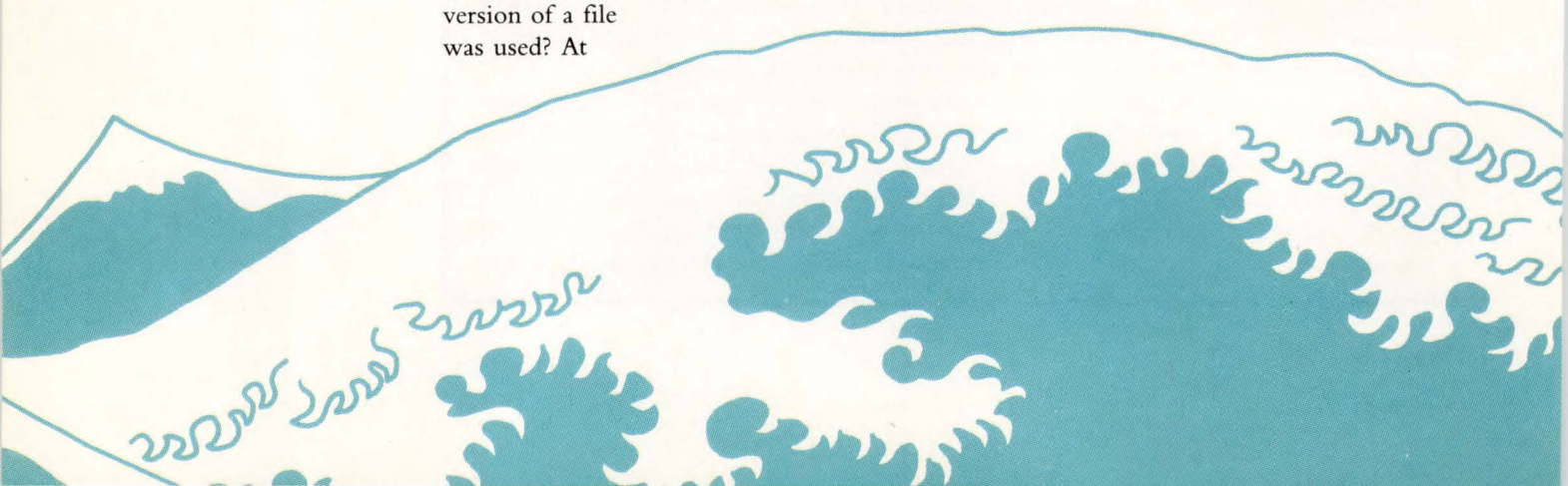
Fairchild has more than a dozen VAXs and more than 35 Apollo Computer DN320 workstations. But while EDCS only runs on one VAX, it can be used by anyone in Schlumberger's worldwide network. After logging onto the VAX, you then can log onto the EDCS through a password protected system. Thus, a user in Fairchild's London branch who accesses a VAX in London could access the VAX in Maine and then reach the EDCS.

Fairchild has facilities on the West Coast, in England and in Singapore that will access the EDCS database when it's completed. Implementation involves taking all of the data types for an electronic design; e.g., the layout, schematics, simulation results and test vectors, and putting them all into an archive database that can be used by anyone who needs the information to support a project. Prior to EDCS implementation, data was kept in a drafting vault on magnetic tapes and wasn't well controlled. Some of it was hard to identify.

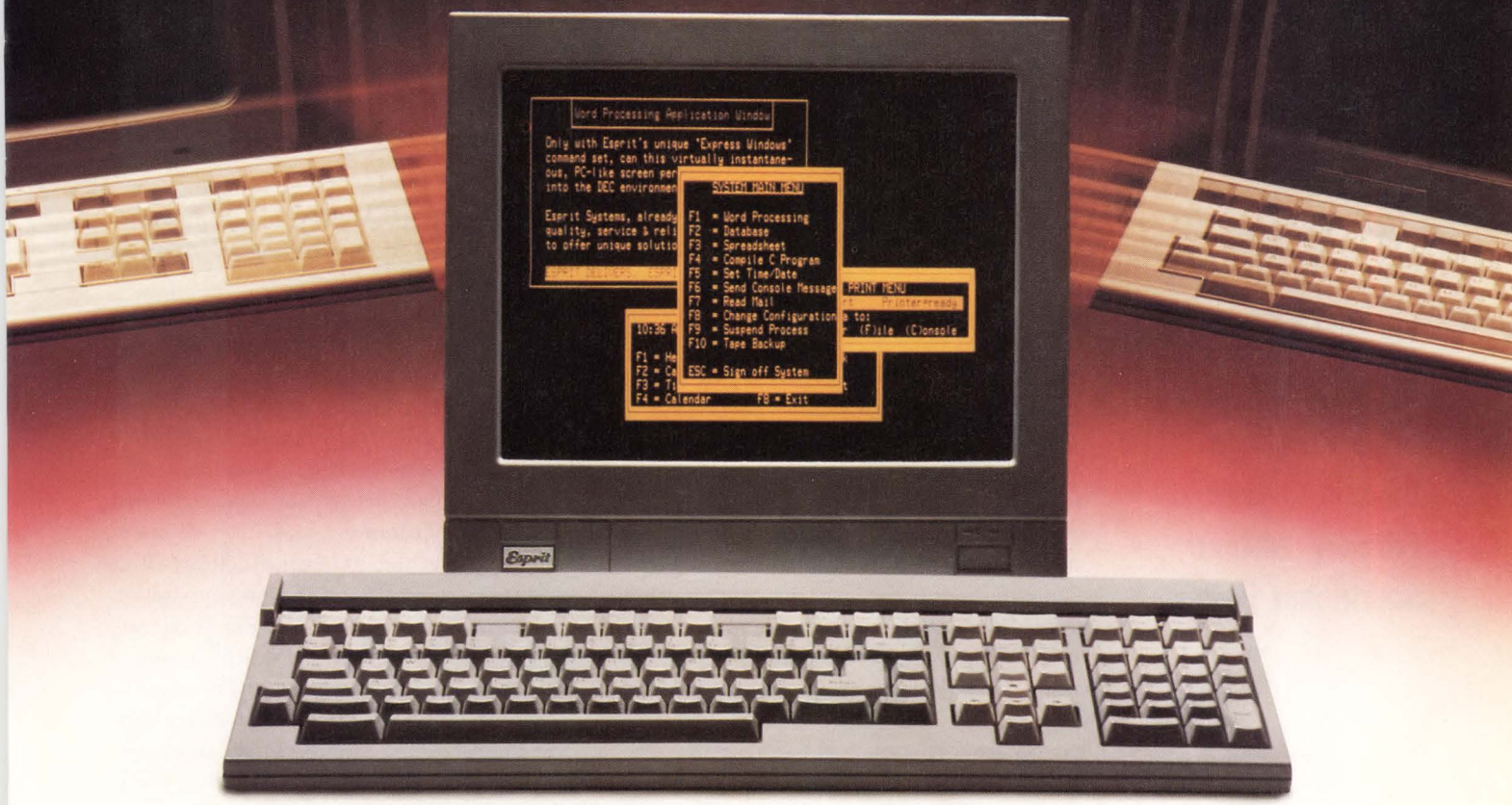
Fairchild believes the benefit of using EDCS is hard to quantify. What's the cost of losing a CAD/CAM database or making a significant number of products incorrectly because an old version of a file was used? At a company like Fairchild with hundreds of products, it's important to avoid such mistakes.

With products like *BASEVIEW* and EDCS, DEC is in the curious position of adding value to the products of its value added resellers. Still, in an informal survey, some of DEC's CAD/CAM resellers complained that DEC is pulling an end-run around them by offering software. Peter Graham, manufacturing applications manager of DEC's CIM Group says, "The underlying perspective at Digital is that the market is much bigger than any one vendor can address. So while we may at times be competing, we look forward to cooperating as well." These shortsighted resellers don't realize that most of DEC's products so far have addressed problems so huge, like the integration of CAD with CAM and the manufacturing database management issue, that most others have shied away from them. This really is for the benefit of all three concerned parties: DEC, its resellers and, most important, its customers. — *Michael Fallon is a free-lance writer based in New York.*

ARTICLE INTEREST QUOTIENT
Enter On Reader Card
High 809 Medium 813 Low 817



CLEAR THE DEC'S



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GRAPHICS

POWER GRAPHICS

By Al Cini

The *PICSURE* Family Of Graphics From Precision Visuals Is User Friendly Without Sacrificing Power.

Drawing pictures with computers involves something of a balancing act — software that's powerful enough to reveal subtle trends in experimental data or represent complicated physical processes often is too complex for the uncomputerized scientist, while the typically limited features found in "easy-to-use" business charting programs aren't powerful enough to score big points graphically. Something is missing between drawing wombats with DATATRIEVE and animating the origins of the universe on a Cray, and for many in the business and scientific communities, that "something" can be the *PICSURE* product family from Precision Visuals of Boulder, Colorado.

Before you can begin to consider the growing number of interactive computer graphics alternatives or understand Precision Visuals' contribution to the marketplace, you need to shed the counterproductive misconception that business graphics and technical graphics are somehow substantially different.

As far as charts are concerned, variables are variables. Content and context aside, a scatterplot of profit dollars against calendar years is fundamentally no different from a scatterplot of observed temperatures vs. light years. If you need a graphics package, your buying decision should be based on budget and features, and shouldn't be colored by the feeling that a particular package is just for "scientists."

PRECISION VISUALS' GRAPHICS FAMILY offers general-purpose interactive graphics suited both for business and scientific applications, evolved from a rich heritage of graphics software developed to the exacting standards of science and engineering.

Precision Visuals' cornerstone graphics software is *DI-3000*, which offers a comprehensive collection of 2-D and 3-D graphics "tool" subroutines that can be CALLed from within an application to provide machine-independent graphics. The *DI-3000* library surrounds a programmer with an object-oriented modeling environment consisting of more than 300 prewritten graphics functions. With *DI-3000*, the science or engineering application programmer can spend more time programming for his unique problem because much less time is needed for writing the prodigious "overhead" software involved in taking a concept and projecting it onto a screen or plotter. Still, subroutines will be subroutines: While you may not have to write very much code in something like FORTRAN or PASCAL, you need to write some, at least, in order to use *DI-3000*.

For the businessperson, or even for the non-computer literate scientist, even a little FORTRAN is entirely too much.

Command-Driven Pictures

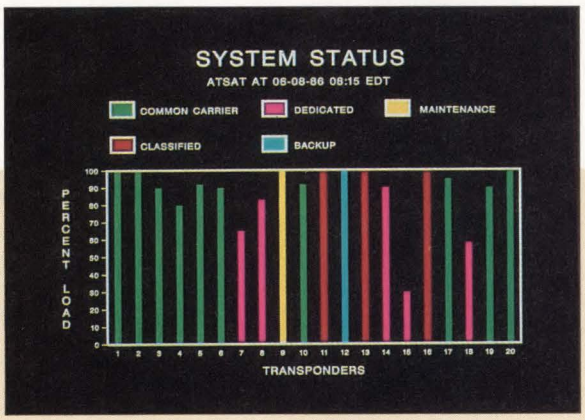
Take a good measure of the power of *DI-3000*'s 2-D drawing routines, wrap a simple command interface around them, and you have

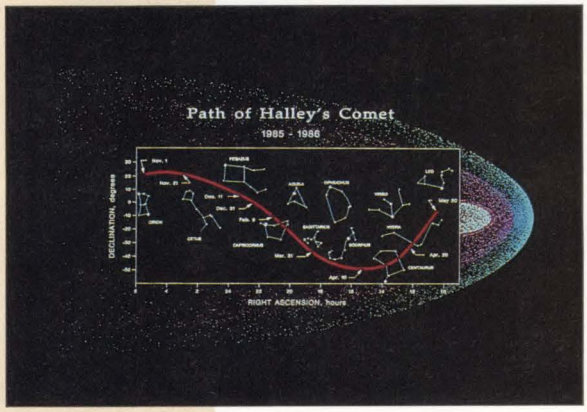
Precision Visuals' *PICSURE PLUS*.

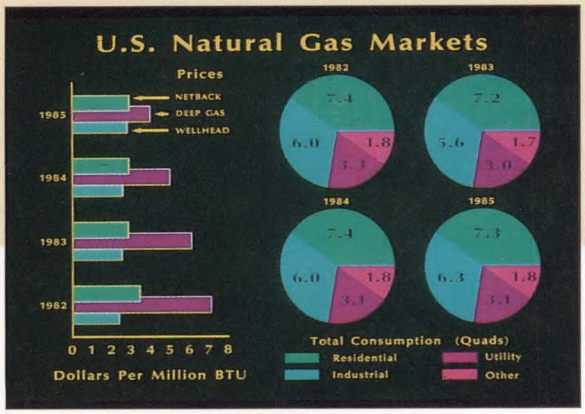
Typically run interactively at a graphics CRT terminal (graphics commands also can be executed "indirectly" from a prewritten file within *PICSURE* or in BATCH mode to produce unattended graphics hardcopy), *PICSURE* accepts chart selection and formatting commands and in turn quickly produces high-quality presentation graphics. *PICSURE*'s command format is simple and straightforward. Once a statement like STACKED VERTICAL BAR has been used to select the kind of graph, and the ENTER DATA command has provided the necessary data points, a publication-quality picture often is just a PLOT command away. Users with highly specialized output requirements will be glad to know, however, that there are lots of tailoring options beyond *PICSURE*'s graphics defaults.

Once a chart type has been selected and data has been entered, successive *PICSURE* commands refine the graphic image by adding to or altering its characteristics. Intermediate results can be reviewed at any point during this graphics building process until the desired results are achieved. Usually, the actual chart drawing is the most time consuming step in the review process; to speed this along, the product offers PREVIEW (fast but coarse), PLOT (slower but prettier), and DRAW (slowest but camera-ready) output modes. Charts that have been refined successively in this manner can be saved and reused later with different data.

Command errors generally are greeted with a clear and unambiguous diagnostic message, and reasonably descriptive online help always is just a keystroke away. Just the same, any command interface, no matter how simple, is simply too forbidding for the hopelessly "computer-shocked" user who wants pictures without having to remember any kind of commands.







PICSURE also affords access to a wide variety of built-in display fonts, which can be used to produce slides for presentations as well as in chart axis labels and legends.

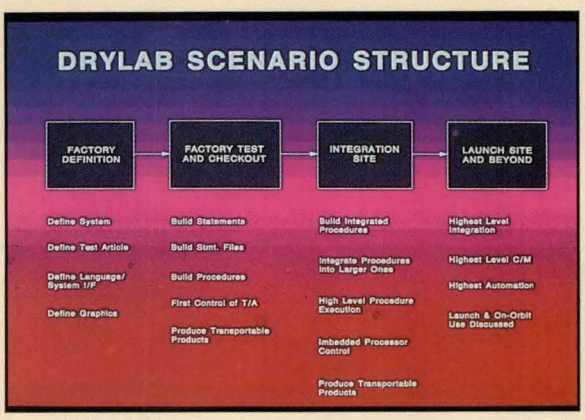
Menu-Driven Pictures

Enter *PICSURE PLUS*, with its two "user-friendliness" components, *PICQUICK* and *PICTOOLS*.

PICQUICK is a true "non-programmer" menu-driven interface to *PICSURE*, offering access to almost all of its features through a succession of simple menus.

From *PICQUICK*'s main menu, a user selects from among eight general functions, including whether a new chart format should be defined or an existing format used. The "new chart" selection leads the user into a chart type menu from which one of various line and bar chart formats can be selected. Subsequent menus prompt for dependent, independent or "paired observation" variables, chart appearance options and legends that can be used to refine the final output further.

While the search for "the ultimate graph" can involve a lengthy tour among *PICQUICK*'s three dozen separate menus, most menu paths are optional and *PICQUICK*'s defaults for unspecified color values, axes and other graphic characteristics usually are adequate. If you get back from lunch to find that you need an international sales pie chart for an emergency two o'clock board meeting, all it takes is a few minutes to select the chart type, enter the data points and print a perfectly acceptable "vanilla" result. If the pie slice that represents gross sales to Ecuador "absolutely, positively" has to be filled with a cross-hatched pattern of orchid or aqua, however, you'd better plan to paint the output by hand or reschedule the meeting.



We all know that interactive commands are easier to use than programming, and menus are even easier than commands. But what do you have for people who need something even easier than menus?

Until people can "Vulcan mind meld" with some future graphics terminal that reads neurons and can translate a user's cloudiest intentions into clear and crisp display graphics, some sort of artificial man-machine interface will be needed, and no matter how simple it is, somebody will always complain about it.

For those who need something even simpler than *PICQUICK*'s comprehensive, general-purpose graphics menus, Precision Visuals provides a tool for custom-building specialized menus: *PICTOOLS*. *PICTOOLS* is a programming language. Now, how can a programming language — which for simplicity's sake is what we dropped in favor of menus — possibly be easier to use than menus?

PICTOOLS is a *specialized* programming language that provides a collection of statements that can be "wrapped around" *PICSURE* commands to define an interactive graphics session tailored to the specific needs of a particular organization or community of users. It takes someone with a knowledge of *PICSURE* commands and a little programming background to use *PICTOOLS*, but once a tailored *PICTOOLS* "environment" has been built, it can be even easier to use than *PICQUICK*.

PICTOOLS statement syntax is patterned after BASIC and offers the familiar variable definition, conditional testing and branching constructs. *PICTOOLS*-specific features include the ability to communicate with the user through CRT-mapped static and scrolling

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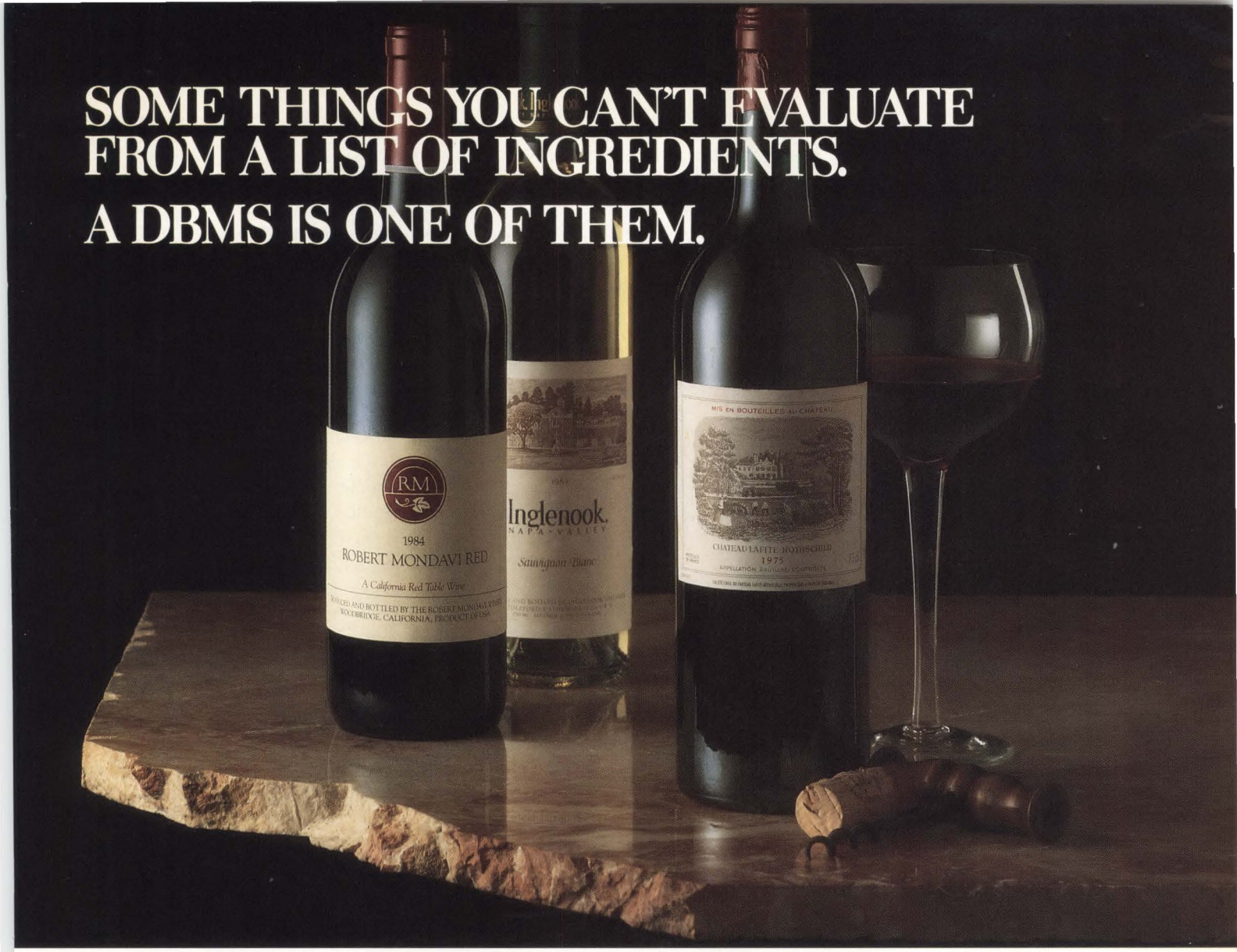
SOME THINGS YOU CAN'T EVALUATE FROM A LIST OF INGREDIENTS.

A DBMS IS ONE OF THEM.



When you think about it, relational DBMS products have a lot in common. They're all built around SQL. Most include 4GL tools. They all have a list of features and functions you can check off one at a time. And they all claim high performance.

But once you really get to know relational DBMS products, the differences between them become as clear as the differences between a great wine and a lesser vintage. It's the care in blending quality ingredients that produces a really great product.

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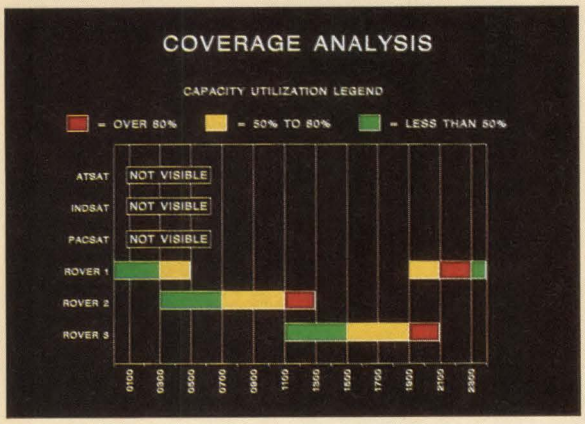
"windows," test for and recover from errors and, of course, conditionally invoke various *PICSURE* graphics commands. An internal directory management feature allows users to define and manipulate objects like data variables and stored chart types using a machine-independent naming scheme, thus avoiding the need to know anything about the local system's often "user-frightening" disk directory management syntax.



Once a *PICTOOLS* interface has been defined, it can be invoked by a single command to the host computer system or automatically entered during login.

Assuming there are no "bugs" in the *PICTOOLS* code that defines it, a *PICTOOLS* tailored menu environment shields its user from the complexities of the host computer system, *DI-3000*, *PICSURE* commands and even *PICQUICK* menus.

Cutting And Pasting It All Together

An important measure of the power of a graphics package is its ability to serve as an integral part of a complex job. The *PICSURE* product family includes several options for internal integration between its parts, as well as a few "hooks" to the outside world.

Independently produced charts and graphs can be combined into a multichart via *PICSURE* commands or *PICQUICK* menu selections. A multichart presents several separate graphic images in different "panes" of a single page. Each graphic image is maintained separately and combined into a multichart format at run-time by issuing appropriate *PICSURE* commands (or by using *PICQUICK*'s multichart menu).

Beyond *PICSURE*, graphics images can be saved as "metafiles" and interchanged with other Precision Visuals graphics products. Complex engineering diagrams produced by *DI-3000* can be incorporated into *PICSURE*/*PICQUICK* charts as descriptive drawings or logos, and, based on some user input or other testable condition, *PICTOOLS* environments can even select one from a variety of metafiles for inclusion in a specialized chart.

Drawing Conclusions

The documentation that describes these products is somewhat ponderous and overpowering, but basically easy to follow. A day or so with the Introduction and tutorial chapters of the *PICSURE* manual (covering the first 90 of several hundred total pages) is all it takes to become familiar with the product's general features. From there, the reference section provides in-depth descriptions of each command, and you can spend several days in this material exploring all the possibilities. The menu-driven *PICQUICK*, on the other hand, can be applied to real charting problems after only a few hours' study and largely mastered in a day or two.

The product is pretty expensive, so people with less serious graphics needs probably will find it difficult to justify. People with a need for sophisticated end-user graphics capability, however, especially those with access to the kinds of powerful display devices and plotters that can take advantage of its power, should certainly consider *PICSURE*.

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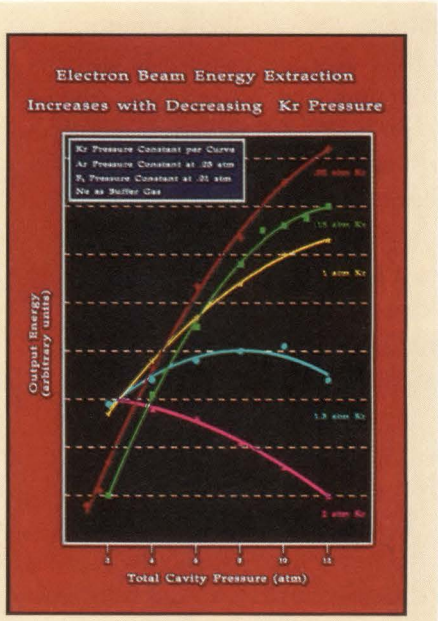

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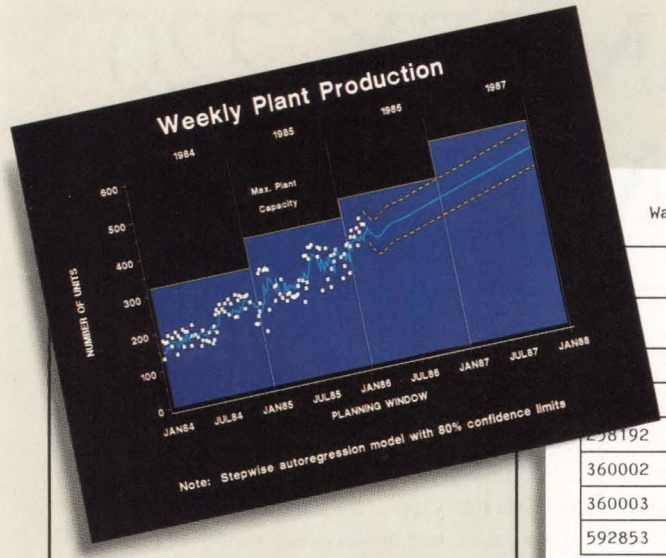

Warehouse Inventory Report - 16JAN87

	Quantity on Hand	Quantity on Order	Projected Reorder Date
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	89450	5000	FRI, FEB 20, 87
258192	20110	1000	MON, MAR 30, 87
360002	8585	0	TUE, FEB 10, 87
360003	15985	500	TUE, FEB 10, 87
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50	6	3	8	5.5	66
60	6	4	9	6.5	83
70	7	4	10	7.0	

* Computer Intelligence, January 1986.

The SAS System runs on these minicomputers: Digital Equipment Corp. VAX™ 8xxx and 11/7xx series under VMS,™ and MicroVAX II™ under MicroVMS™; Prime Computer, Inc. Prime 50 series under PRIMOS®; and Data General Corp. ECLIPSE® MV series under AOS/VS. The SAS System also runs on IBM 370/30xx/43xx and compatible machines under OS, CMS, DOS/VSE, SSX, and ICCF; IBM XT/370 and AT/370 under VM/PC; and IBM PC XT and PC AT under PC DOS. Not all products are available for all operating systems.

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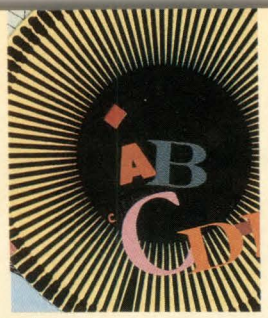

TERMINALS

THE AMPEX 220 TERMINAL

By Bruce Feldman

A Keyboard Virtuoso's Delight.

The Ampex 220 is a DEC VT200 series compatible terminal from Ampex Corporation of Redwood City, California, that does a lot of things well, but excels as a fine keyboard instrument capable of enhancing the firey technique of a Liszt or the gentle meanderings of a Chopin. The joy is in the feel of the keys as the soloist glides through the computational repertoire, turning mere touch typing into music.

Overture

The Ampex has its own resident set of operating characteristics (A220 mode), but also emulates the DEC VT220 with enhancements, the VT100 and the VT52. It operates in modes selected through the host computer or the keyboard, including block mode, local, monitor and online.

The instrument itself consists of a 12-inch diagonal screen resting on a ball and socket rotational base that swivels stage left or stage right, and can bow forward to the orchestra pit or wink at the ladies in the balcony. The pedestal is roughly 13 inches square and 2 5/8 inches high, and is vertically vented in the front, rear and right side (facing forward). The footprint is a bit larger than that of some other VT200 compatibles on the market. A rocker-type power-on switch is hidden at the right rear so as not to disturb the clean lines of the facade, but requires an over-the-top movement to access if you're using the pedestal as a bookend.

The brightness control is a knurled wheel beneath the display unit, to the right. The control adjusts the intensity only to what I'd term a moderate level as judged in the context of a well-lit fluorescent office environment. This proved adequate; the intensity was sufficient to blend the dots into visible, solid character shapes. A higher intensity limit, however, would offer greater flexibility.

The Ampex 220 is available with either a green or eye-saving amber display. A screen-saver feature blanks the display when the terminal is not in use.

The 12-inch screen (actual diagonal measurement from display corner to corner) with non-glare faceplate is surrounded by a 1 3/8-inch picture frame boarder. The color combination is light gray, medium gray and off-white; a clean and unobtrusive scheme for a business environment.

At the rear of the pedestal is an RS-232-C asynchronous port with independent baud rates for receive and transmit modes (50 to 19.2K bps). The auxiliary RS-232 has the above features, and is fully buffered. A current loop interface and a RS-422 interface are customer-installed options. Fuse and power cord sockets also are mounted at the rear; the coiled keyboard cable connects from the left side.

Text can be printed through the auxiliary port to an attached printer. The printer also can communicate to the host if you set the port for bidirectional printing in the setup menu.

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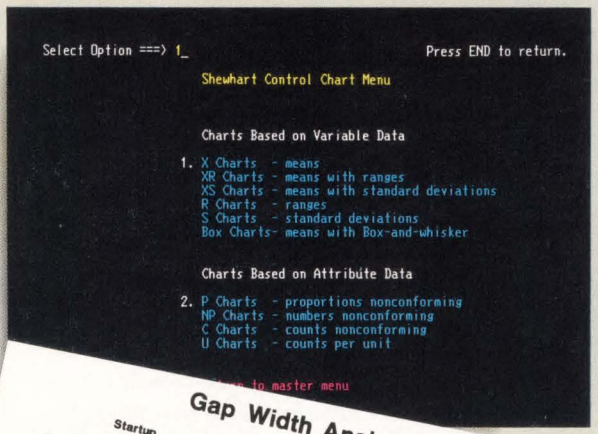

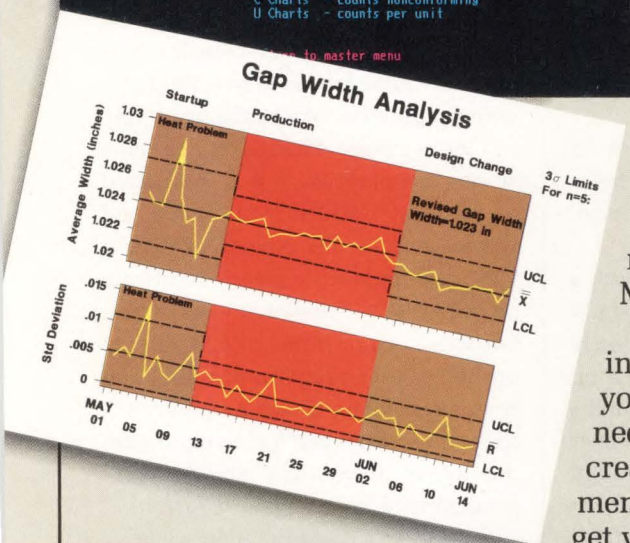

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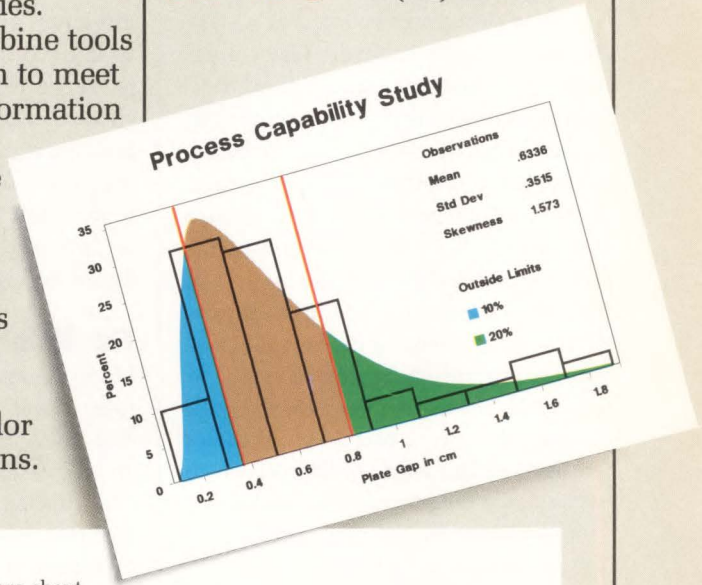

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You can send data through the printer port using an escape code or the PRINT key. Print functions include print screen, auto print, transparent print (printer controller) and print cursor line.

The detached keyboard is a step-sculptured right-handed VT220 emulation with numeric keypad, editing keypad and main keyboard to the left. LEDs, along the function key labeling ribbon only, illuminate the hold screen, caps lock, compose and wait functions and states. Four PF keys crown the keypad numerals and a 20-key strip of function keys frames the top of the keyboard unit. Fifteen of the keys are programmable, while five are reserved for the hold screen, print screen, setup, datatalk and break functions. The keys are labeled but there is little space to write down the programmed user functions, unless you jot them on the top plastic border as I've done.

The left Shift key seems a bit lower than that on most standard keyboards, but practice makes perfect with this kind of keyboarding too, and after a while playing the wrong notes wasn't a problem.

The keyboard elevates cleverly by means of two sturdy blocks on either side that act as legs and pivot on a thick axle in three positions — 7, 11 or 15 degrees of incline respectively. This is fine design — aesthetic, functional, durable and unique.

The keys are firmly placed with a minimum of lateral movement and not so light to the touch that you're likely to see accidental rows of repeating characters on the screen. The F and J keytops are dug out like canoes, deeper than the rest, so they can be found by touch while your eyes are on the screen — this instead of the little "bumps" found on other keyboards.

The Main Performance

Upon powering up, the terminal performs a self-test of the CMOS RAM, the data RAM, the display RAM, the ROM and the visual attributes (displays the test pattern). If there are no problems, the terminal is introduced to the audience by means of an "A220 OK" message that appears at the center of the screen. If there *is* a problem, an error message appears pointing a finger at the specific location of the difficulty.

The setup is a quick and easy menu-generated affair. There are four screens, each with two columns of horizontal bars of related functions. You move between screens via the Enter key on the keypad when the cursor is on the top left-most bar. Within screens, the cursor keys govern movement from bar to bar. There's a status line at the bottom of the screen for assistance.

Defining a function key is not as easy as it could be. You must, in most cases, scroll through other keys in setup to get to the one you want. You scroll through all of the keys, for example, to define the unshifted F20 key. In the VT100 and VT200 emulations, only the Shift-F1 to Shift-F20 keys are available to program; there are no unshifted function keys for these emulations. In A220 mode, either shifted or unshifted function keys are operable, for a total of 40.

Each function key can be programmed with up to 60 bytes of data, and has 400 bytes of non-volatile memory that can be increased to 6,400 bytes with the purchase of a hardware option.

At one point, I had to change emulations temporarily. I was connected to our VAX 11/750 in A220 mode and wanted to have the Ampex emulate a VT52 so I could use a piece of software on our PDP-11. The switch worked fine, but when I came home to A220, all my unshifted user-programmed function keys were wiped clean; I couldn't retrieve the settings and had to reprogram the lot of them. The shifted user-programmed keys remained intact.

A call to a company representative confirmed the veracity of this situation. Unfortunately, there's no way to remedy it, other than to write code for your LOGIN.COM file that reprograms the keys each time you log in, and have it run whenever you switch emulations.

Music You Can See

The display of the Ampex 220 consists of a 7 x 11 dot matrix pattern with descenders. There's a choice between an 80- or 132-column display with 24 lines. A setup selection will erase the screen or not when making this column change. The 25th line is programmable by the user. Three additional display pages are accessible in "flip mode" (auto paging), with the purchase of a hardware option. The terminal also has a split-screen capability. The scroll rate is

adjustible to five speeds, including jump, and four speeds of smooth scrolling.

Video attributes include blink, bold, underline, reverse video and permutations of the above. Non-embedded attributes also are obtainable.

There are 15 resident national character sets with the Ampex 220, including North American, United Kingdom, French Canadian, Danish, Finish, French, German/Austrian, Dutch, Italian, Norwegian, Spanish, Swedish, Swiss (French or German) and Belgian French.

The Ampex has 266-plus displayable characters, including 96 ASCII, 57 control, 31 graphics, 31 line graphics, 60 national characters, 22 supplemental symbols and user-custom characters. Line graphics and double-size characters also are included.

The documentation comes in the form of an untabbed spiral-bound manual with a detailed Table of Contents and Index. There are sections on Installation, Setup, Emulations and Troubleshooting. Twenty-six charts, tables and figures embellish the text. There are appendices on the terminal specifications, installation options, escape and control sequences, and tables of the various downloadable character sets and symbols. There's also a bite-sized summarization of the features of the terminal located at the front for easy reference, and even a section in the manual on how to use the manual! Topical information is brief (perhaps a virtue) but complete and easily found and identified.

Ampex Corporation, a unit of The Allied-Signal Corporation of Morristown, New Jersey, is hardly new to the high technology marketplace, being the company that introduced the first professional audio tape recorder in 1944, the first videotape recorder in 1956 and, sports fans, the first instant replay in 1967. Ampex began manufacturing terminals in 1979, and backs them with a two year warranty, from the date of shipment to the buyer.

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ARTICLE INTEREST QUOTIENT
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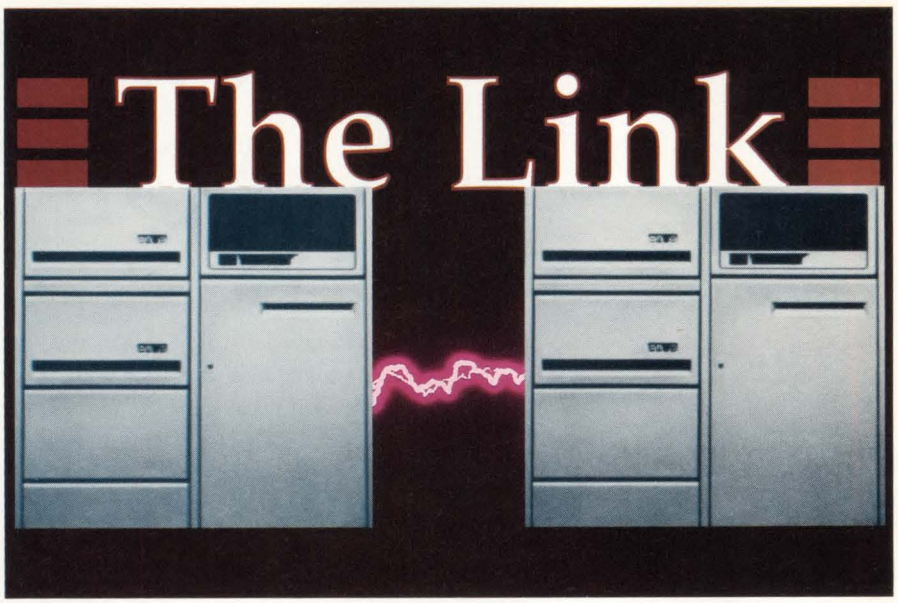

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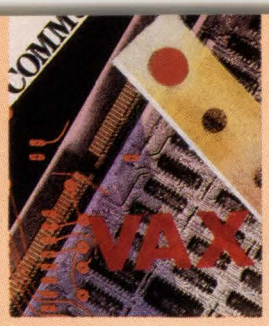

VAX

BUSINESS GRAPHICS MADE EASY

By Dr. Ira Bloom

EDTGRAF Fills The Gap Between *CA-DISSPLA* And *CA-TELLAGRAF*.

Recently, a colleague walked into my office with a graphics problem — how to generate plots of his data on our VAX 11/785 computer without having to write a special program for his particular application or to master yet another software package. In response, I created a graphics program, EDTGRAF, that allows users easy access to the high-quality graphics available in *CA-DISSPLA*, a powerful graphics package marketed by Computer Associates International of San Diego. EDTGRAF easily is usable by computer novices.

The problem with *CA-DISSPLA* is that it requires a good knowledge of programming in a high-level language, such as FORTRAN or PASCAL. To further complicate matters, *CA-DISSPLA* has its own internal syntax, which must be mastered before graphics can be produced. Computer Associates also has marketed a more easily used front end for *CA-DISSPLA*'s graphics routines, *CA-TELLAGRAF*, which is an interpreter-based graphics package. To use *CA-TELLAGRAF*, you have to learn the simpler, though still complex, *CA-TELLAGRAF* language. This may be inconvenient for the casual user who needs graphics infrequently or for the person who needs a plot and does not have a working knowledge of either *CA-DISSPLA* or *CA-TELLAGRAF*. Since it is an interpreter-based graphics package, *CA-TELLAGRAF* is inherently slower than compiled programs written with *CA-DISSPLA*.

It is because of these limitations, that I created EDTGRAF. EDTGRAF brings the power and speed of *CA-DISSPLA* into everyday use for practically everyone. The complex syntax necessary to produce graphics with *CA-DISSPLA* is reduced to simple menus. The use of menus decreases the amount of computer time spent preprocessing command input. Through the use of plain English menus, you can produce graphics quickly and easily in two and three dimensions, and in color.

EDTGRAF is written in VAX FORTRAN and can be used easily by individuals with no knowledge of computer programming. EDTGRAF has capabilities for storing and later retrieving information needed to produce graphics. A DEC command language program is used to start EDTGRAF and to acquire various parameters, such as default directory name, that are needed later by EDTGRAF. During program execution, all inputs are checked by EDTGRAF for those that do not make sense in the current plot, such as a zero value for the increment (size of step between major divisions) on an axis. If an error is detected by EDTGRAF, a meaningful error message is displayed and you are given a chance to correct the error. Other errors, such as data out of the given range for an axis, are detected by *CA-DISSPLA*. Due to the nature of the *CA-DISSPLA* package, there is little feedback directly from *CA-DISSPLA* to EDTGRAF. Therefore, errors detected by *CA-DISSPLA* have

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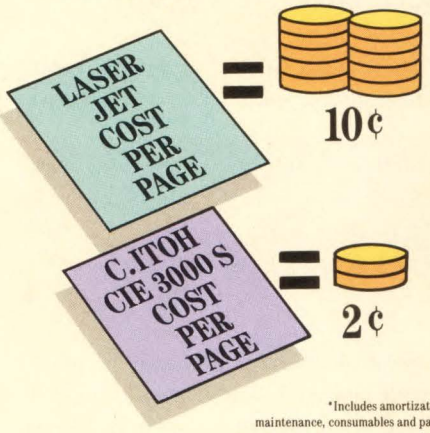

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to be fixed by the user. However, errors can be corrected easily without exiting and restarting EDTGRAF. All graph specifications (graph "setup") can be edited (again, via menus), and the setup can be saved in a file. Once saved in a file, the setup parameters can be read by EDTGRAF and either used directly or altered as desired.

The main menu from which EDTGRAF functions can be selected is shown in Figure 1. Choice 1 initiates the question/answer prompts to describe the general appearance of the graph and to indicate from what source the data are to be read. With most yes or no questions, the default answer is shown in square brackets, as in [N]. Online help is available by answering a yes or no question with "?". For example, at the beginning of the "Create graph" session, you are asked about graph orientation:

```
Current graph orientation is COMIC.
Is this OK? [Y]:
```

A carriage return will give the default orientation, COMIC. If you respond with "N," EDTGRAF will prompt for new rotation, as in:

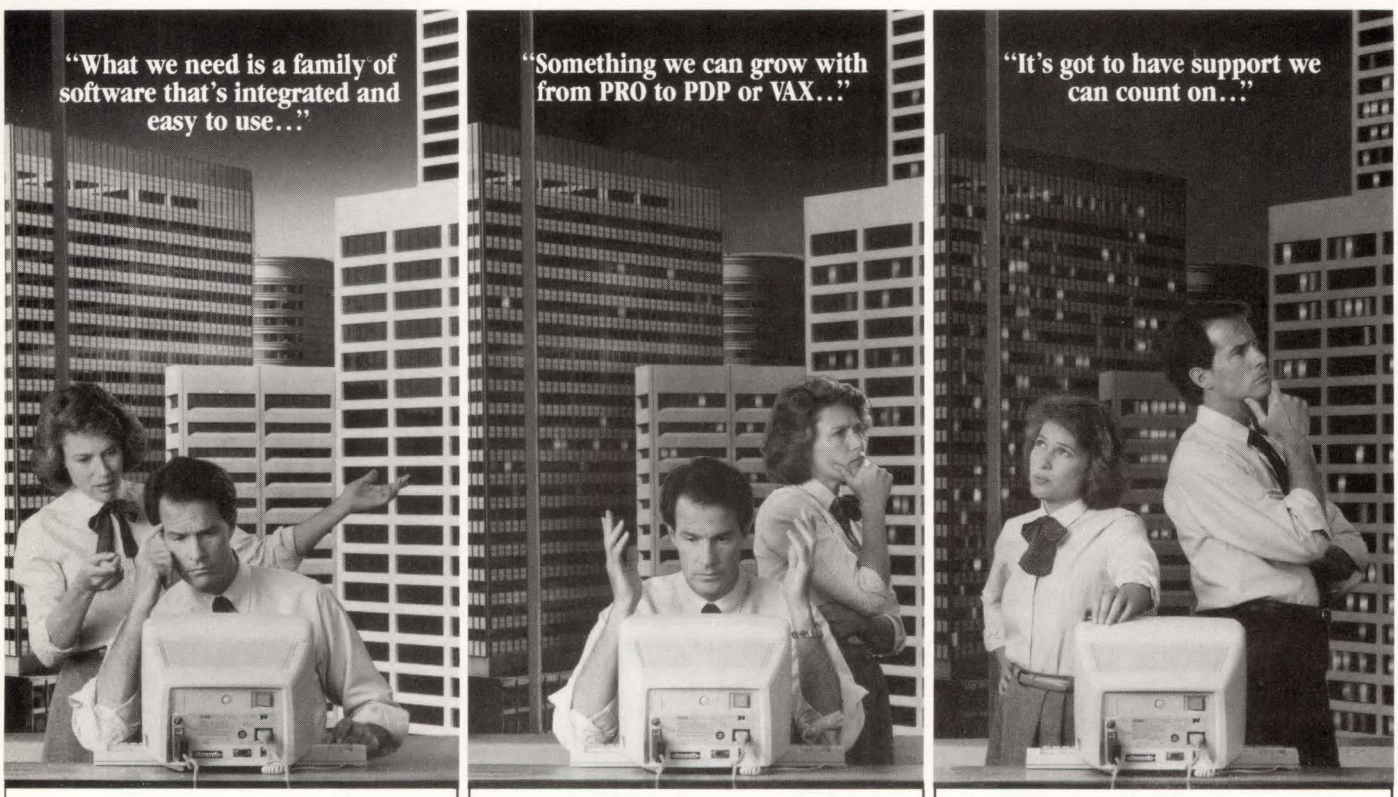
```
Enter new rotation (COMIC, MOVIE):
```

. . . EDTGRAF will not allow certain operations to be used out of order.

If you don't understand what COMIC or MOVIE means and need online help, responding with a "?" will produce:

```
COMIC rotation (default) produces a plot that has the
y-axis perpendicular to the long axis of paper (similar to
a comic strip). MOVIE rotation produces a plot that has
y-axis parallel to long axis of paper (similar to movie film).
```

After a few more questions regarding where the plot is to begin, what the default character height should be, how big the plot should be, and what type of plot is to be drawn, EDTGRAF shows a rough sketch illustrating the basic parameters needed for the plot. An example of the rough sketch



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is given in Figure 2. If a linear plot is selected, you are first prompted:

```
Setting up x axis . . .
Enter minimum, increment (step), and maximum:
```

After EDTGRAF reads these data in free format, it checks whether the limits and increment make sense. For example, if the minimum value is greater than the maximum value or if the increment is zero, EDTGRAF will report that there are invalid limits or increment and reprompts for the information. The number of tick marks between major divisions then is specified. If a zero is entered for the number of tick marks, EDTGRAF will respond, for example:

```
X axis will not be drawn
```

Axis labels are entered at the prompt:

```
Enter x axis label (? = help):
    .....10.....20.....30.....40.....50.....
```

Axis labels cannot be more than 59 characters long (this gives EDTGRAF room to add the end-of-string character). If this requirement is not met, EDTGRAF will generate an error message and reprompt for the axis label. The "?" response will produce a summary of commands to obtain special features, such as super- and subscripts, Greek letters, etc.

It should be noted here that EDTGRAF will not allow certain operations to be used out of order. For example, you cannot edit a graph unless a graph setup is read in via "Edit graph (choice 2)" or a graph has been specified via "Create graph." Further along, you can't draw a graph until the setup is specified and the data are read in.

Any set of ordered pairs or triples to be plotted or manipulated is called a "dataset." Data may be entered from the terminal or from a file, and up to 18 datasets per graph may be specified in either two or three dimensions. The maximum number of ordered pairs (or triples) in any dataset is 1,000. If the dataset does not exist, EDTGRAF prompts you with "Invalid dataset name, try again." EDTGRAF will ask the user for the number of lines in the file to ignore (i.e., lines of text at the beginning of the dataset) in an existing file. To facilitate data entry, data from a file to be plotted may be read from selected columns of a larger data table. You only need specify which columns are to be read. Columns 1 and 2 are the default selections. If columns 3 and 9 are wanted, you must specify those columns at the appropriate prompt. Data in the data table can be either left or right justified. EDTGRAF deter-

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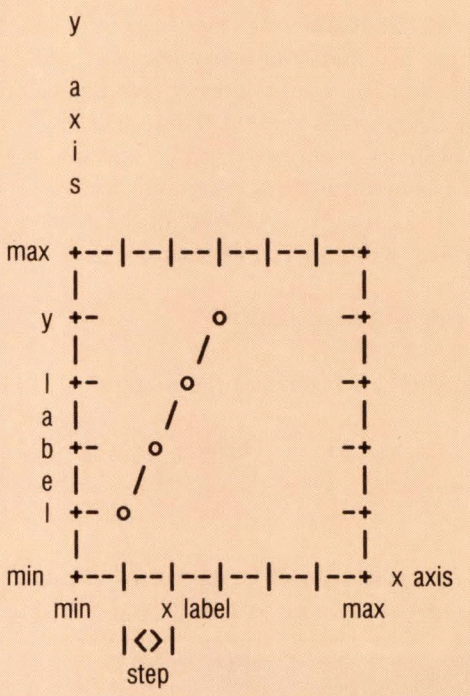
FIGURE 1.

EDTGRAF Version 3.0
Choices:
1. Create graph
2. Edit graph
3. Display graph specifications
4. Specify manipulations on datasets
5. Acquire data from datasets
6. Execute manipulations
7. Add/change dataset color
8. Add/change dataset texture
9. Add/change messages (text)
A. Display data currently stored
D. Draw graph
C. Copy setup
E. Edit data currently stored
G. Directory of graph setups
K. Delete setup
Q. Quit EDTGRAPH
S. Save graph setup
T. Tutorial
U. Update directory
X. Exit program and post-plot graphs

Enter choice:

Main menu from EDTGRAF.

FIGURE 2.



A rough sketch illustrating the parameters needed for the type of plot selected (linear in this case).

mines where the columns are by parsing the line read from the file, and it also checks to make sure that no stray entries are ignored if the columns in the data table are not exactly straight.

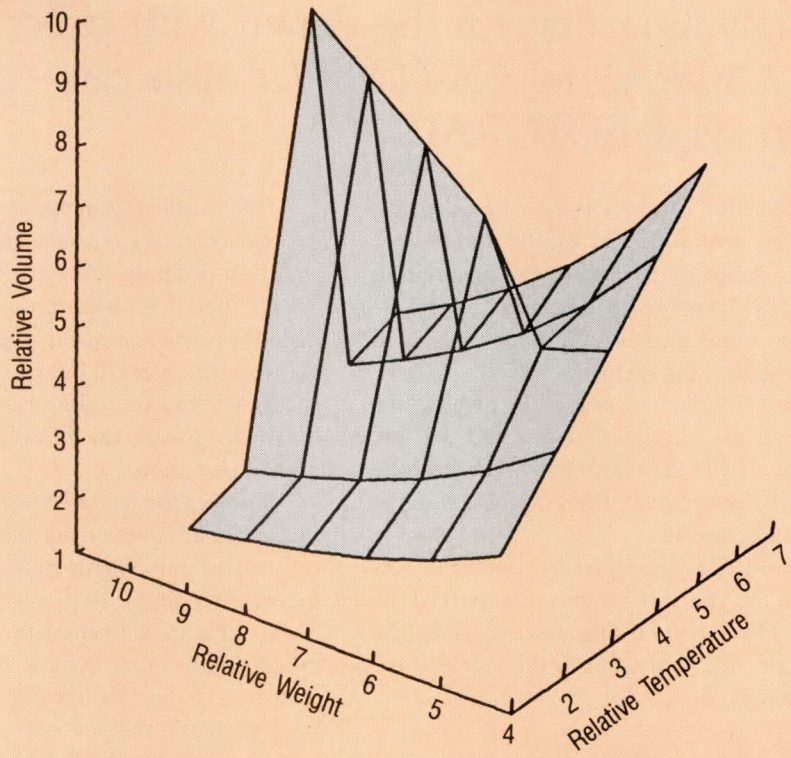
Exactly how the dataset will be plotted is selected by the user. You can select one of 18 types of data-point markers and the texture of the plot line (i.e., solid, dotted, or dashed), and can select whether the points are to be connected. A list of available markers, if that option is selected, is displayed each time a dataset name is entered. Given in the first three columns of the list is the number that corresponds to the dataset number that is represented by that particular marker. This makes labeling of each curve easier and eliminates unwanted redundancy in marker selection.

If more than one dataset is to be plotted, the program asks you whether a legend is desired. The default is [N]. The title of the legend can be up to 20 characters long. The default text in the legend (what is printed beside each marker) is the first 11 characters of the dataset name or up to the "." between file name and extension. Of course, the legend title and text are changed readily through the editing facilities within EDTGRAF.

Once all the preliminary specifications have been entered, they can be edited via choice 2. Items as diverse as plot orientation and axis labels can be changed easily if needed. Plot enhancements, such as the addition of text (choice 9) or dataset color (choice 7), can be changed via their own editing functions; choice 2 does not change the plot enhancements. Choice 3 allows you to view what was entered and check the graph for correctness before drawing it.

Part of the power of EDTGRAF comes in choice 4, specify manipulations. You can tell EDTGRAF to manipulate the data from any or all datasets independently. The types of data manipulations available are sorting of data on x (three-dimensional data cannot be sorted; EDTGRAF will tell you that this operation is not legal), least-squares fitting of data (two dimensions only), and reorganizing of data. Sorting of data is accomplished with a quick bubble sort (top down). Least-squares fitting of the data allows the user to determine how well the data fit a mathematical relationship. The fit equation

FIGURE 3.



A 3-D plot generated by EDTGRAF to allow the rapid analysis of experimental data.

can include polynomials (up to 10 terms), ln(x), xln(x), and exp(x) terms. Reorganizing the data allows you to interchange x and y values in two dimensions and to permute the (x,y,z) triple. With choice D, EDTGRAF will plot the data after manipulation with one exception: After the least-squares fit, EDTGRAF will plot the data that were fit and the least-squares-fit curve.

At choice 5, EDTGRAF automatically will read in the data from the datasets specified. If the data are typed in from the terminal during program execution, EDTGRAF automatically will prompt for a file name into which the data can be written (default is TT<n>_DATA.DATA, where <n> is the dataset number). This facility was incorporated into EDTGRAF to lessen problems with multiple graphs using the same set of data from the terminal. Mistakes during data entry easily are recoverable — the data are not lost. The file name given to the data is kept by EDTGRAF for future use (datasets cannot be edited with EDTGRAF). If so desired and specified, choice 6 will execute the desired manipulations.

Choices 7 and 8 are self-explanatory. Here, you can select dataset color and texture, respectively, from the choices available in *CA-DISSPLA*. Adding text to the plot is done at choice 9. The user is given a brief menu of further options, such as:

```
    Choices:
1. Add messages to plot (max = 80 lines total text)
2. Edit message(s)
3. Specify message color (WHITE is default)
R. Return to main menu.

    Enter choice:
```

Messages are added to the plot through the use of the shareable image, full-screen editor, EDT. EDT is called to edit the messages as well as to add the messages. Before you invoke the EDT editor, you are told to place a control character where individual message blocks end. The maximum message length is 59 characters, including control characters, and 60 lines of text.

Choices A, D, S, and T are self-explanatory. The data that

Almost anything that can be drawn with either *CA-TELLAGRAF* or *CA-DISSPLA* also can be drawn with EDTGRAF.

was entered from each dataset can be viewed with choice A. The final graph, after all manipulations, can be drawn with D. The most important choice for facilitating the later editing of a graph setup is choice S, save setup. The graph specifications are saved into a user-specified file. Only the name need be entered. EDTGRAF appends the extension, "PLOT_SETUP," for its own use. If you try to write over an existing graph setup, EDTGRAF will warn that the file already exists and will ask if you wish to continue. If "Y," EDTGRAF will write over the existing file. If "N," EDTGRAF will ask for a new file name to save the graph setup information.

EDTGRAF keeps track of all graph setups saved and asks if you want a listing of the available setups at the start of the "Edit graph" session. During the listing process, EDTGRAF checks to see if the setup still is present in the user's directory. You may see a listing similar to:

```
Graph setups on [xxxxxxx]

SET_UP1
SET_UP2
MY_FILE
NEWFILE
TESTFILE      < = = file not in directory
Please UPDATE directory
NEXTFILE

Total of 5 setups present
Press RETURN to continue:
```

In the above example, EDTGRAF has found that a file listed in its management directory no longer exists on the current user directory, [xxxxxxx]. At this point, choice U is appropriate to update EDTGRAF's management directory. Choice U also can be used to added setups that were copied (under VMS) from another user's directory to EDTGRAF's management directory.

To facilitate use of EDTGRAF, an online tutorial, written in plain English, is available. The tutorial explains the basics of EDTGRAF, including how to get started. The tutorial takes the user through the graph setup in a step-by-step fashion and shows how to draw the specified graph. It is not meant to be all-inclusive.

The finished graphics are plotted after exiting the program (choice X). Control again is given to the DEC command language program. You can plot the generated graphics (a *.PLOT file), if so desired, on any of the listed plotters. Also included in the command language program is the capability to rotate the plot 90 degrees (i.e., MOVIE → COMIC). The DISSPOP hardware scaling command, HWSCAL = SCREEN, is assumed (makes the plot fill the page) and invoked without user intervention.

The experiences with EDTGRAF that my colleagues and I have had are in the field of science. By using EDTGRAF, we can analyze our experimental data more rapidly than by other means. An example of graphics that EDTGRAF can produce is given in Figure 3. Examination of this three-dimensional plot quickly shows that volume is more sensitive to changes in temperature than changes in weight. Analysis of data is not the only task that can be done with EDTGRAF: Almost anything that can be drawn with either *CA-TELLAGRAF* or *CA-DISSPLA* also can be drawn with EDTGRAF.

Author's note: Since I wrote this article, version 3.0 of EDTGRAF has been released for use in Argonne. In version 3.0, improvements in the way EDTGRAF handles data have been incorporated. For example, version 2.1 could read data from selected columns in a large data set, but the column numbers had to be in ascending order. In version 3.0, the column numbers do not. All entries are screened carefully for non-numeric characters. If non-numeric characters should be found, that entry is ignored and EDTGRAF informs the user of the error.

More functions have been added. For example, choice C (see Figure 1) allows the user of EDTGRAF to copy plot setups from either his plot directory or from someone else's directory while in EDTGRAF. This is in contrast to version 2.1, where the copying had to be performed under VMS.

THIS PROGRAM WAS DEVELOPED under the auspices of the U.S. Department of Energy, Energy Systems Storage Branch, under contract W-31-109-Eng-38. Thanks to J. Osudar (CSD Division) for his assistance and support. *—Dr. Ira Bloom is an assistant chemist for Argonne National Laboratories in Argonne, Illinois.*

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SOFTWARE

TARGET → CALENDAR

By Victor J. Chorney

A Calendar Management System That Scores A Bulls-Eye.

Psst . . . Hey buddy! Wanna cheap date? Here's a nice little calendar management system for your 32-bit system.

Now that I have your attention, I'd like to tell you about the time (seven years ago) when I first saw the prototype of what eventually became the calendar management portion of *ALL-IN-1*. I was struck not so much with deja vu, as with the feeling that this seemed like a good idea. If you've used a calendar management or electronic datebook system, you know that there are advantages to having one. Target Systems of West Marlboro, Massachusetts, has brought one to market at a reasonable price and performance level. It's called *Target → Calendar*.

Two slim, typewritten manuals comprise the documentation set: the *System Management Guide*, and the *User's Guide*. *The System Management Guide* covers the simple task of installing the product — executing a command procedure that takes no more than 10 minutes. The next task is to assign the installation dependent variables; all of which are explained in terms simple enough for any system manager to understand. Release notes (bug fixes and enhancements) also are a part of this manual.

The *User's Guide*, complete with some duplicate pages, has a table of contents that devotes roughly one page for each operation. This manual probably isn't going to be used frequently; in fact, I didn't use it at all. I'd say that unless you're one of those people who thinks that a calculator is hard to figure out, you will have no trouble understanding how *Target → Calendar* works. In any case, the manual assumes a nominal level of VMS operations knowledge and moves quickly into using the product. For example, text and screen representation are provided for each option, and you quickly realize that using *Target → Calendar* is one of the simpler tasks of life.

Operation

Once invoked, the screen displays two windows: a calendar for the current month on the left and a command and text display window on the right (see Screen 1). The "active" date (current when you first enter the system) is displayed in reverse video. On our system, federal holidays were set to be bolded.

There are 16 commands you may issue and, with one exception, each requires pressing a single letter key. The Return key need not be pressed, and invalid selections are ignored. The commands, as stated on the screen, are as follows:

A — Authorize Users. Grants users read, write, or no access to your calendar.

B — Back 1 Month. Changes the calendar box to the last day of the previous month.

C — Copyright. Displays copyright information about *Target → Calendar*.

D — Delete Old Text. Prompts for a range of dates from which to remove text. It will NOT delete from the current date forward, though you can get around this limitation by going into the text itself and blanking out the entry.

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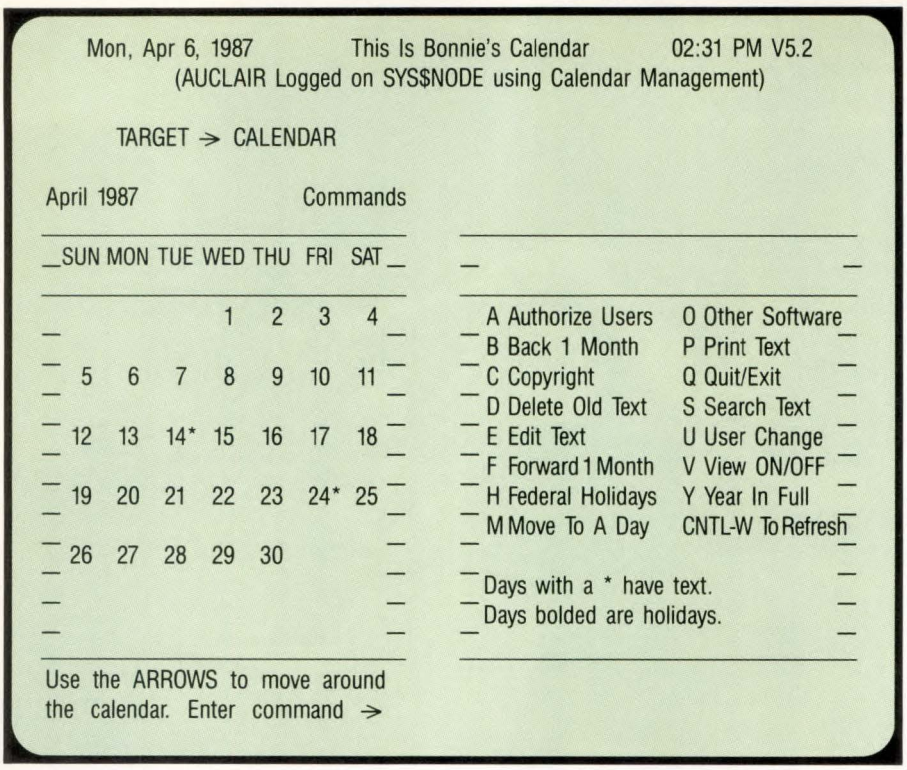

E — Edit Text. Enters or alters the text of a chosen day (CTRL-Z exits the operation).

F — Forward One Month. Changes the calendar box to the first day of the next month.

H — Federal Holidays. Lists the federal holidays that occur during the displayed month.

M — Move To A Day. Selects the "active" day by entering the date; the default is today.

O — Other Software. A list of other products available from Target Systems.

P — Print Text. Prompts for a date range from which to choose, a search string to use and a queue where the output is directed.

Q — Quit/Exit. Leave *Target → Calendar*.

S — Search Text. Prompts for a string to search for (not case sensitive, incidentally) and a starting date to search from.

U — User Change. Allows you to make an entry or read-in (depending on your access privileges) another user's calendar.

V — View ON/OFF. A toggle that displays (or not) the text associated with the date. A note of caution here: There is no statement to remind you once you are in View that you must press V to return to command mode.

CTRL-W — Refresh Screen. For repainting the display (getting rid of messages, for instance).

Y — Year In Full. Displays the year of the "active" date in 132-column format. (This option did not work for me. Only pieces of the calendar were displayed along with some irrelevant lines.)

One more command is available if permitted by the system manager: Entering a dollar sign spawns a subprocess. The screen clears and a message is displayed informing you to logout in order to return to *Target → Calendar*.

There's no online help available, but this package is so straightforward that nothing is lost by its absence. Because a calendar serves its purpose only when you look at it, the system will inform you when you log in of the upcoming activities stated in your calendar. The system manager can set the amount of lead time, ranging between zero and seven days notice.

The system manager can set the amount of lead time . . .

A point of interest: I tested *Target → Calendar* via modem, and the timed delays were fine at 1200 baud. I'm curious, however, what those delays look like at 9600 baud.

Target → Calendar is a nicely done and appropriately priced package that performs its services well. Whether you use it for yourself alone, or as part of a community of users, managing your calendar this way is pleasant and simple. While some might say it's a luxury, I find that a tool like *Target → Calendar* quickly becomes an indispensable part of my personal time management effort and a valuable asset in coordinating my schedule with others.

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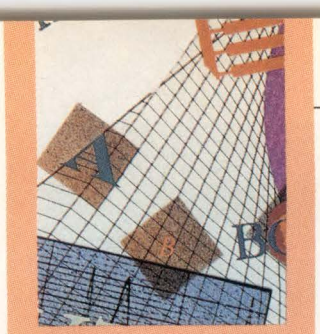


NETWORKING

VAXING TOGETHER

By Ron Levine

Setting Up A Large Networking Hub.

Rockwell International builds big: the space shuttle, the B1 bomber, and advanced semiconductor products such as chips, boards, and modems. So when the company has a processing problem, it too is big.

Take the data processing problem within the Computer-Aided Design (CAD) group of its Semiconductor Products Division (SPD). The CAD group's function within Rockwell SPD originally was to provide support for the company's VLSI chip engineering function. However, over time, that focus changed; now it's the computing resource for all of engineering within SPD, including chip design, system and production engineering (hardware and software), and general application software development for all sizes of computers from micros to mainframes. The CAD group, based in Anaheim, California, also interacts with the company's plants in Cedar Rapids, Iowa. There are 25 people within the group and more than 50 computers.

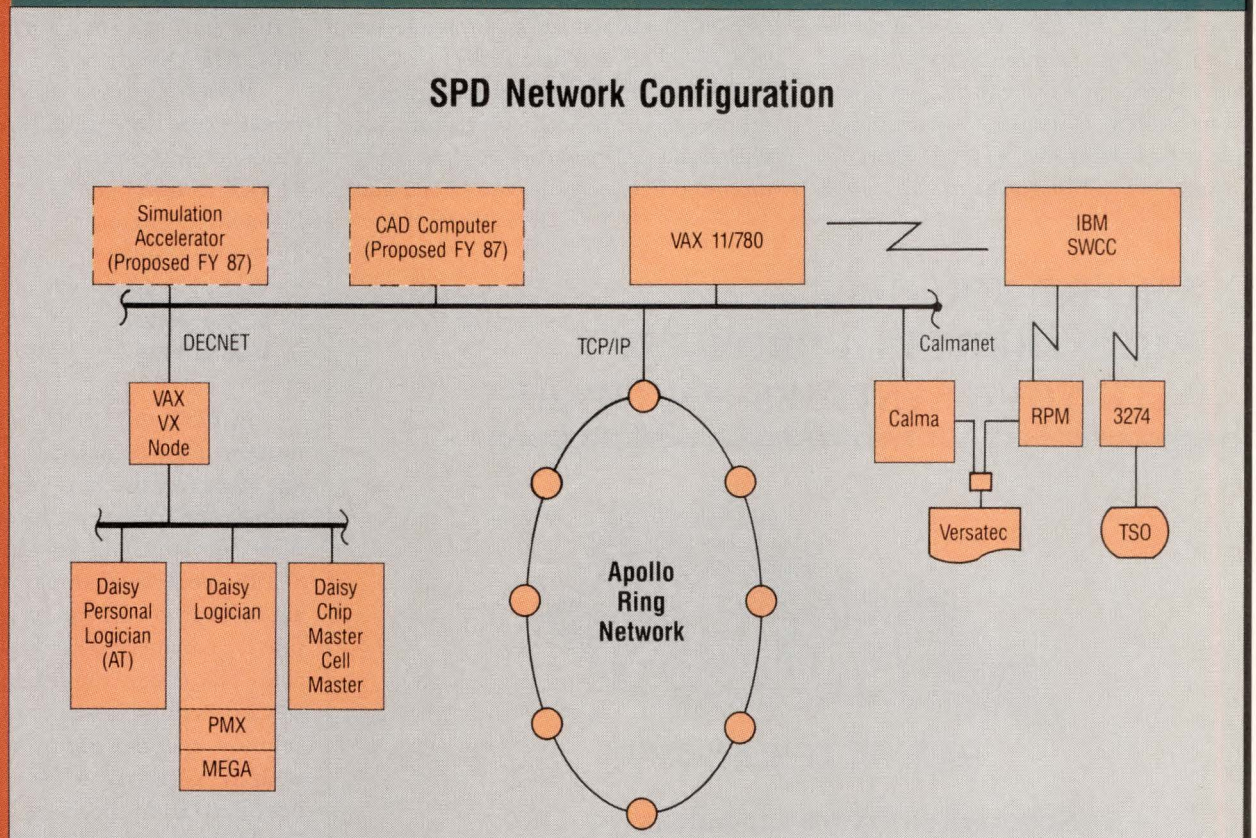
The computers and systems consist of a VAX 11/780 for engineering use, two VAX 11/780s for use in real-time tracking of wafer production, a VAX 11/750 for signal processing analysis and another for use as a test system to check wafer production specifications, along with a MICROVAX to support workstations by providing a gateway between the stations and other processing units. Two PDP-11/44s are used for signal processing analysis in engineering and as a test system for manufacturing, 33 Apollo workstations perform VLSI (chip) design tasks, 10 Calma workstations apply final production data during the final stages of VLSI design, and three Daisy workstations design system products and gate arrays, and do the layout and verification of these items. The two computers for business functions are an IBM 4341 mini and a Prime computer.

All the computers within the CAD group talk to a series of IBM Sierra Class systems at the company's South West Computer Center (SWCC) network. Because of the low baud rates of the connecting communication lines between the SWCC and the CAD computers, and the huge size of the data files that are transferred, remote communications are slow. Therefore, Rockwell plans to install a local CAD host computer during the 1987 fiscal year. This is a very big operation with large amounts of mixed-vendor equipment performing dedicated functions, yet communications among them is essential. The personnel who use the various systems must be able to operate them effectively and efficiently. So the question is, how do you connect all this computer power in a practical manner and achieve the best results?

First Attempt At Connectivity

The CAD group first tried to force a single-protocol solution to achieve total intersystem communications within its complex environment. "We researched networking protocols and various setups and decided that TCP/IP looked the most promising. We also thought it would be an industry standard for the next few years," reports Jeff Blaalid, advanced engineering specialist in the CAD group. This

FIGURE 1.



was in early 1985, when TCP/IP was just coming onto the commercial scene, although it was well known and widely implemented in the non-commercial markets served by Rockwell.

As soon as Rockwell went ahead with this "one protocol solution" project, they ran into problems. Blaalid recalls, "Most of our vendors were reluctant to implement the TCP/IP protocol from the start. Apollo was the only supplier to support it willingly. We tried to pressure the others into supporting this project, but met with little success. Calma wouldn't do it. Daisy tried, but the workstations didn't perform up to expectations, and it was extremely hard to find TCP/IP support for the VAX in 1985."

When it became apparent that the vendors couldn't provide a total networking solution using one protocol only, Rockwell abandoned that idea and began looking at alternative solutions.

Mixed Networking Environment Studied

The next step was to research available networking systems and poll the vendors to determine which solutions, if any, they were capable of supporting. "A mixed-protocol operating environment was a necessity we would have to live with," stated Blaalid.

The research uncovered that even though the equipment suppliers couldn't support any single networking protocol, they all could communicate directly with a VAX/VMS type of environment successfully. So, Rockwell investigated the possibility of using one of its VAX 11/780s as a networking hub. Originally purchased for software development, the 11/780s were being used as engineering and

production systems. Perhaps one could serve in this new function.

The CAD group development people decided to try a mixed-protocol system using the VAX to communicate with the best solution software from each vendor and write their own interconnectivity software. The resulting plan was basically a total Ethernet environment. Ethernet is the backbone of the mixed-networking arrangement connecting all hardware and data, while the additional protocols abide by the physical Ethernet connection and data link standards, and add their own layers of data-linking software to the network.

Rockwell planned for the finished product to use the following protocols within the CAD network: SNA to communicate between the VAX 11/780 and the IBMs, DECnet to connect all VAX and DEC products, TCP/IP where possible to talk to other foreign devices, and Calmanet and D-LAN to connect the Calma and Daisy workstations to the VAX, respectively.

Work began on the networking modules for CAD group processing in the following order:

1. VAX to IBM
2. VAX to Apollo
3. VAX to Calma
4. VAX to Daisy
5. VAX to VAX
6. VAX to PDP

In 1985, the TCP/IP and IBM connections were completed, and last year all other connections were brought online. The hardest protocol to implement into the hub environment was TCP/IP, because nothing was known about its protocols and no documentation for commercial markets was available. The easiest implementation was DECnet because it was a single vendor solution and the group was familiar with it. As the last to be attempted, it benefited from previous experience. Blaalid noted that by this time, the group was on the far side of the learning curve.

Today, the total networking environment is in place and it runs well. The VAX 11/780 makes an ideal hub and the installed MICROVAX node is an excellent gateway between D-LAN and DECnet, simplifying the communications to and from the Daisy workstations and the rest of the network. The hardware and software in this complex networking arrangement mesh well and operate satisfactorily.

VAX Hub Problems

But it's not a perfect solution; problems exist at the human interface level. For example, with this multinetworking and multioperating system (OS) environment, you have to learn and use more than one set of operating procedures, commands, and syntax. You have to interface with the networking software supplied by each vendor (Apollo

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= Apollo Ring Network, Calma = Calmanet, Daisy = D-LAN, DEC = DECnet). Rockwell supplied the interconnecting nodes to permit these protocols to communicate with the hub and with each other, transparent to the user. Thus, engineers must learn to operate within each vendor's OS.

Another problem area involves system revisions. With all of these different modules online to each other and interacting within the CAD network, a change or revision in one has a ripple effect on the entire system. It's a tremendous task to keep up with the revisions to each vendor's environment and implement these changes on the total system.

As for system management, it's a huge task to keep track of the current status of all system parts in the network. When the system has a malfunction under this multiprotocol mixed-vendor setup, it's tough to troubleshoot. Determining where the fault is located (e.g., hub or other hardware, vendor network or CAD connecting network nodes, etc.) requires a longer problem isolation time period than that needed in a single-protocol system.

Security presents another problem. If you maintain accounts in each vendor's system, you have to use a password, login and logout on each system. Then there's the related chore of keeping track of and updating expiring passwords within the different systems.

While these problems aren't severe enough to create a user-hostile environment, Rockwell is working on changes to the existing operating conditions to create a more friendly environment. It's expected that two projects in particular, Single Line Command System and Feedback Loop Enhancement, will provide relief in more than 90 percent of the cases, says Blaalid.

Single Line Command System

The recently installed Single Line Command System allows all the engineers to use the VAX Hub Networking System with a minimum of system knowledge. It makes the CAD software tools available within a shorter learning curve and provides an ease-of-use methodology.

If you maintain accounts in each vendor's system, you have to use a password, login and logout on each system.

If users don't know the VAX/VMS protocols but are familiar with the Apollo operating environment, they can use the Apollo with the Single Line Command System to submit batch jobs on the VAX 11/780 or to route huge data files to the remote IBM machines by creating simple commands to perform fixed functions.

Feedback Loop Enhancement

The Feedback Loop Enhancement software is a job database management program for the VAX 11/780. An advanced scheduler, it gives you run-time data and progress reports on job status.

Feedback Loop Enhancement tells the engineers where the named job is residing in the networking system, the number of jobs preceding it on the processing queue, and job file location information. It also provides current execution status data as the job is run and indicates when the job is transmitted. The Feedback Loop program also directs where job output is sent within the system.

A goal of this project is to have all job commands and output reports, under any of the available protocols, look the same to the user. When fully operational, it should alleviate up to 90 percent of the remaining system management problems.

The other remaining problems on the CAD network also are being addressed. For example, new implementations on the network have cut troubleshooting time to an average of 20 minutes for pinpointing a malfunction.

Plans are under way to alleviate the processing bottleneck that occurs within the TCP/IP protocol environment because of the Apollo connection bandwidth limitations; alternatives and the addition of future products are being considered. One VAX 780, originally purchased for software development (now used by engineering) is saturated and the purchase of a new CAD computer is planned for fiscal 1987.

Rockwell International's Semiconductor Products Division CAD group is satisfied with the VAX Hub network solution to its complex multinetworking mixed-vendor processing requirements. Blaalid concludes, "By selecting the VAX 11/780 as the networking hub, the operational application of the network was greatly simplified. All vendors, except for IBM, support and are able to supply connectivity to the VAX/VMS host. DEC does a good job in supplying connectivity between the VAX and IBM."

By purchasing the best hardware and software solutions available without regard for vendors' protocol, and then providing in-house linking and networking software to tie all equipment to the VAX hub, Rockwell configures the best networking system for the CAD group's needs. By adding the newly developed common single command mode for often-used functions and an advanced job scheduling and tracking programming package, the company achieved an easy-to-use user-friendly environment.

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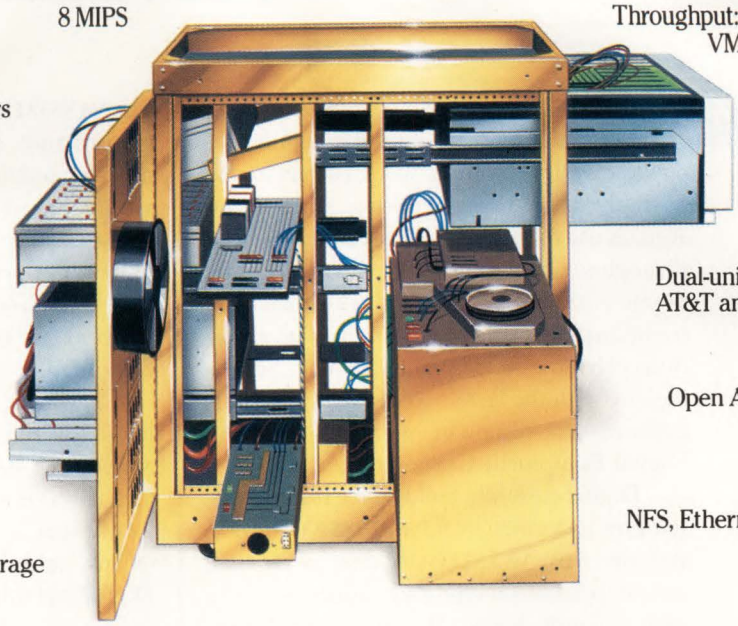

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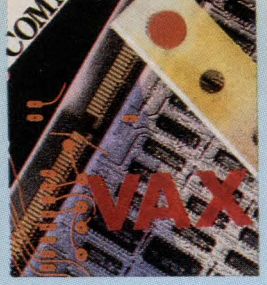

MICROVAX

DEC'S VAXSTATION FAMILY

By David W. Bynon

Office Tools Of The Future.

As with most new computing trends, today's powerful computer workstations started life in the laboratory/engineering environment. And, as usual, they're being used more widely throughout the industry as the cost comes down. Although still higher in cost than the traditional office workstation, these workstations deliver more bang for the buck. Such is the case with the VAXSTATION family of high-performance computer workstations from Digital Equipment Corporation.

Digital currently builds three basic workstations: VAXSTATION II, VAXSTATION II/GPX, and the new VAXSTATION 2000. There are several variations within each of these systems, such as color, grey-scale, and monochrome displays, restricted configurations, diskless versions, and the various chassis/cabinets configurations.

From The Bottom Up

The VAXSTATION 2000 is the newest DEC workstation and, because of its size and cost, probably will prove to be the most popular. The VAXSTATION 2000 is based on a single board computer packaged in a compact desktop enclosure. Unlike the other VAXSTATION systems, the 2000 is busless, restricting its expansion capabilities. This isn't a serious limitation, because the system supports a wealth of resources for an individual user (see Table 1). The VAXSTATION 2000 is suited for many high performance applications such as drafting, desktop publishing, software development, and advanced office applications. The color and grey-scale versions use a four-plane VLSI graphics coprocessor based on the original GPX coprocessor, which increases application performance by offloading graphics and text computation from the CPU.

The next member in the VAXSTATION family is the VAXSTATION II, the original MICROVAX II-based workstation. The VAXSTATION II is available only as a monochrome 2-D system. It's based on DEC's tried and true Q-bus, and is expandable through many Digital and third-party vendor offerings. This system is adept at such applications as laboratory data acquisition and analysis, computer-aided publishing, artificial intelligence, and advanced office applications. The VAXSTATION II is available in two deskside enclosures, depending on your expansion and storage requirements.

Finally, the Porsche of DEC workstations is the VAXSTATION II/GPX, a high-speed graphics coprocessor (GPX) with double-buffered video memory for exceptional graphics and text processing. The GPX coprocessor is capable of accessing display instructions in virtual memory, independent of the CPU, which further increases system performance. The MICROVAX II/GPX, like its older sibling, is based on Digital's Q-bus architecture. Depending on the application, VAXSTATION

Both the VAXSTATION 2000 workstation (foreground) and the MICROVAX 2000 system (man standing) can be integral links in DEC's Local Area VAXcluster environment. Work group users are able to cluster and share resources with other DEC workstations (VAXSTATION II/GPX system, right) and larger VAX systems (VAX 8800 system, far left).

II/GPX buyers may choose from four- or eight-plane color systems, each with a palette of more than 16 million colors. One special note about this system is its ability to support two graphics displays (UNIX only), while the others only support one. The VAXSTATION II/GPX is an excellent tool for such advanced applications as computer aided design (CAD), artificial intelligence (AI), program development, process control monitoring, PC board design, simulations, mapping and so on.

Common Elements

While all VAXSTATIONs are somewhat different in design, purpose and cost, they all share two common elements: CPU and software. All VAXSTATIONs are based on the same popular MICROVAX II CPU and FPU, and operate under VMS. What's more, all VAXSTATIONs share a common workstation software interface called VWS — a powerful multiwindow, icon, graphics system. For UNIX users, Digital offers ULTRIX-32 (Berkeley 4.3 and AT&T System V compatible) and X Windows, the newly emerging windows standard.

The cost of a VAXSTATION is still relatively high; $13,000 to $15,000 at the bottom end. When compared to a fully loaded IBM PC/AT system at $6,000 to $8,000, the VAXSTATION clearly appears to be out in left field. This is an ill-founded comparison, however, because the useful performance and productivity capabilities of a VAXSTATION far exceed those of any current microcomputer offering (this statement is sure to be argued by IBM PC/AT speed freaks and the Macintosh crowd).

What makes the VAXSTATION work so well is software (VMS and the VMS Workstation Software (VWS) and the multitasking capabilities of the MICROVAX II CPU. At any given time, the VAXSTATION user can run and display numerous applications simultaneously. This is not yet possible with any microcomputer systems. For the seasoned VAXSTATION user, it's not uncommon to have four to eight things going on at one time. The VAXSTATION increases productivity and stretches the imagination.

VWS, the VAXSTATION display software, is a window-oriented system. VAXSTATION windows are used to perform such tasks as terminal emulation, presenting menus, displaying messages, displaying graphics images, and drawing boards. The VAXSTATION

TABLE 1.

VAXstation Comparison Chart

	VAXstation II/GPX	VAXstation II	VAXstation 2000
SYSTEM BUS	Q22	Q22	NONE
SYSTEM MEMORY (MAX)	16 MB	16 MB	16 MB
I/O DEVICES			
Serial ports	x	x	x
Ethernet	x	x	x
STORAGE DEVICES			
44 MB, half-height			1-2
71 MB disk	1-3	1-3	1-2
159 MB disk	1-3	1-3	
Floppy disk	x	x	x
95 MB tape	x	x	x
Diskless (LAVC)	x	x	x
DISPLAY SYSTEMS			
Black & White	x	x	x
16 Grey-Scale B&W	x		x
16 Color, 4-plane	x	x	x
256 Color, 8-plane	x		

mouse ("rodentia digitalia"), a pointing/selecting device, is used to manipulate the windows. Windows, for those of you not familiar with its origin, became popular on microcomputers; it took the power of a VAX to make windows truly incredible.

THE PRIMARY FUNCTIONS of the VAXSTATION display are controlled by a Workstation Options Menu, selectable anytime by pointing the mouse to an unused portion of the display and pressing its SELECT button. The default functions from this menu include VWS Help, Creating VT220 and Tek4014 Windows, Print Portion Of Screen, and Setting Up The Workstation. This is a user-definable menu where you can add your own applications, to be invoked through the VWS system, by editing a simple text file that describes the menu. On my VAXSTATION II system, for example, I've modified the Workstation Options Menu to invoke VMS Help, games, VAX/VMS utilities and workstation programs that I've developed.

The VAXSTATION display isn't a standard terminal like a VT220 or VT340. Rather, it depends on the VWS software to provide terminal emulation through windows. VWS emulates the standard DEC terminals (VT220, VT100, and VT52), as well as an industry-standard graphics terminal (Tektronix 4014). The VAXSTATION display can have many terminal windows active simultaneously, each maintaining a separate VMS process. To keep your display manageable, terminal windows can be reduced to icons, moved, resized or deleted. When a terminal window is reduced to an icon, it continues to be active in the background.

For the software developer, VWS supports an extensive set of workstation routines called UIS, which is callable from VMS executable programs.

With the power and functionality of today's VAXSTATIONs, the future is plain to see: VAXSTATIONs will be the VT100s of the late 1980s and 90s. It's not hard to predict that a future low-end VAXSTATION might be a MICROVAX/Ethernet-based terminal (not a system) with a 14- or 15-inch high-resolution color display. The VAX no longer will be the "system" (take note Big Blue), the network is, and each new VAX, MICROVAX or VAXSTATION added to the system increases its power. Imagine the possibilities! — *David W. Bynon is a software consultant at Digital Equipment Corporation, Landover, Maryland. The ideas and information presented in this article are his own and do not necessarily represent those of Digital Equipment Corporation.*

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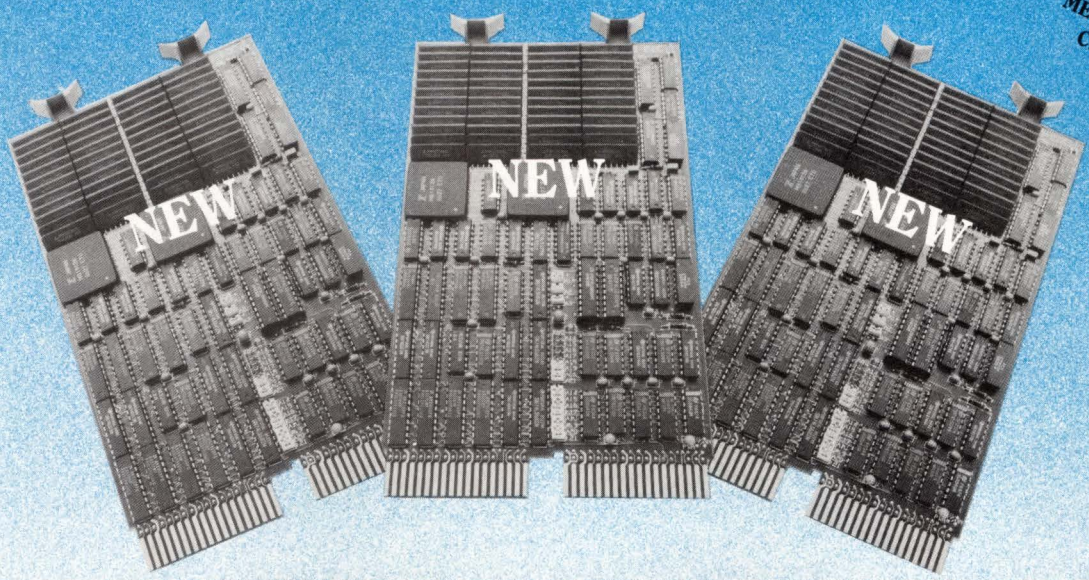

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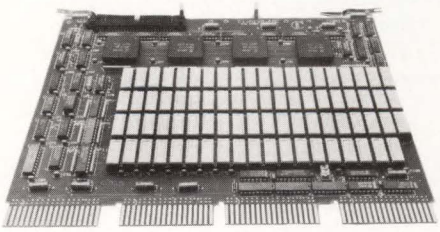

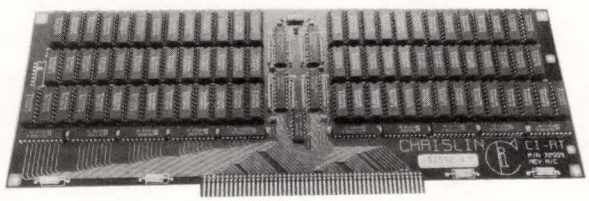

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DCL

SEARCH AND REPLACE!

By John David Nelms

A Program To Perform Multiple String Substitutions In Any Number Of Files.

Mass substitutions and updates of files often are both time consuming and subject to many different types of input errors. I've written a DCL command file on our VAX that I've found to be very useful, particularly when I have to make the same changes to several of my existing programs or data files.

SEARCH_SUB.COM uses basic DCL commands to produce another DCL command file for use by the EDT editor. EDT will perform multiple string substitutions in any number of specified files when it's executed either online or in batch. The command file that's created uses a tilde "~" as a string delimiter, but this also may be changed.

The READ statement is used throughout the SEARCH_SUB.COM file instead of the INQUIRE statement, so that any commas or blanks that are input will be interpreted as part of the string instead of as delimiters. This not only is useful for the strings within the files, but also allows you to be more specific and flexible in the naming of your files to search.

—At the time of this writing, John David Nelms was a programmer/analyst for The Atlantic Companies, Roanoke, Virginia.

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PROGRAM.

```
$!    DCL PROCEDURE TO SEARCH ALL SPECIFIED FILES AND SUBSTITUTE
$!    NEW STRINGS FOR EXISTING STRINGS.
$!
$!    AUTHOR  : DAVID NELMS
$!
$!
$     SET NOVERIFY
$     FLAG = 0
$     COUNTER = 0
$!    Clear screen sequence:
$     ESC[0,7] = %X1B
$     CLEAR = ESC+"["+"0"+"0"+"H"+ESC+"["+"0"+"J"
$!
$!    Make certain the user has no conflicting symbol assignments:
$     DIR := DIRECTORY
$     DELETE := DELETE
$!
$! Get the names of the input files:
$     WRITE SYS$OUTPUT CLEAR
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT "            ***** SEARCH AND SUBSTITUTE UTILITY *****"
$     WRITE SYS$OUTPUT " "
$     READ/PROMPT="FILES TO SEARCH ? " SYS$COMMAND FILES_TO_SEARCH
$     IF F$LENGTH(FILES_TO_SEARCH) .EQ. 0 THEN EXIT
$!
$ INPUT_STRINGS:
$!
$     WRITE SYS$OUTPUT CLEAR
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT "            ***** SEARCH AND SUBSTITUTE UTILITY *****"
$     WRITE SYS$OUTPUT " "
$     READ/PROMPT="EXISTING STRING ? " SYS$COMMAND OLD_STRING
$     IF F$LENGTH(OLD_STRING) .EQ. 0 .AND. FLAG .EQ. 0 THEN EXIT
$     IF F$LENGTH(OLD_STRING) .EQ. 0 .AND. FLAG .EQ. 1 -
      THEN GOTO NO_MORE_STRINGS
$     FLAG = 1
$     WRITE SYS$OUTPUT " "
$     READ/PROMPT="STRING TO SUBSTITUTE ? " SYS$COMMAND NEW_STRING
$     WRITE SYS$OUTPUT " "
$     COUNTER = COUNTER + 1
$     SUBSTITUTE_STRING'COUNTER' = "S~" + OLD_STRING + "~" + NEW_STRING + "~%W"
$     GOTO INPUT_STRINGS
$!
$ NO_MORE_STRINGS:
$!
$     HOLD_COUNTER = COUNTER
$!
$! Build new command file:
$!
$     WRITE SYS$OUTPUT CLEAR
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT "            ***** SEARCH AND SUBSTITUTE UTILITY *****"
$     WRITE SYS$OUTPUT " "
```

PROGRAM... *continued*

```
$     WRITE SYS$OUTPUT "                        BUILDING NEW COMMAND FILE      "
$     DIR/VER=1/NOHEAD/NOTRAIL/OUT=SYS$LOGIN:SEARCH_SUB.TMP 'FILES_TO_SEARCH'
$!
$     OPEN/WRITE NEW_COMMAND_FILE SYS$LOGIN:NEW_SEARCH_SUB.COM
$     OPEN LIST_OF_FILES_TO_SEARCH SYS$LOGIN:SEARCH_SUB.TMP
$!
$ BUILD_FILES_TO_SEARCH_LOOP:
$!
$     READ/END=END_OF_FILES_TO_SEARCH LIST_OF_FILES_TO_SEARCH FILE_NAME
$!
$! Make certain the EDIT command is not overridden by a user symbol:
$     WRITE NEW_COMMAND_FILE "$ EDIT := EDIT/EDT"
$!
$     WRITE NEW_COMMAND_FILE "$ EDIT/NOCOMMAND ",FILE_NAME
$     COUNTER = 0
$!
$ BUILD_EDITOR_LOOP:
$!
$     IF HOLD_COUNTER .EQ. COUNTER THEN GOTO END_OF_EDITOR
$     COUNTER = COUNTER + 1
$     WRITE NEW_COMMAND_FILE SUBSTITUTE_STRING'COUNTER'
$     GOTO BUILD_EDITOR_LOOP
$!
$ END_OF_EDITOR:
$!
$     WRITE NEW_COMMAND_FILE "EXIT"
$     GOTO BUILD_FILES_TO_SEARCH_LOOP
$!
$ END_OF_FILES_TO_SEARCH:
$!
$! Close files and cleanup:
$     CLOSE LIST_OF_FILES_TO_SEARCH
$     WRITE NEW_COMMAND_FILE "$ EXIT"
$     CLOSE NEW_COMMAND_FILE
$     DELETE SYS$LOGIN:SEARCH_SUB.TMP;*
$!
$! Give user the option to submit edit as a batch job:
$     WRITE SYS$OUTPUT CLEAR
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT "            ***** SEARCH AND SUBSTITUTE UTILITY *****"
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT "   THE SEARCH AND SUBSTITUTE COMMAND FILE "
$     WRITE SYS$OUTPUT "   HAS BEEN BUILT          "
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT "   THE SEARCH AND SUBSTITUTE COMMAND FILE IS  "
$     WRITE SYS$OUTPUT "   SYS$LOGIN:NEW_SEARCH_SUB.COM    "
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT " "
$     WRITE SYS$OUTPUT "  WOULD YOU LIKE TO SUBMIT THE JOB TO THE  "
$     INQUIRE/NOPUNCT QUEUE_JOB "  BATCH QUEUE (DEFAULT = Y) ? "
$     IF F$LENGTH(QUEUE_JOB) .EQ. 0 THEN QUEUE_JOB = "Y"
$     IF QUEUE_JOB THEN SUBMIT/NOPRINT/NOTIFY SYS$LOGIN:NEW_SEARCH_SUB.COM
$     EXIT
```

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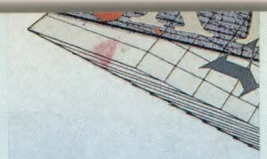

DEC vs IBM

TRANSACTION PROCESSING

DEC/ACMS vs. IBM/CICS, Part 1.

By John Biazzo

This is the first in a series of articles to examine the differences between CICS and ACMS.

The VAX 8000 series computers allow Digital to offer systems powerful enough to support sizable transaction processing applications. Using the VAX Information Architecture (VIA) product set, the application development process is greatly streamlined. Because many transaction processing systems are developed under IBM/CICS, it provides a good standard for comparing them to DEC transaction processing.

DEC, like IBM, enjoys acronyms. ACMS stands for Application Control and Management System. For IBM, CICS means Customer Information Control System. CICS also doubles in the mnemonic sense, in that IBM programmers are known to get their CICS (pronounced "kicks").

Beginning with the basics, CICS has a completely different architecture from that of ACMS, using an "inside-out" type of functionality as opposed to ACMS's "outside-in" style. By inside-out, CICS places all control of the system within the application program. Conversely, ACMS places little control of the system within the application program.

A CICS application typically uses a menu program to act as the entry point to all other programs in the system. From within this menu program, a data input form is sent to the screen and the user signs on with his username and password. Upon successful entry, another screen is displayed from which a selection is made for the desired function. Sounds easy, but that menu program contains not only the means to perform terminal I/O but also file I/O with error checking and complete verification on all inputted data. The kicker is, if the application is written in COBOL, so are all the routines to perform the data verification.

All interaction with terminals, files, and other programs is accomplished through calls to CICS from within the application program. The calls begin with the keywords EXEC CICS, followed by one or two distinguishing keywords to denote the specific function requested. On subsequent lines following or on the same line, the programmer supplies additional keyword clauses to further define his intention. The EXEC CICS call is terminated with the keywords END-EXEC.

The intent of the discussion is to provide the reader with an understanding of how CICS calls are used in a program and some of their capabilities.

The EXEC CICS calls fall into five basic categories. These include file processing, screen processing, program control, temporary storage, and error and function key handling. For the sake of brevity, the file processing calls are used to accomplish file I/O and the screen processing calls are used to accomplish terminal I/O.

Program control calls allow the programmer to control the processing flow of the system. There are two basic types of flow control commands. The first is an XCTL in which the first program transfers control to a second. When an XCTL is used, control never returns to the first program. The second type of program control call is a LINK in which the first program starts a second program. When the

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With ACMS, the application program doesn't interact with the terminal directly.

second program finishes executing, control returns to the first. These programs typically are part of what's known as a CICS task, which may comprise several programs.

Processing flow also can be controlled through the use of action identifier keys or AID keys — function keys which when depressed, return a value to a CICS-defined data field in the program. The programmer then can use IF statements to test the value of the CICS data field to determine which key the user has pressed. Alternatively, the programmer can use the CICS HANDLE AID command. Depending on the value of the AID key, the HANDLE AID command will perform the equivalent of a GOTO to a section of code named in the HANDLE AID call.

Other program control calls like the START and RETRIEVE commands allow the programmer to perform time- and event-driven functions. As its name implies, the START command is used to start a particular program or task. That task or program must RETRIEVE data passed to it from the program that issued the START command.

CICS PROVIDES TWO methods for storing temporary data in a disk file. Temporary Storage Queues are used to pass data between programs where control was transferred by another program with an XCTL or LINK command. Transient Data Queues are used to transfer data to and from programs that are not in the same task. Transient Data Queues also are used to pass data from an online program to a batch program and vice versa. CICS allows the program to read, write and delete records from either type of temporary storage.

Errors that occur during processing are trapped and processed by HANDLE CONDITION commands. In CICS, errors are categorized. A programmer must include a section of code in each program to handle each type of error that may occur during the execution of his program. When an error is encountered, the HANDLE CONDITION does the equivalent of a GOTO to a section of code named in the HANDLE CONDITION statement. The functionality of the HANDLE CONDITION call very closely resembles that of the HANDLE AID call.

Should a program terminate abnormally (something that has never happened to me), CICS provides a method for dumping the contents of memory and data areas to a file so that the cause of the problem can be determined. This command is aptly named the DUMP command.

In some instances, a programmer may wish to terminate a task immediately. For this, he'd use the ABEND (abnormal end) command to cease processing and back out of any partially completed transactions. This restores the files to the state they were in when the transaction was started.

Because of the processing functionality of the program itself, the screen data verification routines, and the GOTOs which are mandated by the error handling and function key facilities, it's not hard to end up with a highly complex piece of code that seems to go around in circles. The inherent design of CICS lends itself to a singular rather than modular approach — one program doing many things instead of several small programs each performing a separate job.

ON THE OTHER SIDE of the fence, ACMS uses an "outside-in" approach in its design. All system control begins at an ACMS menu that contains selections to control modules called ACMS tasks. These tasks are grouped together into ACMS task groups. Application programs are called from within the ACMS tasks and are treated very much like subroutines, in that they're passed data from the task. The passed data structures are called workspaces.

With ACMS, the application program doesn't interact with the terminal directly. Terminal I/O is accomplished from within the ACMS task through direct calls to the screen handler. An ACMS task is broken up into two distinct sections or steps. The first section is called the exchange step and is the way to interact with the user's terminal.

In the exchange step, a specific screen processing procedure is referenced. This procedure is stored in a library file and it defines how the screen looks, what fields it contains, and the type and range of data that the user can enter. If invalid data is entered, the user receives an error message. The screen handler also provides the capability to define help text for each field and to provide default values. Because virtually all data validation and range checking is done with the screen handler itself, the application program receives clean data and is dedicated solely to the processing of that data.

THE SECOND PART of the ACMS task is known as the processing step, which is the way data is retrieved, manipulated and then stored. In this step, the application program is called, to which the appropriate data is passed via a workspace. The workspace may have data provided by a user at a terminal through an exchange step, or from another processing step that ran another application

program in the same task group.

A task is made up of numerous exchange and processing steps. Normally, a task executes in sequential order. Assume, for example, that the first thing in a particular task is an exchange step that puts up a screen for the user to enter record key data. Next, a processing step passes the validated data entered by the user to an application program that performs a database retrieval function. Finally, the retrieved data is passed to a subsequent exchange step which puts the data up on the screen.

The programmer also can define control fields in the task to modify the flow of processing. Depending on the value of the control field, the programmer can specify that control be passed to another step in the same task (whether it's an exchange or processing step), to another task in the same task group, or, he can decide to exit the task altogether and return to the main menu.

The value of the control field can be used in different fashions. The control field can be changed by the application program itself. For example, when the application program reaches a certain condition, the control field is changed so that when the application program finishes, the ACMS task performs a different function than it would have normally, had the application program not changed the value of the control field.

The ACMS programmer also has the option to define function keys in the screen processing procedures. When a particular function key is depressed, the screen processing procedure changes the value of the control field and causes the processing flow to be altered accordingly.

In the event of an abnormal program termination, ACMS and VMS automatically provide three facilities to assist the programmer in determining the cause. The Software Logging Utility Program (SWLUP) monitors the activity and records errors encountered by the screen handler, the database management system or ACMS. ACMSATR or the ACMS Audit Trail Report records activity and errors specific to an ACMS application. Finally, if an ACMS application suddenly crashes, a dump file is produced which then can be examined.

While ACMS doesn't contain commands similar to the CICS START and RETRIEVE, or provide built-in functionality to use temporary storage, this functionality can be reproduced easily. Using VMS system service calls in the application program, START and RETRIEVE processing is duplicated easily. Temporary storage also is accomplished easily using standard VMS file I/O processing.

The ACMS approach to system design is strictly modular. The modules tend to stand on their own and only interact by passing common work-

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spaces. Because most, if not all, user errors are trapped by the screen handler, the application program only has to deal with errors in data processing or file manipulation. With the use of a VMS message file, all error messages can be stored in one place and kept out of the application programs themselves.

The Components

Now that we've defined how CICS and ACMS work, let's take a closer look at the components that make up each system. The CICS system comprises six distinct components. The first is the EXEC CICS calls which have already been elaborated upon. The second component is the screen handling facility known as Basic Mapping Support (BMS). BMS is used to create formatted screen layouts and to define the data fields that comprise a CICS screen or mapset. A source program must be written for each mapset that's used in the system. The mapset defines the column and line position as well as the length of each field to appear on the screen. Labels also are defined positionally. After the mapset is coded, it's passed through a two-step compilation or assembly process.

The first part of the assembly creates a physical mapset that's used to paint the screen at execution time. The second part of the mapset assembly creates the symbolic mapset or dsect needed by the application program. The dsect is the data structure that defines the fields used on the screen.

Each of the symbolic and physical mapsets are stored in the third component of the CICS system, the libraries. The physical mapset is stored in the CICS Load Library and the symbolic mapset or dsect is stored in the Source Statement Library. The physical mapset is retrieved from the CICS Load Library when the program that needs it is run. The dsect is extracted from the Source Statement Library when the application program is compiled.

The application program comprises the fourth component of the CICS system. CICS supports application programs written in COBOL, PL/I, Assembler or RPG II. The application program must only communicate with the operating system through the use of CICS commands. In addition, the application program should not open or close files.

The fifth component of CICS processing is the file access method. CICS supports the use of the VSAM, ISAM, BDAM or DL/I. ISAM and BDAM have been obsolete for at least 10 years. The majority of CICS systems use VSAM, an indexed file access method that allows random access with a full or partial key. The remaining systems use DL/I, a hierarchical database structure.

The remaining component in a CICS system is the Job Control Language (JCL). The JCL is used to define files and the specific characteristics of the environment in which the CICS system is to run. It also can be used to define batch processing procedures that complement and coexist with the CICS application.

Screen Processing

Coincidentally, an ACMS system comprises six distinct components as well. The screen handling component is known as the Terminal Data Management System (TDMS). The TDMS is used to create the screen processing procedures referred to earlier. Each screen processing procedure comprises three distinct parts which, when compiled, form one procedure stored in a Request Library.

The first part of a screen processing procedure is known as the form. The form represents how the screen will look to the user. It defines the position of the data input fields as well as any other text that's to appear on the screen. The form also is where the data validation takes place and where field attributes are defined.

The form is created with the Form Definition Utility (FDU). FDU is a full screen editor in which the programmer can move the cursor anywhere on the screen and either type in text or create a data field. By accessing another menu within FDU, the programmer may specify attributes on a field-by-field basis, such as uppercase only or right justify, as well as many others. FDU also allows the programmer to define valid ranges of data for each field on the form.

The second part of a screen processing procedure is the record. The record defines the storage area where the data is kept while waiting to be input to or output from the application program. The data record is written in a source code which is compatible to both the screen processing procedure and the application program. When the application program is compiled, the same record is copied into it.

The third part of a screen processing procedure is known as the request, which defines the data transfer routine for the screen processing procedure. It states which fields in the data record are to be output to which fields on the form, and which fields on the form are to be input to which fields in the record. The programmer also has the opportunity to output fields with various attributes such as bolding.

The request is written in its own source code assembled by the Request Definition Utility (RDU). The request references both the form and the record in its source code and defines the data transfer statements. The programmer also may define function keys in the request to control program execution. The request is then compiled. When all requests are completed, they are assembled into a request library, which is accessed directly by the ACMS application.

The second part of an ACMS application is the Common Data Dictionary (CDD), which provides a central depository for data record storage. Using the Data Dictionary Language, the programmer can define a record structure and then store it in the CDD. The same record then can be referenced by both the application program and the TDMS request. When the application program is compiled, the CDD record

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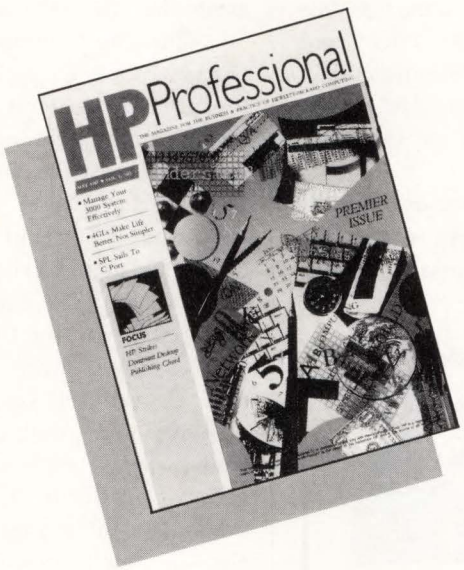

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is copied into the program and translated into the appropriate syntax for the programming language being used. When the request is compiled, the record is used to define the fields referenced in it, as well as to check their compatibility with their corresponding fields on the form. The CDD also is used by TDMS to store forms as well as the source code for requests and request libraries.

The third part of an ACMS application is the file access method. Under ACMS, the programmer may choose between RDB, DBMS, CODASYL or RMS. RDB is a relational database manager, DBMS is hierarchical, CODASYL is a compliant database management system, and Record Management Services (RMS) comes as part of VMS. The choice of file access methods is application dependent. The database systems provide many advantages over RMS, but perhaps their most important feature is journaling.

The fourth component of an ACMS application is the application program. ACMS supports the use of application programs written in COBOL, BASIC, FORTRAN, BLISS, C, PASCAL or PL/I. Application programs also can be written in different languages, yet still be used in the same ACMS task. Application programs are linked together with ACMS supplied code to form a procedure server.

DCL comprises the fifth portion of an ACMS application. The DCL can be used to customize the VMS environment as well as to define batch processing routines. The DCL command procedures also may run standard VMS programs like DIRECTORY and AUTHORIZE. These DCL routines then can be run directly from an ACMS application. DCL routines are assembled into DCL servers.

The final component of an ACMS application is, of course, ACMS. We already have elaborated upon the use of ACMS tasks and task groups. After their definition, tasks and task groups are assembled into a Task Data Base (TDB). ACMS menus are assembled into a Menu Data Base (MDB). The whole application then is assembled into an Application Data Base (ADB).

ACMS TASKS, task groups, menus and applications all are written in source code understood by the Application Definition Utility (ADU). Source code for all four pieces is stored in the CDD. ADU is used to compile and store into the CDD the tasks, task groups, menus and applications. ADU also is used to create the TDB, MDB and the ADB.

When the ACMS application is running, it accesses the application database for information about the application, the task database for information about tasks, and the menu database for information about menus. TDMS screen I/O procedures are found in the request library and application processing procedures are found either in the procedure server or the DCL server.

Regarding maintenance for each type of system, CICS is inherently complex by design. With everything happening within each application program, it's difficult to make a change without possibly affecting something else you didn't intend. This translates into added time and effort required to maintain a CICS system.

ACMS, on the other hand, reeks of modularity. A change to one program or routine can be implemented easily without affecting all other programs, and in less time. This also makes maintenance an easier task. You need only change what you must. As long as a work space isn't affected, nothing else will be affected.

Next month, we'll discuss the differences between IBM COBOL under CICS and VAX COBOL under ACMS. — *John Biazzo is a senior software specialist with Digital Equipment Corporation in Meriden, Connecticut.*

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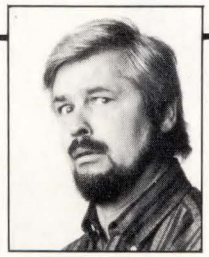

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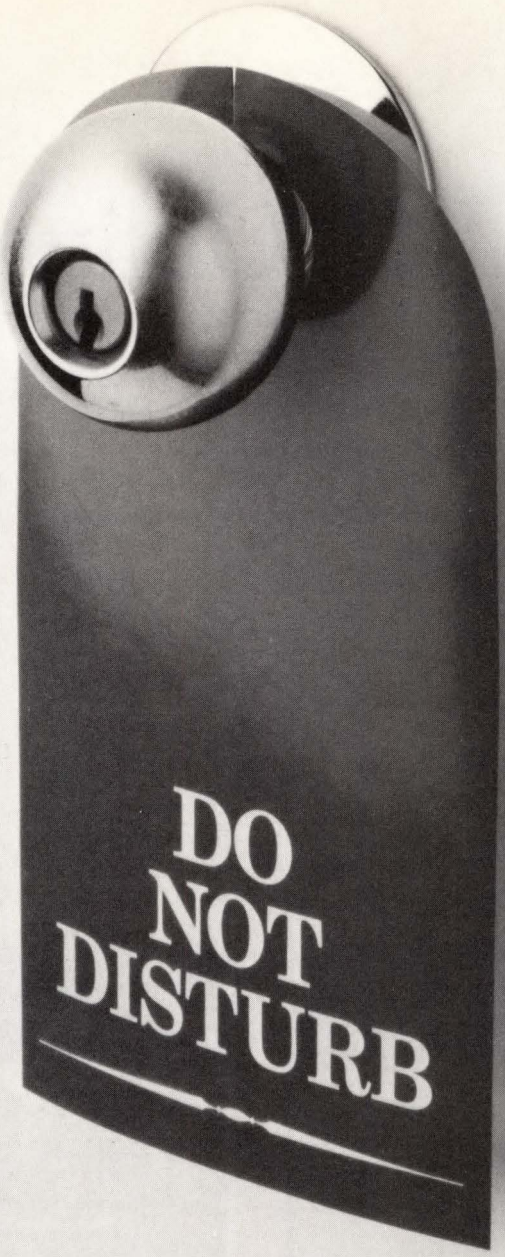

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DCL DIALOGUE

Kevin G. Barkes

A UIC Utility

The DCL command files featured this month complete the trio of command procedure sets that use "stacks" for saving and restoring various environmental items.

UPUSH.COM, and its associated utilities UPOP.COM, USWAP.COM and UKDIRS.COM permit stacking UICs, a useful tool for system managers and other privileged users who have a need to switch user identification codes for various purposes (see Programs 1, 2, 3 and 4).

For a complete explanation of the stack concept, readers are directed to last month's column and the January 1987 issue. These UIC procedures are based on the same principle — the use of global symbols to push and pop UICs on a DCL-maintained stack.

There are a few quirks in these command files that require explanation. In order for a process to modify its UIC, the change mode to kernel (CMKRNL) privilege must be available. Alternately, the process must have SETPRV, which permits any process privilege to be enabled, including CMKRNL.

The procedures verify the authorization of the privileges by using the F$GETJPI and F$PRIVILEGE lexical functions. As shown in the UPUSH.COM procedure, the string containing the list of privileges that the process legally may enable is saved in the symbol AUTH_PRIV; the size of the string of authorized privileges is stored in the symbol AUTH_SIZE. AUTH_SIZE is used in conjunction with the F$LOCATE lexical to test for the presence of a target string within AUTH_PRIV.

First, F$PRIVILEGE is used to determine if the calling process currently has CMKRNL enabled. If this test fails, the F$LOCATE lexical is used to scan AUTH_PRIV to see if CMKRNL can be turned on.

Because it's common for users to employ SETPRV to enable potentially dangerous privileges only when necessary, that privilege is the next target of F$LOCATE. Should both tests

PROGRAM 1.

```
$! UPUSH.COM
$! "Pushes" UIC onto stack.
$! Disable error processing
$    SET NOON
$! If no UIC is specified, print help message
$    IF P1 .NES. "" THEN GOTO CHECKUIC
$    WRITE SYS$OUTPUT "Usage: UPUSH [group,member]"
$    EXIT
$ CHECKUIC:
$! Save the original UIC, and initialize symbols:
$    ORIGINAL_UIC = F$GETJPI("","UIC")
$    CURRENT_KERNEL = 0
$    AUTH_KERNEL    = 0
$    AUTH_SETPRV    = 0
$    AUTH_SIZE      = F$LENGTH(F$GETJPI("","AUTHPRIV"))
$    AUTH_PRIV      = F$GETJPI("","AUTHPRIV")
$! See if we have or can set CMKRNL or SETPRV privileges:
$    IF F$PRIVILEGE("CMKRNL") THEN CURRENT_KERNEL = 1
$    IF CURRENT_KERNEL THEN GOTO SET_UIC
$    IF F$LOCATE("CMKRNL",AUTH_PRIV) .NE. AUTH_SIZE -
     THEN AUTH_KERNEL = 1
$    IF F$LOCATE("SETPRV",AUTH_PRIV) .NE. AUTH_SIZE -
     THEN AUTH_SETPRV = 1
$    IF AUTH_KERNEL .OR. AUTH_SETPRV THEN GOTO SET_PRIVS
$    COPY/NOLOG SYS$INPUT: SYS$OUTPUT:
  You do not have the privileges required to use this command.
$ EXIT
$ SET_PRIVS:
$    SET PROCESS/PRIVILEGE = CMKRNL
$ SET_UIC:
$    SET UIC 'p1'
$    IF $STATUS THEN GOTO FIX_STACK
$    WRITE SYS$OUTPUT "Error setting UIC to ''p1'."
$    GOTO EXIT
$ FIX_STACK:
$! Initialize the stack if necessary:
$    IF F$TYPE(U_NUM) .EQS. "" THEN U_NUM == 0
$! Increment the stack
$    U_NUM == U_NUM + 1
$! "Push" the old uic on the stack
$    UIC_'U_NUM' == ORIGINAL_UIC
$ EXIT:
$    WRITE SYS$OUTPUT "UIC currently ",F$GETJPI("","UIC"),"."
$! Restore old privilege:
$    IF .NOT. CURRENT_KERNEL THEN SET PROCESS/PRIVILEGE=NOCMKRNL
$ EXIT
```

PROGRAM 2.

```
$! UPOP.COM
$! "Pops" UIC from stack
$! Disable error processing
$    SET NOON
$! Exit if nothing to pop; otherwise, pop
$    IF F$TYPE(U_NUM) .EQS. "" THEN U_NUM == 0
$    IF F$TYPE(UIC_'U_NUM') .NES. "" THEN GOTO DO_POP
$ NO_POP:
$    WRITE SYS$OUTPUT "No PUSH to POP!  Stack pointer: ",U_NUM
$    EXIT
$! "Pop" the last uic from the "stack"
$ DO_POP:
$    CURRENT_KERNEL = 0
$    AUTH_KERNEL    = 0
$    AUTH_SETPRV    = 0
$    AUTH_SIZE      = F$LENGTH(F$GETJPI("","AUTHPRIV"))
$    AUTH_PRIV      = F$GETJPI("","AUTHPRIV")
$! See if we have or can set CMKRNL or SETPRV privileges:
$    IF F$PRIVILEGE("CMKRNL") THEN CURRENT_KERNEL = 1
$    IF CURRENT_KERNEL THEN GOTO POP_UIC
$    IF F$LOCATE("CMKRNL",AUTH_PRIV) .NE. AUTH_SIZE -
     THEN AUTH_KERNEL = 1
$    IF F$LOCATE("SETPRV",AUTH_PRIV) .NE. AUTH_SIZE -
     THEN AUTH_SETPRV = 1
$    IF AUTH_KERNEL .OR. AUTH_SETPRV THEN GOTO SET_PRIVS
$    COPY/NOLOG SYS$INPUT: SYS$OUTPUT:
  You do not have the privileges required to use this command.
$ EXIT
$ SET_PRIVS:
$    SET PROCESS/PRIVILEGE = CMKRNL
$ POP_UIC:
$    SET UIC &UIC_'U_NUM'
$    IF .NOT $STATUS THEN GOTO DO_ERROR
$! Decrement "stack"
$    U_NUM == U_NUM - 1
$    WRITE SYS$OUTPUT "UIC changed to ",F$GETJPI("","UIC")
$    GOTO EXIT
$! Handle errors:
$ DO_ERROR:
$    WRITE SYS$OUTPUT "Invalid UIC ",UIC_'U_NUM'
$    WRITE SYS$OUTPUT "UIC remains ",F$GETJPI("","UIC")
$    U_NUM == U_NUM - 1
$    IF F$INTEGER(U_NUM) .EQ. 0 THEN GOTO EXIT
$    WRITE SYS$OUTPUT "Next item on stack: ",U_NUM,". ",UIC_'U_NUM'
$ EXIT:
$    IF .NOT. CURRENT_KERNEL THEN SET PROCESS/PRIVILEGE=NOCMKRNL
$    EXIT
```

fail, the procedure exits with an "insufficient privilege" message. Otherwise, CMKRNL is enabled, the UIC is changed, and the old UIC is stored in the stack. If CMKRNL had to be enabled to execute the procedure, it's disabled prior to procedure termination.

The caveats dealing with excessive use of DCL symbol space, which were noted in the previously published default directory and privilege procedures (January 1987), also are valid here. However, the symbols containing UICs generally are far smaller than their protection and default counterparts. Last month's reader-suggested enhancements and modifications regarding the DCL symbol space issue are similarly valid.

> ***"Because it's common for users to employ SETPRV to enable potentially dangerous privileges only when necessary, that privilege is the next target of F$LOCATE."***

Beginning next month, we'll feature versatile procedures also submitted by readers. You're welcome to join the growing number of "DCL Dialogue" participants. To speed things along, please adhere to the following suggestions:

1. The procedure should work. This may seem to be an inane requirement, but you'd be surprised at the number of submissions we get that are D.O.A. If the procedure is particularly intriguing, we may try debugging it to get it to operate, but generally we return the file with a

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PROGRAM 3.

```
$! USWAP.COM
$! "Swaps" current UIC with one in the UIC stack
$! Disable error processing
$    SET NOON
$! Exit if nothing to "swap"
$    IF F$TYPE(U_NUM) .EQS. "" THEN U_NUM == 0
$    IF F$TYPE(UIC_'U_NUM') .NES. "" THEN GOTO DO_SWAP
$ NO_SWAP:
$    WRITE SYS$OUTPUT "Nothing to SWAP!  Stack pointer: ",U_NUM
$    EXIT
$ DO_SWAP:
$    IF P1 .EQS. "" THEN P1 = U_NUM
$    IF P1 .GT. 0 .AND. P1 .LE. U_NUM THEN GOTO DO_SWITCH
$    WRITE SYS$OUTPUT "SWAP out of range!"
$    EXIT
$ DO_SWITCH:
$    CURRENT_KERNEL = 0
$    AUTH_KERNEL    = 0
$    AUTH_SETPRV    = 0
$    AUTH_SIZE      = F$LENGTH(F$GETJPI("","AUTHPRIV"))
$    AUTH_PRIV      = F$GETJPI("","AUTHPRIV")
$! See if we have or can set CMKRNL or SETPRV privileges:
$    IF F$PRIVILEGE("CMKRNL") THEN CURRENT_KERNEL = 1
$    IF CURRENT_KERNEL THEN GOTO SWAP_UIC
$    IF F$LOCATE("CMKRNL",AUTH_PRIV) .NE. AUTH_SIZE -
     THEN AUTH_KERNEL = 1
$    IF F$LOCATE("SETPRV",AUTH_PRIV) .NE. AUTH_SIZE -
     THEN AUTH_SETPRV = 1
$    IF AUTH_KERNEL .OR. AUTH_SETPRV THEN GOTO SET_PRIVS
$    COPY/NOLOG SYS$INPUT: SYS$OUTPUT:
   You do not have the privileges required to use this command.
$ EXIT
$ SET_PRIVS:
$    SET PROCESS/PRIVILEGE = CMKRNL
$ SWAP_UIC:
$    ORIGINAL_UIC = F$GETJPI("","UIC")
$    SET UIC &UIC_'P1'
$    IF .NOT $STATUS THEN GOTO DO_ERROR
$    UIC_'P1' == ORIGINAL_UIC
$    WRITE SYS$OUTPUT "UIC changed to ",F$GETJPI("","UIC")
$    GOTO EXIT
$! Handle errors:
$ DO_ERROR:
$    WRITE SYS$OUTPUT "Invalid UIC ",UIC_'P1'
$    SET UIC 'ORIGINAL_UIC'
$    WRITE SYS$OUTPUT "UIC remains ",F$GETJPI("","UIC")
$ EXIT:
$    IF .NOT. CURRENT_KERNEL THEN SET PROCESS/PRIVILEGE=NOCMKRNL
$    EXIT
```

PROGRAM 4.

```
$! UDIRS.COM
$! Displays contents of the UIC "stack"
$! Disable error processing
$    SET NOON
$! Exit if nothing to display
$    IF F$TYPE(U_NUM) .EQS. "" THEN U_NUM == 0
$    IF F$INTEGER(U_NUM) .GT. 0 THEN GOTO DO_UIC
$ NO_UIC:
$    WRITE SYS$OUTPUT "Nothing in stack."
$    WRITE SYS$OUTPUT "Current UIC: ",F$GETJPI("","UIC")
$    EXIT
$! Display "stack"
$ DO_UIC:
$    L_NUM = U_NUM
$    WRITE SYS$OUTPUT "Current UIC ",F$GETJPI("","UIC")
$ DO_LOOP:
$    IF F$TYPE(UIC_'L_NUM') .EQS. "" THEN GOTO DEC_COUNTER
$    WRITE SYS$OUTPUT "(''L_NUM'.) ",UIC_'L_NUM'
$! Decrement counter
$  DEC_COUNTER:
$    L_NUM = L_NUM - 1
$    IF L_NUM .EQ. 0 THEN EXIT
$    GOTO DO_LOOP
$    EXIT
```

request that the author correct the problem.

2. The procedure should do something. By that I mean it should serve some useful purpose, or present a fresh approach to an old problem. Procedures that demonstrate iterative symbol substitution are great but of limited interest, unless they also perform some other function.

3. The procedure should be brief. If your procedure is too large to be integrated into our column format, it may be used as a separate feature.

4. Don't reinvent the wheel.

5. Don't delay. We often receive two or three virtually identical procedures within a few days of each other. As a rule, we use the first bug-free file we get.

6. Don't be anonymous. Include your return address. It's a good idea to put it in the procedure itself so readers can contact you directly for comments or additional information.

7. Be patient. Allow four to six weeks for a response to your submission. I respond to *all* letters. If selected, it may take a while for your procedure to appear because of lead time and the number of programs ahead of you in the "queue."

8. Be open to suggestion. (We may request a few changes in your procedure to make it more suitable for publication.) *Author's note:* Reader Tony Carter dialed into ARIS to note that the INQUIRE bug mentioned in the May column has been fixed. Input to INQUIRE made with the terminal set to NOECHO no longer appears in the RECALL buffer. I originally learned of the problem via system dispatches, and confirmed the problem on an earlier version of VMS. DEC obviously was on the stick with this one. Thanks to DEC for plugging a potential security hole, and to Tony for bringing us all up to date. — *Kevin G. Barkes is a specialist in VAX systems software, management, tuning and training in Library, Pennsylvania.*

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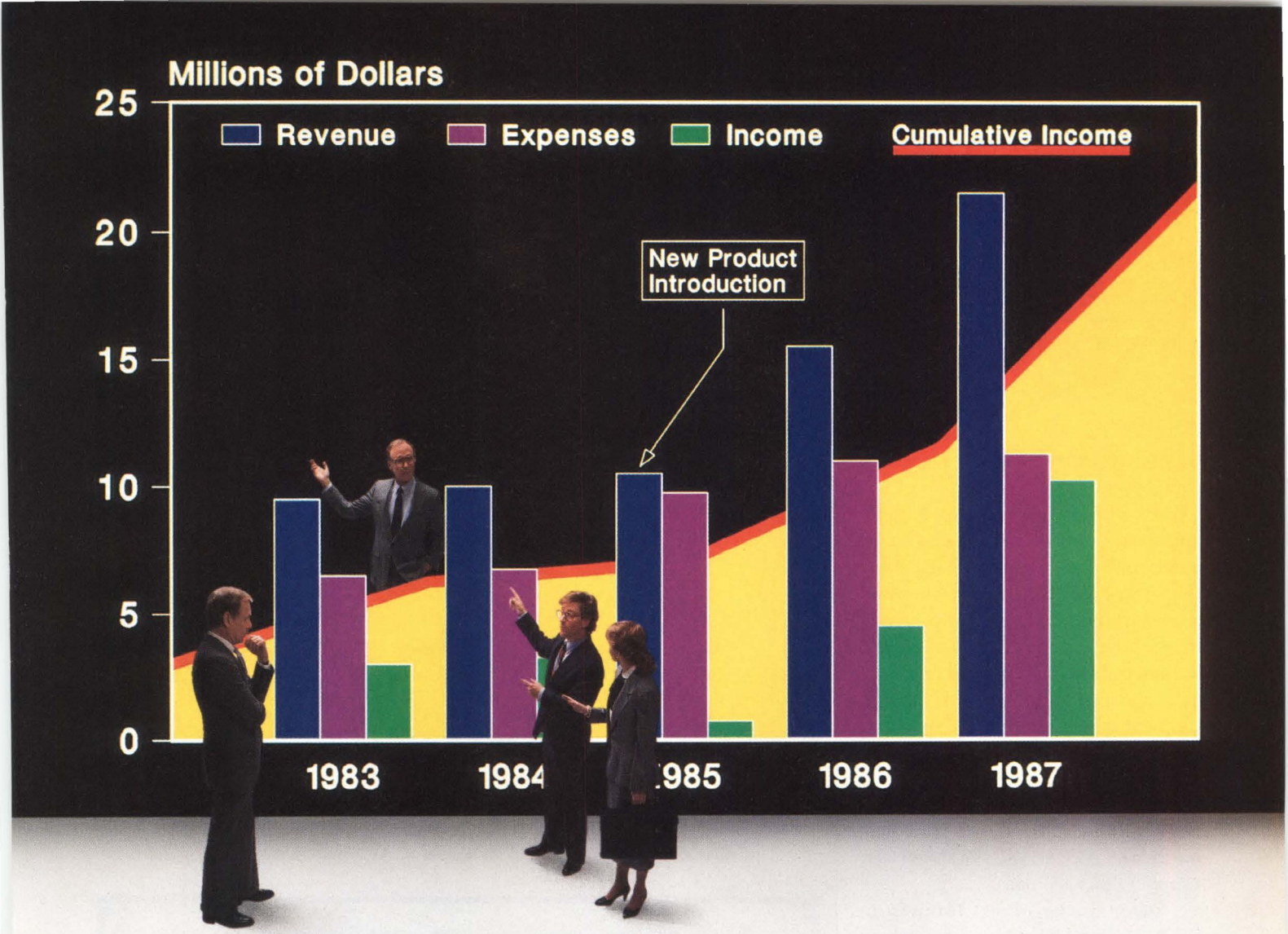

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MANAGING YOUR MICROVAX

Managing Multiple MICROVAXs, Part 2

David W. Bynon

Editor's Note: Part 1 focused on system management using the flexibility of DECNET and VAX Information Architecture.

Those who manage five or more MICROVAX or VAX systems don't need to be told that they need help. They already know it. For those of you about to embark on a multisystem purchase, however, beware; the logistics of keeping multiple systems backed up, up to date, and operating smoothly isn't as simple as you might think. Thankfully, though, there's help: Remote System Manager (RSM) is a system management tool, from Digital Equipment Corporation, with the sole purpose of making multiple MICROVAX/VAXSTATION systems easier to manage.

RSM applies those features of DECNET that Digital has been telling those of us who develop DECNET applications about for years: task-to-task communications, remote task execution, device sharing, system-to-system file transfers and so on. This is the first Digital product that I have seen that effectively applies all of the major features of DECNET.

The RSM System

RSM works on a server/client relationship. The server is a system that provides services to other systems, the clients. In the realm of RSM, these services take the form of software application libraries, print queues, disk and file maintenance, system updates and more. From the server, most typical system management operations can be performed on any registered client systems.

In general, the server is a large VAX system (700 or 8000 series) or a Config-5 MICROVAX. This is necessary

```
REMOTE SYSTEM MANAGER MAIN MENU

1 User Authorization and Access to Proxy Accounts
2 Distribution of Updates
3 Client Modifications and Disk File Management
4 Application Management
5 Application Set and Base System Software Configuration
6 Remote Print Queue Operations
? Help

Select function, then press RETURN

SELECTION>

Press CTRL/Z to EXIT
```

Screen 1. RSM Main Menu.

```
REMOTE SYSTEM MANAGER INSTALLATION MENU

1 Add a Client
2 Define Remote Print Queue
3 Create Remote Print Queue Startup Files
4 Accept Base System Software Configuration into Library
5 Accept an Application into Library
6 Install an Application on a Client
7 Define an Application Set
8 Distribute RSM Definition Files
? Help

Select function, then press RETURN

SELECTION>

Press CTRL/Z to EXIT
```

Screen 2. RSM Installation Menu.

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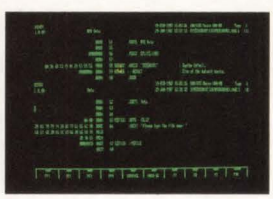

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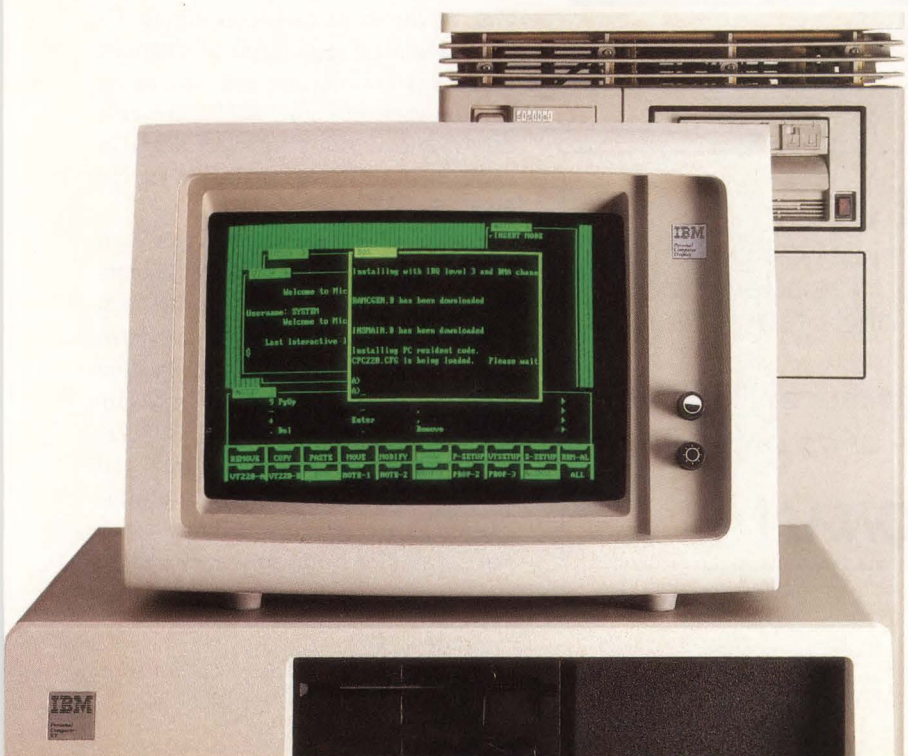

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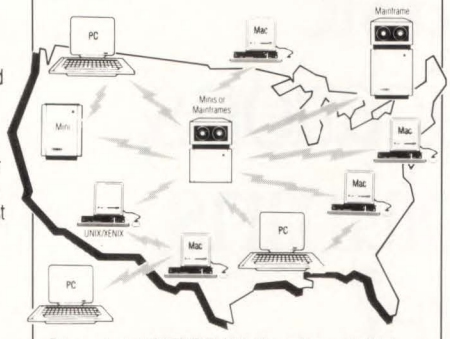

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to gain the full benefit of RSM. For this review, the server was a Config-5 MICROVAX with RA81s, an RA60 and a TU81.

RSM is a menu-driven software product (see Screen 1). This is a unique twist for a VMS management tool because most VAX/VMS products are used at the DCL level. The menus are clean and simple, however, they aren't compatible in operation with other Digital products, namely ALL-IN-1. For this reason RSM is a bit of an odd ball. What RSM lacks in form, however, it more than makes up for in function.

RSM supports the use of the AUTHORIZE utility over DECNET. It is a handy feature that keeps you from node-hopping (SET HOST...) from system to system. Additionally, RSM provides a number of utility functions to enhance the security of your network. For example, RSM will review, and at your direction, modify the DECNET and guest accounts. It looks at account privileges and flags, and verifies that the UIC is unique. As an added precaution, RSM installs a LOGIN command procedure that permits network-only access to these accounts. Other useful features include proxy account management and directory creation for new user accounts.

Software Management And Distribution

One of the most time-consuming efforts in managing multiple MICROVAX systems is keeping the software up to date on each machine. RSM helps ease this problem with a software librarian and a client software installation feature (see Screen 2).

RSM aids the system manager with a basic librarian system. The RSM librarian administrates software in the form of "application sets" and "base system software configurations." An application set is any number of related software products, such as VAX DATATRIEVE, CDD and FMS, or CMS, FORTRAN and PASCAL. A base system software configuration is an entire disk volume, which can be used to bring up a new system

or restore a MICROVAX where the system disk has failed. Once an application set has been defined and application software has been loaded into the library, registered client systems can be loaded easily by the server.

Disk File Management

Anyone who currently manages MICROVAX systems that use RX50s or TK50s as the backup medium will appreciate the disk file management functions of RSM. Through RSM disk file management, you can schedule client disk backups (full, incremental, user files only, etc.). The backup data is stored on the server's larger mass storage devices (i.e., TU81, RA60, etc.) not on the client's backup device. Client backups can be done overnight while the systems are idle.

For those who are emphatic about all their systems having the same environment, RSM has just the thing — a function to distribute logical name, symbol, print queue and DECNET node definitions. It's great! You simply define the logical names, symbols and print queue definitions you want to be common throughout your network of systems, in their respective RSM files, and RSM will take care of the promulgation. Keeping DECNET node definitions is easier too. All you need to worry about is the RSM server's node name definitions. When you give the word, RSM will update the clients.

Print Queue Services

Of all the RSM functions, only one has any direct utility to system users: the remote print queue operations. Like a VAXCLUSTER (though not through the same mechanism), the RSM server can provide a shared print queue capability for its clients, thus allowing all client systems to use the quality line printers and laser printers generally found on larger systems. It's a money-saving feature if employed correctly.

After using RSM for several months, I found it invaluable. The investment made in the purchase of RSM easily has paid for itself in man-hours saved and will continue to do so. Above all, RSM has instilled a feeling of continuity to my network of MICROVAXs. No longer are they individual systems connected by a wire; together they are the system, and it's finally under control.

RSM is a new product and clearly has a long way to go before reaching maturity; nevertheless, my hat is off to its developers. *—David W. Bynon is a software consultant at Digital Equipment Corporation, Landover, Maryland. The ideas and information presented in this article are his own and do not necessarily represent those of Digital Equipment Corporation.*

> ***"RSM supports the use of the AUTHORIZE utility over DECNET. It is a handy feature that keeps you from node-hopping (SET HOST . . .) from system to system."***

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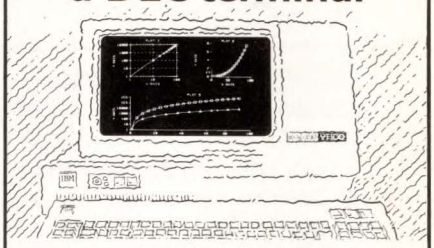

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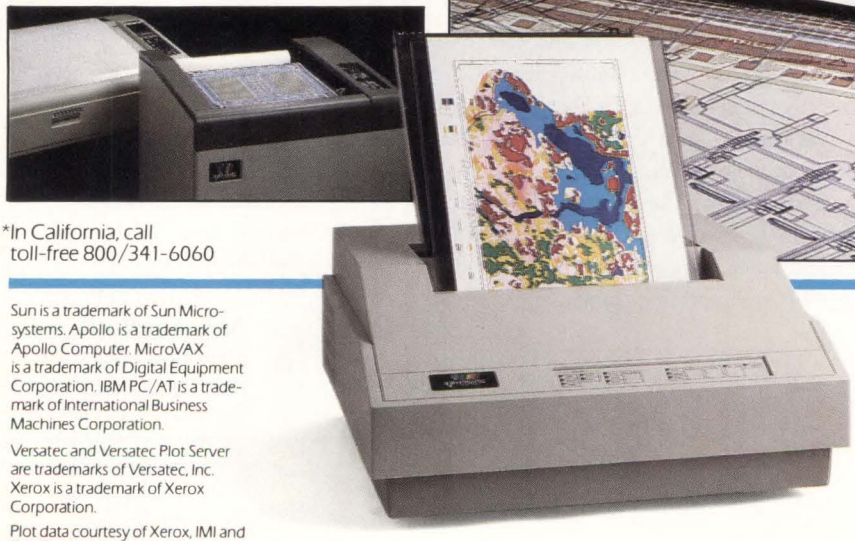

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Whitesmiths' C Compiler V3.0 For RSX

LET'S C NOW

Rex Jaeschke

Editor's note: Whitesmiths Ltd. of Westford, Massachusetts, was a pioneer in the third-party development of C compilers, and they have long been supporting C in DEC environments. Even before the company was formed, several of its founders were implementing C on a PDP-11. In this issue Mr. Jaeschke takes a look at the latest release of Whitesmiths' RSX implementation.

In March, I installed Whitesmiths' V3 compiler on a PDP-11/44 running RSX-11M-PLUS V3.0. The installation notes were adequate and the installation was performed from the FLX tape to disk without problems, using the MOVEMT and INSTAL command files.

With the addition of many of the features in the proposed ANSI C Standard, the various phases of the compiler have increased considerably in size causing Whitesmiths to make the difficult choice of requiring a machine with I/D space on which to host the development system. Note, however, that user programs compiled with this system still can be linked to run on a machine (or operating system) without I/D space support, so older processors (and newer ones too) using RSX-11M and RSX-11S still can be used as targets.

Underscores And The RAD-50 Character Set

The compiler converts all underscores in identifier names to the '$' symbol (because '_' is not a valid RAD-50 character). The compiler generates assembler source, and if you inspect it you'll see numerous calls to library routines with names like **c$rets** and **c$sav**, which save registers and return from a function respectively. While many of these library functions begin with the prefix **c$** (which translates to **c_** in a C program), you must beware of possible conflicts in naming. For example you shouldn't invent a function called **c_sav**, because this name is translated to **c$sav** and will be called instead of the library routine of the same name. Guidelines on the naming conventions for assembly programming are provided, however, you also must read these even if you aren't using assembler.

Because external names on RSX are limited to six characters, I suggest you not use underscores within them because this further limits your ability to have a descriptive name. Underscores are more useful in separating a suffix or prefix or multiple words on systems that support long identifier names (typically of 31 or 32 characters).

The Startup Code

All user-written programs have access to command-line redirection à la a UNIX environment. That is, the > character redirects **stdin** and > redirects **stdout**. The open/append redirection symbol >> is not supported (and neither is the pipe character | because this mechanism is more difficult to implement.)

All this processing is done by the startup code, the source of which is provided in **main.c**. It's worth your time to look at this file because it gives you considerable insight into the run-time envelope that surrounds a C program. The main entry point into this file is **_main** which processes the command-line and sets up the arguments **argc** and **argv** that are passed to the user's main program. Instead of **argc** and **argv**, Whitesmiths uses **ac** and **av**. (This is of no consequence because the arguments declared in **main** can have any valid name.)

An excerpt from this file follows:

```
BOOL _main()
        {
        BYTES ac;
        TEXT *av[MAXCMD/2];

        ac = 0;
        ...
        av[ac] = NULL;
        if (ac)
                _pname = av[0];
        return (main(ac, av));
        }
```

The variables **ac** and **av** are automatic variables local to **_main**. They're set up according to the command-line arguments present with **av[ac]** being set to the **NULL** pointer (as required by the ANSI Standard). Previously, you only were guaranteed that there were **ac** entries in the **av** array. Now, there are **ac + 1** with the last one being the **NULL** pointer. This allows you to walk the **av** array without regard to **ac** and still find the end of that table. If the number of arguments found was not zero, the reserved global identifier **_pname** is set to **av[0]**. That is, **_pname** points to the string that contains the name of the program being run.

Finally, the user's main program is invoked by a call to function **main**, passing it the two arguments **ac** and **av**. Whatever value is returned by **main** is passed straight through to the startup assembler routine that invoked **_main**. Because

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most programs don't return a value explicitly from **main**, this return value will be bogus. (Using a **return** from **main** without a return value or dropping through the closing brace means that some unknown return value will be used by the caller.) To have a reliable return code, you must return one explicitly, such as in **return (0);**. Note that calling **exit** with a return code has the same effect, but this is an unconditional jump to **exit**, so **main** never returns directly to **__main**.

The C.. Driver Prototype File

A driver program C.. handles the compilation request command-line, parses the switches and file names and invokes the preprocessor and compiler phases as appropriate. Because the number and type of switches are many and varied, you can define a particular compilation environment in a prototype file and name that at compile time. Such a file has the type .PRO and allows plenty of flexibility during testing. This mechanism has nothing to do with function prototypes newly added to the C language.

SEVERAL COLUMNS AGO, I answered a reader letter about reducing the size of a user task. The solution was to call your main program **__main** rather than **main** so that the command-line processing stuff would not be loaded (or executed). While this technique still works, it doesn't have the desired effect, because all of the termination code (that was invoked after your program exits) still is pulled in. Whitesmiths is aware of the problem and is working to reduce the minimal task size by restructuring the calls to termination routines.

Task Termination

Several functions related to task termination are worth discussing because they're a direct result of the ANSI Standard. They are **__exit**, **__terminate** and **__onexit**, and their source is in the file **exit.c**.

The function **__exit** terminates program execution immediately by calling **emt**. While the status code specified is returned to the calling environment, no other housekeeping is performed. The function **__terminate**, on the other hand, terminates the program more gracefully by invoking all of the functions previously registered by calls to **__onexit**.

In a DBMS application, for example, you may wish to close certain files or ensure that multirecord transactions either are logically complete or are backed-out, etc., whenever the program is to terminate. Rather than place calls in all of the possible termination paths, you can register the name of a user-written exit-processing function by calling **__onexit**. You may register more than one such function, provided each has type void and has no arguments.

When **__terminate** is called, it invokes each of the functions registered with **__onexit** in their reverse order of registration. Then, it closes all open files and calls **__exit**.

The names of the three functions just described have a leading underscore and are part of the RSX system interface.

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Unless you have some particular reason for not doing so, I suggest you use Whitesmiths' ANSI Standard versions in the corresponding library. Here, **exit** is the equivalent to **__terminate**, and **onexit** is equivalent to **__onexit**. (Note that the ANSI C Committee has since changed the name of **onexit** to **atexit**.) An alternate ANSI termination method is through the **abort** function.

The MACRO-11 Generated Code

The C compiler generates MACRO-11 assembler source code which it optionally assembles. You may find occasion to inspect this code which is quite readable, although not at all formatted as you'd write MACRO-11 yourself. Rather than use the familiar R0-R5, SP and PC designations for the registers, the older forms of %0-%7 are used. All the instruction mnemonics and macro processor directives are written in lowercase. However, once you get used to it and have read the appropriate sections of the manuals, you should have no problem understanding the generated code, even if you have only a passing knowledge of MACRO-11.

THE KIT CONTAINS a number of different run-time libraries depending on your requirement for compatibility with previous Whitesmiths releases or the ANSI Standard and your hardware configuration regarding floating-point support. While various libraries can be used during the same taskbuild, you must understand the order in which you want them searched. The documentation discusses your choices adequately.

The Documentation Set

The whole documentation set has been overhauled and, rather than being in spiral-bound manuals, now is in three-ring binders in slip cases. The two-volume set includes the *C Language*, *Interface* and *Compiler* users manuals. A complete (and lengthy) chapter is devoted to the ANSI C Standard. When reading this or using Whitesmiths' ANSI C library, bear in

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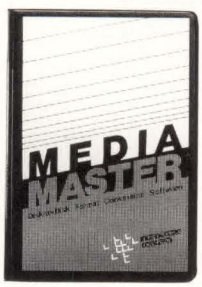

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mind that the ANSI C Standard is unlikely to be finalized until early 1988, so function names or capability may change.

The Symbolic Debugger

CDB is a useful addition and besides being very powerful, is relatively easy to use. Because the debugger prompts for input at the end of a source file line, long lines can make it hard to see what you're doing unless your terminal width and modes are set appropriately. My only complaints about CDB are that it is case sensitive regarding debugger commands (a minor problem) and that it doesn't allow character deletion if you enter something incorrectly. I discovered this after setting numerous breakpoints and single-stepping for quite a while. Then, I accidentally typed *q* (for quit) and couldn't erase it. The only way to go was to exit and lose all my debugging work.

I also wrote a simple program that read from **stdin**, and I redirected **stdin** at the command-line. With the debugger built-in, I couldn't use CDB because it also seemed to be expecting its input from **stdin**, which now was redirected. There was no way to interact with it.

Miscellaneous Points

The new ANSI C preprocessing directive **#pragma** is used. The semantics of this directive are implementation defined, and if a translator doesn't recognize a **#pragma**, it treats it as a comment.

As with previous versions, plenty of information is supplied regarding the generation of freestanding code intended for ROMs or other dedicated systems.

All command-line switches on the utilities and compiler passes use the UNIX format of -x rather than the DEC format of /xx.

The **NULL** pointer macro wasn't defined in **stdio.h**, a place where many C programmers expect to find it. It is, however, defined in **std.h**, **stddef.h** and **wslxa.h**. This "deficiency" has been brought to the attention of Whitesmiths' technical support staff.

Adequate support and documentation is provided for calling assembler, FORTRAN and system service routines.

There are a number of problems encountered when trying to use command-line arguments with embedded white space and quotes, and when using the RSX MCR RUN . . ./CMD = " . . . " command. The void function type is supported by the compiler as a native type.

The new ANSI derived-type **size_t** is **typedef**ed to **unsigned int**. Note that **size_t** is the type of an expression involving the **sizeof** operator. It's also the type returned by the function **strlen**. Many implementations previously have assumed this type to be **int**.

The Bottom Line

The documentation is improved and fairly complete. The installation procedure works fine and the compiler and tools

perform well. With the addition of most of the ANSI C capabilities, this solid product continues to be a good buy if you need to develop native code on a PDP-11. Version 3 of Whitesmiths' native and cross C development systems signifies the firm's transition to the proposed ANSI C Standard, although some of its implementations (most noticeably the one for the IBM-370) have more features and even newer (and typeset) documentation. Whitesmiths' native VAX C compiler V3 should be available by the time you read this. From a functionality and documentation point of view, that version should be very similar to the one reviewed on a PDP-11.

A Look Inside Whitesmiths' Headers

A technique used throughout the headers allows any header to be **#include**d any number of times without conflict. (Of course, this always should be possible because a header shouldn't contain a data definition, only declarations, macro definitions, **typedef**s, etc.) Because a header may be included directly and (many times) indirectly during a compilation, it's time consuming and unnecessary to include the same header more than once. This is prohibited by placing a conditional compilation envelope around each header as follows:

```
/* stdio.h */

#ifndef __STDIO__
#define __STDIO__       1

/* main body of stdio.h */

#endif
```

When **stdio.h** first is included, **__STDIO__** is not defined, so it's defined with a value of 1. When it's included next during the same compilation, that symbol already will be defined and the whole header will be skipped. The same mechanism is used for all the supplied headers, and the macro name used in each case is a function of the name of the header using leading and trailing underscores as shown. Note that you shouldn't use identifiers with two leading underscores because this name space traditionally has been reserved by implementers. (The ANSI Standard reserves all identifiers for the implementer's use, beginning with an underscore followed by a capital letter with arbitrary trailing characters.)

I've long used and taught a similar technique using macro names like **STDIO_H** instead of **__STDIO__**. Whatever you use, it's a good idea. If you don't have a preferred method, use the one recommended by Whitesmiths.

The function **stdio.h** is always an interesting place to start looking at a C compiler since it contains interesting things like the definition of the type **FILE**. Whitesmiths' version is no different. It contains the declarations of all of the I/O library functions as expected, however, it contains both the "old-style" and the ANSI prototype versions all wrapped into one. It does this using a macro of the name **__**. (That's right, two underscores — which is a valid C identifier, and hopefully one not used by the programmer.)

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Let's look at an example of the function declaration for **fopen**:

```
FILE *fopen __((const char *pathname, const char *type));
```

Depending on whether the function prototype format was requested at compile-time, the macro __ __ is defined as either **#define __ __(a) a** or **#define __ __(a) ( )**. If you use the new style, the function declaration becomes:

```
FILE *fopen (const char *pathname, const char *type);
```

and function call argument checking is performed by the compiler. If old style declarations are required, the macro expands to give a declaration of:

```
FILE *fopen ();
```

The addition of prototypes requires that all library functions be declared, not just those returning non-**int** values. Previously, if you needed to take the address of an **int**-returning library function, you had to declare it explicitly in your code because it never was declared in a library header. This no longer will be necessary.

The **const** keyword in the above prototype is an addition by the ANSI committee. It designates that the object will remain a constant value. It's a type modifier that can be applied to any data object.

If you're having trouble with macros with arguments, look at the definition of **getc**, **getchar**, **putc** and **putchar**. Once you understand these, you're no longer having trouble.

All of the headers are self sufficient such that if they need to know something like the type of the derived type **size_t** and the header declares it hasn't previously been included, then the header declares it itself.

In many C libraries, the **str*** and **mem*** functions are declared in **stdio.h**, or worse still, aren't declared at all, because those that return a pointer (which is the same size as an **int** on many systems, including the PDP-11 and VAX) still will work if an **int** is assumed (the default function type used in the absence of a function declaration). Now, ANSI C has these functions declared in its own header, **string.h**, so if you're concerned about portability, you'll need to include **string.h**. Note that if you don't, the chances are your program will run properly on many machines, however, because a prototype for them is not in-scope, no argument checking or conversion will be done by the compiler except for the usual widening of **char**, **short** and **float** arguments.

Other headers worth detailed inspection are **limits**, **math**, **std**, **stdarg**, **stddef** and **stdlib**, some of which are ANSI inventions.

If you've never used **typedef** (or **#define**) to invent your own custom types, you'd do well to inspect some of Whitesmiths' headers. Throughout code written by its developers, you'll be hard-pressed to see a "native" C type used. Since its whole development environment constantly is being ported to new and wonderful operating systems and hardware environments, portability is high on Whitesmiths' list. While you may rather see keywords like **int**, **register** and **extern** in your code, you can learn a few lessons by understanding how and why Whitesmiths uses derived types like **FAST**, **IMPORT**, **BOOL** and **TINY**.

Some examples of its types and the corresponding definitions are:

```
/*      the pseudo storage classes
 */

#define FAST    register
#define GLOBAL  extern
#define IMPORT  extern
#define INTERN  static
#define LOCAL   static

/*      the pseudo types
 */
typedef char TBOOL, TEXT;
typedef double DOUBLE;
typedef int ARGINT, BOOL;
typedef long LONG;
typedef short COUNT, FD, FILE, METACH;
typedef unsigned char UTINY;
typedef unsigned int BYTES;
typedef unsigned long ULONG;
typedef unsigned short BITS, UCOUNT;
```

More To Come

In a recent column I reviewed the DECUS C compiler. Another popular tape in the DECUS library is the one from the Language and Tools SIG. This contains source and data for numerous useful tools and games. Most of the code is written in (DECUS) C. Already, I've identified several useful tools and I plan on a more thorough investigation of the kit. I'll pass on more information as it comes along.

I've been gaining more experience with DEC's new and unreleased (at the time of writing) version of its VAX C compiler. I plan to cover it in an upcoming column.

Readers are encouraged to submit any C-related comments and suggestions to Rex Jaeschke, 2051 Swans Neck Way, Reston, VA 22091. *—Rex Jaeschke is editor of "The C Journal" and the author of numerous articles on the C language. He is a member of the ANSI X3J11 Standards Committee for C.*

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FROM FIELD SERVICE

Ron Levine

Quotes And Unquotables

Although articles in a field service column usually concentrate on field service as a business, this one focuses on field service as people, people in field offices, at customer sites, in repair depots, at warehouses, and at the home office. But, it's the people in the field who have those encounters of a weird kind.

When chatting with field engineers (FE), I find that frequently the conversation turns to a discussion of the trials and tribulations of being a field service representative. Time after time, the same gripes come up, events that particularly bug FEs.

Although the names and places have been changed to protect the innocent and the guilty, the situations are true.

Take the case of Jack. An FE in a major city (one we all know and love), he has a large client site where the manager simply goes crazy when the mainframe goes down. This manager throws chairs, books, manuals, and anything else he can find. By the time Jack gets to the scene, this manager usually has a few choice words about the system, the company and Jack's dubious competence.

Here's another one. An FE, we'll call him Joe, is involved in servicing a television station's communications equipment. When a system failure occurs, the client expects Joe to stay on-site until the problem is resolved, without sleep and sustenance (once for as long as 57 hours save for snacks brought in). There are many other FEs in Joe's company capable of assisting during these marathon sessions, but the customer insists that only Joe service the equipment. (Joe is flattered beyond words!)

The Know-It-All

What about the over-zealous, non-technical customer who wants the credit for uncovering the problem? You know the type. He wants to know everything being discussed and he wants to "report" it all as if *he* had found the answer. Well, here's how two FEs dealt with such a client.

> ***. . . it's the people in the field who have those encounters of a weird kind.***

Don and Gene are on-site field engineers at the XYZ Company. The general manager of XYZ (let's call him Mike) likes to listen in on the FEs whenever they discuss a system problem or corrective action among themselves, and then report it as if it were *his* solution to fix the system. One day, this manager overheard the two FEs discussing a malfunction in the oscillator used for the system clock. Knowing Mike's reputation, they decided to teach this eavesdropper a lesson.

Don said to Gene, making sure Mike heard, "We forgot to wind the clock during the last PM and it ran down." Gene, picking up the story, replied, "Better not let Mike know or he'll complain to our office."

Well, as expected, Mike called the office and demanded to speak to the field service manager (Bill). We can only imagine how that conversation went:

"Hello, this is Mike at the XYZ Company. Your FEs forgot to wind up my system this week so now it's not working! I'm mad and I want it wound now!"

"Who is this?"

"Mike at XYZ Company."

"I don't think I understood your problem. Could you please repeat it?"

"My mainframe needs to be wound."

"Who is this really?"

"Mike, at XYZ Company. My system is down! Tell your FEs to wind it."

"This is a joke, right? Don, is that you?"

"I'm not joking! I want someone to wind my system, now!"

"Is this Candid Camera?"

and so on . . . .

Then there's that other type of "know-it-all" customer: the amateur repairman, always ready and unfortunately willing to give advice and question the procedures being used. Harry,

an FE with a major vendor of computer peripherals recalls this customer story: Harry's client, Peggy, was a very knowledgeable software person, but she knew nothing about hardware. Nevertheless, she gave advice freely. A few years ago, when her disk subsystem was first installed, it wouldn't communicate with the host computer. An FE told her that it had been shipped with the wrong type of bus for her system and he ordered and installed the right parts. The whole system has been running for several years.

But no machine runs forever. One day, it went down, the drives couldn't be accessed by the host. Peggy was convinced that the bus had changed and was causing the current troubles. The problem was extremely complicated and required a number of FEs to work at the site. As each one entered, Peggy asked him to check the bus for changes and insisted that he start troubleshooting at that point.

Even when the problem was traced to an interface card failure, Peggy wasn't deterred. Every time the system has a problem, no matter what the symptoms, Peggy insists that the bus be inspected. The lesson here: After you find a fault in a software package, it's suspect for eternity.

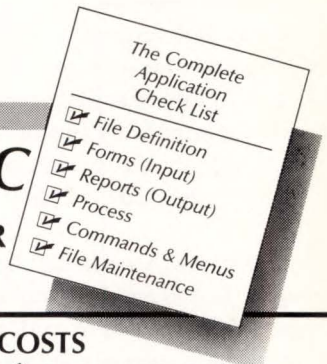
The Uncompromising Client Tale

The following tale of a very uncompromising client and a very unusual problem gets my vote for the most amusing customer story. I promised, under threat to life and limb, not to divulge even the country where this little episode occurred. You'll know why as the story unfolds.

Card punches are color-blind, right? Well, there really was one punch on a busy mainframe system somewhere in this world that wasn't.

This batch processing system employed multiple card colors to designate different job types being processed. The cards were white, blue, green, red, and at times various other offsets of these colors. The card punch worked perfectly, most of the time, outputting thousands of cards each day. It only had one little, but very annoying, problem: Each time it encountered a green card, it stopped. Green cards simply wouldn't feed from the input hopper without jamming.

A simple problem, you say. Obviously, the green cards were defective. Not so, says our FE, Bob. Bob knows because he worked at this site and on this problem for weeks. All green cards from any batch and from various suppliers immediately halted the machine, but these same cards ran in any other card punch in the district (and many were tested) without incident.



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So, Bob tried to enlist the customer's aid. "Don't run green cards," Bob suggested. "Substitute another color." "No," balked the customer, "I want to run green cards, so fix it!"

The next step, fixing it, wasn't an easy task. There seemed to be no apparent reason for the machine's dislike of the green cards. Other machines liked the cards, why not this one? To get an answer, Bob returned a sample batch of the cards to the manufacturer for analysis. "No difference in the green cards," said the supplier. Content, size, thickness, weight, etc. are exactly the same as any other card. What's happening here?

By now, a week had elapsed. Once again, Bob asked the customer to please use a different colored card, at least until the problem was isolated and corrected. After all, it became a matter of pride to get to the bottom of this. "No!" came the response, loud and clear, "Fix it."

After consulting with other company FEs and various experts regarding the "green card faults," Bob decided that maybe the supplier was mistaken. After all, we all learned in Basic Electronics 101 that card punches cannot see colors. So Bob sought a second opinion. Unfortunately, this independent testing lab confirmed that the green cards were exactly the same as the other colored cards. No help there!

There seemed to be no apparent reason for the machine's dislike of the green cards.

As a last resort, the customer was offered a new card punch, free of charge. But he stood firm, "No, I own this punch and I don't want it replaced. Just fix this one."

Bob tried another ploy to get to the bottom of the green card caper. A new batch of green cards was ordered from a third manufacturer. Before shipping, cards from this batch were tested on a similar card punch and ran successfully. Approximately 15 new green cards were placed randomly throughout a batch of 500 white cards and fed into our machine. The result? You guessed it. The card punch stopped each time it reached a green card.

Now weeks had passed since the card punch started rejecting green cards and Bob and his people were no closer to solving the problem. So at a meeting, a decision was made by persons sworn to secrecy to switch the problem card punch with a similar one that would accept the green cards. Drum roll, please.

A punch of the same year and make was tested at the field office with the green cards. All fed perfectly. Then in the middle of the night (the suspense mounts), this punch somehow found its way to the customer's site and the old one went to a site that used only white cards. When the customer came in the next morning, he was told that the feed mechanism had been replaced. True, it had been replaced, along with everything else. And so ends a strange problem that was never solved!

So, next time frustrating events occur in your own field service endeavors, try not to get too upset. Instead, start a journal, write it down, and send it to us. It might make for enjoyable reading in a future From The Field column.

Words We Hate To Hear

- How come you didn't . . . ?
- In my last company we did it this way . . .
- It never did that before.
- But I just changed one thing in the program.
- Now that's a new one.
- I used to do it like this . . .
- I don't know the street, but you make a right.
- You can't miss us.
- Before you came, it was making a sound like . . .
- Didn't they reach you at your office?
- Oh! That button does it, huh?
- While you're here, could you just look at this, too? It'll only take a minute.
- How come it works for you?
- It's about time they sent someone.
- We called, but you'd already left. We found the problem.
- We can give it to you for a PM on Sunday, third shift.
- Well, it does it when you're not here!

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FROM THE LAB-#1

Dave Mallery

Cloning The 750

A good idea doesn't exist in a vacuum for long. A sure sign of a healthy third-party market is the rapid appearance of alternatives to any good new idea.

Expanding the 750's memory is a great idea, and has generated a flurry of activity in the memory labs of New England.

> **"The entire VAX community is burning billions of MIPs computing CRCs that aren't necessary and are never used!"**

Characteristically, a third-party offering must offer a significant price/performance incentive over the vanilla DEC offering. Because the DEC package yields only 14 MB at about $10,000, the third-party option must push the limit to 15 MB. The only other parameter is price.

First to arrive in our Lab was a controller board (essentially an L0008 8-MB controller reworked to handle the extra address bit) and three 4-MB boards from Nemonix. The installation is as I explained in "Older Is Better" (March 1987), with the addition of the wire-wrap to the third memory slot. After installing the three 4-MB boards, you're only allowed three other 1-MB boards, creating an instant surplus of two 1-MB arrays. Do you share my hunch that the price of 1 MB for the 750s is about to decline?

Another technical note: There's no change to be made to the SID register, as there is in the initial 14-MB upgrade.

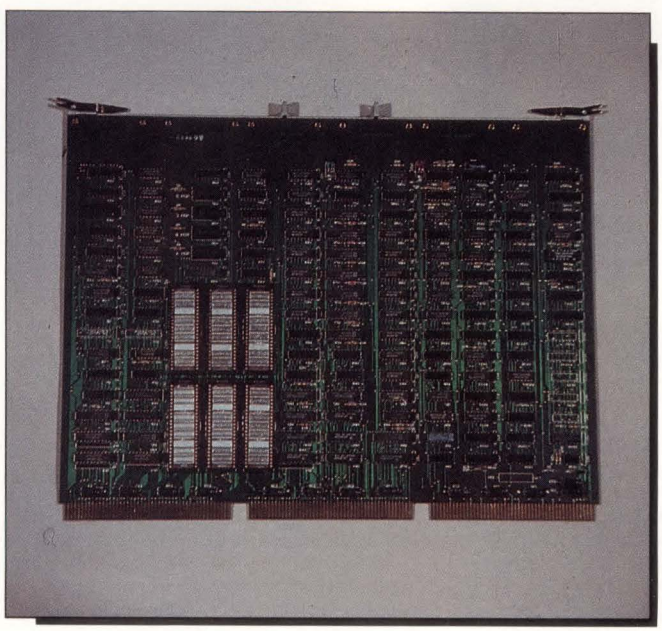
Nemonix promises a fully redesigned board in the near future. They have a big-time CAD operation and tell me that they've completely redone the memory controller. Meanwhile, they're shipping these perfectly functional, though not too aesthetic, reworked L0008 boards. We'll get one of the newly minted boards as soon as they're available. In the meantime, the memory and controller work perfectly.

I also tried several of the 4-MB boards with the DEC L0016 controller board. The 15 MB works perfectly with the DEC controller, so those of you with 14 MB from DEC can gild your lily by buying a third 4-MB board from either of the third parties. Think how much cooler your 750 will be with two less 1-MB arrays!

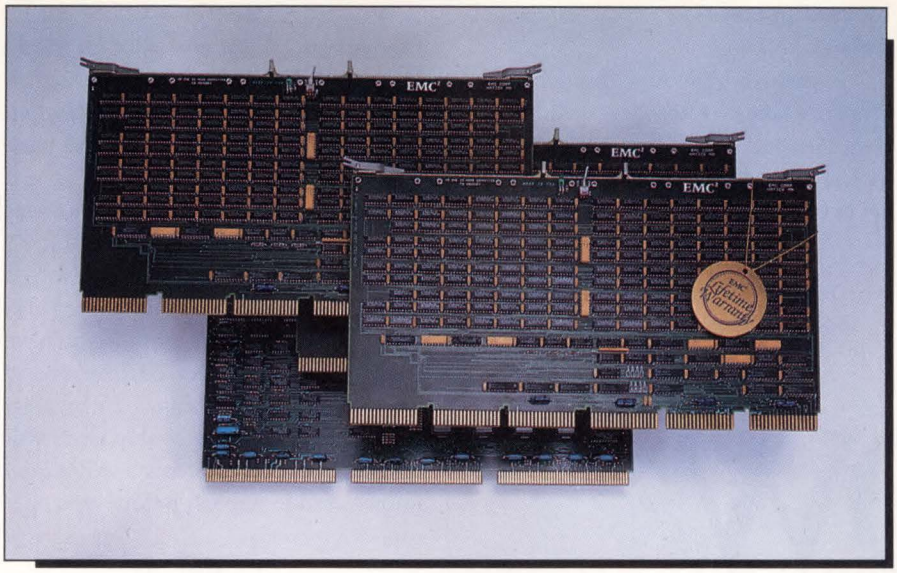
Nemonix also has a CPU accelerator. I haven't had one in my hands, so I can't report. I can say though, that accelerators are tricky business.

The next to arrive came from the halls of EMC². The Stretch-15 controller is a remanufactured L0008. The job was done carefully and looks great. As far as I know, EMC doesn't plan to redo the board from scratch. The memory went in and works. There were a few correctable errors on the third board. EMC has an effective overnight replacement policy that we exercised. EMC tells me that they'll have a liberal trade-in policy on surplus 1-MB boards. (I have a large collection here.)

The extra memory is easy to take. VMS uses a little more in its permanent assignment, and jobs expand to fill the available space. There wasn't a wholesale expansion, however, and there's still a decent amount of memory available most of the time. The difference is that the VMS memory allocation algorithms



Nemonix Inc.'s entry into the 750 market is a reworked memory controller to replace the L00016 card.



EMC² offers a family of boards.

are working well and have more to work with. As I write this, we have a total of 35 processes running and about 8,000 free pages.

If your shop has a fixed number of users and isn't expanding, consider trying one of the virtual disk drivers now available. You could take a few of the 15 MB and use it for a RAM disk. Put your worst RMS index file in there along with some other offenders (like compiler work files) and stand back.

I have the EEC virtual disk driver in-house and will be trying it soon.

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Author's note: As we go to press, Nemonix's redesigned board has arrived. After we've examined and tested it thoroughly, we'll share our findings with you.

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FROM THE LAB-#2

Dave Mallery

To CRC Or Not To CRC!

We really have started something with our review of the Aviv tape components (March 1987). Everyone is trying /NOCRC on their backups and realizing the incredible performance improvement that results.

A reader, Derek J. Pullen of Ault Foods Limited, Etobicoke, Ontario, stated in ARIS that:

"We did some testing on our MICROVAX with a STC 2925 to see what a difference in time we found. These are our results:

BACKUP/BUFFER:5/CRC for 78,000 blocks — 25 Min., 49 Sec.
BACKUP/BUFFER:5/NOCRC for the same — 03 Min., 18 Sec."

Mr. Pullen goes on to ask if anyone else has had corroborating experiences and worries about data integrity.

West Coast Editor Phil Naecker, suggests that instead of turning off the CRC, you increase the /GROUPSIZE parameter, an esoteric BACKUP parameter that controls the number of blocks over which BACKUP will compute the CRC checksum. The CRC algorithm is capable of fixing only one error within each group. DEC defaults the parameter to 10 blocks. The problem is that if you're counting on the CRC option to find and fix errors and if you spread the span of the CRC calculation over too many blocks, you can lose if there's more than one error within the blocks.

I used to believe that most "big" tape drives do a hardware CRC on each

physical block. The CRC sum is written in the between-block "gap." (That's right, gaps are not empty!) This has been true from time immemorial. When I was a kid programmer, the CRC circuits used to fill a six-foot rack. The tape drive is capable of fixing dropped bits by itself in real-time. I was somewhat wrong!

I spoke to Malcom Krongelb from Digital's tape development group. He shed a great deal of light on the subject: TU, TE and TS tape drives from DEC *do not* have CRC in hardware because CRC is not part of the ANSI standard for PE tape drives; TK50s and all GRC (6250 bpi) drives *do*, however. The CRC option was added to BACKUP in the days when the only available tapes for the 780 were from the above group. (As an aside, I have backed up and restored terabytes of data for more than 12 years on TE and TU16s. I have never lost data to a degree that it was totally unrecoverable.)

The bottom line is this: If you have either a TK50 or a GCR tape drive, you're wasting big MIPs doing a calculation that's redundant and probably never will be used, because the drive will signal unrecoverable errors before you get to use it if its hardware CRC fails! I seriously question the necessity for CRC even on TU/TE drives, especially if you have a responsible, properly grandparented backup system on reliable media. The entire VAX community is burning billions of MIPs computing CRCs that aren't necessary and are never used!

> ***". . . a third-party offering must offer a significant price/performance incentive over the vanilla DEC offering."***

I'd welcome any further comment/correction on this issue. We officially have stopped using CRC on all our backups. In fact, the other performance enhancer we've used is /BLOCKSIZE:16384. This squeezes the last drop out of the hardware configuration. Larger block sizes, although available up to 65535, start to make the action at the end of a reel a little risky.

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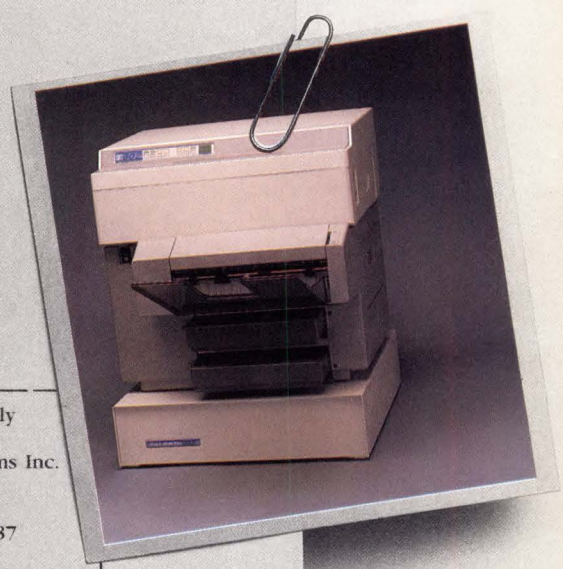

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NETWORKING EDITOR

Bill Hancock

Notes From An EtherVet

I'm fortunate enough to have installed a lot of Ethernets, and I've learned a few things over the years that many newcomers to Ethernet haven't yet figured out or considered. So, the subject of this treatise is some of the ins and outs of Ethernet hardware configuration and installation that I've learned (the hard way) in my Ethertravels.

The information in this article leans toward the more popular baseband Ethernet components unless otherwise noted. While I realize the implications and importance of broadband Ethernet, it's more complex to configure and balance and there are fewer broadband Ethernets than baseband, largely because of the expense. A broadband "transceiver" (RF modem) can cost upward of $10,000 per node hooked into the broadband, not to mention overhead end equipment, etc. If you're a broadband user, may I suggest a reasonable book called *Broadband Network Technology* by Edward Cooper (available from Sytek Press/Prentice-Hall). It's a good book on the basics of broadband networking and gives a good explanation of the different types of broadband and the issues involved with each.

Basically, there are three types of Ethernet cable (or Etherhose as many networking types affectionately refer to the cable): baseband coax, broadband coax and ThinWire (RG58) coax. Most sites using the standard DEC type of Ethernet will be using the broadband coax, also referred to as Beldon 9880 (Beldon's cable type), AWM E60862 Style 1478 or DEC part number 17-00451-01 (they also call it BNE2x-xx). Other sites using broadband technology may use RG6 or RG11 to RG59 broadband coax with RF MODEMs to allow the systems to communicate with the broadband network. ThinWire users will find the familiar RG58 thin coaxial cable almost anywhere (including places like Radio Shack and on the back of your television if you have cable television). Be careful not to get RG58 confused with RG59. Ethernet cable is terminated for 50 ohms, which is great for RG58. While similar in appearance, RG59 is 75 ohms, therefore, incompatible. All three types of cable plants allow the functionality of Ethernet and, with the appropriate interconnection equipment, can be connected. Which cable plant is selected depends on the networking need. Broadband typically is seen where there's a need to provide data networking, video, voice (PBX-PBX) and extended distance networking. Baseband, the easiest to implement and much less expensive than broadband, usually is seen where speed is an issue or installation flexibility is necessary. ThinWire networks typically work in a baseband manner but are used in office environments where a flexible cable plant is necessary because of frequent office layout changes and where there are a substantial number of connection points. In all cases, however, there are some standard "do's" that should always be included in the design and installation.

Growth Planning

First, always plan for approximately 100 percent growth in network connections in the first year. I've often seen the initial plan for the network expand exponentially in the first year. This usually is because management fails to recognize the capabilities of a local area network (LAN) and because it makes an effort to get maximum use of resources after initial installation. A banking client once asked for an Ethernet for 10 PCs so they could communicate to a previously installed ThickWire baseband Ethernet. So, I designed a network they thought would accommodate 10 nodes. In reality, I designed it for 100 nodes knowing full well that banks are rife with politics and that other VPs would see the PCs and want the same capability. As it turned out, I was right. After 10 months, the network consisted not of 10 PCs but of 82 PCs with additional VAXs to handle the extra load.

It's frustrating to have to run the Ethernet to places where no wire has gone before. Be sure to preinspect the area carefully where the cable is supposed to go carefully and be sure that

Broadband typically is seen where there's a need to provide data networking, video, voice (PBX-PBX) and extended distance networking.

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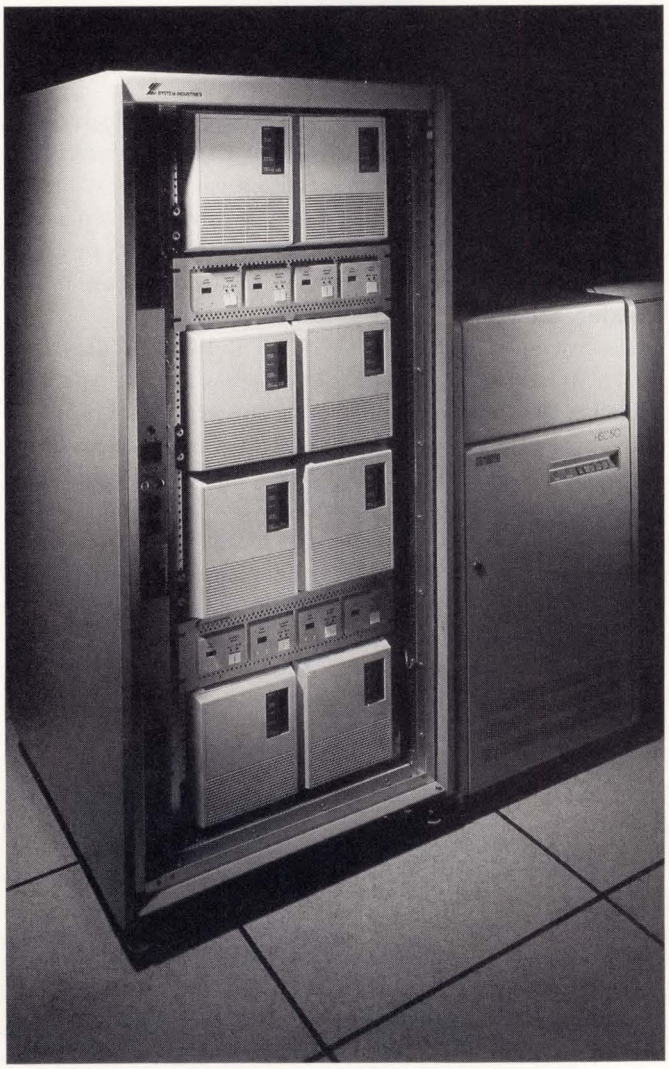

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there is proper cable space, access ways and routing information (where the cable will go and how it will be laid).

Cable Testing

Always check the cable while it's still on the reel. After the cable has been installed in the wireways is the wrong time to find out that it was flawed to begin with. Most cable vendors have a device called a time domain reflectometer (TDR) that can be connected to the cable while on the reel. One end of the cable is terminated properly and the TDR is hooked up to the other end. An electrical signal is sent down the wire. If the results show that the cable is infinitely long, the cable is solid and good. If the TDR reports that the cable is, say, 10 meters long, there's a disruption of some sort at that point and it should be examined and repaired or replaced. It also helps to do this electronic examination in front of cable installation teams to show them that the cable is good, and it had better be that way after it's pulled!

As the cable is being installed (cable people call this pulling cable), use some white athletic tape to mark the cable every five meters. They mark a building map with the cable marking locations for later reference. Finally, use some small, colored labels and write the cable marker number on them. Place the labels either on the baseboard of the walls under which the cable is laid or, if run through the ceiling, on the ceiling in some inconspicuous spot. Later, when the cable fails (it will someday), a TDR session will find the elusive break or short. Tracing the exact location on the cable will be simplified greatly.

Cable Segmentation

Everyone I know has an opinion on cable segmentation. So, to preclude too much controversy, I'm going to suggest only one item for now. If your Ethernet cable is fairly long (over 200 meters) or has a lot of nodes on it (over 30), put a barrel connector in the middle of the cable. Yes, Virginia, it's one more thing to cause a failure, but how often do barrel connectors fail? Rarely, in my experience. Why do it? Well, we know that the network will fail at some time. By placing the connector in the middle, the cable can be disconnected in the middle (separating it into two segments) and the two segments terminated with 50 ohm terminators. The effect is that half of the cable is going to come up and half will not. This allows the network manager to concentrate his efforts on the side that has failed and reduce the search time for the fault. For those who are concerned about potential EMI or RFI problems, don't be. A friend at DEC once told me the story of how, while the technology was under development at DEC, they tested the Ethernet cable for interference. There were some skeptics who doubted the shielding capabilities of the cable, so they placed a live segment of the cable under a powerful FM radio tower. Following this, a test was conducted with various connectors, transceivers and other RF-admitting devices to see what would happen with collisions and other problems (like noise). In the test, few collisions were noted, even under such adverse conditions. Final result? Specification-compliant ThickWire Ethercable is well insulated and durable. Adding an additional barrel connector shouldn't increase the potential for problems and will help isolate problems when they occur.

There are two types of cable: PVC (which is usually yellow in color) and Teflon (usually orange). The general rule is to use Teflon anywhere the cable will run that allows recirculation of air to humans, but check your local fire and city codes for clarification. Sure, PVC is cheaper, but consider this: Do you want to be in the same area as PVC cable if it is burning? Cable made of PVC can give off cyanide gas when burning, which can ruin your whole day in a hurry! Yes, I know that 99 percent of the silly grey twisted pair cables in ceilings are PVC. So who cares? Fire codes often state that existing cable plants are exempt, but that new cables must comply with the fire codes; check!

ThickWire Ethernets (the most common for now) are non-intrusively tapped. Theoretically, this means that a connection being added to the cable won't disturb the network activity in progress.

Teflon has problems as well. Like most glass products, Teflon isn't a true solid material. As a result, constriction of Teflon Ethercable will cause a condition known as "cold flow" and cause the Teflon to migrate in a cable. What this means is that bends in Teflon cable tighter than a nine-inch radius tend to accelerate this condition and, over a period of time, may cause a short in the cable, which of course, kills the network. If this occurs, however, it's a simple matter to remove the offending piece of cable and splice in a new section. By the way, DEC and Beldon don't seem too concerned about the bend radius. They ship Ethernet cable on four-inch reels!

Tapping ThickWire

ThickWire Ethernets (the most common for now) are non-intrusively tapped. Theoretically, this means that a connec-

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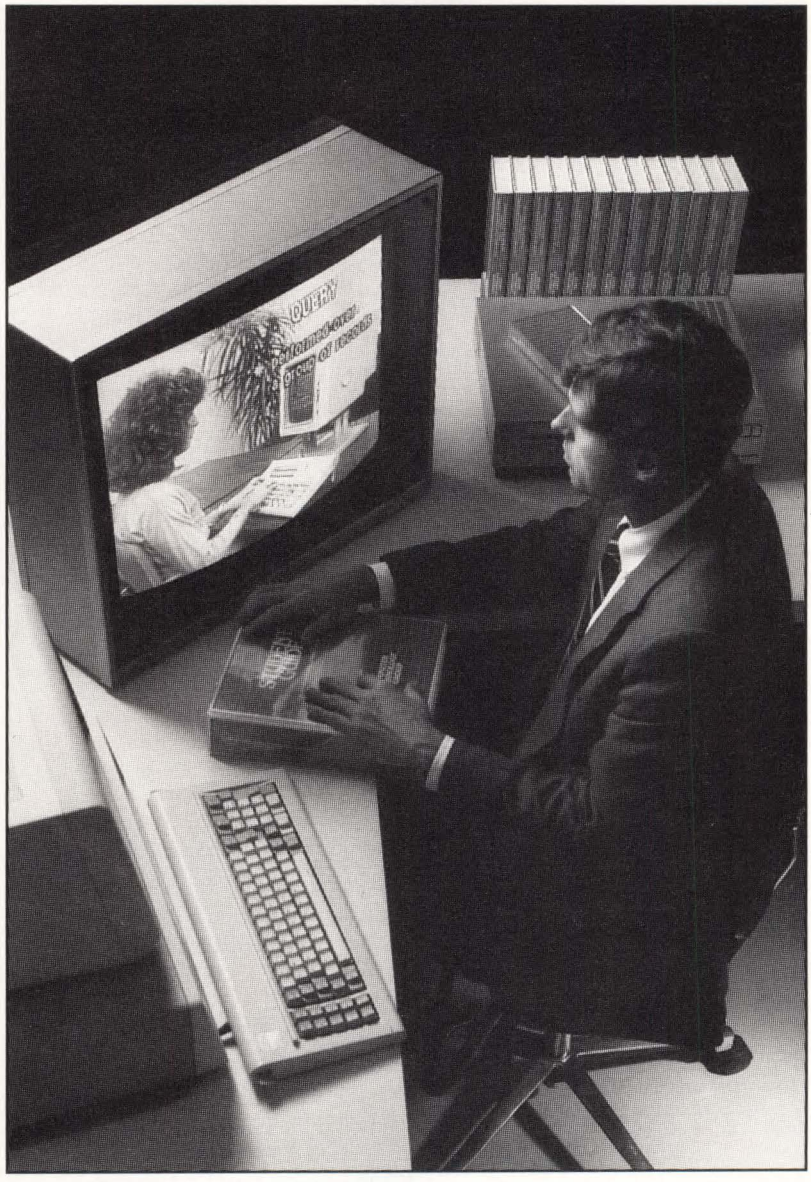

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tion being added to the cable won't disturb the network activity in progress. In truth, usually this is the case unless the installer goofs and causes a short on the cable or the installed transceiver (or another component). The procedure is fairly simple:

1. Find a black marker ring on the cable. They are 2.5 meters apart.

2. Secure the cable with a cable guide. In the case of the H4000A, there's a bracket with a set of plastic drill guides that are clamped on the cable. If you're using an H4000B, there's a slide mount assembly that slides over the cable and is secured to the cable with a screw. In both cases, the drill guide on the H4000A and the tap guide hole on the H4000B should appear directly over a black ring in the cable.

3. Make the tap. Once the guide is in position, the tap should be made on the black ring to ensure that interference on the cable is kept to a minimum (and for other RF reasons too long to explain in this article). A hole is drilled in the cable to remove the outer coating and braid shielding to allow the transceiver to be connected to the cable. The hole is necessary because the transceiver has a metal spine that goes through the hole that's created and connects to the center conductor of the cable, taking care not to also contact the outer layer of shielding (this would cause a short and the network will fail). On H4000As the hole is made with a battery-powered drill; on H4000Bs the hole is made with a small orange hand tool. In the case of the H4000A, it's extremely important that the drill be grounded properly, hence, the use of a battery powered drill. If an AC drill is used and not properly grounded, a ground loop can occur on the cable and the result may be disastrous: transceivers up and down the cable may be burned out by the resultant loop. To compound the problem, the H4000A requires that two holes be punched in the cable at opposite sides. One hole is not difficult to punch, but the second hole may be quite difficult. On installed cables and long cables, the cable frequently will rotate even though

the cable guide may seem firmly in place. As a result, it can be tedious to get correctly punched holes in the cable. If you have an H4000A (they are large, black and the entire case is made of plastic), get someone to help keep the cable in place during a tap session — it reduces the aggravation factor substantially. When the holes have been drilled, remove the required Digital-spec drill bit and manually ream out the hole a little with the drill bit or with a dentist's

> ***"The H4000A is a little tricky to connect because the top and bottom holes in the cable both receive a spine."***

pick to ensure that all braid has been removed, and to remove the various stray bits of insulation and trash that accumulate. On the H4000B, tapping is greatly simplified (thank you, Uncle Digital) by the use of the hand tool and the cable guide that's actually the upper assembly of the transceiver. In both cases, remove any accumulated items with a suitable tool; don't blow into the hole because all you'll do is seat the offending remains of braid and insulation or, possibly, cause moisture accumulation.

4. Attach the transceiver. The H4000A is a little tricky to connect because the top and bottom holes in the cable both receive a spine. It's therefore important that the cable not twist while attaching the transceiver. To assist there are two small brads that fit into two holes on either side of the spine location in the bottom section of the transceiver in the cable receiver trough. The brads have a small, pliable "jaw" on the top, with a long wire end that slides into the trans-

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Suggested Reading

1. *Communications Options Minireference Manual Vol. 4 (Ethernet).*
   DEC order number EK-CMIV4-RM-002
   This is one of the most valuable documents for DEC Ethernet components that I have ever used. I highly recommend it.

2. *Guide to Networking on VAX/VMS.*
   DEC order number AD-Y512A-T1

3. *DELUA User's Guide.*
   DEC order number EK-DELUA-UG-002
   Note: You'll need to order the appropriate user's guide for your controller.

4. *Introduction to Local Area Networks,* by John McNamara. Digital Press.

5. *Networks and Communications Buyer's Guide.*
   DEC order number ED-29415-42
   Std. IEEE 802.1 and 802.3

6. Tutorial On Local Area Networks (IEEE). Order IEEE documentation from the IEEE facility in Piscataway, NJ.

7. *Introduction to Local Area Networks.*
   DEC order number EB-22714-18

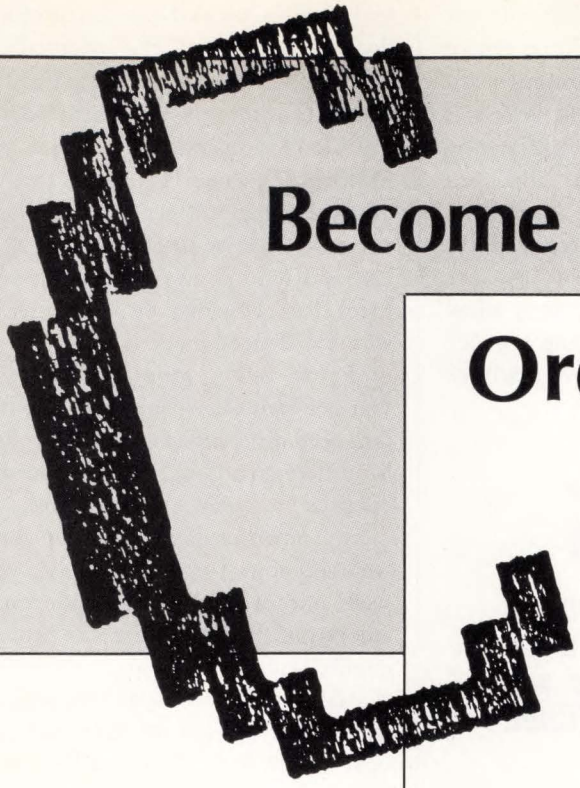
8. *Broadband Network Technology* by Edward Cooper.
   Sytek Press/Prentice-Hall.

ceiver cable trough holes. The jaw of each brad grips the cable to help hold it in place during the cable installation and after the transceiver has been tightened on the cable. In the case of the H4000A, four hands are useful for the insertion of the cable in the cable trough to keep it from twisting as well as to ensure that the spines align properly during the installation of the upper assembly of the transceiver. One set of hands should grip the cable and hold it in place, while the other set places the upper slide on the transceiver and tightens it down with the DEC-supplied hex wrench that's needed to tighten down the center spine and upper receiver. Tighten each wrench position a little at a time to ensure that the entire upper assembly glides down evenly and presses firmly on the cable. When it's completely tightened down, the transceiver is locked in. In the case of the H4000B, the upper receiver of the transceiver also is the cable guide, so once the cable guide has been locked into position, the hole that's made by the installer simply fits over the protruding spine on the lower receiver of the H4000B. The unit is locked down and the tap is complete. The H4000B has brads, like the H4000A, but these are seen when the cable is being fitted initially into the guide. In both cases, the brads' jaws will squeeze shut on the cable insulation as the transceiver is tightened on to the cable (this is why most Etherpeople call the brads "vampire clamps"). With either type of H4000 you'll get a box of replacement brads in case a transceiver is removed and will be used elsewhere.

It's important to note that when drilling holes in Ethercable, if you mess it up (and you will at some time or another), simply move a few inches either one way or another and drill again. It will not cause radical breakdown of cable integrity. Also, if you leave a hole in the cable without a transceiver in it, put a wrap of tape around the hole to keep it clean. If you feel the urge for something more substantial, try a dab of silicone sealer. Do *not* fill the hole with anything conductive, such as solder — it will cause a cable short and the network will fail.

5. Secure the connector. In the case of DEC components, someone came up with a "new way" to connect D-connectors (if viewed straight on, they look like the letter D) to components using protruding studs that slide into notches in a connector. The studs then are secured to the connector by a slide mechanism that slides over the studs and corresponding notched openings, holding the connectors together. In theory, it's a great idea to connect D-connectors without screws or tools. In application, however, the connectors used in Ethernet are too heavy for such an arrangement and cause serious problems with the slide mechanism (it bends and loosens or, in some situations, breaks off). To keep this from happening, use plastic tie downs to secure the transceiver cable to the Ethernet cable. This is done easily by taking a tie down and placing it around the Ethernet cable and the transceiver cable about three to four inches from the transceiver end and tightening up the tie down. Tie downs are cheap (I think that a bag of 1,000 goes for about $6 at Radio Shack) and easy to install. The only drawback is that they are, by nature, non-reusable, but normally you won't be moving transceivers around on a regular basis anyway. In all cases, use plenty of strain relief on connectors and cables to keep the connectors from separating from each other and to keep things from being jostled loose if the cables are moved or pulled on.

6. Label all transceiver cables and transceivers. There's nothing more time consuming than trying to figure



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out who's connected to what. Label first and enjoy later.

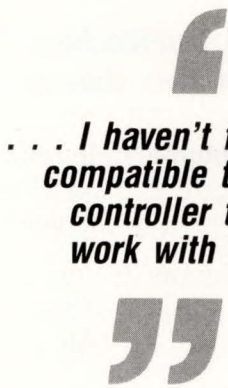
If you're using non-DEC transceivers with your DEC Ethernet controller, be sure you understand that, in accordance with spec, you're not a compliant installation. The Ethernet specifications are quite clear: The same vendor must supply the controller and transceiver for the connection to be within the specification. In many cases, other manufacturer's transceivers (I've had success with Xerox and TCL but there probably are others) work well with DEC's Ethernet controllers, but the mixed-vendor combination is sure to cause finger pointing when problems arise, in addition to violating the specification.

Transceiver installation isn't difficult if approached systematically. Make sure you have all the proper components before you begin the tap operation. Remember that not all new equipment arrives in a functional state, so don't be too surprised if a transceiver acts up or doesn't work.

Controllers

Many communications companies offer Ethernet controllers. In the DEC case, there are Q-bus and UNIBUS controllers for PDP-11 and MICROVAX systems available from many vendors. In all cases, it's important to note which DEC controllers, with the exception of PC Ethernet controllers, are required for proper DECnet software operation. While it's true that you could plug in an Excelan Ethernet controller and use Ethernet, DECnet won't work with it. DECnet requires that the host system loads software components into the controller and that the controller knows what to do with the loaded software. Only DEC controllers know what to do with DEC-loaded software (DECnet) and how to respond to DECnet requests. To date, I haven't found a compatible third-party controller that will work with DECnet. Ironically, the XXDRIVER.EXE seen in the DECnet microfiche was used originally to develop DECnet before the DEUNA was available. It used a third-party Ethernet controller for testing and development and never was supported outside DEC's engineering organization. So, it can be done, but such support is unlikely from DEC, which wants to keep control of the market.

DEC's Ethernet controllers allow the capability of connecting to IEEE 802.3 Ethernets as well as Xerox/Intel/DEC V2.0 Ethernets. Also, most controllers allow the ability to connect multiple protocols simultaneously, through the controller and driver. In the case of the Ethernet driver in VMS, this is achieved through the rather clever use of two drivers, one that talks to the controller directly (ESDRIVER.EXE), and one (a pseudo driver) that talks to the driver that talks to the controller (XEDRIVER.EXE for UNIBUS systems, XQDRIVER.EXE for Q-bus, ETDRIVER.EXE for BI and ESDRIVER.EXE for MICROVAX 2000 systems). The pseudo driver allows the creation of separate Unit Control Blocks (UCBs) for each new protocol so that each "looks" like a new device to VMS. The effect is easy to see. Start up DECnet and then execute the DCL command SHOW DEVICE and you'll find more than one device for the first Ethernet controller. The first device (XEA0: on UNIBUS systems) is the actual controller. Subsequent devices (like XEA6:, XEA7:, etc. . . .) actually are virtual devices created by the protocol declarations when the protocol is declared by a connecting program. The net effect is that the same controller is capable of supporting more than one protocol at a time. This means that it's possible to run DECnet (it actually uses more than one protocol), TCP/IP, XNS, LAT and who knows what other protocol. Protocols may be single user or sharable, depending on how they're set up by the calling program. So, before you get controller happy and feel that you need different Ethernet controllers for different protocols, think again and consider a software alternative. Be careful, however, of some vendors' software solutions. Some are not coded very well and use up a disproportionate amount of system resources to provide connectivity services.



By the way, while I'm harping on controllers, beware of "new technology" controllers. That usually means new firmware and new "undocumented features" (bugs). Many customers have been bitten by the new technologies that appear from time to time. If your network applications are critical, make sure you get a chance to test the controller before committing a critical workload to it. You may be in for a rough ride.

On the down side, many third-party controllers support non-DEC protocols in the controller, effectively offloading the host system. This can be useful in helping your system along when managing multiple protocols on the Ethernet, and may be a good incentive to consider dual controllers on a particular system. When installing dual controllers, make sure you consider bus contention, power consumption, etc., before you purchase the controller because the multicontroller environment requires some planning. Don't worry about Ethernet addressing, however. All Ethernet cards have one unique address that is inserted, usually in ROM, by the manufacturer. In the case of DEC cards using Ethernet and DECnet, two ad-

dresses are involved: the ROM (hardware) address and a virtual address (in controller RAM) that DECnet places in the controller. This second address is based on the DECnet node number plus a specified adder that allows DECnet to know that it's talking, in fact, to a DECnet node as well as for other DEC uses. If you use an Ethernet analyzer, like the Lanalyzer, and try to monitor the hardware address of a particular controller for DECnet traffic, you'll be sadly disappointed. Instead, try monitoring the DECnet virtual address and you'll have success. By the way, the reason for this anomaly in the sea of Etherstandards is because Ethernet uses a 48-bit node address and DECnet only supports, at this time, 16-bit node addresses. Through DEC software trickery (involving the virtual address), DEC is able to fake out DECnet and allow 16-bit addresses where 48-bit addresses normally roam. A constant 32-bit number (AA-00-04-00) from DEC's assigned address range is used as a base and the 16-bit node address for a particular node is appended to it. For instance, if the node were a DECnet router and had an address of 1.182, the resultant "virtual" Ethernet address loaded into the controller would be AA-00-04-00-B6-04. If you have PCs you want to connect to the Ethernet, DECnet supports the 3COM, Interlan and new DEC Ethernet controller for the VAXMATE. In most cases, the controller not only provides for controller functions, but also for transceiver functions. On most PCs, it's a simple matter of hooking up the PC to a ThinWire Ethernet and turning on the software. Users, however, often create Ethernet problems by improperly disconnecting PCs from the Ethernet ThinWire. (This happens when a user decides to take his PC home for the weekend.) Users often disconnect PCs from the cable and remove the "T" connector that's used to tap into the ThinWire. (ThinWire cannot be intrusively tapped; taps are put in by cutting the cable and installing a twist-and-lock arrangement called a BNC connector.)

Most PC connections consist of

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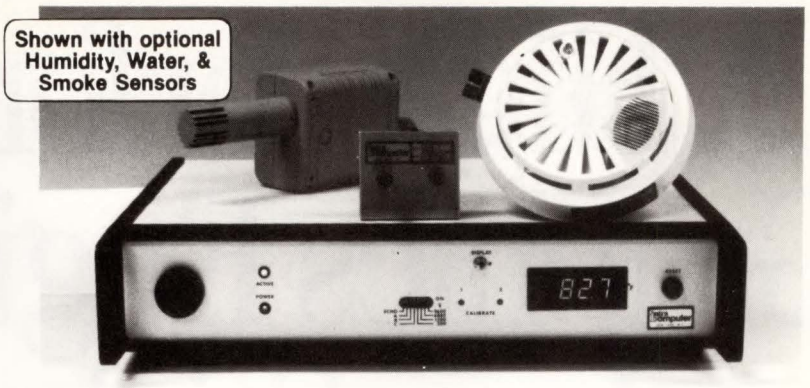

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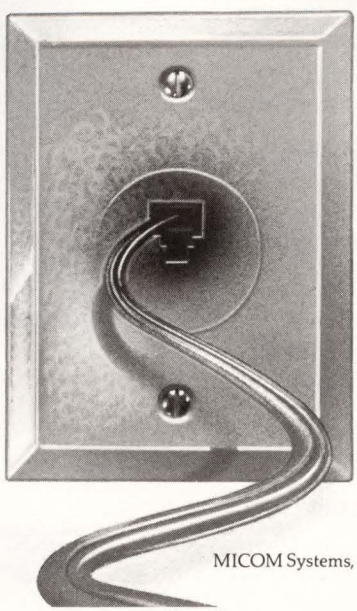

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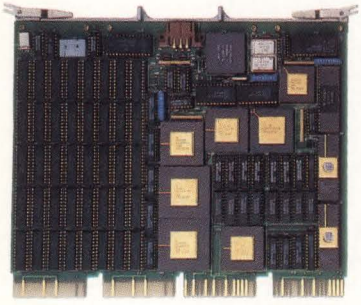

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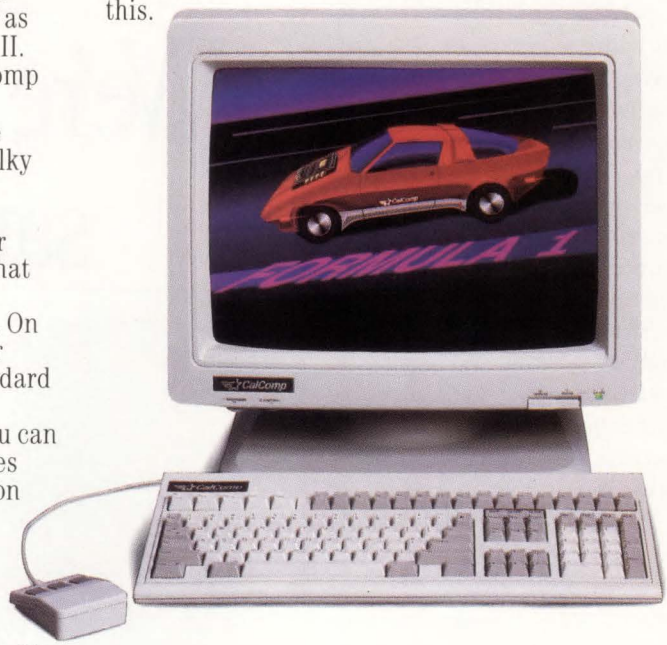

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two female BNC connectors on the Ethernet ThinWire connected to a male T with two male in-line ends and a female third end that connects to a male connector on the PC. The PC model and controller used will determine how hard it will be to get to the male connector on the PC. As a result, users frequently disconnect the T from the Ethernet by disconnecting the two female BNC connectors on the Ethernet, causing an open condition on the cable. Naturally the network dies. To correct this, the logical thing to do is to put a male-male BNC connector where the T was to get continuity back, and the network will be operational again. While simple to fix, locating the problem can be difficult. Imagine more than 20 PCs on a ThinWire in a sea of cubicles. Now try to find which cubicle is missing a PC. You get the point.

There are cures, of course. First, there now are cable lock boxes that can be placed over the T connector so that users cannot reach the two Ethernet ends and disconnect from the network. They can disconnect their PCs but cannot remove the T. Another alternative is connector locks, which are becoming popular. A low budget solution is to Super Glue the BNC connectors for the Ethernet to the male ends of the T (this works well but can cause reconfiguration problems). Still another solution is to place "High Voltage" stickers on the connectors. Laughing? I know it sounds funny, but it really works! In cases where I have used it, users ask to have their PCs disconnected rather than disrupting the network. I have no problem with users disconnecting PCs and using them elsewhere. I do have a problem when they do it incorrectly.

I hope that some of my Ethertricks are helpful. Remember the Zen philosophy of Ethernet:

"You may Ethernet, or you may not Ethernet. There is no wrong."

— Bill Hancock is an independent systems and network consultant in Arlington, Texas.

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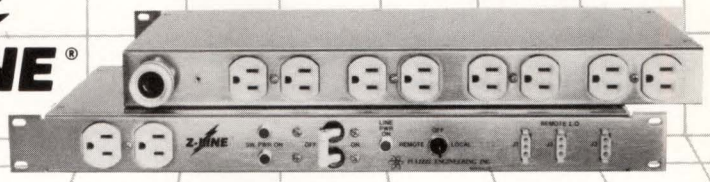

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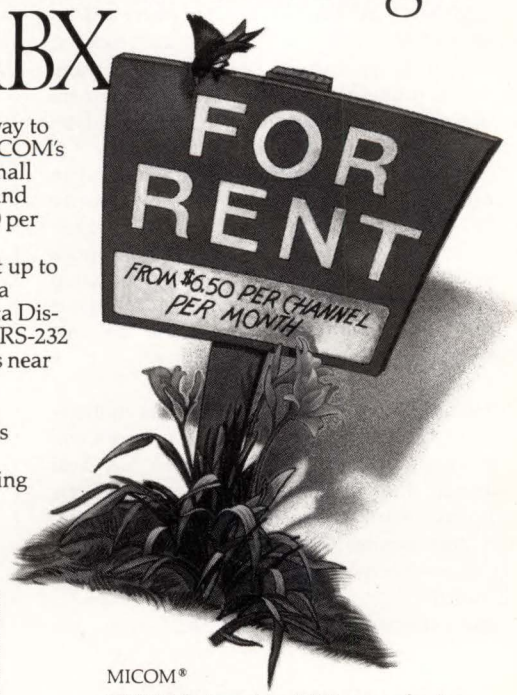

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DEC PROFESSIONALS

Ron Levine has more than 20 years experience working in the computer industry. He worked as a field engineer for Control Data, Scientific Data, Xerox Data Systems and Varian Data Machines. After spending nine years as a customer engineer, Ron went to Osborne & Associates, a computer-industry documentation development firm where he handled many of the company's major accounts.

Since 1976 Ron has been an independent consultant and writer. Prior to joining Professional Press as a technical editor, Ron was the West Coast editor of *C/ESN*, a field service magazine.

Ron majored in Business Information Systems at Santa Ana College in California, and currently attends the University of California Riverside. He also is a part-time computer instructor at Fullerton College in California.

As senior technical editor for *DEC PROFESSIONAL* and VAX editor for *VAX PROFESSIONAL*, **Al Cini** has written many articles on various DEC PDP-11 and VAX software products. He is president of Computer Methods Corporation, a technical training and software consulting firm specializing in applications implemented with DEC computer products.

Al's DEC system experience spans more than 10 years, and he is a widely recognized authority on VAX-based software development techniques. He has developed and presented a number of courses for DEC's Seminar Program's group, including the VAX FORTRAN and VAX COBOL Advanced Programming Concepts Seminars, and the VAX BASIC Version 3 Update Seminar.

Bill Hancock, our networking editor, is an internationally well-known and respected network and software engineering consultant who has held engineering and technical positions at DEC, Texas Instruments, SOHIO Petroleum Company and IBM. He conducts seminars on various network issues and subjects and has more than 2,000 network designs to his credit.

Bill's clients include many of the Fortune 500 and governmental authorities such as the U.S, U.K, Germany, Switzerland, Japan and the Peoples Republic of China. Bill is experienced in all aspects of communications and network design and implementation. He is one of two network expert delegates for the U.S. serving on the International Organization for Standardization (ISO) TC97/SC6/WG5 (Network Architecture) technical committee, and is VP Engineering for Essential Resources Inc., New York.

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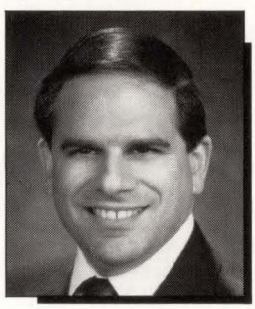
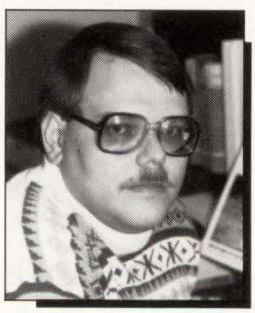


Victor J. Chorney

Victor J. Chorney has worked in data processing for 25 years and has held positions ranging from programmer to systems analyst, from remote system operator to systems programmer, from DP training manager to project manager. Vic has worked in many different application environments, including all areas of accounting (in which he holds a degree from Temple University), insurance, manufacturing, service industries and software development. He also worked at Digital for five years in a variety of positions in software services.

Vic currently is senior consultant in the Management and Technology Advisory Services department of Glickman, Berkovitz, Levinson and Weiner, a suburban Philadelphia accounting firm. He also is program chairman for the Delaware Valley Rainbow Users Group. Vic has an ongoing interest in microcomputers and has presented several sessions at DECUS and at various user-group meetings on relevant subjects.



Kevin G. Barkes

Kevin G. Barkes is a suburban Pittsburgh-based independent consultant. He specializes in VAX/VMS systems configuration, operation, tuning, management and training, as well as VAX-based large-scale publishing systems.

Prior to forming his consulting business, Kevin was systems manager of a Mid-Atlantic legal and financial printing company, manager of a small typesetting firm, coordinator of a governmental information-referral agency, and city editor of one daily and two weekly newspapers. ■

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For more information, contact Pansophic Systems Inc., 709 Enterprise Dr., Oak Brook, IL 60521; (312) 572-6000.

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Project Review Terminal Introduced By Calma

A new Project Review Terminal allowing designers to "walk through" complex 3-D computer models in real-time has been introduced by GE's Calma subsidiary for architecture engineering construction (AEC) CAE/CAD applications.

With the Project Review Terminal, designers of power plants, process plants, commercial buildings or ships can display conceptual alternatives, construction-ready designs or existing facilities quickly and easily. The terminal expedites the review process among designers, owners, constructors and regulatory agencies, and helps eliminate possible construction or maintenance problems, all while the project is still in electronic form.

Its starting price is $50,000 and can be delivered within 90 days ARO.

For more information, contact Calma Company, 2901 Tasman Dr., Santa Clara, CA 95050; (408) 748-9600. TWX: 910 338 2088.

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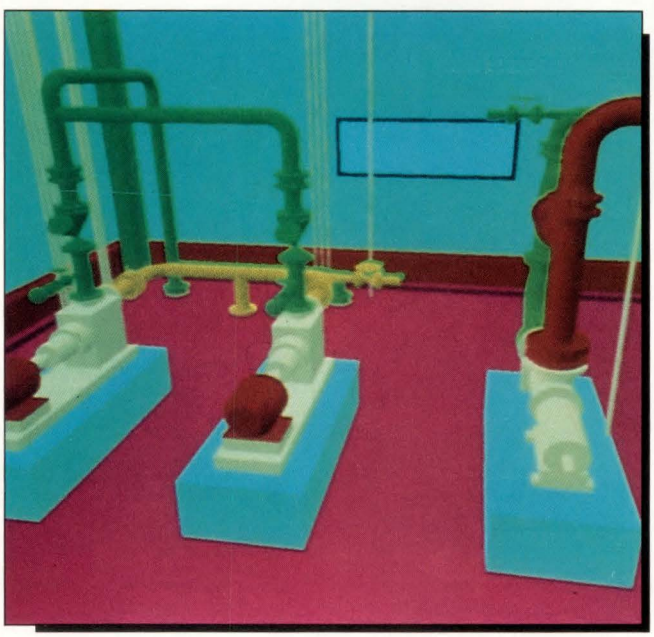

This image of a process plant is a solid-shaded 3-D computer model displayed on Calma Company's Project.

Auto-trol Announces Latest Release

Auto-trol Technology Corporation has announced the latest release of its TECH ILLUSTRATOR application software. TECH ILLUSTRATOR is a program consisting of powerful, easy-to-use drawing and annotation tools designed specifically for use by the professional illustrator in a technical publishing environment. The latest release contains enhanced graphics, text, and editing features accessed via on-screen menus. It also includes the ability to dynamically arrange the menu layout, message windows and multiple graphic viewports to match the illustration job requirements.

TECH ILLUSTRATOR 6.0 is available for use on DEC workstations, including the VAXstation II/GPX and the VAXstation 2000.

For more information, contact Auto-trol Technology Corporation, 12500 North Washington St., P.O. Box 33815, Denver, CO 80233; (800) 233-ATTC.

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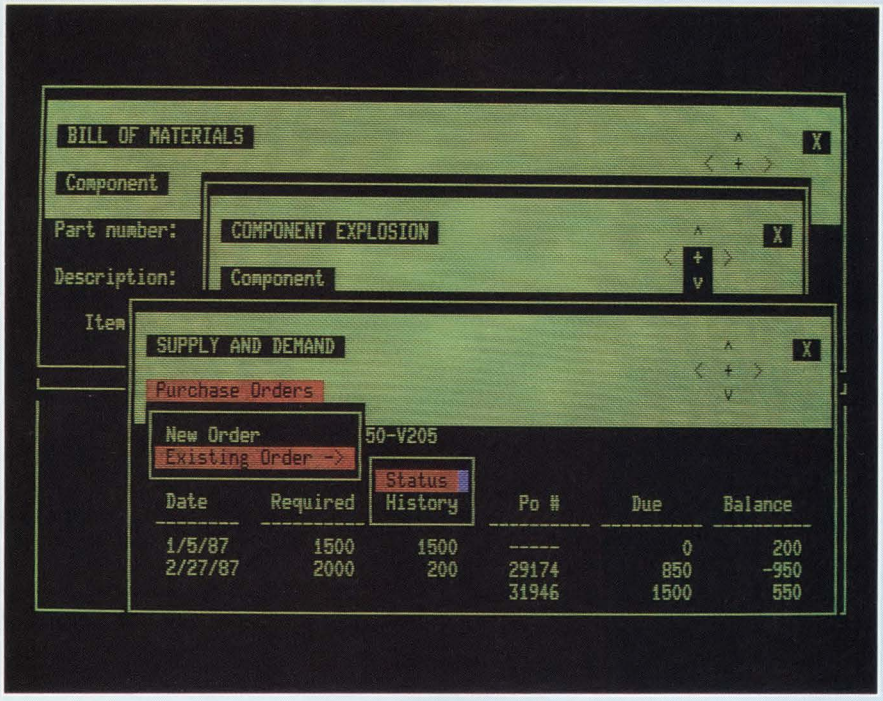
Tektronix Announces SA/RT and SD Tools

Tektronix Inc.'s Computer Aided Software Engineering Division announced that two new software products — Structured Analysis/Real-Time Tools (SA/RT), supporting both Hatley and Ward Methods, and Structured Design (SD) Tools (version 2) — now are available on VAX computers, MicroVAX II, VAXstations, and VAXcluster systems. SA/RT Tools automates modeling of real-time systems, and SD Tools automates software design.

SD Tools is a set of graphically oriented software development tools that automates the structured design method of software design. Version 2 transforms a real-time system model into alternative structured



SYBASE Available For Online Applications

Sybase Inc. has announced the first high-performance relational database management system designed for online applications. The SYBASE system is a SQL-based RDBMS for VAX/VMS and Sun/UNIX and provides the capabilities required for online applications: high-volume performance, DBMS-enforced data integrity, high availability, distributed database management, etc.

Sybase has two components: the DataServer and the DataToolset. The DataServer handles data management functions for all users on the system. The DataToolset provides a set of window-based tools for building and running applications on either character terminals or bit-mapped workstations.

To learn more, contact Sybase Inc., 2910 7th St., Berkeley, CA 94710; (415) 548-4500.

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designs and preserves data and control information from the system analysis, automatically including them in the system design to establish traceability from analysis to design.

The price for SA/RT Tools ranges from $5,400 for the VAXstation 2000 to $54,000 for the VAX 8800. SD Tools is priced from $3,600 to $36,000. If purchased together, the price ranges from $9,000 to $90,000.

For CASE sales information, contact CASE Division Marketing, Attention: SA/RT Tools and SD Tools, P.O. Box 14752, Portland, OR 97214; (800) 342-5548. In OR (503) 629-1573.

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LAS Analyzes Digital Imagery Data

COSMIC, NASA's Computer Software Management and Information Center, has announced LAS, a software system for manipulating and analyzing digital image data. LAS functions include image analyses such as clustering, classification, film processing, Fourier transforms, etc.

Data files that are accepted by LAS include formats such as LANDSAT, Thematic Mapper, and EDIPS. Geometric transformations include correction of LANDSAT distortion, grey-level correlation, mapping grids, coordinate system conversions, and other general cartographic transformations. LAS also provides functions for intensity transformation and multispectral processing. LAS will process images of up to 8196 pixels per line, with 8196 lines per image band.

LAS operates on a VAX 11/780 under VMS 4.0. Graphical output is designed for the Versatec plotter. The program also supports two display systems under VAX-supplied commands: the International Imaging Systems display processors and Hazeltine Interactive Analysis terminals.

For additional information, contact COSMIC, The University of Georgia, Athens, GA 30602; (404) 542-3265.

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Star Expands DEC Support

Star Technologies Inc. announced the development of ST-VAXBI-I, a 10-MB interface that links Star array processors to the VAX Bus Interconnect (VAZBI). The ST-VAXBI-I provides a fast and efficient interface to any VAXBI-based VAX host operating under VAX/VMS for the entire family of Star array processors.

The ST-VAXBI-I supports burst transfer rates of 10 MB per second on a dedicated VAXBI bus and up to 5 MB per second on a shared VAXBI bus. Multiple array processors may be attached to one VAX system, or multiple VAXs (Q-bus, UNIBUS or VAXBI bus interfaces) may share one array processor. The interface also supports all real-time system functionality of Star's high-performance array processors.

To learn more, contact Star Technologies Inc., 515 Shaw Rd., Sterling, VA 22170; (703) 689-4400.

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ICEX Releases New Version Of GRAPHkit

ICEX Inc. has announced Version 2.0 of its graphics software, GRAFkit. GRAFkit is a low-cost, integrated system of high-level utilities for presenting data visually through graphics in the VAX/VMS and MicroVMS environments.

Major enhancements in Version 2.0 include concurrent and interactive graphic output to provide the simultaneous display of the graphics while they are being computed. Versatile graphic output also has been added.

GRAFkit organizes large amounts of numeric data and converts them into a

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There's only one company that can say they're at the top of C.Itoh's list: Digital Equipment Corporation. Because when it comes to the company we keep, our printers and terminals run only with the best.

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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.

And the view doesn't stop here. C.Itoh's terminals are the perfect blend of price and performance and of quality and reliability. Pound for pound, there's none better. Nor more DEC-compatible.

Like our CIT224 terminal — completely VT220-compatible but with more desirable features, including a 14-inch screen, a 10 x 16 character cell, 11 set-up menus and 45 programmable key functions.

And the CIT101XL — to keep the fires burning in the VT100 market. Again, 100% compatible. But heavier on features than any alternative available. Even if DEC was still making its VT100.

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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graphic display. Its capabilities are well suited to generate scientific and technical graphics which include annotated graphs, contours, and scatter diagrams with a variety of different techniques for presenting two- and three-dimensional data fields. GRAKkit can generate a map from an internal cartographic database of world boundaries and allows the incorporation of user-specific data for data field overlays.

For more information, contact International Computer Exchange Inc., 740C South Pierce Ave., Louisville, CO 80027; (303) 666-5400. Telex: 292 682.

Enter 907 on reader card

Autodesk Announces AutoCAD VAX/VMS

Autodesk Inc., creator of AutoCAD, supports the VAXstation 2000 and VAXstation GPX workstations. Both Digital and selected authorized AutoCAD dealers will distribute the VAX version of AutoCAD 2.6 for these workstations under VAX. Shipment of this version will begin with the second quarter of 1987.

Drawings generated by AutoCAD version 2.5 or later under PC-DOS or MS-DOS are compatible with those generated by AutoCAD under VMS. Therefore, in an environment incorporating personal computers and multitasking VAX workstations, drawing can be exchanged between the two operating systems.

AutoCAD version 2.6 under VMS offers the same comprehensive drafting and design features as AutoCAD 2.6 under PC-DOS/MS-DOS and is priced at $2,850.

For more information, contact Autodesk Inc., 2320 Marinship Way, Sausalito, CA 94965; (415) 332-2344. TWX: 275 946. FAX: 415 331 8093.

Enter 953 on reader card

DECUS Australia Set For August

DECUS Australia will be held August 23-28 in Observation City, Perth. This year the theme is "Software: Getting Down to Business." The six-day convention is for all DEC users, and will include speakers, papers, presentations and exhibitions. Included at the symposium will be "Management Stream," an invaluable aid to data processing administrators who need to catch up on the latest DEC hardware and software developments.

For complete information, contact Carolyn Bennett, DECUS Australia, Locked Bag 26, Chatswood NSW 2067, Australia; (02) 412-7144

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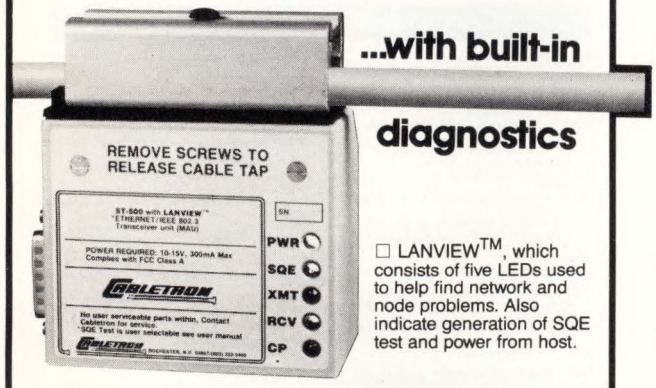
RFI Suppressors Protect Modems

Electronic Specialists recently announced the introduction of Phone Line RFI Suppressors. Designed to protect modems against RFI interference emanating from local radio or

Ethernet Transceiver ST-500



...with built-in diagnostics

☐ LANVIEW™, which consists of five LEDs used to help find network and node problems. Also indicate generation of SQE test and power from host.

☐ Heartbeat (SQE) test can be configured or disabled without disassembling the unit. Therefore, you need inventory only one transceiver type.

☐ Compatible with Ethernet Versions 1.0 and 2.0 and IEEE 802.3 specifications. Recognized by: UL-478; CSA 220; VDE 0806; VDE 0871, Class B; IEC 380; FCC Part 15, Subpart J, Class B; and NEC 725-2(b).

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

Ask for literature and prices.

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EXADICA Software, Inc.

P.O. Box 22822
Lexington, KY 40522
(606) 269-6971

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TV stations, these units also have proved effective against police, taxi and CB interference.

Natural RFI from lightning and other spheric discharges, often affecting phone lines, are attenuated as well.

Priced from $30, the PD/RFS models are available in a wide variety of connectors to accommodate all installations.

To learn more, contact Electronic Specialists Inc., 171 S. Main St., P.O. Box 389, Natick, MA 01760; (800) 225-4876.

Enter 909 on reader card

FSC Assumes Maintenance On HSC's DEC Equipment

McDonnell Douglas Field Service Company (FSC) assumed maintenance on approximately 50 percent of McDonnell Douglas Health Systems Company's (HSC) installed base of DEC equipment.

Included in this contract are 60 systems comprised mostly of PDP-11 and some VAX systems. A maintenance program was developed by FSC's Business Planning and Sales groups. The program, representing a comprehensive plan for the assumption and continued support of DEC-based hardware for the Field Service Company, was introduced in Atlanta, St. Louis, Chicago and Washington D.C. in late January.

For further information, contact McDonnell Douglas, Field Service Company, (714) 250-7205.

Enter 910 on reader card

V-X MASTER-2000 Is For VAX 2000 Series

American Management Company, developer of system management software for VAX computers, has announced V-X MASTER-2000, a new addition to its V-X MASTER family. A user friendly system management tool, V-X MASTER-2000 allows VAX 2000 owners to perform all the system management functions required to use their system without extensive training in VMS and without referencing manuals.

V-X MASTER-2000 is a menu-driven system that provides easy-to-use functions in each area of system management including managing users, ports, disk space, queues, security, and backing up the system. V-X MASTER-2000 provides extensive error checking, has complete on-line help and on-line documentation that teaches fundamental VMS concepts while allowing users to do productive work immediately after the product is installed.

V-X MASTER-2000 is priced at $895. For further information, contact American Management Company Inc., 420 Bedford St., Lexington, MA 02173; (617) 861-6262.

Enter 911 on reader card

Color Plotting System Offered By Benson

Benson's single-pass color electrostatic system gives an E- sized color plot in as little as 3.8 minutes. All colors are plotted simultaneously at 0.3 inch per second in a single pass. At 254 dpi resolution, the writing head delivers over 60 percent more resolution than 200 dpi multipass color electrostatic plotters.

In Benson's single-pass color plotting system, the paper passes by the four stationary color heads only once, eliminating the paper stretching that can occur in multipass plotters as the paper is pulled back and forth over the heads four times. The complex

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- Program test & development tools
- Full documentation
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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)
LOSHOW* 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
CRSEG* 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

*A 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 touted 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 Suppt required)

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System 1032 is one of the most powerful 4GLs for applications development on the VAX. If you need screen-based applications development, you should see what we've been doing. And take a look at the PC integration/PC workstation ideas CompuServe is adding.

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hydraulic systems needed to raise and lower toner baths in multipass plotters also have been eliminated. Benson's proprietary writing/toning stations remain stationary as the paper passes by in a single pass.

Data storage in the host computer is virtually unnecessary since complete plot files are stored in the CES. Both memory and hard disk configurations are available. A total of 2 MB of high-speed RAM and special-purpose VLSI combine to perform the high-end, color applications involving complex graphic elements and fill areas.

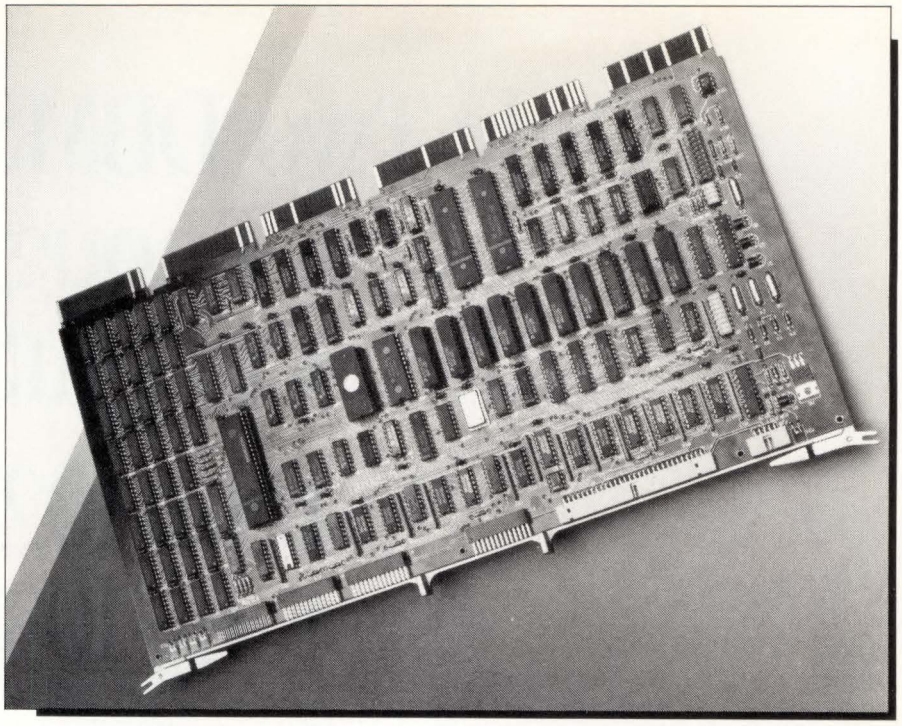
To find out more, contact Benson, 385 Ravendale Dr., P.O. Box 7169, Mountain View, CA, 94039-7169; (415) 964-7900.

Enter 901 on reader card

Webster Unveils New SMD Disk Controller

Webster Computer Corporation has released what it claims to be the DEC world's first cached UNIBUS SMD/SMD-E disk controller to implement DEC's MSCP (Mass Storage Control Protocol).

The new HEX-height disk controller (WUSMD) is being aimed worldwide for



The WUSMD, from Webster Computer Corporation, is a cached UNIBUS SMD/SMD-E disk controller.

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disk upgrade subsystems to suit users of PDP-11/84, 44, 34 and 24 UNIBUS CPU designs, as well as all VAX CPUs containing UNIBUS.

Featuring up to 3-MB per second transfer rate, the WUSMD flexibly couples these disk drives of various sizes and data rates to all DEC standard operating systems without software modifications.

The WUSMD sells for $3,020.
To find out more, contact Webster Computer Corp., 1037 N. Fair Oaks Ave., Sunnyvale, CA 94089-2183; (408) 745-0660.

Enter 916 on reader card

MM-Series And F-Series UPS Systems Introduced

Sutton Designs Inc. has introduced the MM-Series and F-Series UPS Systems. The MM-Series UPS systems are offered in 250 watt to 1,000 watt sizes. The F-Series UPS Systems are continuous online sine wave UPS systems and are offered in 3 KVA to 15 KVA sizes. Both units have ZX-5000 extended range surge/spike/noise protection circuitry built in to filter out worst case power line surges, oscillatory RFI and EMI noise, and voltage transients, assuring that only clean, filtered AC power ever enters the protected computer system.

The F-Series UPS systems also include computerized self-diagnostic monitoring and a control package that monitors all system modes, alarm conditions, 12 power parameters, creates an outage log, and can be displayed on the LCD included or simultaneously at a remote computer terminal through the built-in RS-232 port.

The MM-Series UPS systems are priced between $399 and $1,399. The F-Series UPS Systems are priced between $5,995 and $14,995 complete with battery packs.
To learn more, contact Sutton Designs Inc., 300 N. Tioga, Ithaca, NY 14850; (607) 277-4301.

Enter 913 on reader card

Trimarchi Offers Low-Cost Removables

Users who require removable Winchester hard drives no longer have to pay a premium to get them. Trimarchi Inc. has unveiled a line of low-cost removable 5.25-inch disk subsystems. The subsystems range in size from 34 MB to 2400 MB.

A 640 MB subsystem is $13,700.
For more information, contact Trimarchi and Associates Inc., P.O. Box 560, State College, PA 16804; (814) 234-5659.

Enter 915 on reader card

Promod Unbundles CASE Tools

Promod Inc. has announced an unbundling of its computer-aided software engineering (CASE) integrated environments. ProMod/SA, is a Yourdon/deMarco-based structured analysis module; ProMod/RT, a structured analysis module with real-time extensions; and ProMod/MD, a modular design and pseudocode language module.

Unbundling lets CASE tool users buy individual CASE modules from one vendor as needed, with the assurance that a complete software lifecycle CASE program can be assembled without any compatibility or interface problems.

The minimum hardware configuration required to run ProMod on a PC is 640K of memory and 10 MB hard disk storage. All VAX products operating under VMS are

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supported. Analysis and design data can be exchanged between the VAX and personal computer systems at any time during the cycle.

Pricing for ProMod licenses depends on system requirements, with total package prices for PCs beginning at under $8,000, and package prices for the VAX beginning at under $24,000.

To find out more, contact Promod Inc., 23685 Birtcher Dr., El Toro, CA 92630; (714) 855-3046.

Enter 914 on reader card

Sherpa DA-DMS Designed For Engineering Groups

Sherpa Corporation has announced a distributed version of DMS, capable of residing on multiple VAX/VMS computers in a DECnet environment. Sherpa DA-DMS (Distributed-Access Design Management System) software automates the management of design files by tracking the overseeing associated design data throughout complex design processes. By establishing comprehensive management control over all aspects of the design process, Sherpa systems shorten product development cycles, increase productivity and reduce redesign and scrap costs.

Sherpa DA-DMS can be used in conjunction with VAX clusters, where the cluster acts as a single CPU. Companies can first automate design process management in one group or division with the original DMS product, then expand the system across many groups and divisions with the distributed-access Sherpa system.

A minimally configured DA-DMS encompassing one host on a VAX, one remote on a DEC MicroVAX, and network servers is priced at $70,500. Current Sherpa customers can upgrade their DMS system for approximately $20,000.

For more information, contact Sherpa Corp., 611 River Oaks Pkwy., San Jose, CA 95134; (408) 433-0455.

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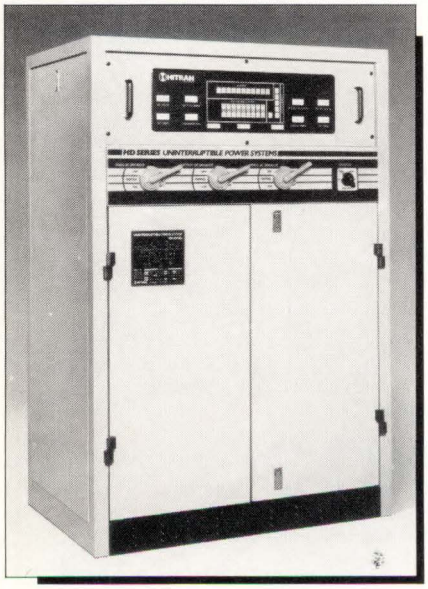


Hitran Corporation's HD series of online uninterruptible power systems.

HD Series UPS Protects Heavy Industry

Hitran Corporation introduced a new HD Series of online uninterruptible power systems (UPS) designed to protect computers and other sensitive devices in critical, heavy duty industrial applications. They are intended for use with process and/or manufacturing control computer operations where power interruption can't be tolerated either in an emergency or even for normal maintenance of the UPS. These units are built to the highest levels or reliability and are designed to be safe and easy to test, service and maintain without disrupting power to the critical load.

A front mounted control panel shows the entire UPS operating and alarm status and allows six separate commands to be executed via membrane switches. Eleven different alarm conditions can be monitored via front panel red LEDs and via optional remote indicators and alarm devices operated by a contact closure. Nine status indicators show the condition of all major subsystems via green or yellow LEDs. Front panel mounted magnetic circuit breakers also are supplied for the main AC input, battery DC power and bypass AC input.

For more information, contact Hitran Corporation, 362 Hwy. 31, Flemington, NJ 08822; (201) 782-5525.

Enter 918 on reader card

Wyse Technology's WY-99GT offers full ANSI, ASCII and PC terminal compatibility plus graphics.

WY-99GT Offers Compatibility, Graphics

Wyse Technology announced a terminal that offers full ANSI, ASCII and personal computer terminal compatibility plus graphics in one affordable unit. The product is available through distributors and VARs in the U.S.

Wyse's powerful new WY-99GT offers flexibility with more than a dozen compatibility modes for text and graphics applications. Its multiple keyboard options allow users to work in the ANSI/VT-220, multiuser PC or ASCII terminal environments.

In the DEC (VAX/ULTRIX) environment, the WY-99GT offers both VT220 compatibility and high resolution, plus graphics — at a price lower than the text-only VT220.

Wyse's WY-99GT sells for $649.

For more information, contact Wyse Technology, 3571 N. First St., San Jose, CA 95134; (408) 433-1000. Telex: 371 9730. FAX: 408 946 3496.

Enter 922 on reader card

Enhancements Improve VAX/VMS Compatibility

Celerity Computing announced system enhancements that expand the capabilities of its entire line of computer systems.

The enhancements speed the performance of applications developed on Celerity systems by up to 35 percent, double the number of online users supported, and allow many software programs written for VAX/VMS systems to be ported easily to Celerity systems. All system improvements are due to enhancements in Celerity's system software, including its UNIX operating system and optimized language compilers.

Learn more by contacting Celerity Computing, 9692 Via Excelencia, San Diego, CA 92126; (619) 271-9940.

Enter 919 on reader card

SETPOINT Provides TDC Package

SETPOINT INC. in a joint project with Petro-Canada Products Inc. has announced the TDC-3000 communications package. The TDC-3000 runs on VAX architecture, including the MicroVAX II. Other features include X.25/HDLC/LAP B Network protocol between VAX and TDC-3000 and X.25 Network protocol support provided by standard DEC hardware/software. The FORTRAN-based package is configurable to support multiple Honeywell TDC-3000 Computer Gateways and multiple concurrent users per VAX CPU.

For more information, contact SETPOINT INC. at 950 Threadneedle, Houston, TX 77079; (713) 496-3220.

Enter 920 on reader card

SI Announces Removable Winchester Disk Drive

System Industries Inc. has announced the Quick Disconnect System, which allows small form factor disk drives to be removed easily from enclosures and secured in remote vaults, safes and cabinets.

Formatted capacities of removable SI drive modules currently range from 320 MB in the 5¼-inch package to 522 MB in the 8-inch form. Removed from a Quick Disconnect enclosure chassis, each lightweight drive module is interchangeable among all other SI Quick Disconnect chassis of corresponding 5¼-inch or 8-inch size.

The 5¼-inch Quick Disconnect System and the 8-inch model are available with prices varying, depending on configuration. For example, a 2-drive 5¼-inch Quick Disconnect System in a 19-inch rack will range from $16,900 to $19,400.

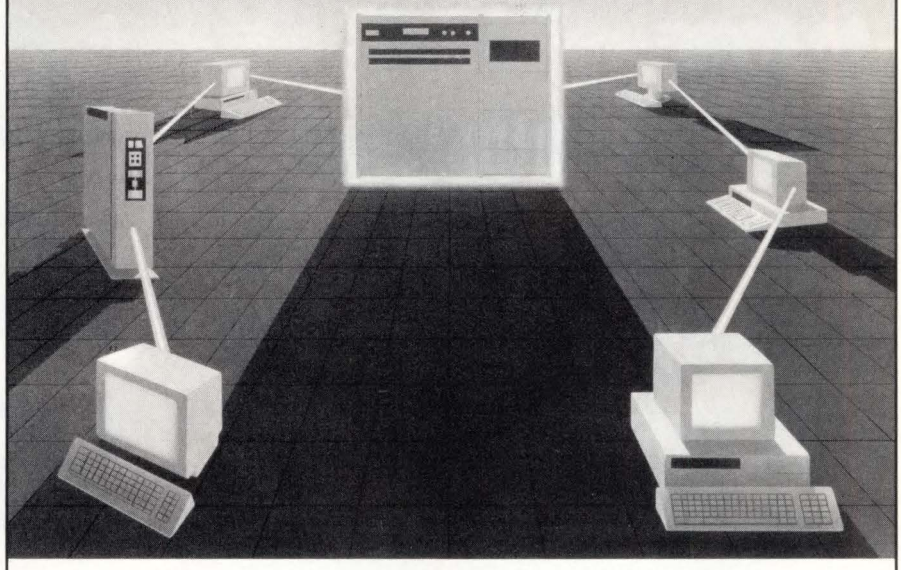
For more information, contact System Industries, 560 Cottonwood Dr., Milpitas, CA 95035; (408) 432-1212.

Enter 921 on reader card

VAX-To-PBX Interface Unveiled By ACC

Advanced Computer Communications (ACC) unveiled its ACP 6640, a front-end processor that connects a VAX computer to any PBX possessing AT&T's Digital Multiplex Interface (DMI) protocol. It will bring

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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OEM inquiries welcome

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terminal users a means of access to the VAX through a high-speed connection to the PBX. The ACP 6640 is the next member of ACC's Advanced Communication Processor product line. It achieves high-data throughput by combining two Motorola 68000 12 MHz microprocessors with ACC's QUADbus architecture.

The ACP 6640 is a two-board set that supports 23 asynchronous data channels, each with data rates up to 19.2 Kbps. It functions as if 23 auto-answer dial-out modems were connected to the VAX through the PBX telephone system, but instead, only three twisted-pair lines are needed. The lines appear to the VAX as locally attached terminal devices capable of full-duplex data transfer. The ACP 6640 supports remote login, file transfer, full-screen editor functions, and database access.

To find out more, contact Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, CA 93101; (805) 963-9431. TWX: 910 334 4907.

Enter 917 on reader card

Cadre Expands With Teamwork/IM

Cadre Technologies recently announced Teamwork/IM, a fully integrated information modeling module that rounds out their suite of computer-aided software development tools. Teamwork users can perform analysis of complex systems from any or all important viewpoints.

Teamwork/IM is a graphics-based, entity-relationship diagram editor based on, industry standard, Chen notation. The editor understands entity-relationship diagram modeling rules, and is combined with powerful consistency and completeness checkers that enable analysts to develop models faster and with a greater degree of accuracy. Also, the data definitions associated with the entities and relationships can be generated automatically with user-configurable physical and logical attributes.

Teamwork/IM is priced at $3,600 as an add-on to other TEAMWORK products, or at $8,900 as a standalone product.

Find out more by contacting Cadre Technologies Inc., 222 Richmond St., Providence, RI 02903; (401) 351-5950.

Enter 924 on reader card

CS09 Designed For DEC Q-Bus Computers

Emulex Corporation introduced the CS09, a dual-wide Q-bus communications multiplexer designed for small- to medium-range terminal applications.

The CS09 is a DHV11-compatible communications multiplexer that handles 16 asynchronous RS-232 lines. It consists of a single dual-wide controller board, plus a choice of distribution panels. The CP09 distribution panel provides full modem control for both full- and half-duplex connections to phone lines, while the CP09/J modular jack panel has modular jack connectors and no modem control.

The CS09 sells for $1,600 with full modem control or $1,400 with no modem control.

For further information, contact Emulex Corp., 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626; (714) 662-5600 within CA and (800) EMU-LEX3 outside CA.

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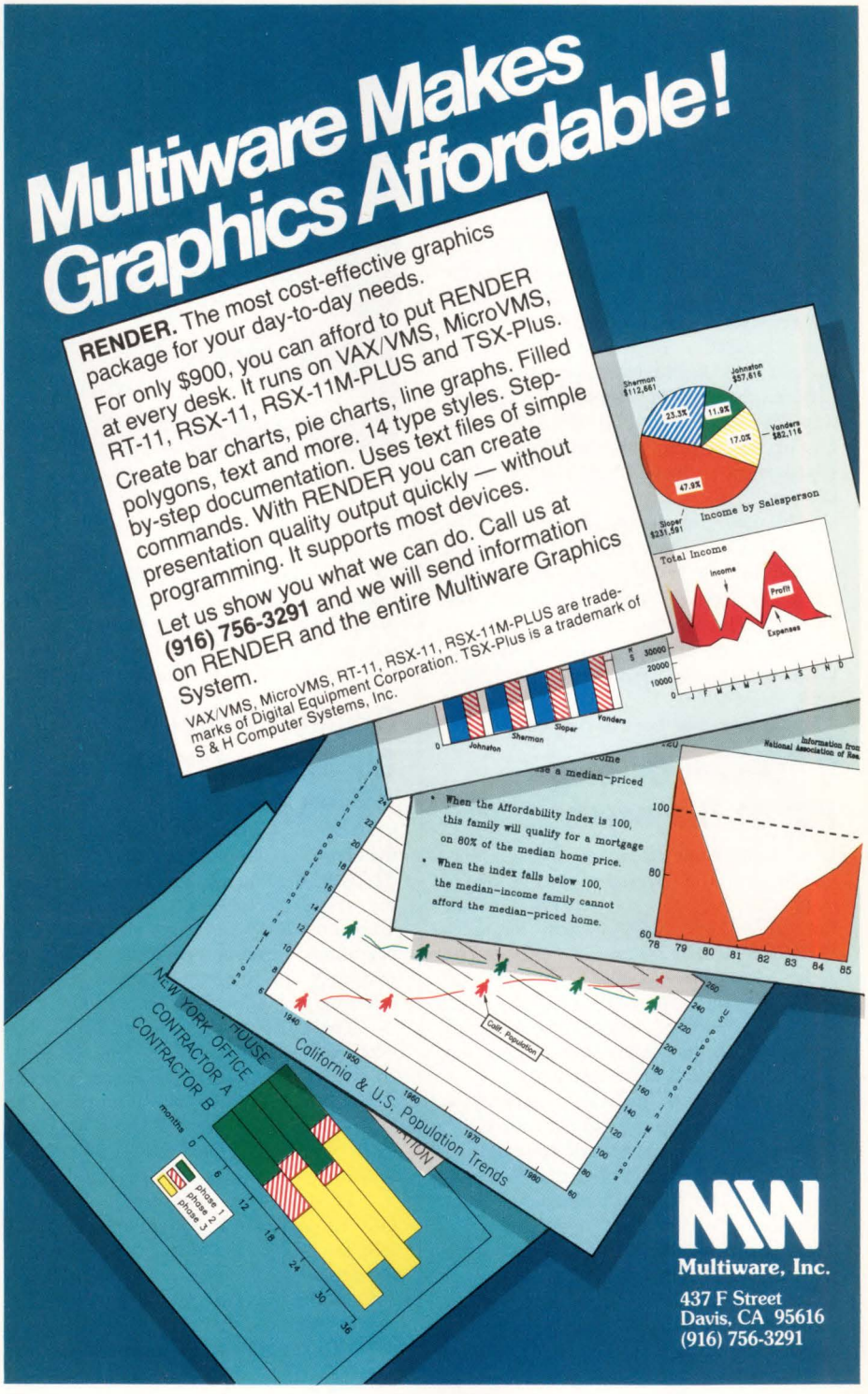

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BLOX/TEMPLATE Hardware Versions Introduced

Template Graphics Software has released versions of the BLOX/TEMPLATE User Interface Management System for equipment manufactured by Masscomp, Sun Microsystems, Silicon Graphics and DEC.

BLOX/TEMPLATE is a user interface management system that accelerates the development of graphics applications. BLOX/TEMPLATE provides the software tools necessary to prototype portions of an engineering or scientific graphics application, and "test drive" it without writing a line of code. It is compatible with VMS, ULTRIX and UNIX.

BLOX/TEMPLATE consists of PICTUREDIT, a generalized graphics editor for creating icons, symbols and full diagrams; TABLEGEN, an interactive screen editor for creating menus, work and message areas on the graphics screen; HELPGEN, for automatic generation of online help files; an Interaction-Handler that creates the linkage between the user-interface and the application subroutines; and TEMPLATE, a full 2-D or 3-D graphics subroutine system that supports more than 175 different graphics devices.

An end user license for the BLOX/TEMPLATE product ranges in price from $13,000 to over $50,000, depending on the computer system being used and the TEMPLATE software options selected.
To find out more, contact Template, 9645 Scranton Rd., San Diego, CA 92121; (619) 455-5590.

Enter 923 on reader card

Quickware Develops PDP-11 Diagnostics

Quickware Engineering & Design Inc. announced the availability of DEC-compatible diagnostic software programs for the QED 11/85 CPU, which upgrades PDP-11/04, 24, 34 systems, and others. The eight Quickware-specific programs are designed to report processor configurations, test CPU operation, verify floating point operations, diagnose the cache memory and test line clock and serial line units.

The products include programs to diagnose the operation of Quickware QED 11/85 CPU board, diagnostic programs to test the memory and I/O map in Quickware systems and DEC diagnostics to test all other peripherals.

Full documentation is provided for the individual programs and for configuring a system exerciser. The diagnostics are available for $300 plus a media charge; 1600 bpi magtape media is $30.

To find out more, contact Quickware Engineering & Design Inc., 139 Brighton Ave., Boston, MA 02134; (800) 237-1185 outside MA and (617) 782-8330 in MA.

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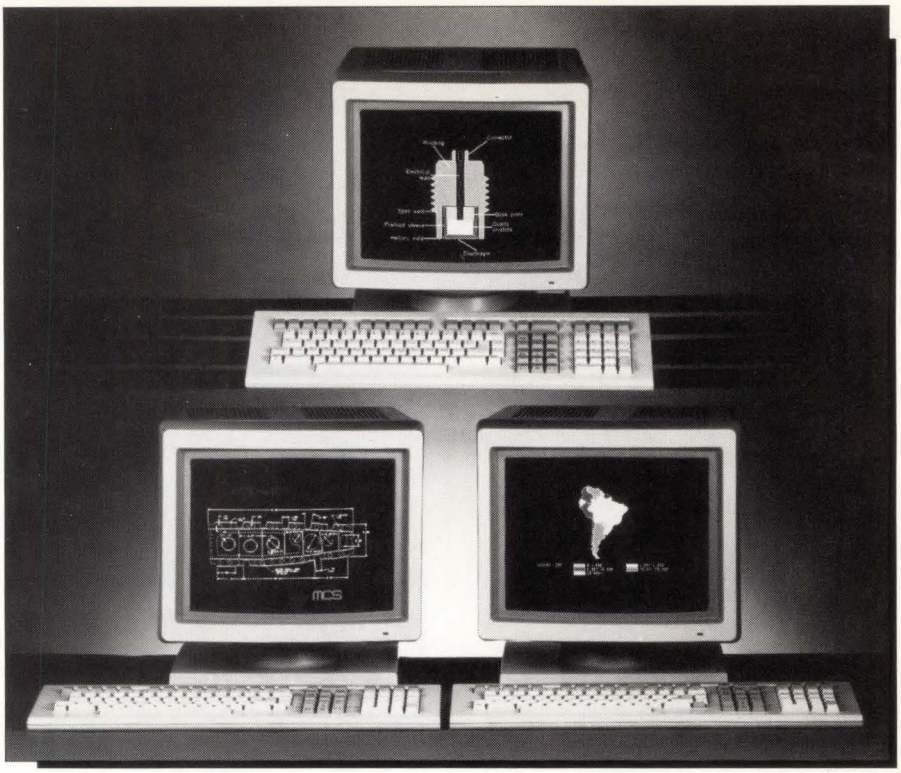

The GO-400 series of color composite terminals from GraphOn Corporation.

GraphOn Announces GO-400 Series

The GO-400 series is GraphOn's family of color composite terminals. The series features the first color composite terminal user of the TI TMS34010 Graphics Systems Processor for faster throughput, high-resolution Trinitron CRT, providing sharp focus, high brightness, freedom from doming and high frequency and image size optimization for differing emulations and resolutions.

The GO-405 emulates the Tektronix 4205 and supports ReGIS. The GO-407 emulates the Tektronix 4207, and it provides ReGIS and full VT220 alphanumerics. The GO-411 emulates the Tektronix 4111 and 4207, with ReGIS and full VT220 alphanumerics.

The GO-405 sells for $2,995, the GO-407 sells for $3,795 and the GO-411 sells for $5,995.
For further details, contact GraphOn Corp., 1901 South Bascom Ave., Campbell, CA 95008; (408) 371-8500.

Enter 958 on reader card

MAP/TOP 3.0-Compatible OSI Software Announced

Touch Communications Inc. recently announced products that conform to the MAP/TOP 3.0 specification. The new products have a transparent user interface that lets users view an entire network of dissimilar computers as a simple extension of their local system; precluding the need to retrain users or rewrite existing applications when migrating to OSI.

Touch OSI is available for the DOS and VMS operating systems as well as for porting to other operating systems. The product runs on IBM PC and PC-compatibles and on the VAX family.
For more information, contact Touch Communications Inc., 10 Victor Square, Scotts Valley, CA 95066; (408) 438-4800.

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Business Graphics Use Unmodified VT220s

William A. Pedersen and Associates announced GRAPH220 Business Graphics Software for the VT220 and comparable ANSI terminals. Users who previously could only view data as tables or needed more expensive graphics terminals now can develop

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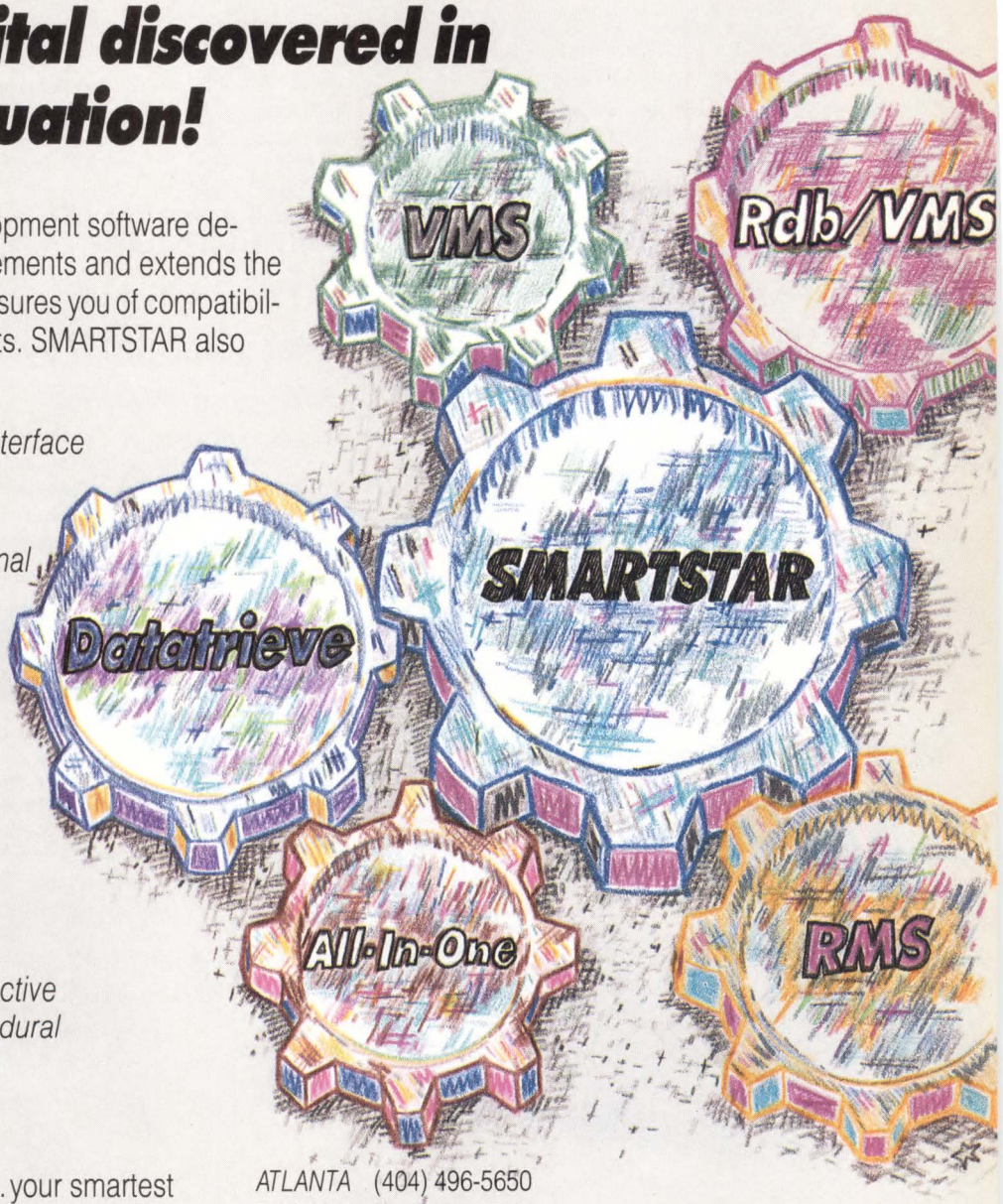
- *A unique, bi-directional "bridge" which allows SMARTSTAR to access 3GL languages, and allows SMARTSTAR to be accessed by any VAX 3GL language.*
- *And now... ANSI-compliant Interactive SQL, with full reporting and procedural extensions!*



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and display business graphics on VT220s or compatible terminals without additional hardware. GRAPH220 runs as an applications program under DEC's VAX/VMS operating system.

Features include four basic chart types with 12 variations, interactive keyboard interface, flexible data entry, online context-sensitive HELP, etc.

List price for MicroVAX and VAX II systems is $795; for VAX 8000 series machines the license lists at $1,495.
For further information, contact William A. Pedersen and Associates, 1037 N. Fair Oaks Ave., Sunnyvale, CA 94089; (408) 735-9511.

Enter 930 on reader card

Chesapeake Software Introduces SDC

Chesapeake Software has introduced SDC, a serial data capture program for the VAX and MicroVAX. SDC provides simple, programming-free capture of data from many instruments with serial interfaces, such as RS-232C, RS-422, RS-423 and current loop. Data may be logged in files, or moved directly into RS/1. The features of SDC include full control of the serial line name, output filenames, start- and end-of-file trigger, and maximum number of files created per run. You can specify the prompt string sent to the instrument, the frequency of prompting for data, length of time for each collection, the length of each data record and whether a timestamp is placed in each record.

SDC is written in FORTRAN-77 and runs under VMS. The package includes the SDC executable image and complete documentation for installation and use.

The price is $495 for a MicroVAX 11/750, $695 for a VAX 11/780-8500, and $895 for a VAX 11/8600-8800. The RS/1 interface is $200 and requires RS/1 and RS/1-HLI licenses as well.
To learn more, contact Chesapeake Software Inc., 2500 Grubb Rd., Wilmington, DE 19810; (302) 475-5229.

Enter 935 on reader card

ACT Announces Ada/1750 Cross Compiler Release

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

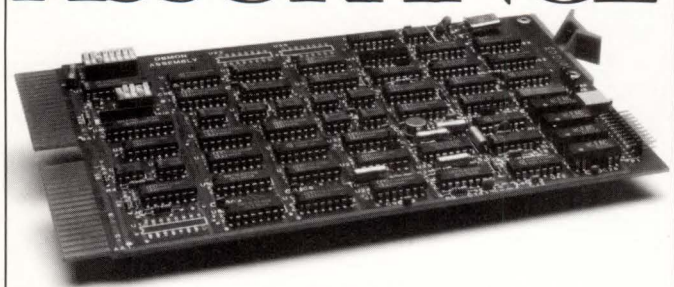
ACT's Ada Compilation System has a compact, efficient and flexible run-time executive, mature toolset (including assemblers and linkers), and full language support. Host computer improvements include faster compilation speed and reduced resource use. This was achieved by reducing the number of processes, the amount of disk I/O, and the overhead of accessing the program library. To learn more, contact ACT Corp., 16 E. 32nd St., New York, NY 10016; (212) 696-3600.

Enter 927 on reader card

Xeta Releases 8-Port Multiplexer

A DEC DL11-W and Atex-compatible multiplexer that supports up to eight local devices and has a Z80 processor and 64K RAM on-board has been introduced by Xeta Incorporated. The Xeta Octoport general-

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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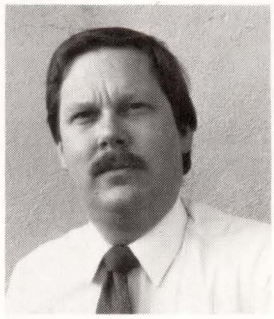

"All in all, we are very pleased with GABA's RealWorld system. We find the code to be highly consistent and much easier to modify and support. Our customers like the User Manuals and the whole presentation is very professional. As a result, we now spend more time selling systems than supporting them."

Mr. Dirk Epperson
Performing Arts Technology
Berkeley, California

RealWorld may be the best solution for you, too. The system includes Accounts Receivable, Order Entry/Invoicing, Inventory Control, Sales Analysis, Payroll, Accounts Payable, Purchase Order, Job Cost, and General Ledger for either the PDP-11 or any VAX/MicroVAX under VMS.

Contact GABA for descriptive literature and pricing.

GABA

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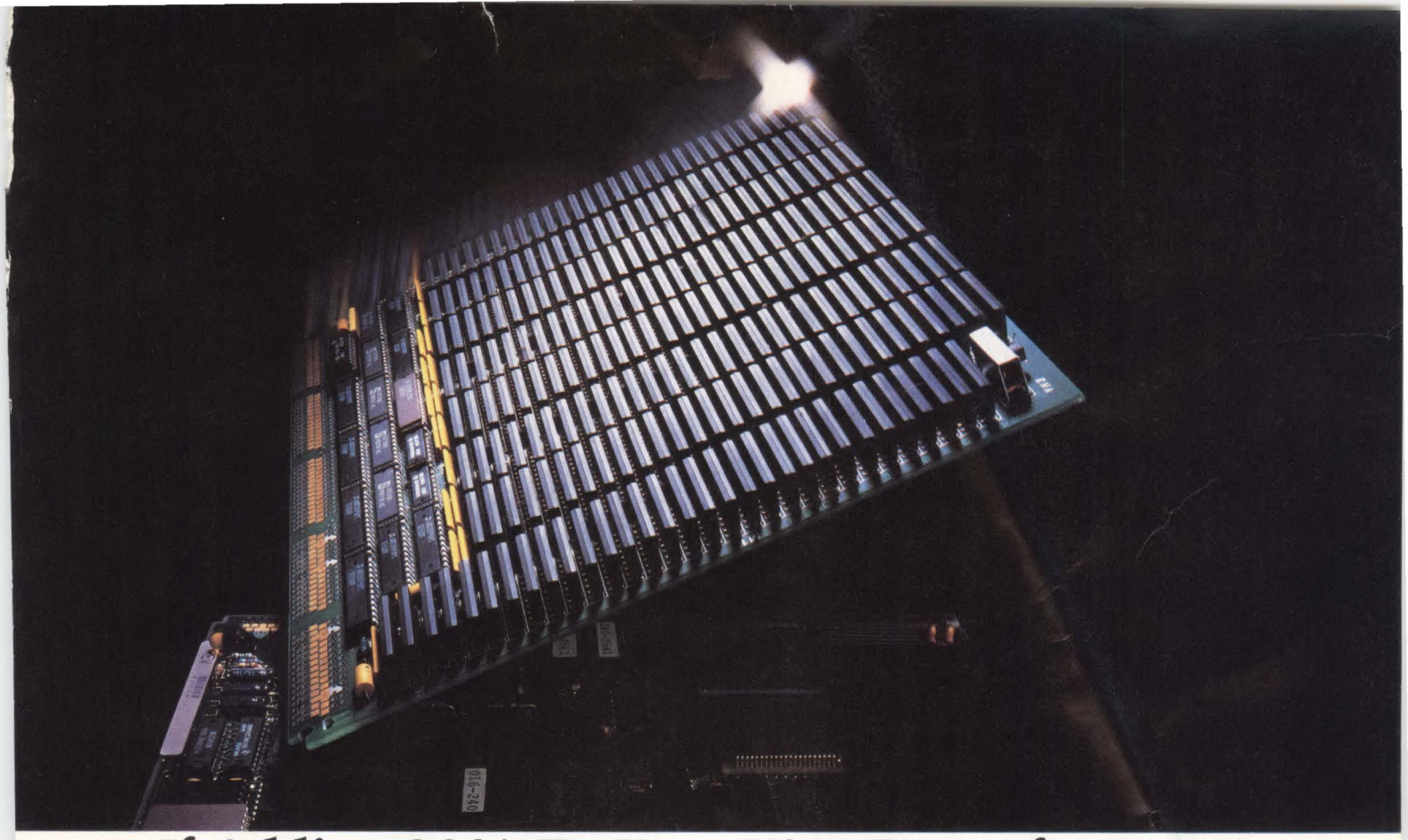

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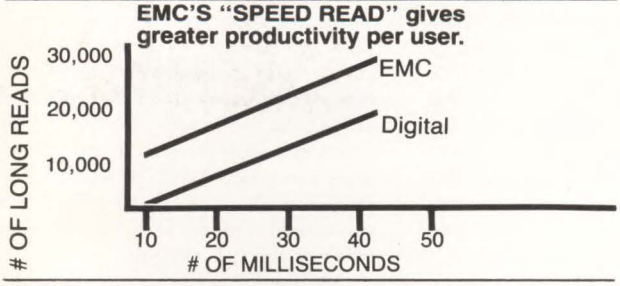

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To stand behind that quality, EMC guarantees the boards to last the life of your system. If you ever suspect a problem, we'll supply a replacement overnight. Or, if you require more immediate service, you can choose from a selection of 4-hour response programs.

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purpose multiplexer is a single quad height UNIBUS board that supports up to eight local devices and has full modem control on Port O which can be configured separately from the other seven ports. Featuring a Z80 processor with 64K RAM, it can be down loaded with specific applications programs.

Supporting simultaneous baud rates of 300, 600, 1200, 2400, 9600, and 19.2K, the Xeta Octoport provides internal self-tests, has a 4K data buffer and uses no software overhead. It is fully software compatible and the UNIBUS interface is a DEC DL11-W look-alike with CSR break and maintenance bits.

The Xeta Octoport general-purpose multiplexer sells for $2,395.

For more information, contact Xeta Inc., 51 Lake St., Nashua, NH 03060; (603) 881-8122.

Enter 931 on reader card

Cybernex Limited Enters Mobile Data Market

Cybernex Ltd. introduced its new line of mobile data products. They include a network, a network controller, a mobile packet radio controller and a vehicle-mountable terminal. The vehicle-mounted MT-10 Mobile Packet Radio Controller connects any RS-232 asynchronous terminal or laptop PC to MNET.

The outstanding operating feature of the MT-100 is its "micro" instruction set. This allows application designers to create the terminal's instruction set and to load each soft key with a macro sequence.

Cybernex also has developed a full-scale Computer Aided Dispatch System (C-CADS) for the light transport industry. Designed to run on MicroVAX II, VAX, PC AT computers and IBM mainframes, C-CADS can be implemented over existing private mobile radio networks through the MC-10 Network Controller and MT-100 vehicle-mounted terminals.

To learn more, contact Cybernex Limited, 1257 Algoma Rd., Ottawa, Ontario, Canada K1B 3W7; (800) 267-3660.

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Pecan Releases Enhanced FORTRAN-77

Pecan Software Systems Inc. enhanced its FORTRAN-77 compiler. Enhancements include support for TYPE COMPLEX, the "EER+" option, list-directed I/O, support for IEEE standard two and four word reals values, string subset and concatenation routines and the PARAMETER statement, among others.

Pecan's languages are part of the Power System, an integrated family of program development tools. The Power System is available for most popular mini and microcomputers, including the Apple II, Macintosh, IBM PC and compatibles, PDP-11, VAX, TI, Tandy and others. Applications developed using the Power System are portable. The Power System languages are integrated, so that applications can be developed in multiple languages.

The FORTRAN-77 compiler is $99.95. Complete information is available from Pecan Software Systems Inc., 1410 39th St., Brooklyn, NY 11218; (718) 851-3100.

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Cybercredit II Expanded For Small/Medium Banks

A new microcomputer-based credit collection system for small- and medium-size banks and financial institutions has been introduced by Control Data's Cybercredit Financial Systems.

Cybercredit's comprehensive collection management software now runs on the MicroVAX II. The system can support up to 16 credit collectors and manage multiple delinquent loan portfolios. It can link to multiple host processors allowing Cybercredit II to access a wide range of new data on borrowers, such as social security numbers, insurance claims and bank account numbers.

Cybercredit II costs $125,000 to $150,000, depending on the number of collector terminals needed. It also is available for medical, retail and government applications.

For more information, contact Cybercredit Financial Systems, 7822 Bonhomme Ave., St. Louis, MO 63105; (314) 862-7700.

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Integrated Spreadsheet Introduced For FOCUS

Information Builders Inc. has announced the introduction of FOCCALC, a fully-integrated spreadsheet for use with FOCUS, a 4GL DBMS. FOCCALC spreadsheets and data can be uploaded or downloaded between FOCCALC running under VAX/VMS and PC/FOCCALC running with PC/FOCUS under MS-DOS. Spreadsheets created with LOTUS 1-2-3 can be transferred to PC/FOCCALC and uploaded into FOCCALC to take advantage of the processing power of the VAX as well as to make these spreadsheets available to multiple users.

FOCCALC for VMS requires Release 1.3 FOCUS on VAX/VMS. A one-time license fee ranges from $1,600 for MicroVAX and VAXstations to $12,000 for VAX 8800 and larger. FOCCALC for VAX/VMS is available immediately.

For more information, contact Information Builders Inc., 1250 Broadway, New York, NY 10001; (212) 736-4433.

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EXOS 205T Expands PC LAN Connections

Excelan Inc. has introduced a high-performance intelligent PC controller board that brings increased flexibility and lower cost to departmental and workgroup LAN computing. The EXOS 205T board expands Excelan's family of PC LAN products. It allows IBM PCs and compatibles to communicate with other PCs and with dissimilar host computers over standard thick Ethernet or lower-cost thin Ethernet or lower cost thin Ethernet cable.

Excelan has reduced LAN connection costs by building into its EXOS 205T and Ethernet transceiver along with connectors for both thin and thick Ethernet. EXOS 205T has 256K or RAM with zero-wait states. When combined with the EXOS 8000 series, the EXOS 205T provides complete communications solutions for PCs using PC-DOS, PC-XENIX or RT-AIX operating systems.

TCP/IP networking software also includes PC-to-host applications for high-speed file transfer and virtual terminal connections (TELNET), with VT100, VT52 and/or IBM-ANSI terminal emulations.

For more information contact Excelan Inc., 2180 Fortune Drive, San Jose, CA 95131; (415) 354-4458.

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3CI Markets InFoCen For DEC Systems

3CI Incorporated has signed an agreement with WordPerfect Corporation to become a WordPerfect Reseller. 3CI develops and markets InFoCen, an information management and application development system for DEC and other computer systems. The company recently completed testing on a preliminary integration of InFoCen's relations DBMS and the WordPerfect shell and library functions. WordPerfect word processing users can access InFoCen from the WordPerfect shell or access WordPerfect while executing InFoCen. Data may be migrated between the two systems.

3CI will continue to develop additional levels of WordPerfect integration. According to 3CI, the integration will complement InFoCen's textual data management capabilities and WordPerfect's file management functions. To obtain further information, contact 3CI's Corporation office at 155 W. Harvard, Fort Collins, CO 80525; (303) 223-2722.

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For further information contact: The Editorial Department, Professional Press, 921 Bethlehem Pike, Spring House, PA 19477.

Coefficient Announces Support For STB's Card

Coefficient Systems Corporation has announced that VTERM/220 now supports the Chauffeur HT board from STB Systems Inc. VTERM/220 provides a 132-column terminal display through horizontal scrolling or full-screen display through special video adapters such as the STB Chauffeur HT board. It also provides complete VT220 and VT100 emulations and throughput up to 19,200 baud.

With VTERM/220, all host software written for DEC terminals, including full-screen text editing packages, runs on the IBM PC, XT and AT with modification.

VTERM/220 is available without copy-protection for $245. The STB Chauffeur HT board is available from Coefficient.

To find out more, contact Coefficient Systems Corporation, 611 Broadway, New York, NY 10012; (212) 777-6707.

Enter 941 on reader card

Sentinel Provides Maintenance Service

Sentinel Computer Services provides DEC service and maintenance to VAX and PDP systems, all DEC terminals, printers and disk drives, and most third-party DEC compatibles. The company began in 1982, and in 1984 the new DEC/Wang division was formed.

Sentinel stocks thousands of spare parts for a variety of DEC, IBM and Wang mainframes and peripherals, as well as most OEM compatible equipment. Sentinel's Resource Center houses the classrooms for training customer engineers where full-time instructors are continuously examining new equipment, mastering its maintenance and conducting on-going training of its field staff.

To find out more, contact Sentinel Computer Services, 1010 Jorie Blvd., Suite 360, Oak Brook, IL 60521; (312) 990-8060.

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Belden's Cables Meet LAN Standard

Belden Wire and Cable offers two 50 ohm coaxial cables that operate as trunk/transceiver cables. Belden 9907 and 89907 are appropriate for local area networks such as DEC ThinWire Ethernet and were designed to meet the future requirements of IEEE Standard 802.3.

The cables have a 20 AWG (19 x 32) tinned copper center conductor and are insulated with cellular polyethylene (9907) or cellular FEP Teflon (89907). EMI/RFI protection is achieved with a Duobond II shield

Trunk/transceiver coaxial cables from Belden Wire and Cable meet LAN standard IEEE 802.3.

and an overall tinned copper braid. Belden 9907 has a gray PVC jacket making it suitable for office environments. Belden 89907 is jacketed in gray FEP Teflon for plenum applications.

Belden 9907 corresponds with DEC part #17-01248-0-0. Belden 89907 corresponds to DEC part #17-01246-0-0. Both cables have a nominal capacitance of 25.4 pF/ft. and a velocity of propagation of 80 percent.

Suggested trade net is $186 per thousand feet for 9907 and $592 per thousand feet for 89907.

For more information, contact Belden Wire and Cable, P.O. Box 1980, Richmond, IN 47375; (800) Bel-den4.

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CA-TELLAPLAN Announced By Computer Associates

CA-TELLAPLAN provides graphics and the capabilities to prepare plans and monitor schedules, including work break down structures and PERT/CPM diagrams, full reporting of staff requirements by skill type and actual versus budget costing by department. It contains English-language commands.

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To find out more, contact Computer Associates International Inc., One Tech Dr., Andover, MA 01810-2497; (617) 685-1400. Telex: 475-8093.

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Have Colleague Will Travel

Colleague, by QUE Computer Equipment, is a VT100/220-compatible portable terminal with a built-in 300/1200 baud modem that is the size of a legal pad. Colleague is self contained and can be used anywhere. It includes a rechargeable battery, good for up to 19 hours of operation, plus a 25-line by 80-character display. The only installation required is connection of the terminal into a telephone jack. There also is a built-in plug for connection to a printer.

For more information or for a free demonstration, contact QUE Computer Equipment, 7100 44 St., SE, P.O. Box 1270, STN. "T," Calgary, Alberta, T2H 1X2; (403) 236-6100.

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Signal Announces ILS For MicroVAX 2000

Signal Technology Inc. (STI) has announced the availability of its Interactive Laboratory System (ILS), a Digital/STI Cooperative Marketing Partner product, for the MicroVAX/VAXstation 2000 and local area VAXcluster products. With the MicroVAX 2000, the full complement of ILS programs now runs on the complete line of VAX computers.

ILS can be used in a variety of scientific and engineering applications that require analysis of time series data using digital signal processing techniques. Operations include frequency analysis, digital filtering, numerical analysis, data manipulation, and speech processing. ILS supports data acquisition functions for the VAXlab real-time Scientific Workstation.

Version 6.0 ILS provides windowing features on VAXstations, and includes a simplified menu system.

Prices for ILS on the MicroVAX/VAXstation 2000 range between $5,100 and $12,500.

For additional information, contact Signal Technology Inc., 5951 Encina Rd., Goleta, CA 93117; (800) 235-5787 or (805) 683-3771. ■

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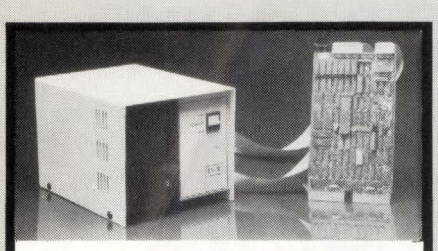

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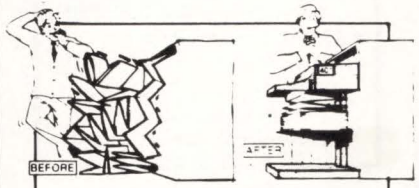

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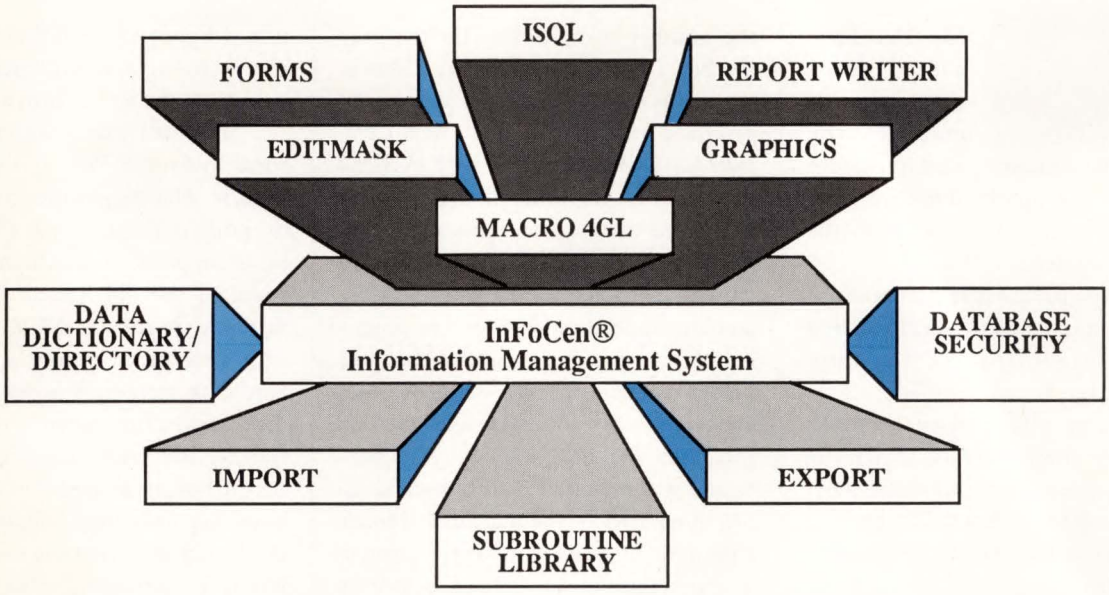

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BACK END

John C. Dvorak

'No Lust' For IBM Model 50s

Months have passed since the announcement of the IBM Personal System/2, and its stature is anything but memorable. Big Blue may have struck out this time in the popularity contest.

Then again, this may be corrected by what some people describe as IBM marketing ineptitude. I see it as sheer brilliance, even if not planned.

What I'm talking about is IBM's penchant for forcing quotas down the throats of hapless dealers who will crawl on their hands and knees to kiss the feet of the IBMers who control distribution. Basically, IBM has put larger than life quotas on its dealers to make them perform, or else! So, the struggling dealer has no choice but to accept the quota and dump his excess inventory at cost (or below) onto the gray market.

IBM says its hates the gray market. It *has* to say that to assuage its dealers who are always complaining about being undersold for equipment by sellers who aren't even authorized to sell the stuff. I don't believe for a minute that IBM doesn't love the gray market. The gray market keeps the iron moving and keeps the cash rolling in. The hapless dealer who acts as a jobber gets nothing for his work when he sells to the gray market. Essentially, he's working as a jobber for IBM without any benefit of pay. It's a sucker's game.

So already we see 47th Street Photo and other discounters selling discounted Personal System/2s.

All IBM has to do to curb this is to trace serial numbers. But perhaps that's too hard for Big Blue. After all, it would take a computer to do it. In the next few months, we can see exactly how soft the whole market is for these machines by the number of units that hit the gray market. I think we are in for a shock.

I was a guest on a small national TV program produced by PBS called *Computer Chronicles*. I appeared with *PCWorld* Publisher David Bunnell and we were to discuss our take on these machines. I was to do my usual complaining and clowning around, for which I'm prized, and hopefully Bunnell would be poignant. Now, you have to note that just before we came on, two salesgeek types appeared who sounded like android pitchmen for IBM. One guy in particular was falling all over himself singing the praises of the machines. I made a point to refute each and every positive assertion this one fellow made before we even could begin our analysis.

I showed the viewers some fancy benchmarks that demonstrated the relative sluggishness of the vaunted Model 50 and showed how easy it was to tear down a machine (the one thing I do like about the new units).

Bunnell then made an excellent point. "There's no lust for these machines," he said. "When the IBM PC was introduced, people lusted after it. Same with the Macintosh. I don't see it with any of these models."

Bunnell can't be taken lightly on this point. While he may think some things are marvelous that later turn out to be duds, I don't know of an instance where he thought something was a dud that turned out to be marvelous. He thinks the new machines are duds and so do I.

Let's face it, all that's interesting about them is the fact that they plug together nicely without a lot of cables (there are zero cables inside the beast) and, there's a nice new bus of the future inside that will let the thing run at faster clock speeds without worry of RF radiation. I figure some of the cheap clones out there are sending enough microwaves into the air to down a passing 747.

So what's wrong with the IBM Personal System/2? Well, nothing is *wrong* with it. The bigger question is what's the point of the new system? The Model 50 is supposed to be the hot item and supplant the old line as the mainstay machine. It runs at 10 MHz with one wait state memory and a slow 85 MS hard disk seemingly accelerated with a disk cache. But when I test the data transfer rate with the cache, it tells me that it hovers around 450 KB/sec. This is no big deal. And whatever you do, don't start believing the notion that the interface is screaming at the 10 Mbits/sec that ESDI disk drives are capable of performing.

So what can a machine like this do? Not much if it gets attached to a memory hog and consequently slow operating system like UNIX or the soon to arrive OS/2. There's just too little throughput.

Throughput is the most overlooked and ignored problem with these little IBMs. Few microcomputer magazine editors have any idea what the real speed of a hard disk is on a stock IBM XT or an AT. They'll tell you about seek times as though that was all there was to it. Meanwhile, the data transfer rate of an XT or AT is about 150-160 KB/sec. That means the machine may take more than two seconds to load a 400K file. Two seconds is a long time in the world of computers, where we talk of nanoseconds and picoseconds.

These machines will not set the world on fire, but the gray market may save them.

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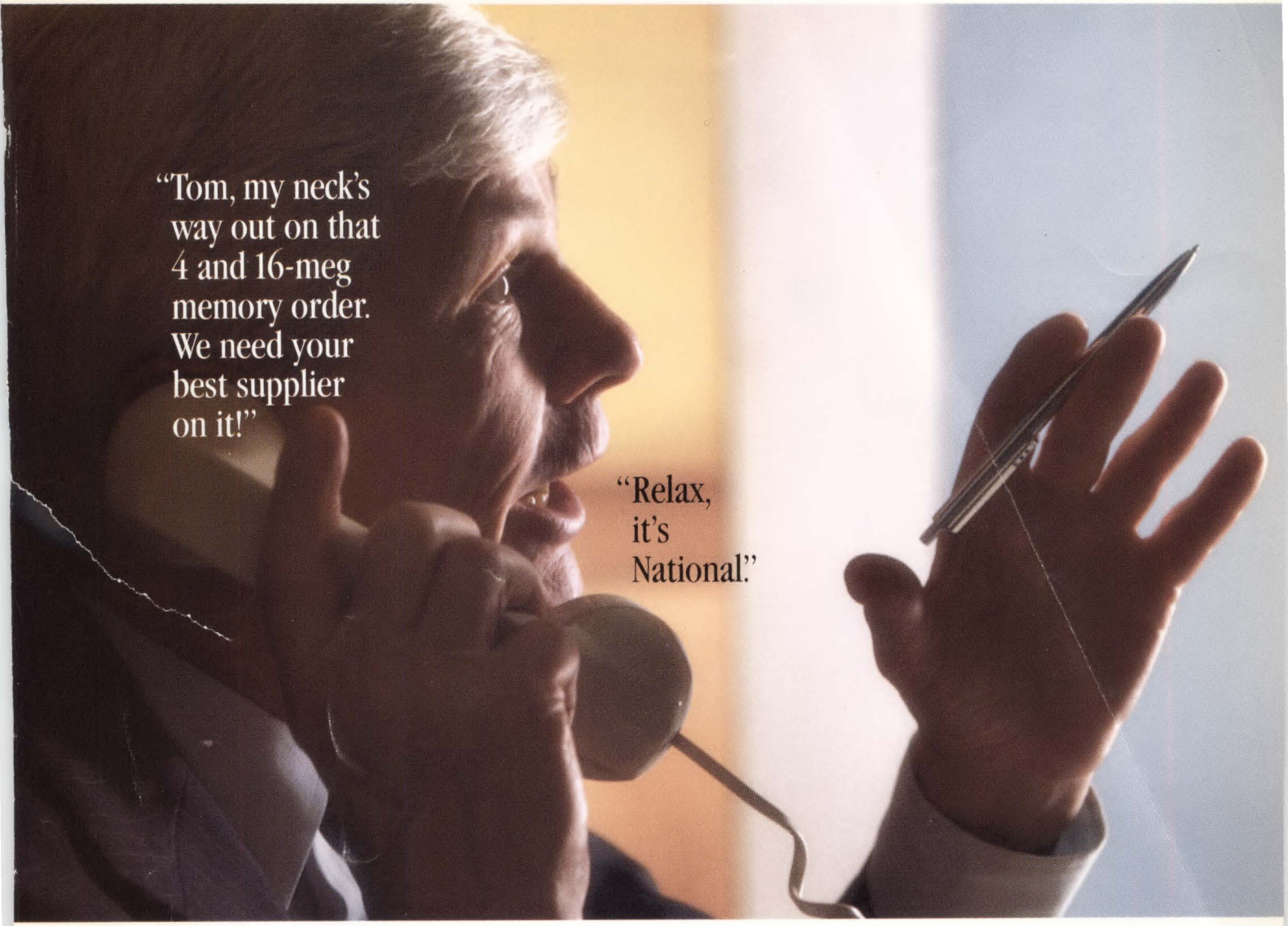

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