



VAX

DNS

JUNE ■ 1988

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DEC

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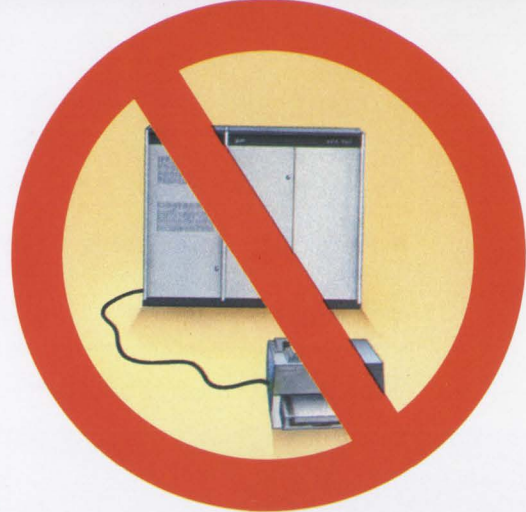
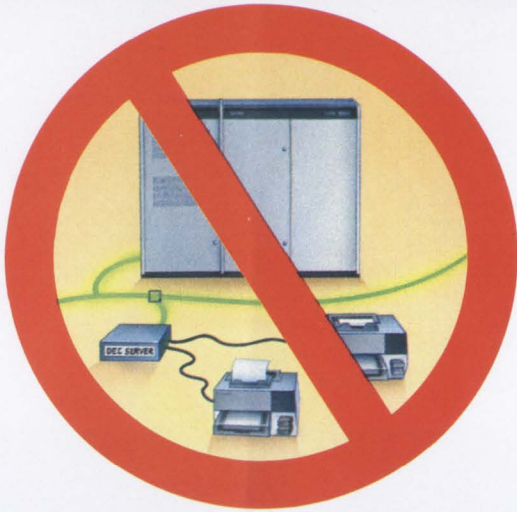
- A Guide To Power Problems
- Security For The New Manager
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DEC PROFESSIONAL JUNE 1988



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The lab seal indicates that the product reviewed has been tested by one of our experts in our Laboratory and Testing Center.

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DEC PROFESSIONAL Laboratory and Testing Center, a working Local Area Cluster where we test software and hardware in real-world conditions. Photographer Steve Krouch, PhotoSep, Pennsauken, NJ.



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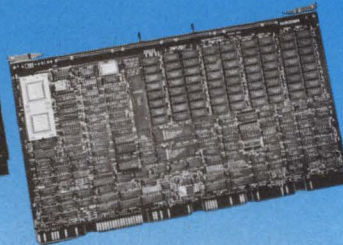
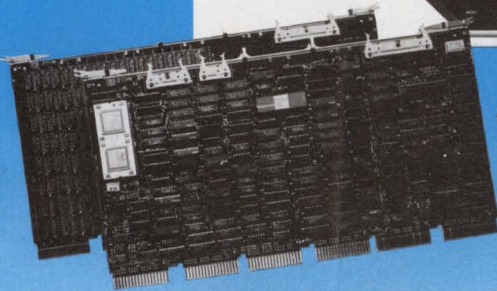
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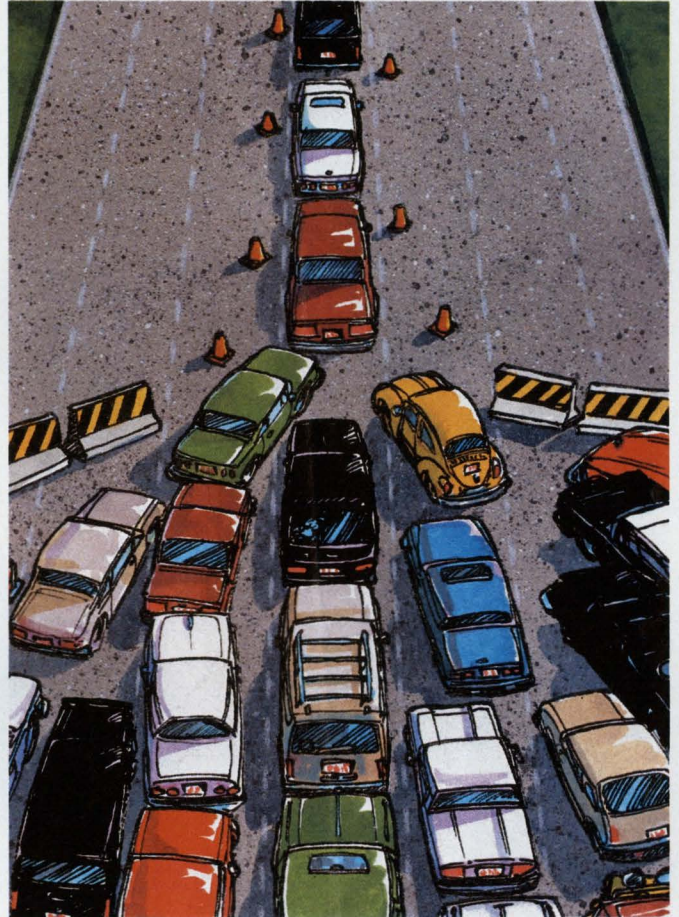
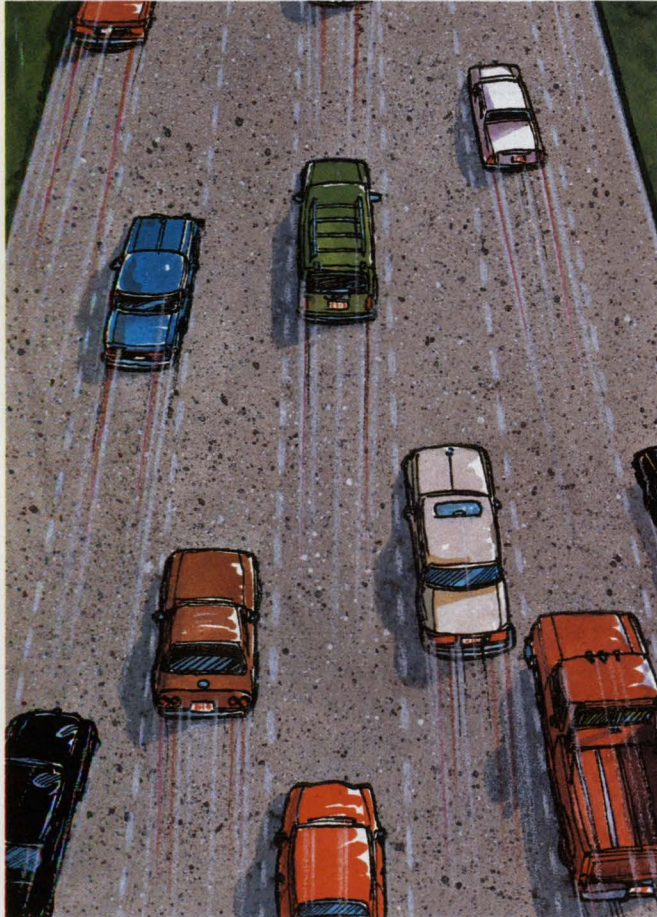
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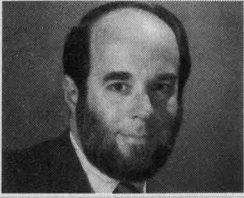
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CIRCLE 167 ON READER CARD



PUBLISHER

Carl B. Marbach

It's Not Funny Anymore

Hacking used to be fun. Finding ways to break into a computer system was a challenge that many high school and college students and most programmers couldn't resist. After all, if you could break in, then you really *knew* what you were talking about. You were a certified guru — a real wizard.

Years ago at DEXPO, we set up a PDP-11 and offered a prize to anyone who could crack our security system. While our backs were turned, someone pried open the back door, attached a console terminal, crashed the system and by interrupting the startup procedure was able to make himself a privileged account. We were angry that someone cheated, but we paid up.

Now a new security problem has appeared, the so-called viruses that are attacking computer systems. A virus is a program inserted into a computer system standalone or attached to another innocuous program that's activated at a later date and destroys data. These viruses are becoming widespread and are infiltrating sensitive computer systems and networks.

These insidious programs are simply vandals at work destroying what we do. It's been rumored that some viruses are attached to otherwise prestigious programs. We've been told that Aldus's *Freehand* program for the Macintosh contains a "benign" virus. If it's true, then some viruses can be attached to programs that come directly from manufacturers.

What does this mean?

Remember that a virus attached to a privileged program, like LOGINOUT, has the capability of compromising any and all data on your computer. This could render your computer system useless. Hundreds of thousands of dollars worth of computers, worthless; all because the data on them is insecure. It could be here today and gone tomorrow.

What's the answer? Do we return to the days of legions of green eyeshades and accountants/bookkeepers bent over 40-column ledger forms, because that data was secure?

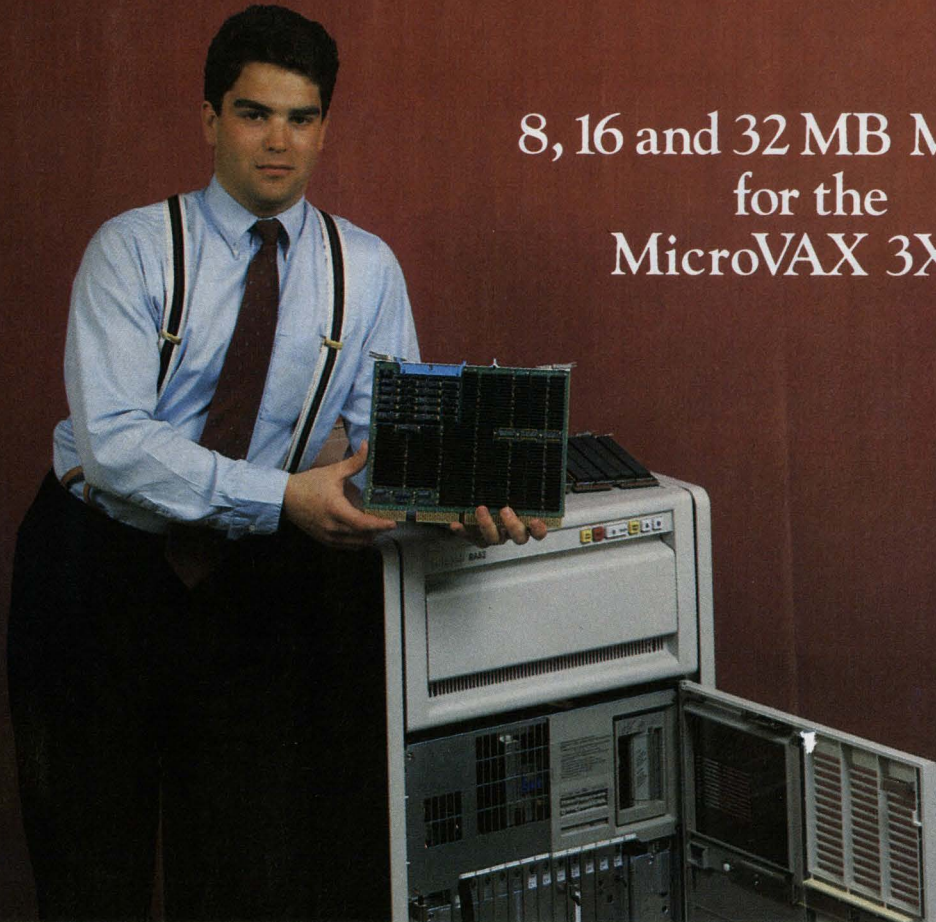
Is this scenario farfetched? For \$250,000 cash someone within DEC is reached and he attaches an innocuous patch to VMS V5.2, which inserts a virus onto several privileged programs. This virus copies itself into many corners of every VAX when V5.2 is installed. These programs lie dormant for many months. Eventually, a person arises at DECUS and announces

that it will cost \$1,000 for every VAX installation to have the keys to unlock the virus and free themselves from certain destruction. The only other solution is to remove all your data and completely reload VMS (from a new distribution), then add only your source code, recompile and link them and hope that you found everything and that the new version of VMS doesn't have a similar virus.

Crazy? Yes. Impossible? No! Our businesses, our livelihoods and our computers are being threatened. These criminals must not be tolerated. We need laws, enforcement and a community awareness that this kind of behavior is unacceptable.

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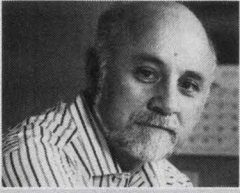
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CIRCLE 243 ON READER CARD



EDITORIAL

Dave Mallery

Calypso: Music Or Sinking Ship?

I attended the launch of the Calypso (VAX 62x0) line and viewed the proceedings with mixed emotions. I'd been hoping that the 62x0 series would obliterate the 82/83xx line from a price performance standpoint and that we'd be able to pick up a distressed 8250 on the surplus market at a favorable price. Too bad. The only machines affected by the announcement are the 8530, the 86xx and the 8550.

The Calypso has brought a measure of sanity to VAX pricing, however. It has removed a number of midrange models. And, it makes the growth path cheaper; it's easier to plug another CPU into your cabinet than to add another cabinet to the cluster, with all the attendant overhead of CI interfaces.

Certainly the Calypso has brought new luster to DEC's profit margins. It has implemented the 64-bit, 100-Mhz backplane using most of the BI mechanics. This has lowered the cost of the system backplane, perhaps more than any other economy in the line. Until a larger scale of integration permits multiple CPUs on a single card or carrier, this will represent the cheapest way to couple such busy devices.

I also attended the announcement of the new high- and low-end additions to Hewlett-Packard's Precision Architecture machines and saw some interesting parallels.

HP's high-end machine (95x) looks amazingly similar to both the Calypso and the 8800. There are slots in the 100-Mhz, 64-bit system backplane for up to four CPU cards. There are slots for massive amounts of memory. BI-like bus adaptors with slightly less bandwidth abound.

I've found that, in high-end electronics, things that look similar cost the same to make. When comparing HP and DEC, some are tempted to attribute a higher cost to the HP hardware, as it has a reputation of higher quality. But, HP machines cost about one-third of DEC machines for comparable horsepower. HP claims that, in its history, it never has had a product with as high a gross margin. It attributes those margins to the economies of manufacturing RISC processors.

That's nonsense. If you count cards, the CPU accounts for only about 15 percent of the finished goods. In an 8800, the CPU might account for 20 percent.

My conclusion is that DEC is making hay while the sun shines. And well it might. The Goths aren't at the gate yet,

but they're gathering their hoards somewhere in the provinces.

This has been a month of announcements. There are two new RISC chip sets, both of which start at 12 mips. When you hear about them, and the prediction of the downfall of the midframe, remember this axiom: "A workstation doesn't a mainframe make!"

Look inside a Calypso or an 8800 to see what a tiny part of the entire system the CPU is. Consider how difficult it is to keep a 12-mips CPU busy. If you want memory, consider the cost of the cache to keep 12 mips at full speed. As for I/O, the cost of gigabytes has plunged, but not nearly on the same exponential curve as the cost of mips. Getting those gigabytes off the disks and into the CPU remains as expensive as ever.

You want an operating system? Consider your choices. As UNIX standards drive off into the cosmos, consider what's left: a nasty squabble over who owns what and who's gonna take whose football and go home. Guess who gets left in the dust on the playing field?

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LETTERS

CACHING CONTINUED

Having read two Letters To The Editor in response to my November 1987 article "Caching In On RSTS/E," I felt it important to respond. Both Mr. Smith's (February 1988) and Mr. Finneran's

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.

(March 1988) statements regarding all opened files being cached by RSTS/E when the SET CACHE/ALL command is in effect appear to be accurate, I admit, but this was not the main premise of the article.

Both letters point out the other important issues that were raised. First, not all systems have sufficient memory to take advantage of caching every file/program open performed by the SET CACHE/ALL command. In these cases, there isn't a simple way to enable se-

quential or random caching on groups or classes of files (perhaps only on specific disks) in their UFD entries — a solution provided in article.

In addition, some RSTS/E utilities do not preserve the UFD caching bits when used on flagged files; e.g., PIP. If system performance is dependent upon file-by-file caching, and files' caching attributes disappear through use of these utilities, they quickly can be restored on large groups of files.

I specifically stated in my article that it wasn't intended to address the effects on system performance of caching. Mr. Smith correctly asserts that SET CACHE/ALL is for those who want to randomly cache all read requests; however, \$SET CACHE/ALL is all you need. On the surface, this is a correct statement, but can a system manager necessarily know that all that's needed for improved performance is to randomly cache all files? I do not feel that a single worst-case virtual array — perhaps on an unloaded system for timing comparisons — is in any way an accurate measure of the effects of randomly caching all files on a loaded system's overall performance.

I have been an avid reader and contributor to your magazines since they first appeared, as well as a long-time RSTS/E and VMS user. They continue to provide an important forum and significant practical contributions to the DEC community. I am especially glad to see that there still is an active group of RSTS/E users, with critical technical eyes, reading your magazine!

Laurence F. Koolkin
Montpelier, Vermont

CORRECTION

The disk emulating version of EMC Corporation's Archeion optical storage subsystem will be compatible with VAX/VMS V4.6 and maintain compatibility with subsequent versions of VMS. The version cited in April's Product Watch was incorrect.

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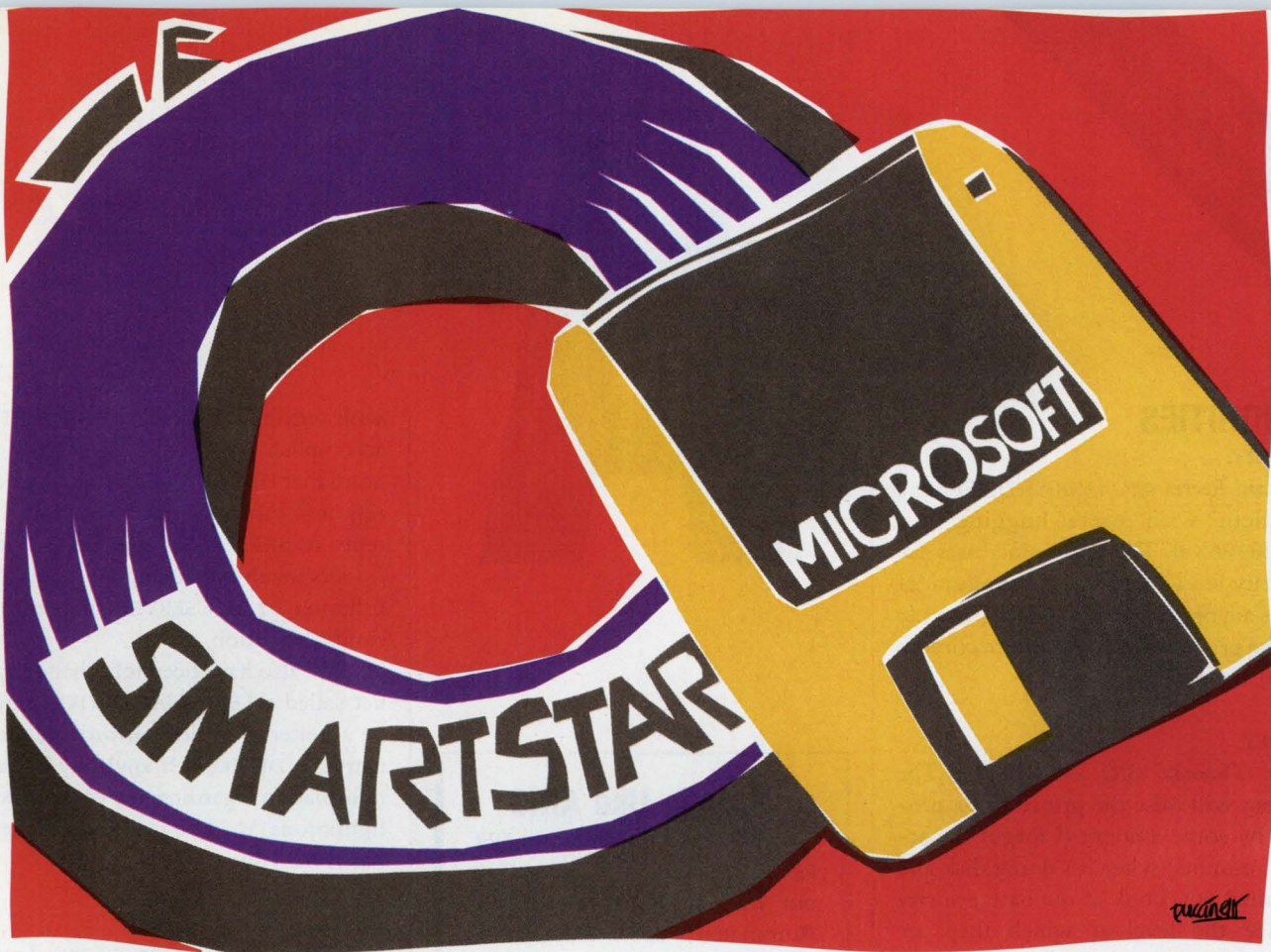
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A ARISTALK

PRIORITIES

QUERY:

Richard Reeves (SIG 13/MESS 73): I have a problem with users hogging our MICROVAX II. The system increases the priority level depending on application. Does anyone know of a way to put a cap on the priority level (i.e., set a maximum level) for any given user?

REPLY:

Steve Thomas (SIG 13/MESS 74): The system will raise the priority of a process by some amount (I forgot the actual amounts) when it's doing disk and terminal I/O. Look at the base priority to see the level at which they are competing.

Concerning caps: Don't set your base priority any higher than that which some other user (e.g., SYSTEM) can log in as; if your high-priority process gets into a permanent loop, you'll have no more system until you reboot. Also, don't set your priority any higher than the Job Controller's priority; this generally is considered not nice. Don't set your priority any higher than 15; the SWAPPER runs at 16 and it's highly bogus to make the SWAPPER swap itself out; i.e., a BUGCHECK (machine crash) soon will follow.

WPS SPEED

QUERY:

Laura Gail Chase (SIG 12/MESS 181): We currently have a 11/785 running WPS with approximately 23 WPS users. We are planning to purchase two MICROVAXs to run WPS and move our primary WPS users to those systems. We also want the users of the MICROVAX to have access to the 785, if needed.

We're planning to run Ethernet

with terminal servers and DECNET to accomplish this task. However, we heard that DECNET will cause very poor response times for our WPS users. In a reply to SIG 12/MESS 188, one of your readers mentioned using DECSERVERS/Ethernet or DECSERVERS/muxes in a similar situation.

We also have been told that a product called a TERMINAL SWITCH might be a better and more affordable alternative to DECNET. If anybody has any information regarding any of these configurations, we'd be interested in hearing from you.

REPLY:

Kent Cearley (SIG 12/MESS 181): Laura, we're running WPS/PLUS under ALL-IN-1 on MICROVAXs using DECSERVER 200s. Response time doesn't seem to be a problem, even with the port speeds set at 4800 baud. The server tends to optimize traffic on DECNET and send packets when a timer circuit expires, instead of with each keystroke. Some people seem to even get performance enhancements versus devices connected directly to controller cards. Anyway, I'd be interested to hear which way you go and what the results are.

How To Use ARIS

If you're a subscriber to *DEC PROFESSIONAL*, you can call up our VAX and log into ARIS, our Automated Reader Information Service. In ARIS, you can download programs from our publications, communicate with our editors, request a change of address, find additional information about advertisers, order books and back issues, check the guidelines for submitting articles, access our cumulative index, take a peek at our editorial calendar for the year, and communicate with other DEC users.

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

SIG Identifications

Here are the SIG categories referenced in this month's *ARISTalk*:

- 12Site management
- 13System performance
- 21Controllers/memory

CONVERSION DISK FAILURES

QUERY:

Martin A. Bluestein (SIG 21/MESS 85): I'm attempting to convert an 11/23+ system to 11/73, but I'm experiencing disk failures. Specifically, I purchased an 11/73 and a new backplane/box (because DEC stated that the 11/73 required it); I'm also attempting to upgrade to RSX11M+ V3.0, from V2.1.

The system runs well under 2.1

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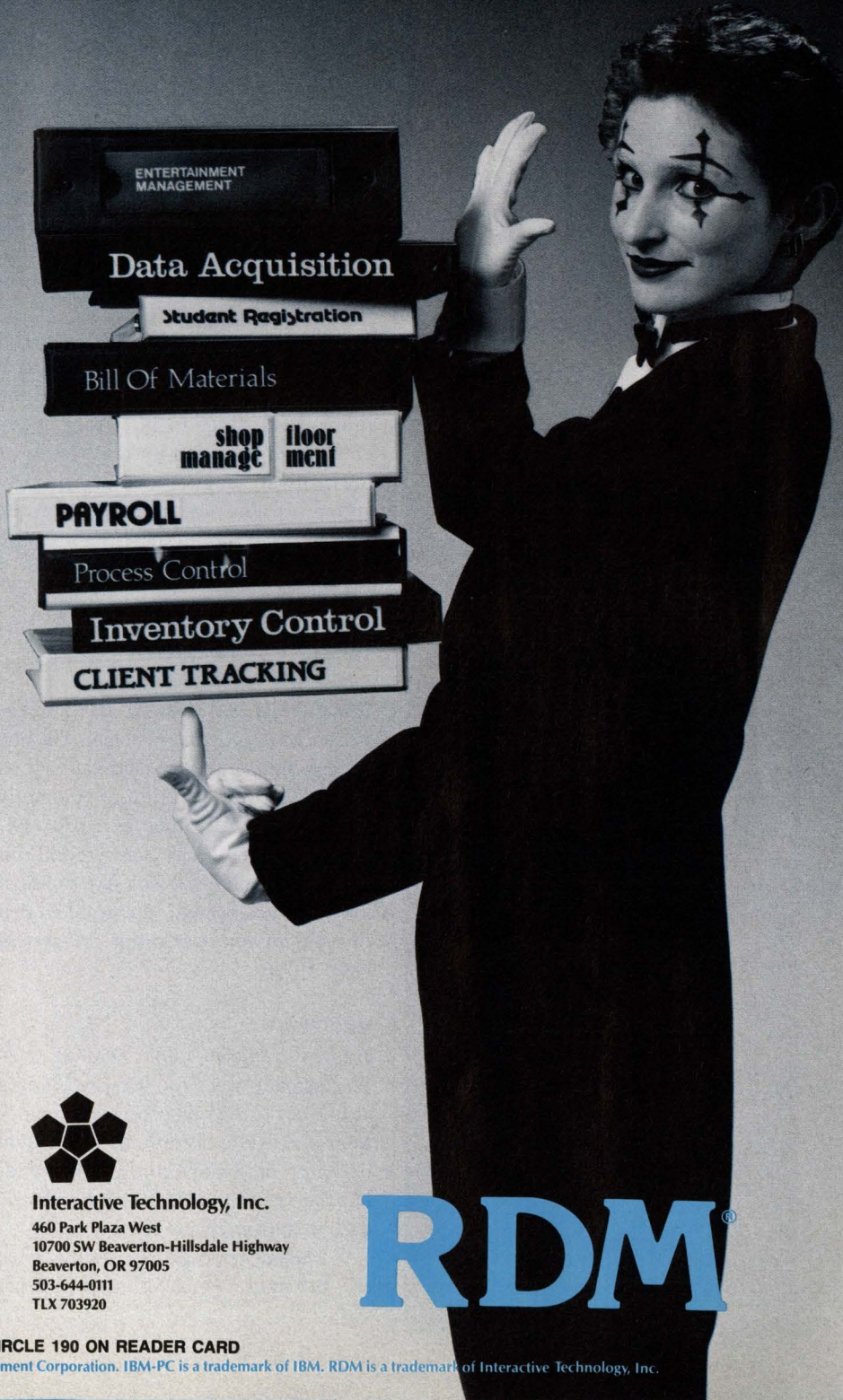
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with 11/23+, but V3.0 with 11/73 generates disk failures (device timeouts) when testing two or more disks under IOX. I've patched DMDRV according to the Emulex patch sheet but to no avail. Emulex and DEC both scratch their heads; I'm scratching mine too, but if this isn't solved, mine will roll. Disks are Fuji 2322 and 2312. I'd appreciate your suggestions.

REPLY:

Wayne Steffen (SIG 21/MESS 87): I'm assuming that the 11/23+ is in a different backplane than the 11/73. Do you know if the disk controller needs NPR jumper removed? Find out if it's removed on the old backplane slots for the controller, and if so, it must be done for the new backplane.

Has your RSX-11M-PLUS V3.0 run on any system? If not, you're using a new system on new hardware, and the number of things to go wrong is increased. Try to use a known system or the hardware diagnostics to test the new system. If you can bring up 3.0 on the 11/23+, you can eliminate the software as a problem.

NULL PROCESS

QUERY:

Mike Cohen (SIG 13/MESS 111): I've experienced a recurring problem. The null process intermittently degrades system performance by consuming practically all the CPU. All other user processes slow to a crawl. How can I prevent this from happening? I'd also like to know a way of dealing with the problem that doesn't involve rebooting the system (VAX 11/730).

REPLIES:

Andrew Duggan (SIG 13/MESS 112): Unless your user processes are running at priority 0, the null process can't block their execution; even then, CPU would be split evenly between them. It sounds like they're waiting for another resource; e.g., memory, an I/O device, etc.

The null process only can run when the COMpuTe queue is empty. What

kind of information can you get from:

- \$ Show System
- \$ Show Memory
- \$ Monitor Process/TOPCPU
- \$ Monitor Modes
- \$ Monitor States

These should give you some information about what's limiting the resources of your system.

Phil Anthony (SIG 13/MESS 113): The null process runs (i.e., shows CPU time; nothing's actually executing, and the null process is just a place holder) any time nothing else is running. In addition to Andrew's suggestions, though, I'd add the possibility that you have malfunctioning hardware, such as a terminal or tape drive or even the floating point accelerator, swamping the bus with stray interrupts. When VMS reboots, it sends a lot of hardware resets, terminating such an intermittent problem temporarily.

Richard B. Gilbert (SIG 13/MESS 116): How long has it been since you did a full image backup and restore of your system disk? A badly fragmented disk will bring VAX/VMS to its knees. Check the value for window turns using MONITOR I/O. If the value is greater than zero, you have a file fragmentation/disk fragmentation problem. There are several utilities around, most of them seem to be called FRAG, that will read BITMAP.SYS and report how free space on the disk is distributed.

The ideal situation, of course, is to have the free space in one large chunk. Typically, the free space is in several hundred separate chunks. This can cause the system to spend an inordinate amount of time looking for space, every time a file is created or extended. Worse, this ensures that your files will be fragmented. The simple, though time consuming, solution is to do an image backup and then restore the backup. This causes all files to be contiguous and all free space to be contiguous. There are several commercial software packages, and one from DECUS that will aid in curing/controlling the problem. ■

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PRODUCT WATCH

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Fiber optic systems provide higher speed information transfer over longer distances with lower data error rates than conventional cable systems. Fibronics of Hyannis, Massachusetts, is a key player in developing products that can benefit from using the advantages of fiber optic technology.

SYSTEM FINEX, from Fibronics, is a new high-speed fiber optic LAN. It's the first network to conform to the Fiber Distributed Data Interface (FDDI) standard. The FDDI standard is defined under the auspices of the ANSI X3T9.5 working group.

Based on an open system architecture, the Fibronics network is a dual-fiber, high-bandwidth, 100 megabit-per-second, counter-rotating token-ring system. SYSTEM FINEX will connect heterogeneous mainframe computers, link together engineering work-

stations or link these engineering workstations with mainframe computers. The high-performance system also can interconnect existing Ethernet networks through bridges and gateways.

SYSTEM FINEX is a hardware and software solution that addresses all seven

layers of the ISO model. According to Dr. Joseph Garodnick, corporate vice president of marketing, "The adherence to the ISO model allows users to implement this new high-speed network without the fear of obsolescence as the ISO software develops."

With the high backbone speed of an FDDI network, transfer rates of 100 megabits per second are possible. For example, a SYSTEM FINEX network is able to transfer the text of the entire 48,000 pages of the *Encyclopedia Britannica* in 13 seconds.

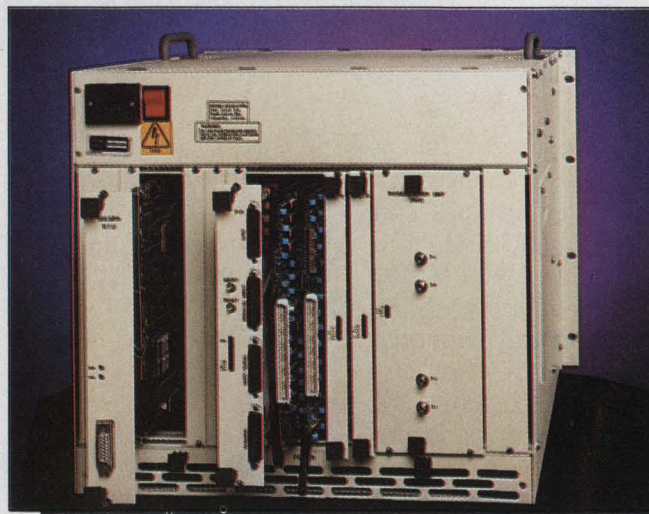
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For further information, contact Fibronics International Inc., Communications Way, Independence Park, Hyannis, MA 02601-1892; (617) 778-0700.

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RTE Deltec of San Diego, is revolutionizing the UPS market with its new 8000 Series Online UPS. According to president Ray Meyer, "The 8000's proprietary design will soon replace conventional UPS systems." Virtually all existing medium- to high-power online UPSs use a non-utility interactive inverter design that was developed in the 1970s. In contrast, the RTE Deltec 8000 uses the technology of the

1980s, and according to the company that's what makes it a revolutionary new standard for the industry.

Meyer states that the new design eliminates the AC-to-DC-to-AC conversion problems that have been inherent in past UPS designs. The 8000's utility interactive, online design provides an efficient use of power, circuitry and space.

Operating at a 95 percent AC-to-AC efficiency results in low operating costs, quiet operation, less than 57 dB and less load on computer room air conditioning. But perhaps the most apparent is the size reduction; the 8000 Series is more than 50 percent smaller than most competitive inverter-based systems.

According to Meyer, "The 8000 Series uses a bidirectional utility-interactive, online converter that provides precise output reg-



The 8000's utility-interactive, online design provides an efficient use of power, circuitry and space.

ulation while supplying DC voltage to maintain battery charge. The design minimizes the conversion between AC and DC voltages."

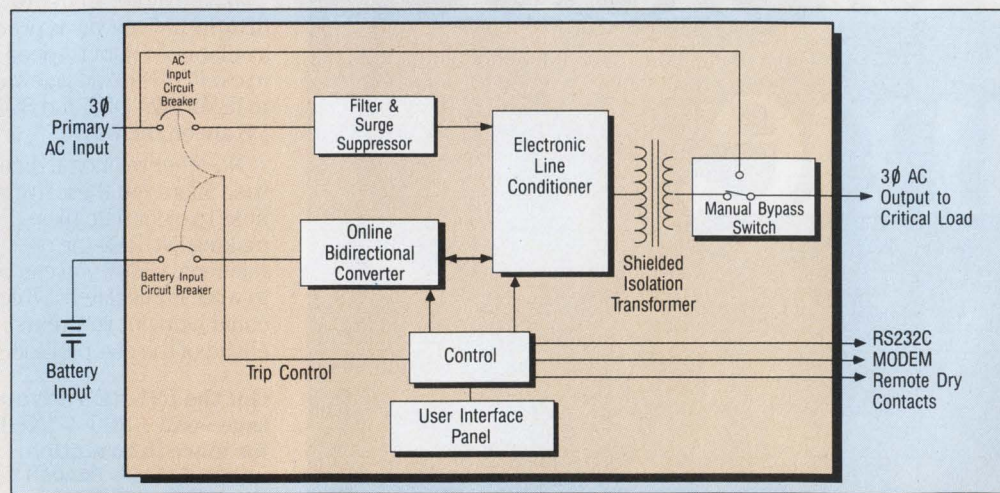
In addition to providing magnetic isolation, the 8000 features redundant sources of protected power that increase the system's reliability. The

bidirectional converter eliminates the need for the separate rectifier/charger found in older systems. The converter acts as a charger and inverter, which provides total conditioning by adjusting the pulse widths and phase angle. Unlike offline designs, the 8000 also enables the early detection of an inverter failure before a crisis situation can occur.

A "make-before-break" manual bypass switch provides the ability to perform maintenance on the system without interruption or a phase shift. The 8000 UPS is available in models from 10 KVA to 25 KVA at prices ranging from \$20,555 to \$28,388.

For further information, contact RTE Deltec, 2727 Kurtz St., San Diego, CA 92110; (619) 291-4211.

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—Suzanne Garr



The 8000 Series UPS block diagram.

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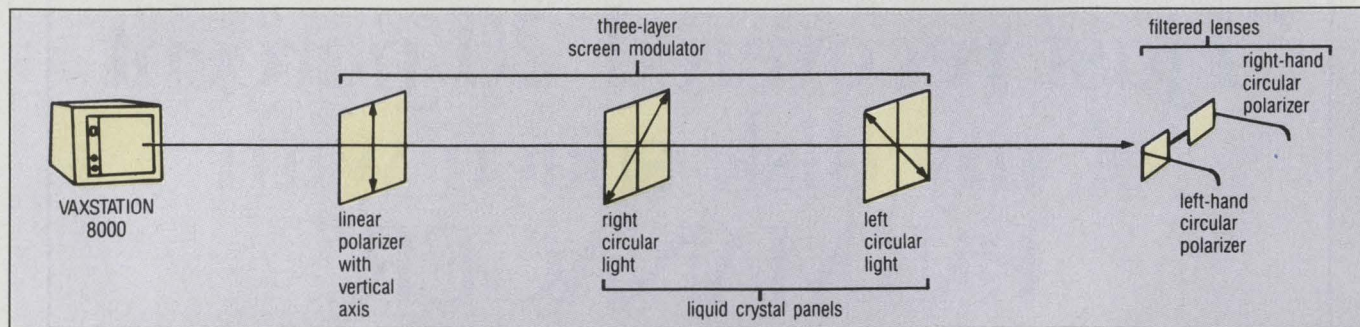
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The combination of polarized glasses and the Z-Screen, which fits on the CRT, makes the image appear 3-D.

Evans & Sutherland Brings Stereo 3-D To Graphics Market

The VAXSTATION Becomes A High-Tech ViewMaster With ZScreen, And Sunglasses

A new state-of-the-art stereoscopic three-dimensional graphics system is available for advanced simulation and modeling applications, thanks to an OEM agreement between VAXSTATION 8000 developer Evans & Sutherland, of Salt Lake City, Utah, and StereoGraphics Corporation, of San Rafael, California, which perfected the stereo technology and will supply the essential hardware to Evans & Sutherland.

StereoGraphics' components include a display controller that converts workstation processor data from 60- to 120-fields per second and accommodates color or monochrome output; the ZScreen modulator, a set of liquid-crystal panels that fit the screen like a glare shield; and light-weight, polarized, dark glasses.

Shadowfax, Evans & Sutherland's workstation software with antialiasing and static shading capabilities, makes it possible for the

stereo images to maintain straight lines with clean edges. In its stereo viewing option with the controller, *Shadowfax* alternately produces two slightly different angles of an image, each for 1/98th of a second. The first image is a right-eye view; the second is a left-eye view.

By doing this, the screen image is compensating for a shuttering effect carried out by the ZScreen, as well as the filtering effect of the glasses. When viewed through the ZScreen and the glasses, the image appears to have three dimensions.

The ZScreen shuttering is an optical illusion caused by three panels. The first is a polarizer. The other two are coated with electron alignment layers, one that circles to the left and one to the right. The light shot from the CRT follows these alignments.

The glasses are filters. The left lens only permits light from the left display angle to pass through and shields the light from the

right image. Likewise, the right lens only lets the right eye see the right image. So, by capitalizing on the fact that each eye sends a separate image to the brain, the brain is tricked by the rapidly altering images into thinking it sees an object with depth and mass.

Additionally, the glasses allow you to move around without seeing the image duplicate or break up and allows onlookers several feet from the terminal also to get the full stereo effect.

Besides overcoming 3-D's poor historical reputation, the biggest problem facing Evans & Sutherland and StereoGraphics is public perception that standard, flat 3-D graphics is sufficient and that stereo 3-D is an unnecessary overkill.

But stereo 3-D is a capability that's in high demand among technical workstation users with applications in molecular modeling and topographical mapping. In these industries, analysis and problem solving can be expedited by visualizing molecular modeling or terrain.

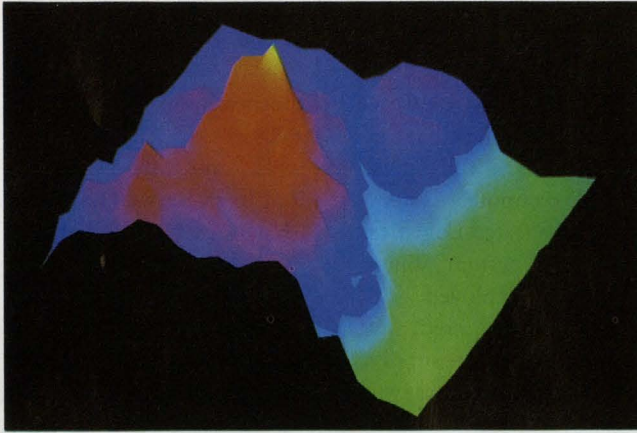
At the Scripps Clinic in San Diego, Dr. Chandra Singh is involved with molecular docking, a com-

plex operation that involves connecting macromolecular structures. "With the stereo viewing option, the docking of an inhibitor into the active site of a protein can be achieved within an hour," explains Dr. Singh. "Without stereo, this docking procedure could take days to accomplish."

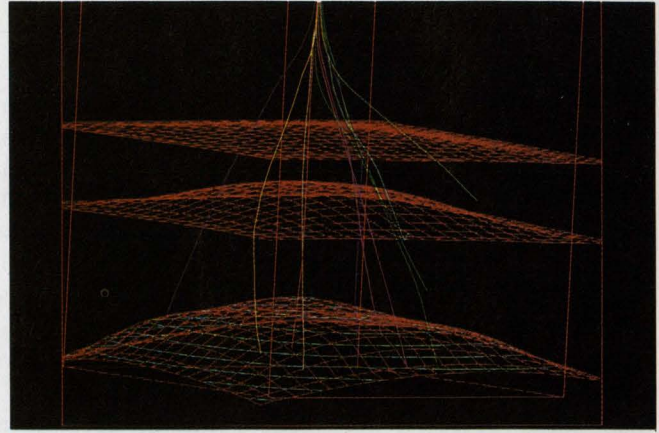
Screen simulation is the best way to determine if and how docking can proceed, which isn't possible with standard 3-D graphics programs. Stereo 3-D gives the receptor molecule depth and bulk, making it easier to dock the satellite substrate molecule, particularly when it must attach somewhere inside the receptor.

"I believe that stereo viewing is absolutely necessary to completely understand complex 3-D molecular structures," concludes Dr. Singh.

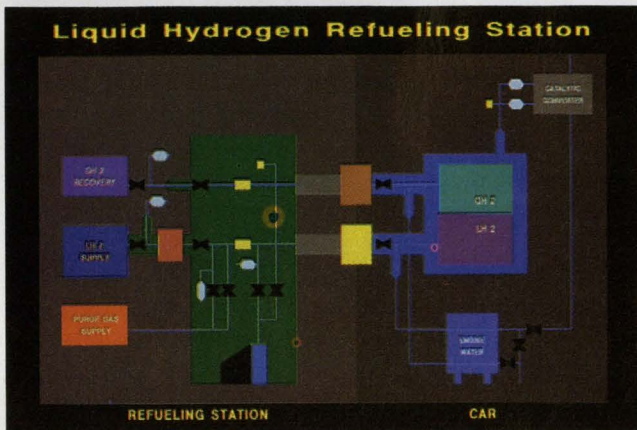
There are a few input options available from Evans & Sutherland. The first is the eight-dial manipulation device that is standard with the VAXSTATION. These dials can be programmed to ease movement and rotation along the x, y and z axes, or zooming and screen location. The other is the more nimble *Spaceball* trackball from SpaceWay Ltd., Australia,



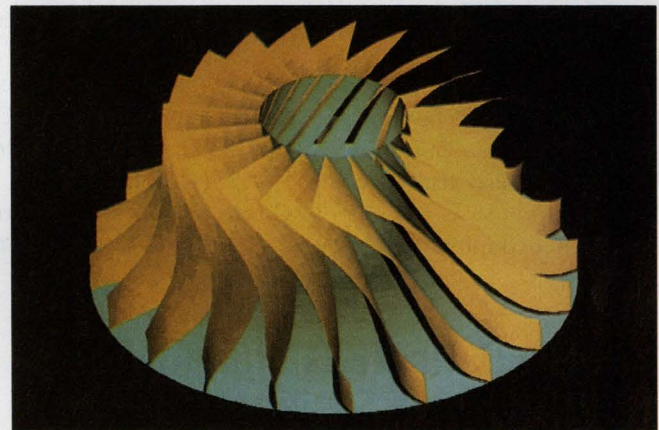
Local, interactive 3D manipulation of mapping data captured on a Tektronix 4129.



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.

CIRCLE 148 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,

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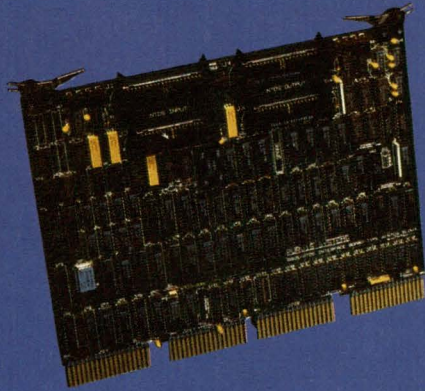


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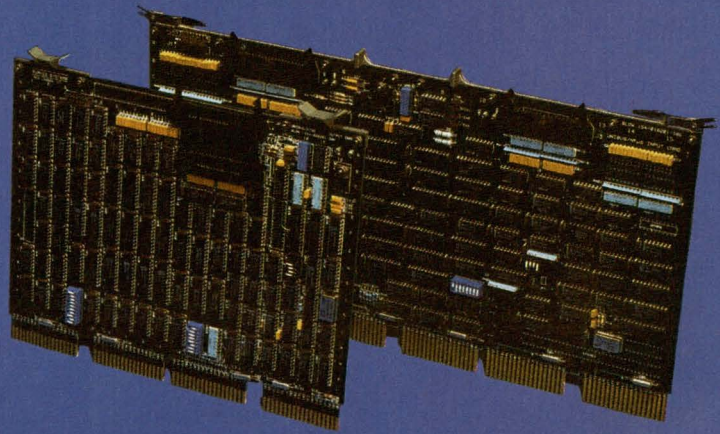
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Third-Party Suppliers Boost Capabilities Of RCI's Precision-Intensive VisiNET

Numerix' NMX-4322 Processes Imaging Applications At 20 MB/Second

The number of products available for the VisiNET, an RS422-based image data bus that connects to VAXs via the Q-bus or UNIBUS, is increasing as new applications are materializing in scientific markets requiring high-speed image transfer. The VisiNET was developed by Recognition Concepts Inc. of Incline Village, Nevada. RCI augments the VisiNET with the Trapix 5500 image processor and Trapix Plus image acquisition and display workstation.

Trapix images, which can be 512 x 2048 pixels with 8-, 10- or 12-bit precision, can be acquired from a variety of devices, such as cameras, VCRs, infrared or radar. Trackball and joystick interfaces, and roaming and zooming images are available. The VisiNET supports up to 10 devices, including RCI's real-time VisiSTORE disk, which stores up to 20 GB with sustained transfers at 19.6 MB per second.

When combined with the NMX-432/E Attached Vector Processor (AVP), from Numerix Corporation of Newton, Massachusetts, Trapix benefits from a floating-point machine that can perform 2-D Fast Fourier Transforms, filtering, a FOR-

TRAN optimizing compiler and warping functions on large images.

Other products using VisiNET interfaces are available from Tektronix Inc. of Beaverton, Oregon, and Jupiter Systems Inc. of Alameda, California. Tektronix' VisiTEK is a display workstation with 2040 x 1536 x 8 monochrome resolution and support for up to four display devices. The Jupiter imaging workstation has 1280 x 1024 x 28 color resolution.

In addition to its floating point capabilities, Numerix' NMX-432/E AVP also has a 64-MB memory that can execute image processing functions on a standard (1K x 1K) image at speeds up to the 20 MB per second capable on the VisiNET. The AVP attaches to the Trapix system with the NMX-4322, an interface that supports a low-speed control path and the VisiNET's high-speed data path.

System calls for the NMX-4322 consist of three FORTRAN routines:

1. CALL VPINI, which initializes the image processor within the AVP for data transfer over the VisiNET.
2. CALL TX2AP, which executes the data transfer from the image processor to the AVP.
3. CALL AP2TX, which starts data transfers from the AVP



The Numerix VisiNET interface and RCI's Trapix image processor sit atop the NMX-432 attached vector processor.

to the Trapix image processors.

Numerix' director of marketing, Larry Zagorsky, says that the interface furthers the AVP's usefulness by uncovering new potential markets, and adds that with the new level of I/O performance, "We can now meet some of the critical needs of our image processing customers."

Numerix also provides a 5-foot tall, 19-inch wide

cabinet that houses the Numerix AVP and NMX-4322 with the Trapix image processor.

For further information, contact: Numerix Corporation, 20 Ossipee Rd., Newton, MA 02164; (617) 964-2500.

Circle 571 on reader card

Recognition Concepts Inc., 341 Ski Way, P.O. Box 8510, Incline Village, NV 89450; (702) 831-0473.

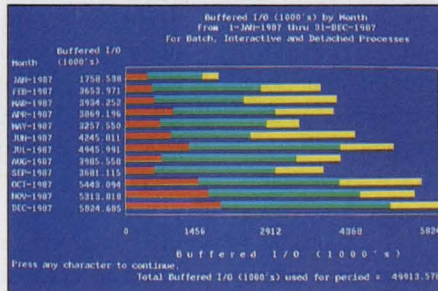
Circle 499 on reader card

—Evan Birkhead

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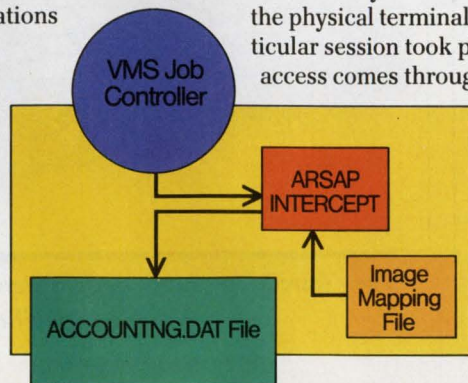
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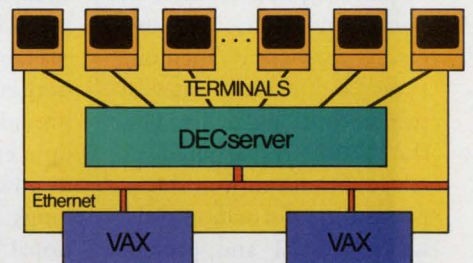
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Pack Up And Go With Texas Instrument's TravelMate

The TravelMate LT220 Data Terminal Excels In Functionality And Portability

The TravelMate LT220 portable data terminal, from Texas Instruments of Austin, Texas, is a plug-compatible DEC VT220 terminal that allows you to tap the power of a VAX from remote locations. The LT220's five pounds, 8 1/6- x 11 1/2- x 3 1/6-inch packaging makes it well suited for applications, such as sales/service automation, electronic mail and database access, where portability and a small footprint are key requirements.

With an easy-to-read display, high-speed internal communications options, credit card-sized memory cards and several integral printer options or cradles, the LT220 is targeted at telecommunications, transportation, information services, financial and professional services and government markets.

"In designing the LT220, the first product in the TravelMate LT series, we have drawn on new technologies in displays, communications and storage media," says Jerry Rycaj, data terminal products' marketing manager. "The result is a laptop terminal with equivalent functionality to a desktop VT220, plus additional features."

The LT220 is designed for applications that require

portability in VMS and UNIX operating environments. It can be customized for specific applications developed by VARs and end user organizations. No changes in host application attributes are required. The LT220 supports all VT220 character and screen attributes and has a familiar, full-function VT220 keyboard layout with embedded numeric keypad.

The LT220 has a 25-line x 80-column, Supertwist LCD with 640 x 200 resolution. This large, crisp display provides excellent screen readability. A backlit screen option is also available to provide readability in low-light environments. A built-in power-saver feature prolongs readability and optional battery life.

Two L-shaped printer cradle options, ink-jet or thermal, are available. The LT220 terminal plugs into either printer to form a complete, self-contained unit. Both printers provide draft mode at 160 cps; the ink-jet option also prints 80 cps in near letter-quality mode. Roll paper can be used with both printer options, however, the ink-jet printer also accepts fan-fold and letterhead paper.

Portability of a laptop is as important as how fast the user can communicate. RS232 and parallel interfaces are standard with the LT220.

Communications options include an internal 300/1200 bps modem or 2400 bps modem. The 2400 bps modem is among the first to be integrated into a laptop terminal. This increases communication speed, thereby reducing costs. The non-volatile memory stores up to three host configurations. A credit card-sized MultiFile Cartridge option allows an LT220 user to create, edit and store multiple files of information. This option also includes forms generation, a run file capability that automates the data collection and communication processes with the host computer and an Auto Access feature for storage of phone numbers and automatic log on sequences.

The LT220 supports up to 1/2 MB of memory, which VARs can program in C for

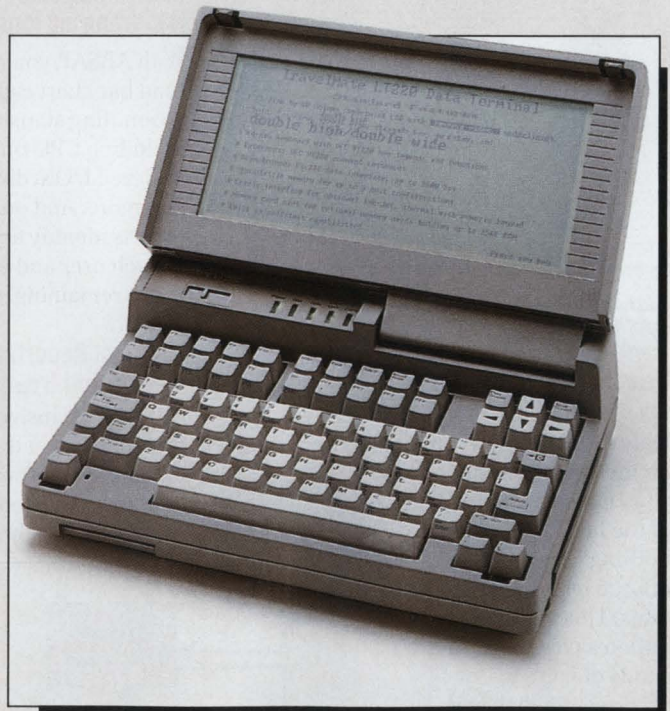
data collection, storage and retrieval. VARs can develop proprietary applications, thereby customizing the terminals to fit specific user needs. Built-in self-test capabilities to help you pinpoint problems are also available.

A battery option allows operation of the LT220 when an electrical outlet isn't available. An adaptor also lets you operate the laptop terminal from a car battery. With optional MNP protocol (up to Class 5), error-free data transmission with increased data throughput can be accomplished in a conventional or cellular phone network environment.

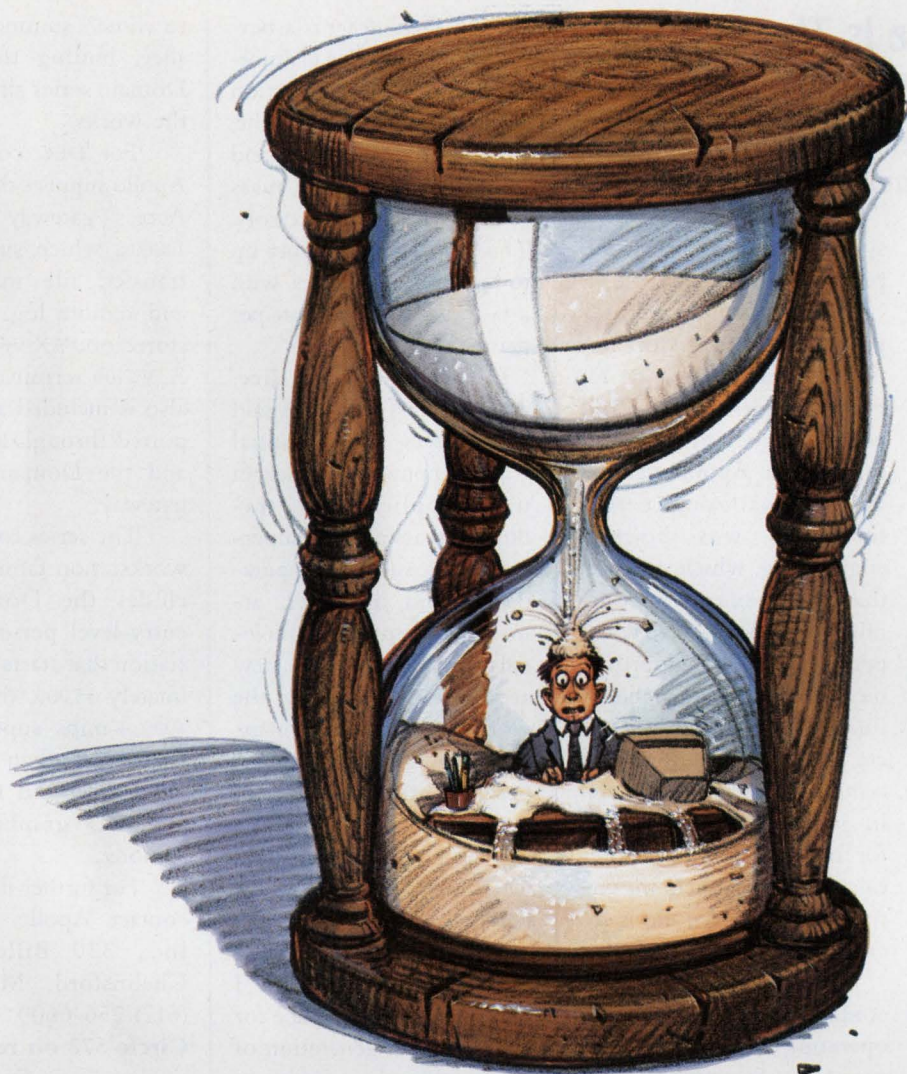
For more information, contact Texas Instruments Inc., Data Systems Group, P.O. Box 181153, DSG-196, Austin, TX 78718; (800) 527-3500.

Circle 550 on reader card

—Suzanne Garr



The TravelMate LT220 weighs less than five pounds combining portability with functionality.



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CIRCLE 158 ON READER CARD

64-Bit Architecture Is The Center Of PRISM's Workstation Series

Apollo Sets New Desktop Processing Marks With A Supercomputer Engine

With activity in the workstation marketplace heating to a boil, Apollo Computer's repositioning of its technical and business systems was expected. New competition from DEC, Hewlett-Packard, Sun and Silicon Graphics has furthered the state of the technology, and graphics offerings from startups Ardent and Stellar have spread out the field.

What wasn't anticipated was the extent to which Apollo would go to redesign its architecture. But Apollo's 64-bit Domain 10000 series, which is being promoted as a personal supercomputer, is capable of 15- to 30-VAX mips per processor and can be configured with up to four RISC processors. The new architecture is called Parallel Reduced Instruction Set Multiprocessing (PRISM), and the lower end 10010 systems (single processor) start at \$69,900.

The personal supercomputer is available in two configurations: a server configuration with 8 MB of main memory and a 348-MB disk at the entry level and a computational graphics workstation configuration that adds eight planes of color and a 19-inch 1024 x 800 color display. The main memory uses 1-megabit DRAMs but will accept 4-megabit units. At the high-end 10040 (with four processors), the server prices start at \$129,900 and the workstation prices start at \$139,900. The synchronous

system bus can attain 150 MB per second.

The 10000s are reportedly the first workstations to integrate a 64-bit format with RISC and parallel/multiprocessing capabilities. Apollo claimed that its breakthrough design technique was holistic engineering, which suggests that improvements in compiler technology were compensated for by improvements in the system architecture and operating system, etc. In particular, the RISC central processors have built-in independent processors for integer and floating point calculations that help the entire system handle number-crunching computations.

Each PRISM system comes with the Domain/OS operating environment that runs UNIX System V (Rel. 3), Berkeley 4.3, or both simultaneously.

Also included with an

off-the-shelf 10000 is a new data flow compiler technology, a 128-KB instruction cache and a 64-KB data cache, PC/AT and VME buses, and up to 3 GB of local mass storage with four processors. The system can support up to four 5¼-inch drives, with a 15-megabit transfer rate per drive.

Thomas Vanderslice, Apollo's chief executive, said he expects the personal supercomputer to unearth new applications traditionally assigned to supercomputers, such as computational fluid dynamics, atmospheric simulation, molecular modeling and a new area that's penetrating the workstation market, financial modeling. It's also expected to bring new levels of performance to Apollo's current customers in mechanical CAD and CAE and electronic design automation.

"This is the first system of its class, one which I believe will set the pace for an entire new generation of workstations for many years

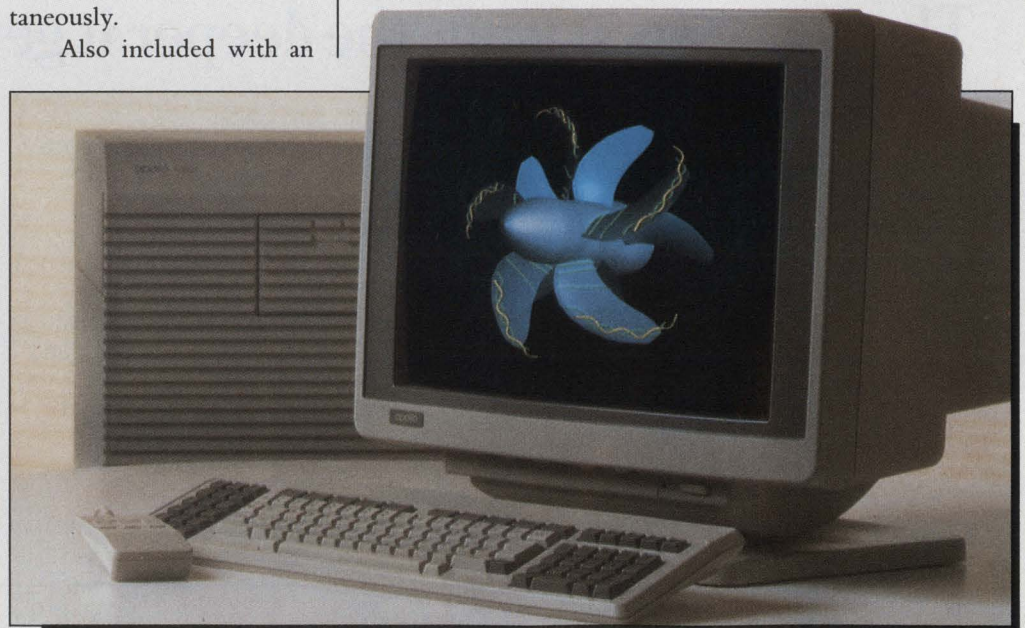
to come," summed Vanderslice, hinting that further Domain series already are in the works.

For DEC connectivity, Apollo supplies the Domain/Access gateway with the 10000s, which supports file transfer, file management and remote log in to data stored on VAX/VMS systems. A VT100 terminal emulator also is included and is supported through RS232 ports and the Domain Ethernet gateway.

The series rounds out a workstation family that includes the Domain 3000 entry-level personal workstation that starts at approximately \$5,000, the Domain 4000 4-mips superworkstation for less than \$14,000 and the DN580 and DN590 2-D and 3-D graphics workstations.

For further information, contact Apollo Computer Inc., 330 Billerica Rd., Chelmsford, MA 01824; (617) 256-6600.

Circle 572 on reader card
—Evan Birkhead



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But things have gotten more complicated. There are now major tradeoffs available between speed, capacity, and cost.

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On the other hand, smaller systems and networks may be able to get by nicely with a much less expensive but slower backup solution.

The point is that no single backup answer is right for everybody.

So now, MegaTape offers you a choice. The exceptional cost/capacity of 8mm. Or the "industrial-strength" performance of our proven cartridge technology—now dramatically upgraded.

You can still pick up the phone and order a MegaTape system for just about any minicomputer or workstation network.

But now you'll have to decide *which* MegaTape system to order.



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When speed counts, nothing tops the new MT-1500. At maximum transfer rate, this rugged powerhouse backs up 1.2 gigabytes on a single cartridge in under 30 minutes. And it offers features you simply can't get anywhere else:

- Up to three plug-in interfaces: any combination of Pertec and SCSI. A front panel switch selects the CPU.
- Complete software compatibility. No need for special device drivers or backup utilities.
- Comprehensive local and remote diagnostics. A technician can easily troubleshoot the entire system from the front panel—or from across the continent, using a terminal and modem.

The MT-1500 comes in rackmount and tabletop configurations, and is designed for easy OEM customization. It's even read compatible with the previous generation of MegaTape systems.

NEW
GT-88

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Even though the new 8mm data cartridges promise eye-popping capacity and unbeatable cost per megabyte, we saw a few problems. Unproven reliability, for one. Nonstandard interfaces, for another.

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- A full 1.25 MB of Cache, for burst-mode transfer rates up to 880K bytes per second.
- Optional switching between two different CPUs at the push of a button.

The GT-88—complete with AC power supply—is conveniently packaged as a tabletop unit or in 8" form factor to fit standard enclosures. And it's format-compatible with other 8mm backup systems.

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	GT-88	MT-1500
Capacity (formatted)	2.0 GB	1.2 GB
Transfer rate (burst)	880 KB/sec	3000 KB/sec
(sustained)	246 KB/sec	764 KB/sec
Interfaces	Pertec	Pertec, SCSI
I/O ports	1 or 2	up to 3
Dimensions (in.)	4.5H x 8.6W x 14.0D	8.75H x 19.0W x 24.0D


So while we may have complicated your choice a little bit, in the end the right decision is obvious.

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CIRCLE 139 ON READER CARD



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Achilles' Heel

A SITE MANAGER'S guide to power problems.

BY DR. ALEX SEVERINSKY

CONSIDER THE HYPOTHETICAL situation where a manager is using remote file access on a LAN with a DECNET-to-VAX connection to gather information for a monthly report. The system is working fine, but suddenly the keyboard locks and doesn't respond to input.

Another user on the network is baffled by corrupted data that he proofed a few days before. Meanwhile, complaints about unexplained board and power supply failure trickle in from other network users, who are tired of frequent system shutdowns and rebooting their systems.

To solve the problems, the site

manager complains to the LAN vendor who installed the new network. Network connections and hardware and software components are examined, replaced and re-examined. But, network users still complain about the same problems, and frustration builds.

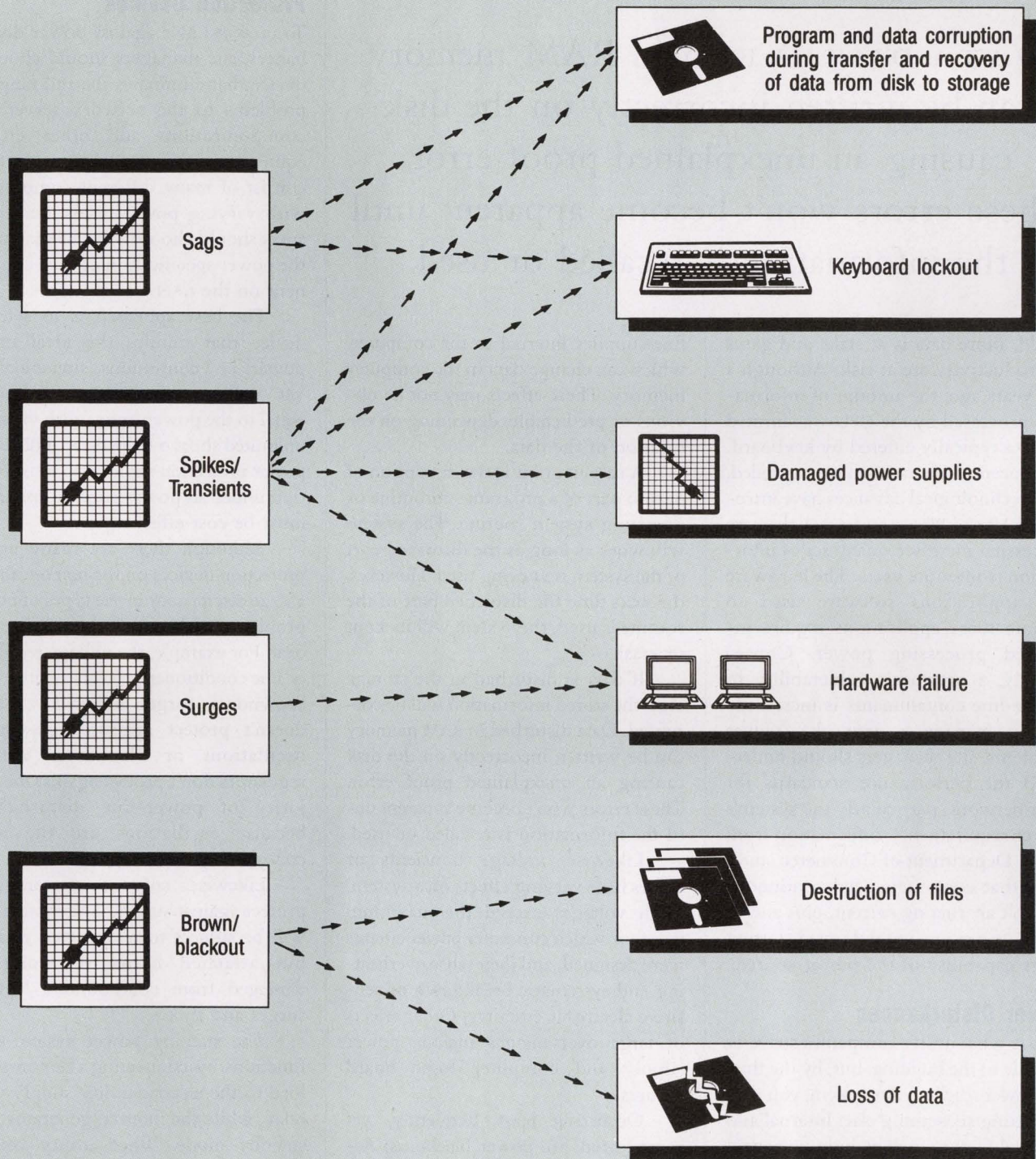
The unexpected has happened. The proven network coupled with the proven software and hardware is a problem. That unexplained problem requires examining the most crucial, yet most neglected, component of any network: electric power.

Since the dawn of the computer age, power has been a problem. Main-

frames were pampered in a dust-free, climate-controlled environment. Dedicated power lines were installed to eliminate power problems. Today, as mini- and microcomputers have proliferated, that kid-glove treatment has changed. Now, computers are plugged into a wall socket and expected to work. Power is expected to be reliable, but often it's not.

Power-line disturbances are a common occurrence. According to an IBM study, power-line disturbances take place 57 times a month on average (two times per day for commercial sites), with undervoltages and high frequency

Figure 1.



Effects of power problems on microcomputer systems.

oscillations occurring most frequently.

Because of technological advances in networking and software applications, power problems today result in serious consequences. More users are af-

with your system (see Figure).

For example, power sags, caused by lightning, and normal business loads such as elevator motors and air conditioning, can cause glitches on power-

RAM and the possible destruction of files, if the failure occurs when the file allocation table is being rewritten and stored on the hard disk.

Protection Devices

To protect LANs against power disturbances, site managers should choose a device that eliminates the full range of problems to the network server and communications and other critical equipment. Because computer systems consist of many different components with varying power needs, site managers should choose a device that meets the power specification of each component on the LAN.

The best approach is to select a device that mimics the ideal utility power; i.e., continuous, sinusoidal 120 VAC voltage waveform at a frequency equal to the power line's, with virtually unlimited short overload capability. The power protection device also must function under all power conditions, and it must be cost effective.

Although there are many power protection devices on the market, there's a large discrepancy in the types of power problems with which each device can deal. For example, the voltage regulator or line conditioner protects against sags, brownouts, surges and spikes, but it doesn't protect against high-voltage oscillations or blackouts. Voltage regulators don't protect against the majority of power-line disturbances, because oscillations are the most common.

Likewise, surge protectors only protect against surges. The system still will be subject to unexpected crashes, but attached hardware won't be damaged from compounded hits by surges and spikes.

The standby power system (SPS) functions by connecting the computer load to the electric utility supply via a relay, while the internal generator is in standby mode. When utility voltage drops below a certain voltage, relay transfers load to the internal generator, which draws current from the battery.

But SPSs have drawbacks. Often,

DATA DISTURBED in RAM memory can be written incorrectly on the disk causing an unexplained proof error.

These errors won't become apparent until the information is recalled or used.

fect, more data is at stake and gains in productivity are at risk. Although a few years ago, the amount of information processed by the CPU was limited by data typically entered by keyboard, the concept of information has expanded.

Technological advances have introduced LANs, WANs and CAD that are processing increased quantities of information from more users. The hardware and applications software used to operate these applications require increased processing power. Consequently, a network's vulnerability to power-line contaminants is increased.

To manage a network's power problems, site managers should understand the performance standards for their network, particularly the system's power requirements. Information from a U.S. Department of Commerce study finds that computers need continuous 120-volt alternating current, plus and/or minus 10 percent and unlimited starting surge capability of the power source.

Power Disturbances

This is what utility companies strive to provide to the building, but, by the time the power reaches your system, you may be getting something else. Internal and external factors such as lightning, grid switching and cycling of equipment inside a building can cause voltage sags, spikes, surges, brownouts and blackouts. These disturbances can play havoc

line supplies internal to the computer, which can change data in the computer memory. These effects may not be obvious or predictable, depending on the location of the data.

A case in point is the disruption of data in part of a program subroutine or operating system routine. The system will work as long as the disturbed part of the system isn't being used. However, the next time the disturbed part of the routine is used, the system will lockout or crash.

If data is disturbed in the storage area, the stored information will be corrupted. Data disturbed in RAM memory can be written incorrectly on the disk causing an unexplained proof error. These errors won't become apparent until the information is recalled or used.

Likewise, voltage transients or spikes have varying effects on a system. High voltages exceed the maximum value for which computer power circuits were designed, and they cause overheating and systematic breakdown of sensitive electronic circuitry. Other effects of large overvoltages include power supply and computer logic board failures.

Occurring least frequently, yet most feared, are power blackouts. According to an IBM study, power failures represent one percent of the total number of power-line disturbances. Yet, they can cause the loss of all data in

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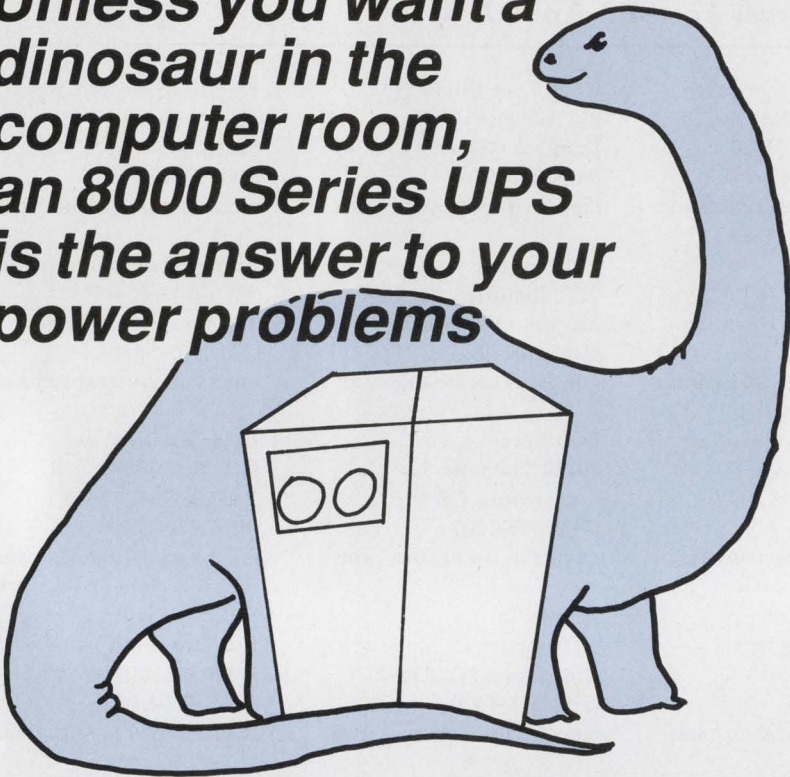
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Continued on page 43.

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the computer system won't ride through the time it takes the SPS to initiate operation after sensing that the voltage has dropped, and the system will crash anyway. Also, SPS equipment doesn't protect against spikes and high-frequency oscillations, and it has limited function during brownout.

Although a SPS is limited in its power protection capabilities, an online uninterruptible power supply (UPS) eliminates all types of power problems. It continuously operates from battery power and doesn't switch, using line voltage only to keep its batteries charged. In effect, the online UPS isolates the computer system and peripherals from the utility line. It's an ultimate computer power source.

Evaluation Criteria

Unfortunately, there are no available standards for specifications and performance of UPS devices. To evaluate online units, there are two different criteria that need to be assessed to determine each product's capabilities: inrush capability and output waveform.

Inrush capability is the capacity required for the power source to start up all connected loads at any time. When electronic equipment is turned on, the power draw surges temporarily to exceed the operating power requirement for the attached equipment. If this happens when the demand for power from the UPS is already high, a short-lived overload occurs. Consequently, online devices may require inrush or surge capacity as high as 2,000 percent.

Without this capacity, users starting their computers at the beginning of each day would overload the UPS; systems wouldn't turn on, or other devices on the line would shut down. Online devices with insufficient inrush capacity can't be used to power equipment to the rated output of the UPS.

A second key issue is the quality of the waveform produced by the UPS. A sine waveform is characteristic of ideal utility power and will power any type of load. This waveform must be a pure alternating-current (AC) type. Even the

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smallest percentage of direct current (DC) on the output can saturate numerous magnetic loads, such as fans and transformers, thereby making them inoperative.

An online UPS with similarity and performance to ideal utility power is the best solution to power problems. It offers the following features:

1. Sine waveform with no DC on the output.
2. Frequency similar to that in the power line.
3. Virtually unlimited short overload capacity.

This type of UPS eliminates all utility power disturbances and doesn't create any of its own. Therefore, no

costly engineering investigation of the site power is necessary. —*Born and educated in the Soviet Union, Dr. Alex Severinsky is president and founder of Viteq Corporation in Lanham, Maryland.*

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A

CHECKING THE TEMPERATURE

A N I N E X P E N S I V E approach to environmental monitoring.

BY STEVE REES

THERE ARE MANY computer room environment monitoring systems on the market and most are expensive. There is an alternative to this problem, however, that you won't need to negotiate with your finance department; in fact, you probably can implement it out of petty cash.

This technique involves using an ordinary household thermostat to signal the VAX that the temperature has risen above a preset threshold (the jargon-minded reader could call it a passive, one-bit analogue-to-digital converter). A thermostat usually operates by way

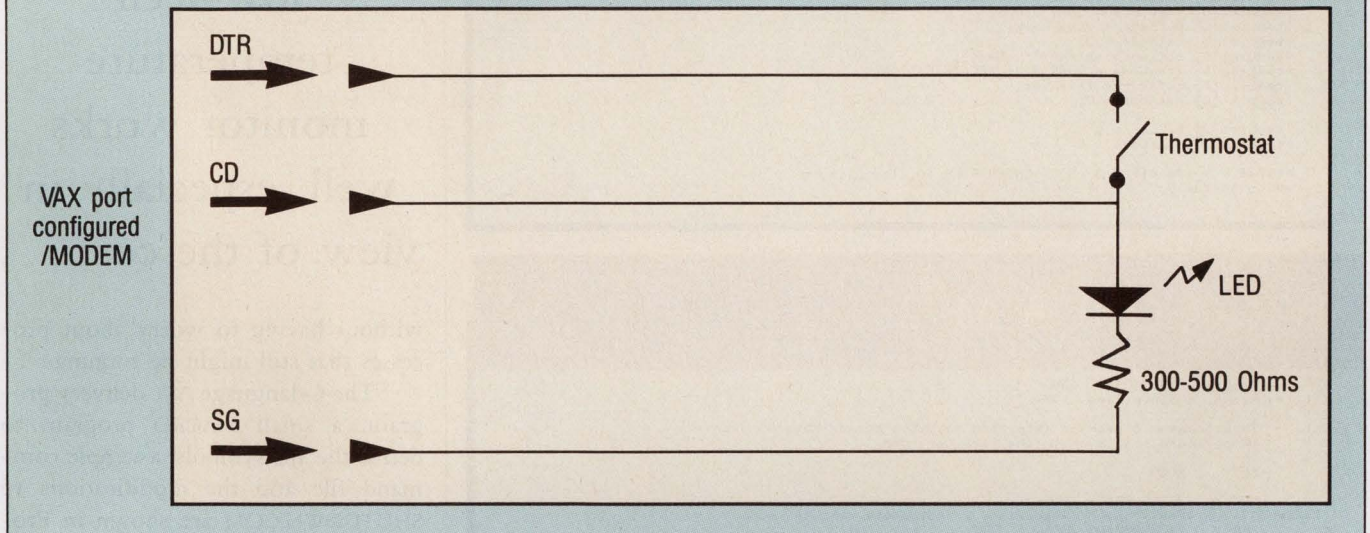
of a bimetallic strip that tilts a mercury switch as the temperature changes. Models designed to control furnaces usually close the contacts as the temperature falls and opens them as it rises. This type is used here.

First, an unoccupied terminal port on the VAX is selected and set up /MODEM/PERMANENT. This tells the machine to listen to, among others, the RS-232 Carrier Detect (CD) signal on the port. It also makes the port's Data Terminal Ready (DTR) signal go positive, providing the power needed to signal high temperature. Next, CD and DTR

(pins 8 and 20, respectively) on the VAX port are wired to the thermostat. Testing with an ohmmeter will show which of the thermostat connections are the right ones to use.

The thermostat then is set to three or four degrees above the room's ambient temperature; this closes the circuit through the mercury switch, connecting DTR to CD. Since DTR is high, CD is pulled high, indicating to the VAX that a connection has been established through the port. Although not necessary, Signal Ground (pin 1) also can be wired to the thermostat so that

Figure 1.



Schematic of low-tech computer room temperature monitor.

a light-emitting diode can indicate when CD is high; i.e., when the temperature is below the threshold (see Figure 1).

Whenever the machine is booted, a detached process queues a CTRL-Y AST to the thermostat port and then hibernates. If CD drops on a port configured /MODEM, all such ASTs are delivered to the initiating process. Thus, when the temperature rises, the thermostat breaks the connection between DTR and CD, causing CD to drop. The VAX then delivers the AST, awakening the process. The AST-handling routine submits to batch a command file that, in our case, sends REPLYs and mail messages to any technical staff who may be logged into the local system, and mail messages via DECNET to the staff at the main operations center.

If no response to these messages occurs within 10 minutes, a version of SHUTDOWN.COM, which doesn't stop the queue manager, is executed in batch on all three of the VAXs in the room. This allows at least a graceful dismantling of disks. Bringing the systems down in this fashion won't reduce the heat appreciably, but it will allow whoever comes to the rescue to cut the power

PROGRAM 1.

```

/*****
***** Program: THERMOSTAT.C
***** Author: Steve Rees, 1987
*****
***** This program queues an AST to a port indicated by the logical
***** THERMOSTAT_PORT and then hibernates. When the process
***** is awakened by the AST, it submits the command file
***** THERM:THERMOSTAT.COM to SYSSBATCH and exits.
*****
*****/

#include <stdio.h>
#include <ssdef.h>
#include <iodef.h>
#include <descrip.h>

long status;
short channel;
$DESCRIPTOR( devDesc, "THERMOSTAT_PORT" );

globalvalue SJCS_QUEUE;
globalvalue SJCS_FILE_SPECIFICATION;
globalvalue SJCS_ENTER_FILE;

main()
{
    void thermostatRoutine();

    status = sys$assign( &devDesc, &channel, 0, 0 );
    if ( !(status & 1) )
        exit( status );

    status = sys$qio( 0, channel, IO$_SETMODE | IO$M_CTRLYAST, 0, 0, 0,
        &thermostatRoutine, 0, 0, 0, 0 );
    if ( !(status & 1) )
        exit( status );

    status = sys$hiber();
    if ( !(status & 1) )
        exit( status );
}

/*****
***** AST-handling routine for the thermostat.
*****/
void thermostatRoutine()
{
    struct {
        short bufLen, itemCode;
        long bufAddr, retAddr;
    } itemList[3];
    char queueName[] = "SYSSBATCH";
    char fileName[] = "THERM:THERMOSTAT.COM";
}

```

Continued.

PROGRAM 1. . . . continued

```

itemList[0].bufLen = strlen(queueName);
itemList[0].itemCode = SJC$ QUEUE;
itemList[0].bufAddr = queueName;
itemList[0].retAddr = 0;
itemList[1].bufLen = strlen(fileName);
itemList[1].itemCode = SJC$ FILE_SPECIFICATION;
itemList[1].bufAddr = fileName;
itemList[1].retAddr = 0;

itemList[2].bufLen = 0;
itemList[2].itemCode = 0;

status = sys$sndjbc( 0, SJC$ ENTER_FILE, 0, itemList, 0, 0, 0 );
exit( status );
}

```

PROGRAM 2.

```

$ !      Program: THERMOSTAT.COM
$ !      Author: Steve Rees, 1987
$ !
$ !      This command stream is submitted to batch to indicate an over-
$ !      temperature condition in the computer room.
$ !
$ !      SET      NOON
$ !
$ !      REPLY    /TERM=OPAO: /BELL -
$ !      "%THERMOSTAT-F-TOASTY, high temperature in corporate computer room."
$ !      REPLY    /TERM=OPAO: /BELL -
$ !      "-THERMOSTAT-F-TOASTY, system shutting down in 10 minutes."
$ !
$ !      REPLY    /USER=(SYSTEM,TECHNICAL,OPERATOR) /BELL -
$ !      "%THERMOSTAT-F-TOASTY, high temperature in corporate computer room."
$ !      REPLY    /USER=(SYSTEM,TECHNICAL,OPERATOR) /BELL -
$ !      "-THERMOSTAT-F-TOASTY, system shutting down in 10 minutes."
$ !
$ !      MAIL    SY$INPUT /SUBJ = "Overheating in corporate computer room" -
$ !              CENTRL::SYSTEM,CENTRL::TECHNICAL,CENTRL::OPERATOR -
$ !
$ !              *** WARNING ***
$ !
$ !      The temperature in the Corporate computer room has risen above an
$ !      acceptable level. The systems will be shut down in 10 minutes.
$ !      Please contact someone to check into the situation, either to
$ !      restore air conditioning or to power off the equipment, as soon
$ !      as possible!
$ !
$ !      WAIT    0:10:00.00
$ !      SUBMIT  /REMOTE VAX2" THERM password":THERMOSTAT
$ !      SUBMIT  /REMOTE VAX3" THERM password":THERMOSTAT
$ !      0      THERM:THERMAL_SHUTDOWN 0 SHUTDOWN YES NO LATER NO NONE
$ !
$ !      LOGOUT

```

PROGRAM 3.

```

.title      SJC macro definitions
;           To be linked with thermostat.c
$SJCDEF    GLOBAL
.end

```

PROGRAM 4.

```

Excerpt from THERMAL_SHUTDOWN.COM, the version of SHUTDOWN.COM used here.
=====
.
.
$stand_alone = 1
$33:
$if remaining .gt. 1 .or. queues_stopped then goto 36
$!say "%SHUTDOWN-I-STOPQUEMAN, The queue manager will now be stopped."
$!set noon
$!if f$search("%SY$SYSTEM:QUEMAN.EXE") .nes. "" then stop/queue/manager
$!set on
$queues_stopped = 1
.
.

```

THIS
profoundly
low-tech
temperature
monitor works
well, especially in
view of the cost . . .

without having to worry about processes that still might be running.

The C-language AST delivery program, a small MACRO program to define the SJC symbols, a sample command file and the modifications to SHUTDOWN.COM are shown in Programs 1-4 respectively.

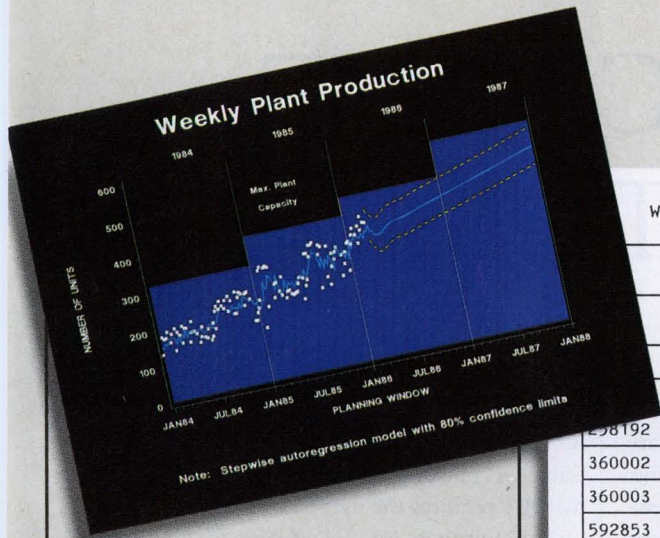
In tests conducted here at Ault Foods Limited, Etobicoke, Ontario, the thermostat reacted to the temperature rise within 10 minutes of the air conditioner shutting down and had all three VAXs down 11 minutes after that. Note that the time to activation depends on the amount of computer equipment, the size of the room and the thermostat setting, etc. This profoundly low-tech temperature monitor works well, especially in view of the cost, about \$15 in parts, two hours of labor, plus a small ongoing quantity of VAX resources.

This project suggests obvious extensions. Simple circuits to detect low or excess humidity, water on the floor or even unauthorized entry into the room are available in hobbyist electronics books. One or more of these could be built and connected to your VAX using the same method. This approach to environmental monitoring might seem unorthodox, but think of the fun you can have bragging about your homemade VAX peripherals. — *Steve Rees is a technical analyst for Ault Foods Limited, Etobicoke, Ontario.*

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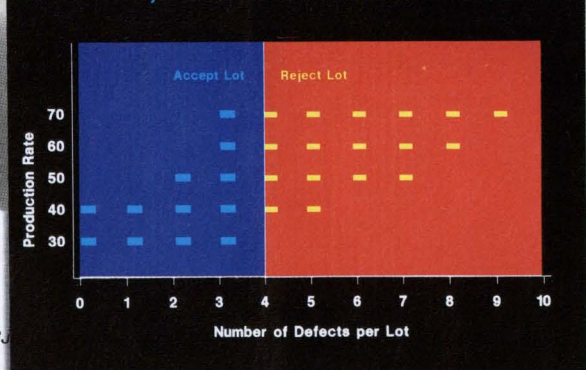
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THE SCHEME OF THINGS

By Betty Steele Adukoski

Understanding Security In A Non-Privileged Environment.

User identification codes (UICs), protections and access control lists (ACLs) are mechanisms in the VMS security scheme. When maintaining several non-privileged environments on the same system, these mechanisms are useful tools and offer sophisticated and complex options for enhancing system security. But, complexity can lead to confusion.

To avoid unruly mishaps and problems in these non-privileged areas, it's important to understand what these mechanisms do, where they obtain their default values and how they can be controlled.

UIC-Based Protection

UIC-based protection consists of a UIC and a protection code. They work together to control access according to the user UIC. The UIC specification can be either numeric or alphanumeric and is [group,member]. When a user tries to access a file, the system compares his UIC to the file's UIC. Based on the file's associated protection code, the system determines if access should be allowed. The user's UIC is stored in the system authorization file (SYSUAF) and is assigned when the username is created. \$\$SHOW PROCESS displays the user's UIC.

The protection code defines the type of access allowed to the file, based on the user's UIC. The protection code is SYSTEM:RWED,

OWNER:RWED, GROUP:RWED, WORLD:RWED. SYSTEM protection refers to privileged users. OWNER means that the user must have the same UIC, both group and member, as the file. GROUP requires the user to have the same UIC group number. WORLD refers to all users. (R)ead, (W)rite, (E)xecute and (D)elele describe the type of access allowed for that type of user, for example:

```
$DIR/OWNER/PROTECTION
Directory of DUA1: [PROD.DATA]
FILE.DAT;1 [110,2] (RWED,RWED,RWE,)
```

A user with a UIC of [110,150] would have group read, write and execute access but not delete access. World users, any user that doesn't have the same group UIC [110,*], would have no access.

Each directory file also has a protection code and UIC. If a user needs access to a file, all the directories for that file also must allow the access. The top-level, or root, directory and all subdirectories in the path to that file need the proper protection set to allow the user to get through them to the file, for example:

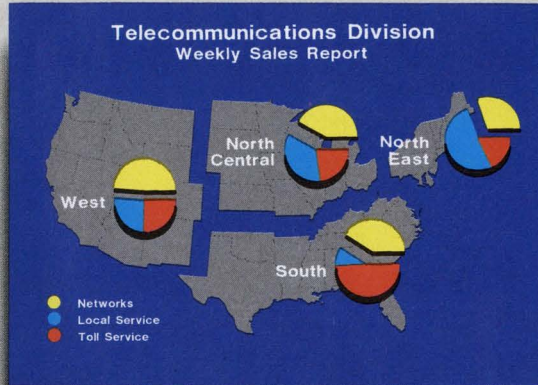
```
Directory of DUA1: [PROD]
DATA.DIR;1 [200,2] (RWED,RWED,RWE,)
```

The same [110,150] user wouldn't be able to access FILE.DAT. Even though FILE.DAT allows GROUP:RWE, the directory DATA.DIR is a different UIC and doesn't allow world access of any type. Therefore, the user would be blocked by the directory and denied access. In this example, the root directory PROD.DIR also would need to be checked to ensure that it

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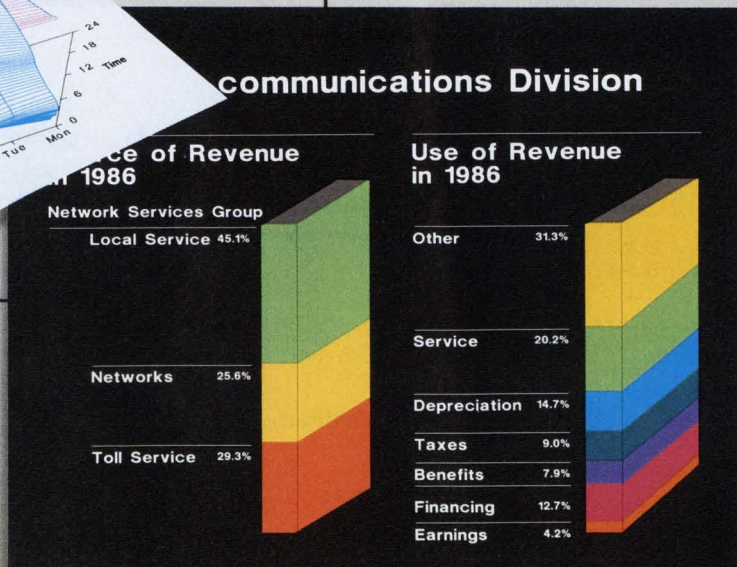
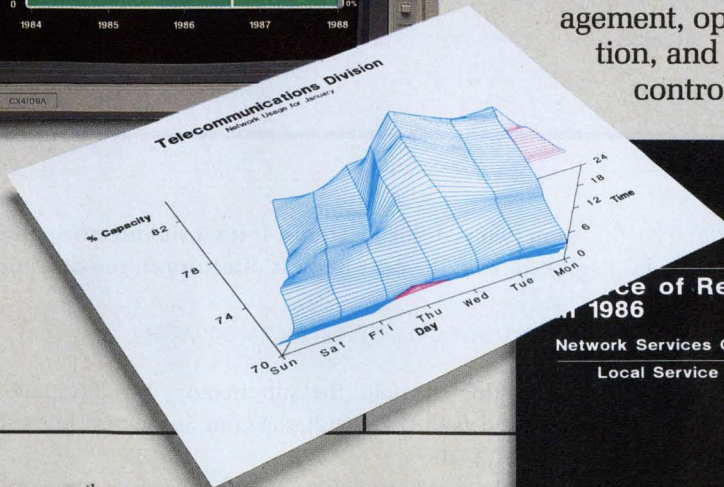
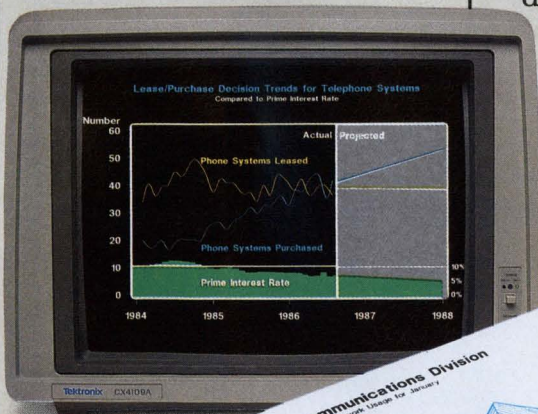
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T

TABLE 1.

Summary Of Commands		
Security Defaults	UIC	Protection
File: new file previous version exists Subdirectory Root directory	directory previous file next highest directory disk volume	default process protection (RMS__FILEPROT) previous file next highest directory less delete MFD less delete
Security Show Commands	File/Directory	Process
UIC	DIR/OWNER	SHOW PROCESS
Protection	DIR/PROTECTION	SHOW PROTECTION
ACL	DIR/ACL	
All securities	DIR/SECURITY	
Security Change Commands	Existing	New
File UIC	SET FILE/OWNER	COPY/OWNER
Directory UIC	SET FILE/OWNER	CREATE/DIRECTORY/OWNER
File Protection	SET FILE/PROTECTION	COPY/PROTECTION
Directory Protection	SET FILE/PROTECTION	CREATE/DIRECTORY/PROTECTION
Process-created files		SET PROTECTION/DEFAULT
File ACL	SET FILE/ACL	
Directory ACL	SET FILE/ACL	

allows the access needed by the user.

A file's default UIC is assigned from the directory in which it resides, for example:

```
$COPY
From:   DUA2: [TEST.DATA]FILE2.DAT
To:     DUA1: [PROD.DATA]**
```

Because DATA.DIR has an owner UIC [200,2], the FILE2.DAT that was copied into that directory also will have the UIC [200,2].

The default UIC for a newly created directory is derived

from two possible locations. If it's a subdirectory, the UIC is pulled from the next highest directory in the directory tree:

```
$CR/DIR DUA1: [PROD.DATA.SOURCE]
```

In this example, the subdirectory SOURCE.DIR would reflect a default UIC [200,2], the same as the next highest directory DATA.DIR.

If the directory being created contains a top-level directory, the default UIC comes from the disk volume. \$SHOW DEVICE/FULL shows the owner UIC for the disk volume.



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The default protection for a file is assigned from the default process protection. The SYSGEN parameter RMS_FILEPROT is used to establish this user protection during login. \$SHOW PROTECTION displays the default process protection.

If a previous version of the file being copied already exists in the destination directory, both the UIC and the protection code are inherited from the previous file:

```
$COPY
From:   DUA2: [TEST.DATA FILE.DAT]
To:     DUA1: [PROD.DATA]*.*
$DIR/OWNER/PROT
Directory of DUA1: [PROD.DATA]
FILE.DAT;2      [110,2]  (RWED,RWED,RWE,)
FILE.DAT;1      [110,2]  (RWED,RWED,RWE,)
FILE2.DAT;1     [200,2]  (RWE,RWE,RE,)
```

As shown in this example, no previous version of FILE2.DAT existed. Therefore, the UIC was assigned from DATA.DIR directory, and the protection came from the default process protection. The second version of FILE.DAT, however, inherited its UIC and protection from the previously existing version.

Subdirectory default protections are pulled from the next highest directory. The default protection of a top-level directory comes from the volume master file directory (MFD). \$DIR/PROT [000000] 000000.DIR displays the default MFD protection.

When either a root directory or subdirectory is created, all protections are inherited except delete. By default, no delete access is allowed. For example, the newly created SOURCE.DIR directory inherits the protection of DATA.DIR minus the delete protections. This means that SOURCE.DIR has the default protection SYSTEM:RWE, OWNER:RWE, GROUP:RE, WORLD:NO ACCESS.

Changing Defaults

Typically, files are moved between captive non-privileged areas by privileged users in a controlled procedure. Non-privileged users who aren't captive are capable of getting to DCL (\$). These users can copy their own files within their non-privileged area.

The procedure for any of these file manipulations can include guidelines for overriding the default UICs and protections for files and directories.

If a file's UIC needs to be changed, the following DCL command would be used:

```
$SET FILE/OWNER=[110,150] FILE.DAT
```

The UIC also can be assigned at the time the file is copied by using \$COPY/OWNER=[110,150].

An existing directory's UIC can be reassigned by using \$SET FILE/OWNER or \$SET DIRECTORY/OWNER. For a new directory, the UIC can be appended to the CREATE command: \$SCR/DIR/OWNER.

File protection can be changed during the file copy or after

When either a root directory or subdirectory is created, all protections are inherited except delete.

the file has been moved:

```
$COPY/PROTECTION=(O:RWED,G:RWE,W:R)
$SET FILE/PROTECTION=(O:RWED,G:RWED,W:R)
```

The first example assigns the specified protection to the file at the time it's copied. The second example changes the protection for a file that's not being moved but simply modified.

An existing directory's protection can be reset by using \$SET FILE/PROT. When changing a root directory, remember to preface it with the MFD:

```
$SET FILE/PROT=G:R DUA1:[000000]PROD.DIR
```

For a new directory, the protection can be appended when the directory is created: \$SCR/DIR/PROT.

New files created by captive non-privileged users default to the process protection. The default process protection can be changed for these captive users in their LOGIN.COM:

```
$SET PROTECTION=G:RWED/DEFAULT
```

Including this DCL command in the user login resets the user's default group protection. System, owner and world protections remain unchanged.

If the non-privileged user isn't captive and is capable of getting to DCL (\$), the user can issue the same DCL command to change his process protection.

It's important to remember two points regarding default process protection:

1. If a previous version of a file being created exists, the protection is picked up from that previous version and not from the process default.
2. When the user logs off, the default protection returns to its original value. If the different default protection is needed, non-captive users or the captive user's LOGIN must reset the protection every time he logs in.

ACLs

The ACL is used with the UIC-based protection to enhance security in areas where specific protection is needed. The ACLs are stored in the rights database, which is created through AUTHORIZE.

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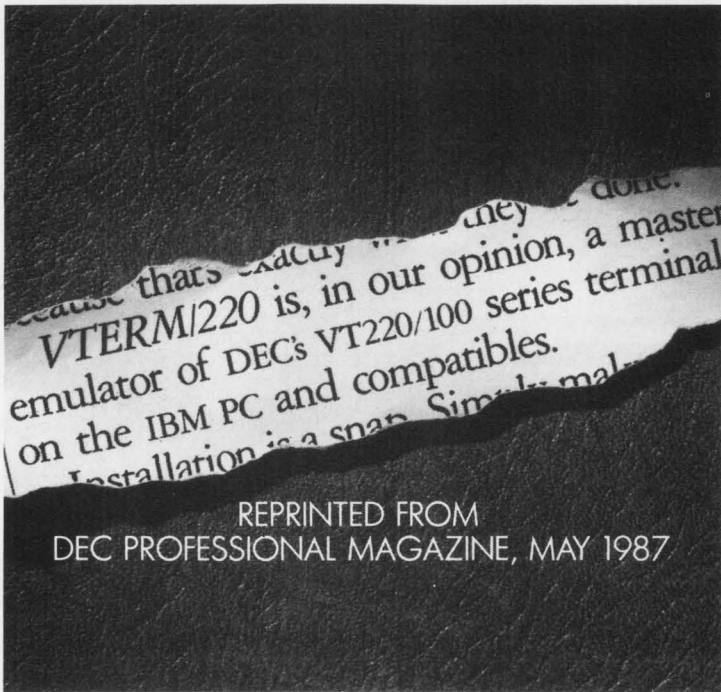
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A file can have an ACL that specifies access to that particular file for a certain user or group of users:

```
$SET FILE/ACL=(IDENTIFIER=[110,22],ACCESS=READ)
File: FILE.DAT
```

Even though FILE.DAT has a GROUP:RWED protection for [110,*] users, user [110,22] is allowed read access only.

If the same \$SET FILE/ACL command is assigned to a directory, it also will prevent the user from accessing the file, even if no ACL is set on the file itself.

Any subdirectories created inherit the ACL from its next highest directory, if an ACL exists:

```
$DIR/ACL
Directory of DUA: PROD
DATA.DIR (IDENTIFIER=[200,*],ACCESS=NONE)
```

When SOURCE.DIR was created, it defaulted to the same ACL as DATA.DIR. \$DIR/ACL displays any ACL that's set for a file. Check all directories for that file for any possible ACLs affecting access to the file.

ACLs can be beneficial tools in a non-privileged environment when more specific access segregation is needed. But don't assign so many ACLs that your system becomes burdened and unmanageable. It's important to read, in greater detail, all the ACL options available and plan their uses before actually implementing them. If you take this precaution, you'll decrease the chances of accidentally overriding an assigned ACL with an established higher level ACL structure.

Security Maintenance

To maintain non-privileged segregation security properly, UIC-based protections and ACLs should be monitored frequently to detect and correct unauthorized changes or access errors to these areas. \$DIR/SECURITY displays the UIC, protection and ACL for a file.

Regular review of your security scheme can alert you to possible protection bottlenecks. You also can catch implementation errors that may cause unnecessary privilege violations for your non-privileged users.

When a captive user questioned me about an access violation that she received, I reassured her I could fix it and that she hadn't been violated.

Do your homework before you set up these security features. If you have a full understanding of UIC-based protection and ACLs before you begin, you'll find it will be a smoother implementation. Your system will thank you in better performance and less maintenance. Your non-privileged users will thank you by not asking embarrassing questions. —Betty Steele Adukoski is a Florida-based free-lance writer.

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SECURITY

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By Robert Hansen

An In-depth Look At Five Key Issues.

In any shop, there are five security issues that need to be addressed. These include the control of access to system facilities, logging computer use and performance, maintaining program and data integrity, developing policies and procedures to deal with security related issues, and the housing and location of computer facilities.

Controlling Access

Regarding access, one consideration is the need to control physical access to your computer room. Only people who need access to the computer room should have it, but many unauthorized people manage to acquire keys or combinations. There's a wide variety of locks available, with methods of restricting access ranging from handprint recognition to the conventional key; the best method for you depends on the level of security needed at your site.

A popular and practical option is the combination bolt on the computer room door. This option is attractive, because the combination can be changed as often as necessary, and it's relatively cheap. The reason for restricting access to the room is to keep people from having access to information; i.e., the system con-

sole, modem telephone numbers, backup tapes, etc. So change the combination regularly.

There's also the issue of controlling access to the system, both local and dialup access. Unless people must be able to dial in to your system at any time without advance notice, disconnect your modem from the system when it's not in use. No hacker can get through a disconnected modem. Require modem users to request that the modem be hooked up for a specific time period. If they need it after hours (and you don't have someone on duty at the time), hook it up before you leave at night and disconnect it again in the morning. It may seem like a lot of trouble, but you'll feel better the next time you hear about the guy whose system got trashed by someone fooling around over the modem.

A person dialing in to your system should not be provided with any information about your system until he has logged in successfully, and he should be required to enter a system password before the username prompt. This will thwart the casual hacker and the uninformed disgruntled employee. You can accomplish this with the following commands:

```
§ SET PASSWORD/SYSTEM  
§ SET TERM/SYSPASSWORD/PERMANENT term-id
```

where term-id is the device name of the dialup terminal.

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PROGRAM 1.

```
$ SET ACL SECRET.DAT/ACL=(IDENTIFIER=[15,*],ACCESS=READ+WRITE+DELETE)
$ SET ACL SECRET.DAT/ACL=(ALARM_JOURNAL=SECURITY, ACCESS=READ+
WRITE+DELETE+FAIL)
$ SET ACL SYSSYSTEM:SYS.EXE/ACL=(ALARM_JOURNAL=SECURITY, ACCESS=WRITE+DELETE+
SUCCESS+FAIL)
$ SET AUDIT/ALARM/ENABLE=( LOGFAIL=ALL, BREAKIN=ALL, LOGIN=(DIALUP,REMOTE),
LOGOUT=(DIALUP,REMOTE), ACL )
$ DEFINE/USER SYSSCOMMAND TTBo:
$ REPLY/ENABLE=SECURITY
$ DEASSIGN/USER SYSSCOMMAND
```

To suppress the system announcement message on all terminals, enter:

```
$ DEASSIGN/SYSTEM SYS$ANNOUNCE
```

At the same time, update your SYSTARTUP.COM file to reflect the changes, or the changes will disappear the next time the system is rebooted.

You also may wish to control the times during which users can log in to the system, and means by which they can do so (local, remote, dialup, etc). This can be accomplished by running the AUTHORIZE utility and modifying each username. The following example shows how to make sure that a user with the username Razor can log in only on Monday through Friday, from 8 a.m. to 6 p.m., and never can dial in to the system:

```
UAF> modify/noaccess = (primary,19-7,
secondary,0-23)/nodialup RAZOR
```

You can do a lot with AUTHORIZE, so think about what your users need to be able to do, and read about AUTHORIZE in the manuals.

You may want to consider running a watchdog-style program on your system, which automatically will log out users who are inactive for a specified period of time. Using programs that monitor user activity ensures that terminals don't remain logged in and vulnerable for an excessive amount of time. There are a number of such programs available from third-party developers, as well as some unsupported ones available through DECUS.

Logging Computer Use And Performance

VAX/VMS provides several methods by which a system manager can monitor his system. Each method has distinct advantages and should be considered with the specific needs of your environment in mind. As time goes by, you will develop an innate sense for how your system normally feels. Here, I'll focus on the VMS Accounting Utility, Security Auditing, and the use of access control lists (ACLs) to restrict access and

sound security alarms. These surveillance utilities have a generic appeal to the security conscious VAX manager and provide a simple means of logging potentially subversive or compromising activity.

When trying to document or detect a security breach, the VMS Accounting utility is a useful tool. When studied regularly, the Accounting log can help you spot suspicious events or unfamiliar patterns of system use. For instance, you might see that someone logged in at 3 a.m. one weekend morning, perhaps with an unauthorized username. Or, you may notice that someone has been logging into your system via a remote network node which normally is inactive during the time the events were logged.

If proper attention isn't paid to the log, however, you won't be aware of some of the strange activity that could be taking place on your system. If you don't know what is being logged, \$ SHOW ACCOUNTING from DCL will tell you. If Accounting isn't enabled on your system, and you want to enable it, the *VMS DCL Dictionary* provides a complete list of events that can be logged. A common command to enable basic accounting might be:

```
$ SET ACCOUNTING/ENABLE = (PROCESS,
INTERACTIVE, LOGIN_FAILURE,
SUBPROCESS, DETACHED, BATCH,
NETWORK, PRINT, MESSAGE)
```

Of course, each system has a unique environment with a unique set of requirements that need to be assessed to determine exactly which events should be logged.

With Accounting enabled, you have a variety of reporting options available to you. For instance, you can scan the log each morning, looking for unusual activity. One way to do this is with the command:

```
$ ACCOUNT/SINCE:2-JUN-1988/TYPE = "-"PRINT
```

to list all events for which Accounting is enabled, except PRINT type events.

The DCL command SET AUDIT allows you to enable a number of security alarms that can alert you to possible attempts to compromise your system. When an event occurs for which a security alarm is enabled, a message is sent to all users who are enabled as security operators. The message indicates the type of event and provides relevant details concerning the perpetrating process (PID, username, image, privileges used, etc.).

To conform to some basic security principles, I recommend enabling security alarms for log in failures, break in attempts, and successful log ins from remote and dialup terminals. A successfully sounded alarm is the most reliable in-

dication of a security breach available, because the alarm sounds before a privileged user can alter any log files or change his identity.

If there are files on your system that are sensitive, you can set alarms on them. Alarms can be set to indicate file access (or attempted access) for READ, WRITE, EXECUTE, DELETE and/or CONTROL. To set an alarm on a file, place an entry in the target file's ACL defining what types of access should sound an alarm. For the alarm to sound after the ACL entry has been made, ACL auditing must be enabled.

You must have at least one terminal enabled as a security operator's terminal for the message to be displayed.

The Program shows:

1. How to set an alarm on a file called SECRET.DAT that will sound when any user other than [15,*] tries (and fails) to access it.
2. How to set an alarm that will sound anytime the file SYS.EXE is written to.
3. How to enable security auditing for the ACL-based alarms as well as for log in failures, break in attempts, and dialup and remote log ins and log outs.
4. How to enable a security operator's terminal.

For more security-conscious sites, audit the use of privilege to access files, which wouldn't be available otherwise to a user. This can be accomplished with the command:

```
$ SET AUDIT/ENABLE = FILE__ACCESS =  
(SYSPRV,BYPASS,READALL,GRPPRV)
```

As you can imagine, though, this type of auditing can create huge amounts of data that must be sifted.


Maintaining Data Integrity

There's an undocumented CHECKSUM command that provides an excellent means of verifying the integrity of a file. To use it, type:

```
$ CHECKSUM FILENAME.DAT <CR>
```

Nothing will be displayed, but a nine- or 10-digit checksum value will be computed and stored in the symbol CHECKSUM\$CHECKSUM. The slightest change in the file (such as using the PATCH utility to change a single byte) changes the checksum value. By periodically recording the checksum values for important files on your system and comparing them to the previously recorded values, you can discover if one of the files has been changed.

Don't record the checksum values on the system. That would create two problems: the perpetrator can alter the recorded values, and the existence of the values can alert the intruder that you're aware of his activities, so he can take evasive action. Write a short command procedure that performs a CHECKSUM on a list of files, printing the result and erasing the evidence from the disk.



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You also can set write-access alarms on important system files so that if a user writes to one, you know immediately of the violation. Some files for which you can save checksum data and/or ACL based file-access auditing are listed below (these are files that DEC lists as having particularly high security significance):

```

SYS$SYSTEM:      SYS.EXE
                  F11BXQP.EXE
                  LOGINOUT.EXE
                  DCL.EXE
                  JOBCTL.EXE
                  JBCTSYSQUE.DAT
                  SYSUAF.DAT
                  NETUAF.DAT
                  RIGHTSLIST.DAT
                  STARTUP.COM
SYS$LIBRARY:     SECURESHR.EEXE
SYS$MANAGER:     SYSTARTUP.COM
                  VMSIMAGES.DAT
SYS$SYSROOT:    [000000]SYSEXE.DIR
                  [000000]SYSLIB.DIR
                  [000000]SYSMGR.DIR

```

Often neglected is data stored offline (i.e., BACKUP tapes). Tapes containing sensitive or confidential data must be kept locked up. Tapes (especially TK50s) are easy to hide and can often be carried out without arousing any suspicion. I know of a financial institution where employees took summer heat breaks in the computer room, where backup tapes were stored. With all the people coming and going, it would have been easy for one of the employees to walk off with a tape or two each day, making a competitor very happy. If you can't lock the door to the room where the tapes are stored, use a locking cabinet.

Storing data off-site is an excellent way to keep your tapes out of danger. If you have a current system backup stored in a secure off-site location, you're protected against the destruction of your data, either by malicious or natural means. A common practice is to rotate weekly or monthly full system backup tapes to an off-site location. This allows the convenience of having on-site backups easily accessible while providing the security of a current off-site backup.

If your site is a high-security environment, or if you feel your confidential data is vulnerable, consider employing a data encryption utility. Encrypting your data is a good way to ensure that only authorized users can see sensitive information, but this benefit needs to be weighed against the cost of the time spent encoding or decoding the data and the hassle of generating and remembering encryption keys.

Some sites might be interested in the VAX/VMS Encryp-

tion Facility (DEC SPD 2674). It uses the National Bureau of Standards approved Data Encryption Standard (DES) algorithm to encrypt your files. An advantage to using this product is that it's designed to work with VMS Backup, using the undocumented /ENCRYPT qualifier. That means you can make sure your backup tapes are unintelligible to would-be data thieves.

Implement A Set Of Security Policies

It's important for each site to develop and implement good security policies. The *Guide to VAX/VMS System Security* is full of facts, examples and good suggestions that will help you develop a set of policies suited to your environment.

There are certain standard common-sense policies applicable to every site. One such policy concerns password expiration. When you initially add a user to the user authorization file (UAF), set his password as expired. This ensures that the password will be changed on the first log in.

Think about the length of time that passwords should remain valid. If you conclude that passwords should be changed more or less frequently than the default of six months, specify a password lifetime. Expire all passwords if, at any time, an unauthorized person might have password knowledge. This will force a password change upon each user when he logs in next:

```

$ MCR AUTHORIZE
UAF> ADD RAZOR /PASSWORD = PDX287OSU
      /PWDEXPIRED /PWLIFETIME = 60-0
UAF> MODIFY/SYSTEM__PASSWORD = KGMS89

```

Naturally, the standards applicable to user passwords also apply to the system password. But, system passwords don't have a lifetime (they don't expire), and a minimum length isn't enforced. You must choose an appropriate system password and change it periodically.

Another good security practice is the implementation of a procedure for dealing with the termination of personnel who use the system. When you learn of an employee's plans to resign (or of his impending termination), perform a full system backup. When the employee leaves, mark his account as expired immediately. Although most employees aren't likely to behave maliciously, don't guess at which ones will.

Add a page to your Policies and Procedures (P&P) manual describing the steps to be taken when an employee leaves. Take into account the nature of your site and the environment in which the employee has worked, and make sure the employee's account is expired, the system password has been changed, his keys have been returned, and any combinations he might have possessed (i.e., to the computer room) have been changed. Further consider whether you should force other users to change their passwords (by setting them as expired with AUTHORIZE).

Another page of your P&P manual should be devoted to

emergency situations; i.e., ones that inhibit or prevent the normal operations of the system, including such natural disasters as fire, flood, earthquake, power failures and gas leaks.

What takes place at your site depends on the structure of the building and the location of the computer room, but be conscious of any potential security problems the situation might create. For instance, if the power goes out, does the door to your computer room automatically unlock? Power failures have been staged to facilitate access or to cover up covert system activity. Anticipate potential security holes that might be created at your site by such situations, and either make them impossible or have a procedure for dealing with them during the crisis.

Vital to any system security management technique is forethought. By considering security issues, you are preparing to take action. By developing a set of policies and procedures, you're ensuring that your ideas are used and perpetuated.

Secure Housing And Location

Although you probably aren't in a position to affect the structure and location of your computer room, secure housing is an important and overlooked security issue. Many computer culprits have gained access to the computer room by taking advantage of poor structure in the building. Examples include people lifting up ceiling tiles and climbing in through the ceiling, cutting holes in the roof, breaking windows, picking locks, etc. At one California college, disgruntled professors climbed over a wall separating a public area from the system console, removed a doorknob, took it to a locksmith and returned undetected in less than four hours. They had all the privileges they wanted and a key.

The importance of each of these issues varies, depending on the specific needs of your company. But, ignoring even one area could lead to disaster. We've all heard horror stories about hackers getting into a system and deleting files or maliciously altering data. But, we usually think the other guy will be the target.

Clients (or others that rely on your company) may have grounds to file negligence suits against you and your company in some cases. If an unauthorized person gets confidential information (such as personnel data), you can be sued by one of your own employees. What would happen to profits, if your competitors had access to information sensitive to your company? What would happen to your job?

Questions like these make it worth considering the consequences of ignoring security. It will take a little effort, some research and thought, but by addressing these issues and planning your strategy, you can minimize your risk. —Robert Hansen is senior software engineer at Software Techniques Inc. in Cypress, California.

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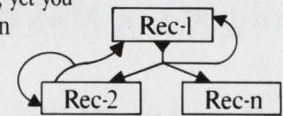
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CONNECTIVITY

P C INTEGRATION: A MIDTERM REPORT

By **Steven Salemi**
and **Mark Maxson**

An Overview Of The Past, Present And Future Of Desktop Connectivity.

Personal computers in the workplace changed the way people do their jobs, but not always in ways that industry observers expected.

The continuing decline in the cost and size of processors and memory made the personal computer possible. Information systems architects responded by moving the computing resource closer to the demand. The result, a self-contained compute engine on the desktop, led to the development of spreadsheets, desktop publishing, windowing and other software considered too compute-intensive for shared systems.

With the freedom to implement this new breed of applications came a number of drawbacks. Personal computers are personal; i.e., one human, one machine. But one-on-one doesn't represent the way most people work. Companies and other organizations, the primary buyers of PCs, succeed through shared efforts and teamwork. A primary activity of people working in organizations is information sharing in meetings, presentations, conferences, committees, reports and memoranda.

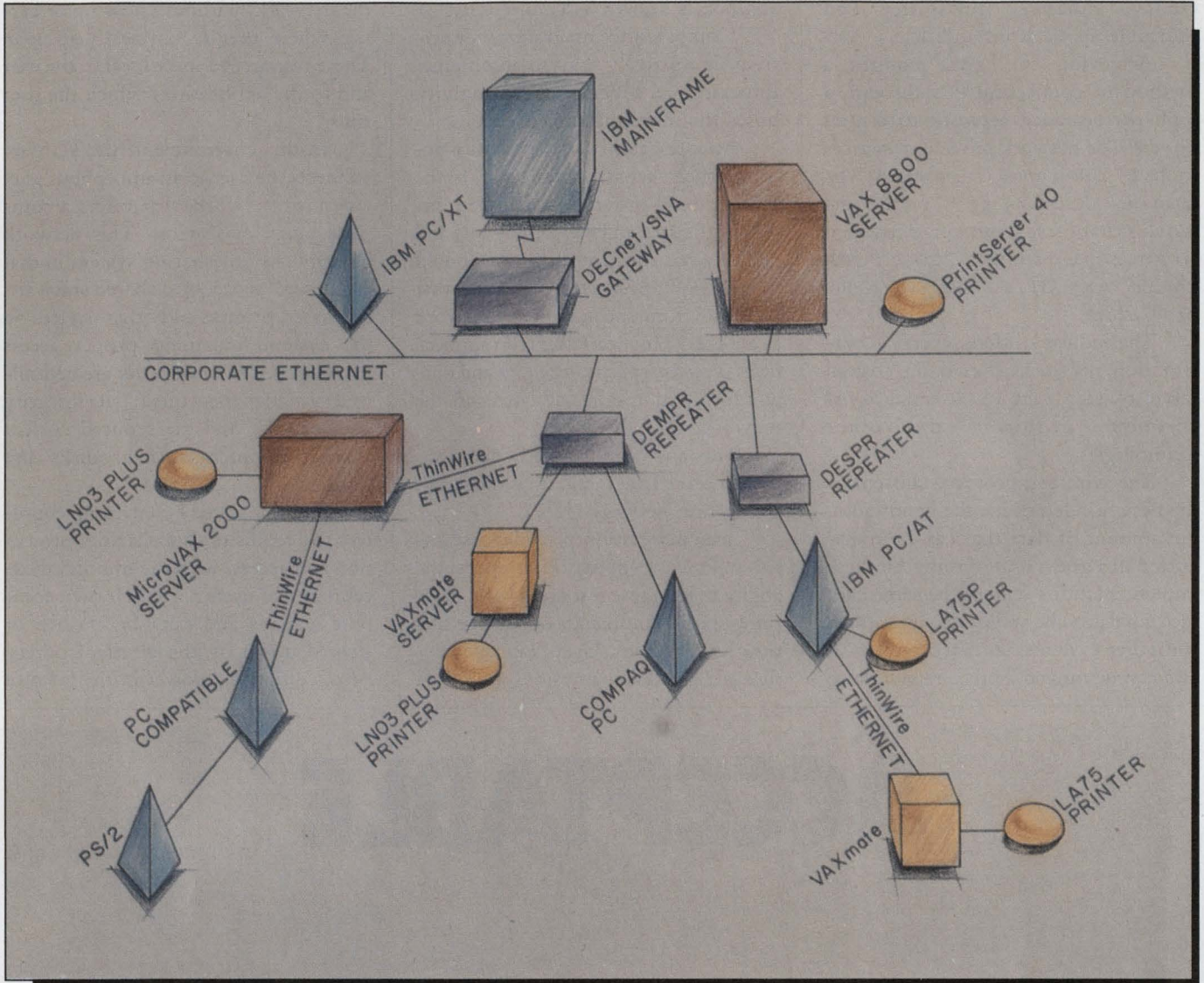
The advances in personal productivity enabled by the personal computer were a giant step backward in terms of information sharing. Because much of the organization's data is now contained on PC floppy disks, Win-

chester drives and hardcopy scattered from office to office, the ability to share information among all users is a distant dream. The reality scenario is a 1.2 MB floppy containing a word-processed memorandum, a database on a Winchester, a spreadsheet with one user's macros stored on a 360 KB diskette and a printout of a report with a 3½-inch microfloppy taped to the front page.

To address the difficulty of information-sharing in this environment, myriad conversion utilities, document importers and exporters, and rudimentary attempts at point-to-point file transfer networks have been devised. But, these spot solutions to individual problems lack consistency and system-wide efficacy. They have proven very difficult to implement and manage. PC users feel victimized by their own tools.

Another problem created by PCs in the organization is information security. More than ever, information is regarded as a valuable corporate asset to be guarded and preserved against loss or corruption. With this asset now buried among hundreds or thousands of personal computers, it's impossible to ensure that all data is regularly backed.

Compared to traditional large disk and tape storage systems, the low cost of the



devices used to store PC data implies a greater risk to data. The hazards of the typical office environment (coffee, cigarette smoke, vacuum cleaners, filing cabinet magnets, and so on) could cause a systems architect to tremble in fear of imminent loss.

The absence of centrality in this distributed working environment makes management of the overall computing resource difficult, if not impossible. When a new version of an application or operating system arrives, it can take months or years before each user obtains the updated copy and is brought "up to rev." In the meantime, there's a mixed-mode environment with the strong

possibility of data incompatibility and other headaches.

This article explores network integration as a solution to these and other computing problems, contrasts connectivity and integration, compares several architectures and explores one architecture in depth: Digital's Personal Computer Systems Architecture (PCSA).

PC Network Integration

The goal of PC integration is to provide a shared network environment for each PC, with access to common disk storage, printers and other devices. The compute engine lives on the desktop, with centralized disk storage for ease of management, backup, cost effi-

An enterprise-wide network topology with PCs acting as peers in the network.

ciency, enhanced reliability and shareable applications and data.

Achieving this goal requires a method of connecting PCs through a high-performance network to central servers. The network provides resources to the PC community transparently. The term *client* describes any PC on the network that uses server-provided resources; i.e., an IBM PC/XT, PC/AT, Digital VAXMATE, COMPAQ DESKPRO or PC clone.

The industry offers several PC integration networks, based on coaxial cable, twisted pair, RS232 serial asynchronous protocols and other technologies.

The wire and protocol chosen for the network determine the bandwidth, the amount of data that can be transmitted in a given unit of time. All these implementations achieve the same end, moving data. The ability to connect two computer systems, so that a stream of bits can be moved from one system to

another, is known as connectivity.

Compared to integration, connectivity is relatively easy to accomplish. Integration, a superset of connectivity, poses the more difficult questions.

After the ability to move bits is accomplished, what comes next? Is the user required to write programs to interpret the stream of incoming bits and decide what to do with them? Should PCs be equipped with programs that copy files from one point in the network to another? How can users run applications directly, specifying input and output files that reside anywhere on the network?

The answers to these questions point up the true integration of any PC integration network.

True integration provides a seamless interface to network resources; the ability to use these resources without issuing special commands or copying files to a local system. Users can reference files and printers that reside throughout

the network, without knowing or caring where they're physically located. These resources appear local to the user and to the applications which the user runs.

In this environment, the PC wire connects the user to an amorphous gray cloud, or network, that offers a complete range of services. This network resembles a timesharing system in that each user has access to shared software, databases, printers and other devices on the system (assuming proper access privileges). Other benefits are centralized system management, data integrity and security, and the reduced cost of sharing resources such as disks and printers.

This integrated PC environment offers the requisite data sharing, protection and access, with the important exception that users have their own compute engines and can't be crashed or slowed down by the work of others. Also, computing power in the form of

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additional PCs is expandable linearly in a PC network; in a timesharing system, it must be enhanced in large, discrete, host processor-sized steps.

The Scope Of Integration

One popular class of PC integration products, PC LAN servers, shares disks and printers from one central MS-DOS system among a small number (typically four to 20) of MS-DOS workstations. These first-generation PC integration products from IBM, Banyan, Novell, Micom-Interlan and other firms provide horizontal integration. Such architectures support resource sharing among the members of a small department or workgroup, but provide limited and usually non-transparent mechanisms for communication or integration beyond the workgroup level.

Another class of PC integration products provides vertical integration up the organizational ladder to corporate mainframes and superminis. Such pack-

ages generally are limited to task-to-task or file-transfer functionality, due to conversion requirements when talking to foreign (non-MS-DOS) architectures. Examples include SNA gateway products and 3270 emulators.

A third class of PC integration products includes DEC's PCSA and offerings forthcoming from other manufacturers. These products are capable of wide area network (WAN) access in addition to PC local area network (LAN) access, providing seamless two-dimensional (vertical and horizontal) integration among like machines in the workgroup, and among mainframes and superminis on the departmental, divisional and corporate levels.

Seamless Integration

Let's examine the technical aspects of achieving seamless integration, using DEC's PCSA products — VAX/VMS Services for MS-DOS server software and DECNET/PCSA Client software — as an

example. Note that PCSA is a phased implementation, integrating mainstream MS-DOS products with larger systems. Its long-range goal, stated in DEC's recent network application support announcement, is to extend seamless integration to as many different types of client systems as possible.

On a non-networked MS-DOS system, the user is presented with mnemonically labeled disks and printers. Floppy disks are A: and B:, the hard drive is C:, and printers are LPT1: through LPT4:. When an MS-DOS application or user wishes to use one of these devices, the utility or application performs an Interrupt 21 hexadecimal system call to the MS-DOS operating system for service.

PCSA begins its work here, with Microsoft's *MS-Net*. A piece of code known as REDIR, the DOS Redirector, captures control before MS-DOS, examining the parameters in the system call for the drive letter. If the request is

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to a local drive (A:, B: or C:) or printer, REDIR releases control to MS-DOS and allows the request to execute normally.

However, if the reference is to a virtual drive letter (e.g., drive N:) or remote printer, REDIR assumes this is a network reference. It examines a data structure to determine which network node (server system) is associated with drive letter N:. The I/O request is inspected for type (OPEN, CLOSE, READ, WRITE, DIRECTORY, etc.), and a message packet is formulated containing these parameters. The packet, called a Server Message Block (SMB), is passed to PC-resident DECNET code, which transports the message across the local or wide area network to the destination server system.

The server system, either a VAX-MATE or VAX/VMS, receives the SMB packet via DECNET, which identifies the packet type and passes it to object 64, the Personal Computer File Server (PCFS)_SERVER process. This image interprets the request type and examines the data structures to identify the corresponding directory on the VMS file system (or printer attached to the server) that services the client. PCFS has the intelligence to do on-the-fly conversion of the data stream from MS-DOS to VMS format, converting a variable length sequential access text file to MS-DOS STREAM format, for example.

PCFS also maintains file locking information and won't allow simultaneous write/read requests to collide within the same file. This becomes interesting when one file is to be opened by two or more file servers, each running on a different member node of a VAX-CLUSTER. The solution is a carefully designed system of locks and signals to preserve data integrity.

After the requested operation is performed, the result is placed in the SMB packet, and the response is sent to the client, where the I/O request completes transparently. The user might never know the PC went onto the network for data.

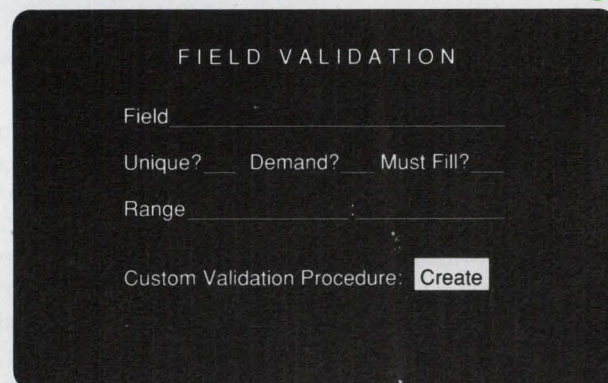
In this implementation, a file on the server can be accessed simultaneously by a number of MS-DOS clients and by applications running on the VAX. PCFS

masks any differences in file structure or access, enabling MS-DOS and VMS applications to cooperatively access a common database. This approach is suitable for transaction processing applications, where PCs serve as point of entry stations, validating and preprocessing records, which then are posted to a common database resident on large VAX

disk farms. It also overcomes the 32-MB MS-DOS limit on file size, because the file structure storing the data is the more robust VMS ODS-II file system.

An interesting side effect of bridging the DOS and VMS worlds is the mapping of MS-DOS file names to VMS file names. MS-DOS allows file names of up to eight letters with three-letter ex-

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tensions (e.g., MSDOSFIL.TXT), but VMS allows longer file names. However, VMS file names may contain only A-Z, 0-9, \$, _ (underscore) and - (hyphen) characters; MS-DOS allows almost any character in a filename specification, including some that aren't printable.

The resolution of this problem may be inelegant, but it works: MS-DOS clients aren't shown filenames that are too long for MS-DOS to accept, and MS-DOS filenames containing illegal-for-VMS characters automatically are converted. The illegal character is represented as its hexadecimal value, prefixed by a flag sequence of double underscores. Thus, JOE&BOB.TXT becomes JOE__BOB.TXT, a legal VMS filename. When a client requests a directory, all filenames are scanned for __xx and backtranslated accordingly. Thus, the MS-DOS user sees the file as it originally was named, oblivious to DEC's mirror tricks.

This is only one of a number of areas where differences between the different file systems required smoothing over.

Performance Issues

With this conversion taking place in real time, you might expect performance to suffer. However, the latest release, version 2, of DEC's VAX/VMS Services for MS-DOS delivers throughput roughly equivalent to a local hard disk, owing to a virtual memory cache and multi-threaded processing.

Also found in V2 is a new component, Local Area Disk (LAD) services, also called the Disk Server. LAD provides a vast enhancement in performance at the sacrifice of some functionality.

Not all applications require file sharing, but a large amount of file services overhead is spent in tracking the shareability context of files. Not all applications require WAN access, but overhead is expended in gaining access to it. Not all DOS files need to be readable by VAX/VMS systems, although CPU cycles are required to map one file system to the other.

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LAD represents a trade-off of these features. It works by intercepting the flow of control farther down the stream on the MS-DOS client side, letting MS-DOS take control and assert DOS file system mapping. When DOS attempts to perform its I/O to a non-existent local disk, LAD (implemented as both MS-DOS and VMSM device drivers) takes control and notes the I/O request parameters in a Direct Access to Disk (DAD) packet. The packet contains the logical block number to be read from the disk, except there's no physical disk, only the network virtual disk.

LAD checks the table of drive associations and determines the service name for which this packet is destined. Instead of DECNET, the packet is handed to Local Area Systems Transport (LAST), a highly-optimized message protocol specifically engineered for high-throughput transaction processing on local area networks.

LAST delivers the request to the server node, where it's received by a VMS-resident LASTDRIVER. LASTDRIVER removes the network protocol and

passes the DAD message to LAD\$KERNEL. LAD\$KERNEL looks up the association between the requested service name and a container file on the VMS disk system. A container file is a large, virtual disk image that contains an MS-DOS file structure and concomitant retrieval information.

Thus, LAD files aren't visible to VMS applications; only the container file is. LAD\$KERNEL reads the desired block from the container file and returns it as the response message, via LASTDRIVER and the network. The client receives the block and returns it to MS-DOS; the network access is completed invisibly as if the I/O had been local.

The LAD/DAD/LAST mechanism for serving virtual disks is significantly faster than local hard disk performance. File system and RMS overhead is eliminated; DEC moves blocks of information over the Ethernet wire. The overhead from file sharing also is eliminated; LAD disks aren't write-shareable. A system cache on the server

compresses multiple requests into single I/O operations, a feature MS-DOS can't match locally. LAST eliminates some of the network overhead required by DECNET.

In practice, LAD services are useful for storing files that typically don't need to be written to, such as operating system, applications and other utility files, as well as personal files that users don't wish to share with other users on the network. Because the LAD container file is compatible with the DECNET-DOS Network Virtual Disk (NVD), the LAD file is accessible through the DECNET-DOS Network Device Utility (NDU) in a WAN.

The LAD is also a good choice for workstation-specific startup information, including networking code that allows PCs equipped with intelligent Ethernet controller cards to be booted remotely over the network. Remote boot capabilities provide a high level of security, enable true diskless PC workstation operation and make it easy for system administrators to distribute system startup and configuration files over the network to users.

File server access and disk server access can be coresident on one client; i.e., a client can use drive letters E:, F:, G: and H: to map network LAD disks and use drive letters I: through Z: for file server connections to various servers throughout the local and corporate networks.

The Future

PCs still look like PCs, but network integration has transformed local systems into windows that let users access the computing resources of the entire organization, from the printer in the next office to a database on disks halfway around the world.

Much work remains, however. Now that the bridges are built, common data formats must be provided, so that applications can access different files and programs regardless of underlying hardware and software architectures. As new types of client systems become popular, and new industry standards

evolve, these must be integrated into existing systems and networks.

Although the target keeps moving, the bull's-eye remains a transparent system that enables users to make use of disk, file, print and compute resources from their desktops, and permits systems architects to distribute those resources as required to any part of the

organization. —*Steven Salemi is president of Bottom Line Communications in Concord, Massachusetts, and Mark Maxson is supervisor of software development for DEC's Personal Computing Systems Group in Littleton, Massachusetts.*

ARTICLE INTEREST QUOTIENT
Circle On Reader Card
High 531 Medium 532 Low 533

Unlock M.I.S. Backlogs

January 18, 1988

8:00	_____	2:00	_____
9:00	_____	3:00	_____
10:00	_____	4:00	_____
11:00	_____	5:00	_____
12:00	_____	6:00	_____
1:00	_____	7:00	_____

Do: _____

Call: _____

Calendar

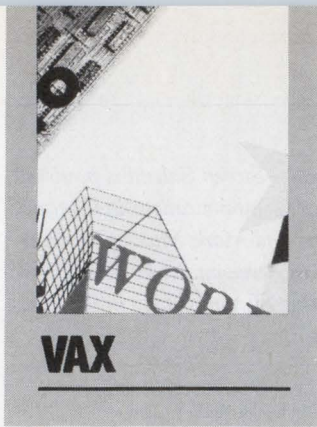
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CIRCLE 112 ON READER CARD



T O NAME ME IS TO KNOW ME

By Philip A. Naecker

Editor's note: This is the second in a series on

DECNET Distributed Services (DSS). (See Jeffrey Schriesheim's article "Netting DECNET System Services" [April 1988]). These layered products from DEC are intended to combine multiple VAX computer systems into a highly integrated, distributed computing environment.

Distributed Name Service (DNS) Simplifies The Management Of Network Resources.

If you work in a large organization that uses DEC computers, you know that computer systems are becoming increasingly unstable. Disks are added, directories are moved around, printers are moved from one node to another, and new nodes constantly are being added to the network. If you've been following DEC's marketing activity, you also may have surmised that Digital intends to proliferate new machines throughout the client's company rather than just add bigger machines in the computer center. Therefore, keeping track of resources and making use of the resources as they move from location to location are becoming major headaches.

At one time, logical names might have been a technical solution for keeping track of the location of resources. A programmer would use a logical name, like APPLICATION_DISK, to point to the resource, and the translation of the logical name would result in the actual resource, such as "DUA4:". By using the

logical name rather than the actual name of the resource, the program is insulated from change, when the system manager decides to move the application to a new disk; e.g., when he changes the translation of APPLICATION_DISK from DUA4 to DUA5..

But today computer systems are distributed across networks and, for a number of reasons, logical names don't extend into the distributed environment. Yet to be able to access a resource that may move around the network is essential, if software maintenance costs are going to be controlled and resource use maximized.

THERE ARE TWO PARTS to solving the problem of location resources around the network. The first is to devise a logical naming scheme that will be both stable and meaningful. The second is to be able to distribute those names and their associated attributes around the network, so that they're available to every application that needs them.

The VAX Distributed Name Service (DNS), from Digital, is a DECNET layered product that provides a network-wide means of assigning unique, location-independent names to network resources. The named resources, called objects in DNS parlance, can be disks, printer queues, nodes and anything else you want to name. But, DNS provides

more than a naming mechanism; it distributes the names across the network automatically, so that all applications and users can access an object using the same name. If an object is moved, an ap-

An interesting feature of DNS is that it provides a time service.

plication that uses DNS won't have to be changed. DNS will make sure that the new location of the object is provided to all the applications that use it.

DNS is based on a server-client model. DNS server software is installed on a DNS Server Node and maintains a database of DNS object names on that node. The DNS server software also communicates via DECNET with all other DNS Server Nodes in the network, propagating information from the database to application in the network that needs to know it. The applications that use DNS information are called clients. At present, there are two DNS client software products: VAX Remote System Manager V2.0 and VAX Distributed File Services. In the future, there will be many more DNS client products. In fact, in Phase V of DECNET, all DECNET nodes will be DNS clients, because all DECNET node names will be DNS objects.

To make use of a DNS server, a DNS client sends the server a resource name and requests information (attributes) about that resource (see Figure 1). There are many attributes that can be requested, but the most frequent one is the node name where the resource resides. The client then uses the attribute, such as the node name to perform useful work. In the case of Distributed File Service (DFS), for example, DFS would use the node name returned by the DNS server to find out where a group of files resides at the moment.

DNS uses a hierarchical model of the network namespace, in which related objects can be grouped (see Figure 2). For example, a network namespace might group names by department, such as PERSONNEL, MARKETING, SALES, etc., or by some larger organizational boundary, such as

AUTOMOBILES, AEROSPACE and CONSUMER_PRODUCTS. Names are fully qualified by the hierarchy, like file names under VMS that are qualified by the device and directory name. Thus .PERSONNEL.DEVELOPMENT.SOURCE_DISK is different from .MARKETING.DEVELOPMENT.SOURCE_DISK. (In

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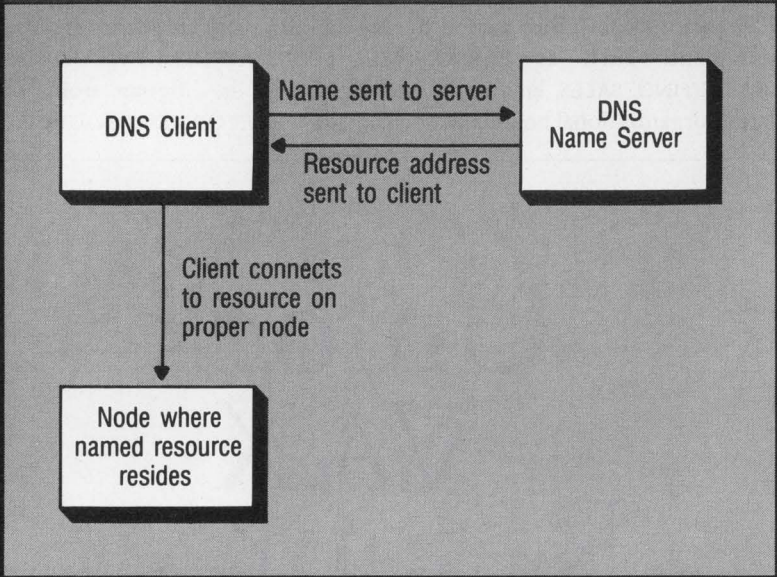
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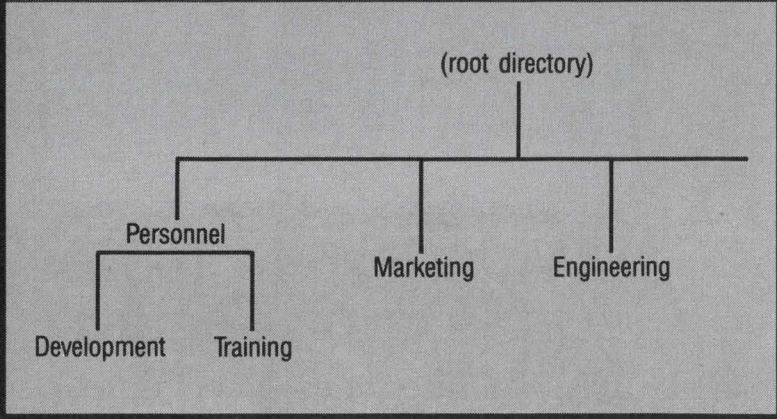
CIRCLE 113 ON READER CARD

F I G U R E 1 .



Server-Client structure of DNS.

F I G U R E 2 .



Hierarchical name space.

DNS, the leading dot character is used to denote the root of the namespace, so every DNS name starts with a dot.)

Why It's Better

In contrast to traditional naming practices, the use of DNS is consistent with a dynamic network environment. For

starters, there's a single namespace throughout the network; i.e., the translation of a particular name is the same for every node in the network. In contrast, if an application uses logical names to locate a file in the network, it would be possible for two nodes to have different translations for the same logical name. Furthermore, to move the object

(resource) to which those logicals are pointing, a resource manager has to locate all the logical names in the network and change them simultaneously, while moving the actual application to the new location.

Moving a resource is simple with DNS. The object location and the DNS name are changed, and the next time a client application requests the location of the object, it will receive the new location. Furthermore, DNS automatically will propagate the new location to all the other name servers on the network that need to know about the location of the object.

DNS also provides a single point of control for managing access to an object. Each time a client requests information about a DNS object, the client's access rights are checked against the current access database for that object. If the client doesn't have access, the information isn't returned, and the client is prevented from gaining access to the object. Like other attributes of a name, access rights are consistent throughout the network. The rights are based on the concept of a network user identifier, `nodename::username`, and thus are superior to access control based upon DECNET access control information or proxy logins.

DNS also provides a means of defining network-wide groups of users. A DNS manager can assign individuals to groups, or groups to other groups simplifying access control. For example, you might create a group called `PERSONNEL.OFFICE_MANAGERS` and assign to it the users using `nodename::username` who are office managers. Another group might be called `PERSONNEL.VICE_PRESIDENTS`, and both groups could be assigned to a third group called `PERSONNEL.SIGN_PURCHASE_ORDERS`.

How Do I Get There From Here?

DNS information is provided to the network by DNS servers. There is at least

one DNS server in a network, but there can be more, if necessary. You want to make sure a DNS client can locate at least one active DNS server in the network at any time. If a DNS client can't

DNS doesn't distribute the information about every object to every server.

find a DNS server, it can't obtain information about DNS names. Typically, a network will have at least one server node on each Ethernet, plus enough redundant servers to guarantee that an active server is available to all DNS clients. A server and client can run on the same node, too.

Why not put the DNS service on every node? Well, the short answer is that the service function consumes valuable computer resources. The long answer is it involves a greater understanding of how DNS partitions the namespace among servers.

Although DNS names are fully qualified hierarchical objects, like Common Data Dictionary pathnames or VMS directory/filenames, there's a single namespace on an entire network, so there can be only one object with any particular name. But DNS distributes names across the network, so all servers have a common view of the namespace. The tricky part is that DNS doesn't necessarily distribute the information about every object to every server.

The smallest clump of information distributed is a DNS directory. A directory is any of the higher parts of a DNS pathname, such as .PERSONNEL.DEVELOPMENT. Inside of the .PERSONNEL.DEVELOPMENT directory, there may be a number of DNS objects, such as SOURCE_DISK, TEST_DATABASE, etc. The entire .PERSONNEL.DEVELOPMENT directory (or, for that matter, the

entire .PERSONNEL directory) could be distributed to one or more nodes in the network.

There always would be one master copy of the directory that could be changed, and the other read-only copies on other DNS server nodes would be updated whenever an object in the

master directory is modified. For example, if software development for the personnel department is taking place in Los Angeles and New York, a copy of the .PERSONNEL.DEVELOPMENT directory may be placed in servers in both locations. That way, a request for information from that directory wouldn't have

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There are performance and reliability advantages to having a local copy of the directory, so directories generally are propagated to be close to the places where they're likely to be used.

to travel across country to be satisfied.

In contrast, the .PERSONNEL.INSURANCE directory may only exist in the home office, because rarely does anyone access the names in this directory from anywhere else. On the other hand, .PERSONNEL.NEW_EMPLOYEE might exist on the LAN in every city in which a new employee could join the company, because the new employee applications run in each of those cities.

Note that a copy of a directory doesn't have to exist on a local node in order to be accessible. The namespace is identical across the network, so a software engineer in Houston could access a name in .PERSONNEL.DEVELOPMENT even though a copy of the .PERSONNEL.DEVELOPMENT directory isn't available locally. However, there are performance and reliability advantages to having a local copy of the directory, so directories generally are propagated to be close to the places where they're likely to be used.

Physically, DNS objects are stored in an RMS ISAM file called a clearinghouse. Because only entire DNS directories can be distributed (it's not possible to distribute a single name such as .PERSONNEL.DEVELOPMENT.SOURCE_DISK; you must distribute the entire directory), a clearinghouse is a collection of DNS directories. A DNS server deals with clearinghouses; i.e., with collections of directories. Often there's only one clearinghouse per DNS server node, but it's sometimes useful to

separate directories into different clearinghouses, even on the same node. For example, you might want to remove some directories from service on this node but leave other directories operating. You can do this by grouping the directories into separate clearinghouses.

An interesting feature of DNS is that it provides a time service. Because DNS object updates propagate through the network in a rather complicated fashion, dependent on update frequencies (called the convergence) and factors such as server node availability, it's possible that two updates for the same DNS object may reach a server out of sequence. Therefore, DNS puts a time stamp on every activity. The time stamp is based on Greenwich mean time, which is calculated from local system time plus a time zone offset defined in the DNS database.

Using DNS

Using DNS has two components: the system management component and the client component. The client component is easy, because at this time it's limited to Digital layered products. There's no documented user interface for DNS at this time, although it will be in Digital's interest to add one in the future.

A system manager or DNS server manager accesses DNS using a program called DNS\$CONTROL. This program is similar to the Network Control Program of DECNET. Learning to use DNS\$CONTROL is straightforward, if you understand DNS concepts and are comfortable with NCP.

There are two kinds of system

management tasks you can do under DNS: namespace management and server management. Namespace management must be done in cooperation with other DNS managers in the network, because the namespace must be defined consistently. By using DNS commands you can create new DNS directories, but there's no DNS command to create a DNS object. Objects are created only by DNS clients.

You also can use DNS\$CONTROL to create an alias for an object, thus preserving an old name while applications convert to a new name. For example, the .PURCHASING.COMPANY_CARS directory might be moved to .PERSONNEL.COMPANY_CARS. In this case, an alias, called a LINK in DNS, would be created to reflect the old name without requiring that duplicate information be maintained.

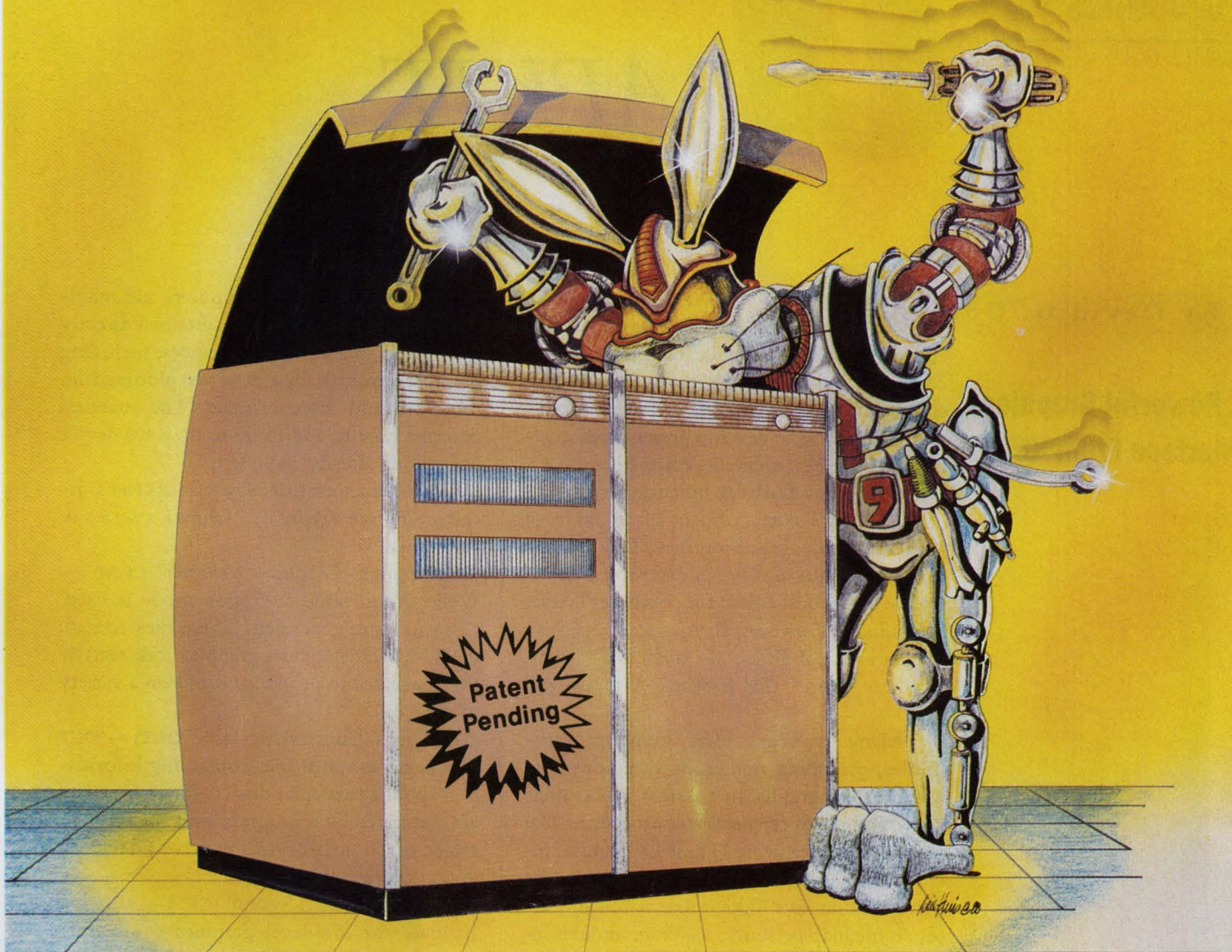
Managing the server involves monitoring server performance and possibly tuning the DNS parameters that affect performance. For example, if you have an active server you might want to increase the RMS buffering in certain clearinghouses or periodically reclaim unused clearinghouse space. If a disk crashes, you may have to obtain a backup copy of a clearinghouse from a tape or establish a read-only copy of a clearinghouse as the new master copy.

DNS is a strategic product for Digital. It will be a key component of Phase V DECNET networks and will be used by more products in the future. Digital is counting on DNS to simplify the management of network resources: without DNS, difficulty of access to network resources may well become a barrier to Digital's goal of putting a Phase V Node on every desk. At DEC PROFESSIONAL, we're currently using DNS with Remote System Manager V2.0 and Distributed File Services V1.0. As this series continues, we'll report on our experiences with DNS.

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CIRCLE 249 ON READER CARD



GRAPHICS

G_RA_FK_IT

By David G. Goldstein

A Powerful Graphics Interface From ICEX.

GRAFkit, by International Computer Exchange (ICEX) of Louisville, Colorado, is a recent entry in the race to win your production software budget. It consists of a series of programming tools to develop presentation quality graphics. Yet, unlike its competitors, ICEX sacrifices some fluff for functionality.

GRAFkit's core consists of an array of FORTRAN callable subroutines. The package makes no claim to offer an extensive user interface and is best suited for computer literate individuals. However, if you need extensive graphics capabilities — available almost nowhere else — this package certainly will help.

Many packages offer graphing capabilities, providing numerous variations on a few types of graphs. In contrast, ICEX offers a few, algorithmically difficult procedures that most companies avoid. These capabilities include 3-D graphs and objects (including manipulation and hidden line removal), cartographic map presentation (from libraries included with the package) and overlaying graphs.

In addition, *GRAFkit* features device-independent capabilities and various modes of operation. It works in two modes: interactive where the user sees the graphics screen with each graphics call; and metafiles to create fast, embedded graphics for use as a part of larger applications.

By incorporating a sophisticated, device-independent architecture, versions are available

that run on both microcomputers and mainframes. Also, output can be obtained directly or spooled to a variety of devices, including graphics terminals, disk files, pen plotters, film recorders and laser printers. The manuals describe how to add to more than 100 device definitions already included.

For a pictorial display of *GRAFkit's* architecture, see Figure 1. It shows a series of acronyms:

1. Computer Graphics Metafile (CGM) — When the metafile operation mode is used, CGM files are generated. These files contain the device-independent graphics code read by the Translator to produce output on a variety of devices.
2. Device Characteristic Table (DCT) — DCT files begin as ASCII files containing information about a particular device. These files then are converted by a program into binary files, which the Translator uses to drive a device to obtain fast graphical display.
3. Graphics Kernel System (GKS) — GKS is a standard for low-level graphics commands. *GRAFkit's* 0A level implementation of GKS is used to provide such primitive graphics functions as drawing lines, marking text, drawing filled polygons and defining coordinate systems. These commands are accessed by all levels of *GRAFkit's* drawing functions and provide the actual device-independent commands used by the CGM and Translator programs. The GKS standard implemented is designed around the International Standards Organization and American National Standards Institute for the graphic's creation in standard FORTRAN-77.
4. System Plot Package Subroutines (SPPS) —



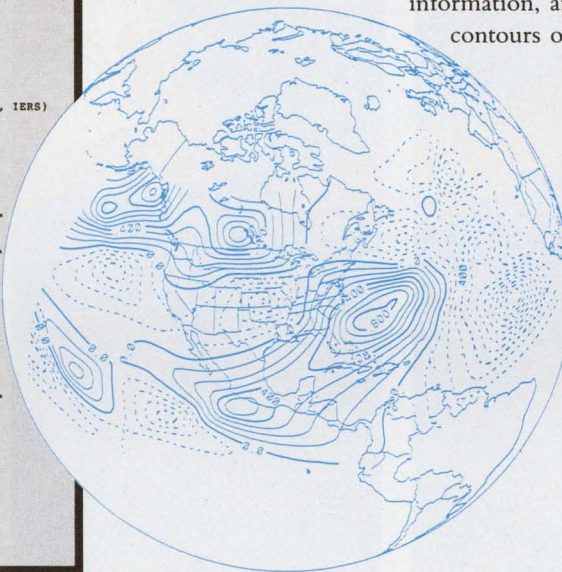
PROGRAM 1.

```

C
REAL A(55,45), LONMIN, LONMAX, LATMIN, LATMAX
COMMON /TRANS/ IDIM, JDIM, LONMIN, LONMAX, LATMIN, LATMAX
COMMON /CONRE4/ ISIZEL, ISIZEM, ISIZEP, NREP, NCRT, ILAB, NULBL,
1
2
DATA IDIM, JDIM / 55, 45 /
DATA LONMIN, LONMAX, LATMIN, LATMAX / -160., -20., 0., 60. /
C INPUT ARRAY OF VALUES FOR CONTOUR MAP.
C
OPEN (UNIT=1, FILE='SAMPLE12.BIN', STATUS='OLD', FORM='UNFORMATTED')
READ (1) A
CLOSE (1)
C
C OPEN GKS, OPEN AND ACTIVATE THE WORKSTATION, GENERATE TITLE.
C
CALL OPNGKS
CALL PWRTY (.5, .975, 'SAMPLE 12', 9, 1, 0, 0)
C CHANGE DASH-LINE PATTERN, THEN DRAW SATELLITE VIEW OF GLOBE.
C
CALL MAPSTI ('DA', '010421'O)
CALL SUPMAP (2, 40.0, -90.0, 0., 0., 0., 0., 0., 1, -1000, 4, 0, IERS)
C
C OVERLAY CONTOUR MAP, CLOSE FRAME, CLOSE GKS.
C
IOFFM = 1
CALL CONREC (A, IDIM, IDIM, JDIM, 0., 0., 0., 1, -1, -585)
CALL FRAME
CALL CLSGKS
END
C-----
C THE FOLLOWING TWO ROUTINES PERFORM THE MAPPING OF THE CONTOURS ONTO
C THE SATELLITE VIEW OF THE GLOBE.
C-----
FUNCTION FX (X,Y)
C
COMMON /TRANS/ IDIM, JDIM, LONMIN, LONMAX, LATMIN, LATMAX
REAL LONMIN, LONMAX, LATMIN, LATMAX
C
XLON = LONMIN + (X-1.0) * (LONMAX-LONMIN) / (FLOAT(IDIM)-1.0)
YLAT = LATMIN + (Y-1.0) * (LATMAX-LATMIN) / (FLOAT(JDIM)-1.0)
CALL MAPTRN (YLAT, XLON, FXLON, YDUMMY)
FX = FXLON
RETURN
END
C-----
FUNCTION FY (X,Y)
C
COMMON /TRANS/ IDIM, JDIM, LONMIN, LONMAX, LATMIN, LATMAX
REAL LONMIN, LONMAX, LATMIN, LATMAX
C
XLON = LONMIN + (X-1.0) * (LONMAX-LONMIN) / (FLOAT(IDIM)-1.0)
YLAT = LATMIN + (Y-1.0) * (LATMAX-LATMIN) / (FLOAT(JDIM)-1.0)
CALL MAPTRN (YLAT, XLON, XDUMMY, FYLAT)
FY = FYLAT
RETURN
END

```

Example 1: This is an elementary example of *GRAFkit*'s capabilities to work with and overlay maps. The program reads in a satellite view of the globe and some weather information, and superimposes the contours onto the globe.



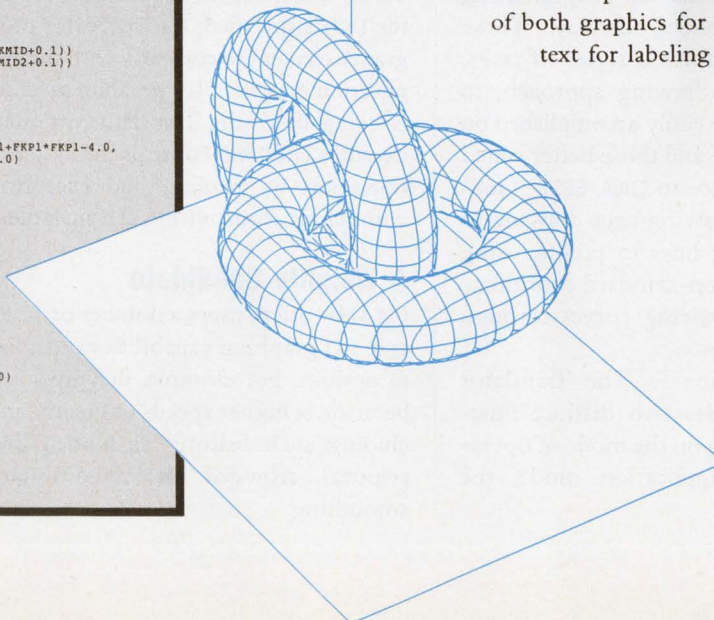
PROGRAM 2.

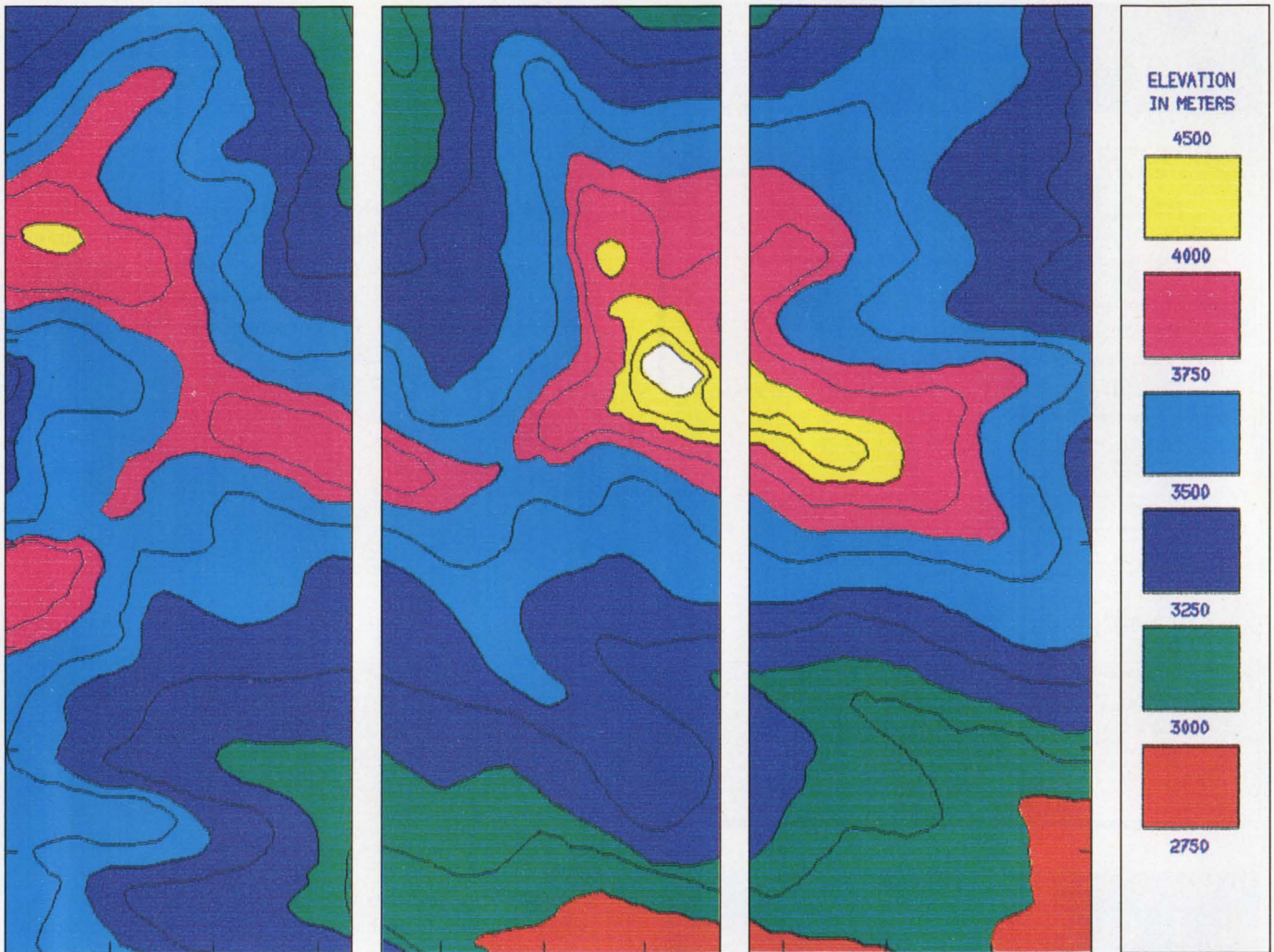
```

C
DIMENSION T(21,31,19), SLAB(33,33), EYE(3)
DATA NU, NV, NW / 21, 31, 19 /
C
C CONSTRUCT THREE DIMENSIONAL ARRAY TO BE PLOTTED
C
JCEN1 = FLOAT(NV)*0.5 - 3.0
JCEN2 = FLOAT(NV)*0.5 + 3.0
DO 300 I=1,NU
  FIMID = I-NU/2
  DO 200 J=1,NV
    FJMID1 = J-JCEN1
    FJMID2 = J-JCEN2
    DO 100 K=1,NW
      FRMID = K-NW/2
      F1 = SQRT(36.0/(FJMID1*FJMID1+FRMID*FRMID+0.1))
      F2 = SQRT(36.0/(FIMID*FIMID+FJMID2*FJMID2+0.1))
      FIP1 = (1.0-F1)*FIMID
      FIP2 = (1.0-F2)*FIMID
      FJP1 = (1.0-F1)*FJMID1
      FJP2 = (1.0-F2)*FJMID2
      FKP1 = (1.0-F1)*FRMID
      FKP2 = (1.0-F2)*FRMID
      T(I,J,K) = AMIN1(FIMID*FIMID+FJP1*FJP1+FKP1*FKP1-4.0,
        FRMID*FRMID+FIP2*FIP2+FJP2*FJP2-4.0)
    100 CONTINUE
  200 CONTINUE
300 CONTINUE
C
C DEFINE EYE POSITION
C
EYE(1) = 100.0
EYE(2) = 150.0
EYE(3) = 125.0
C
C OPEN GKS, OPEN AND ACTIVATE WORKSTATION.
C
CALL OPNGKS
C
C LABEL THE PLOT.
C
CALL PWRTY (0.3, 0.97, 'SAMPLE 9', 8, 1, 0, 0)
CALL PWRTX (0.3, 0.93, '3-D DONUTS', 10, 22, 0, 0)
C
C DRAW THE THREE DIMENSIONAL ARRAY.
C
CALL EZISOS (T, NU, NV, NW, EYE, SLAB, 0.0)
C
C DEACTIVATE AND CLOSE WORKSTATION, CLOSE GKS.
C
CALL CLSGKS
END

```

Example 2: *GRAFkit* has the capability to draw perspective projections in 3-D with hidden line removal. The program functions by first computing the coordinates of points in the intersecting donuts and specifying the points to be displayed in the intersecting donuts. It then computes the display, specifying how these points should be seen from a particular perspective (eye positioning) and calls subroutines to perform the actual drawing of both graphics for the donuts and text for labeling the scene.





Longs Peak, Colorado.

SPPS provides a plotting interface between the utility programs and GKS to ensure efficient use of programming time and graphical display. These subroutines perform a series of tasks, using a vector drawing approach, to speed tasks more easily accomplished on a plotting device and those better suited for a raster device to GKS. SPPS' functions include drawing text, drawing to points, drawing lines to points, using fractional and non-standard coordinate systems, and drawing curves through sets of data points.

5. The Translator — The Translator program provides two distinct functions, depending on the mode of operation. In the application mode, the

Translator provides device-dependent commands to the terminal, based on the device-independent requests made and the DCT's specified; the Translator program executes concurrently with the application program. If a graphics metafile is being used, the Translator program executes later and controls the system's operation by reading and executing commands from within the metafile.

A Weighty Candidate

GRAFkit offers users a number of 1-, 2- and 3-D graphing capabilities and a list of options. For example, drawings can be made at higher speeds or quality, including such features as hidden line removal, crowded line removal and smoothing.

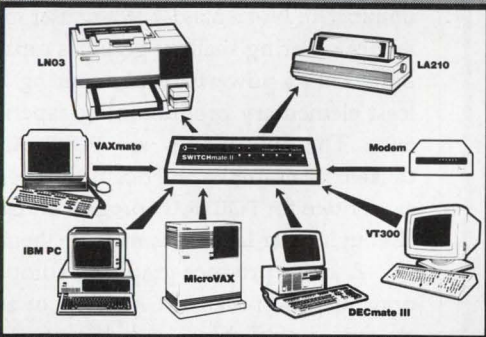
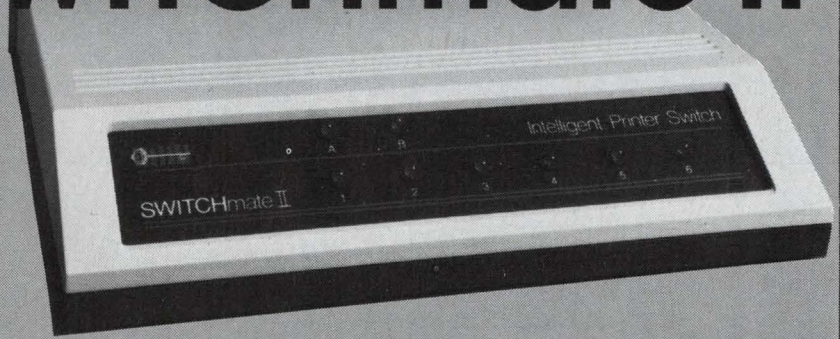
The types of graphs and pictures that can be generated include:

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2. Scattergrams — for displaying experimental data.
3. Contour maps — functions of the type $f(x,y)$ with differing grades of contour, drawing speed and image quality.
4. Both normal and logarithmic scales — for display.
5. Cartographic maps — including the capability to graphically manipulate, overlay and display entries from an included library of maps.
6. Vector drawings and streamlines — to display such things as effects of magnetic fields.
7. 2-D pictures with gray-scales.

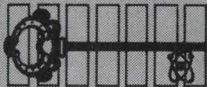
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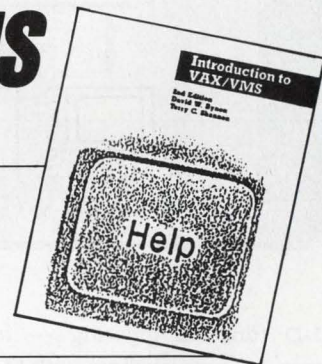
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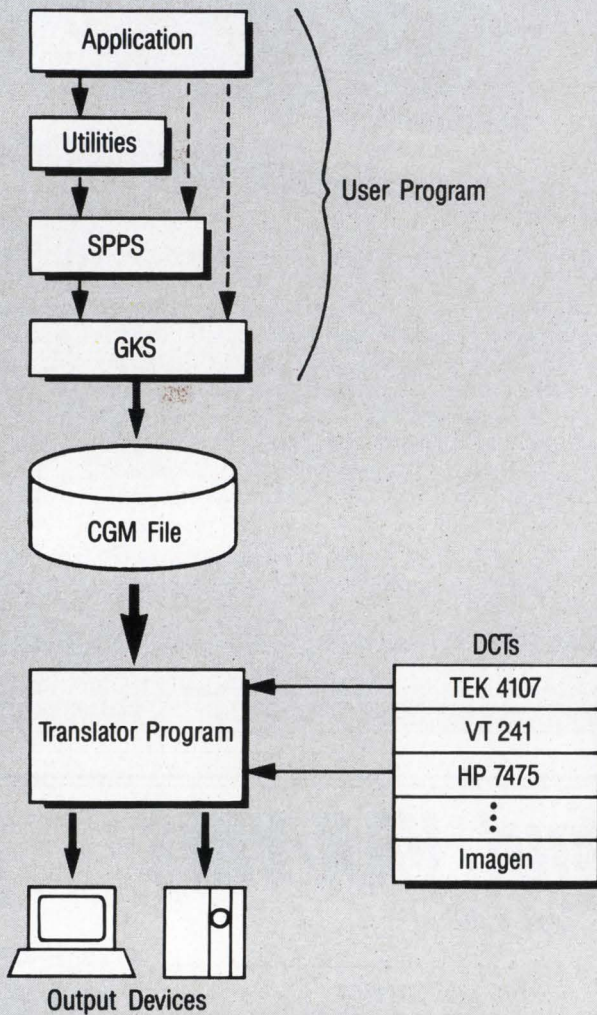
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FIGURE 1.



The GRAFkit architecture.

8. 3-D function drawing — incorporating 3-D axis labeling, with the text being displayed in three dimensions.

9. 3-D surfaces — with hidden lines removed.

10. 3-D solids — generated from data arrays.

GRAFkit also has text incorporation capability; text can be aligned, sized, spaced, subscripted, superscripted, rotated, colored and chosen from a variety of fonts. These capabilities are algorithms built on lower level graphic primitives for such functions as line and

region drawing, fills and windowing.

To illustrate GRAFkit's capabilities, see Examples 1 and 2, created by Programs 1 and 2, respectively.

Uses

GRAFkit can be used for presentation and scientific graphics, and mappings for topographical and cartographical displays. ICEX's software can be used by mathematicians, physical scientists and business people, and it provides the sophisticated 3-D modeling required by engineers and computer scientists.

However, GRAFkit isn't for the

GRAFkit

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CIRCLE 458 ON READER CARD

uninitiated. Not a hand-holding user interface covering shallow graphics capabilities, it's a powerful tool requiring at least elementary programming experience. The subroutines are FORTRAN callable; all examples and documentation are written for FORTRAN programming, although other languages may use them.

A kit to produce graphs, it's not a draw or paint package, CAD/CAM or an electronic publishing tool. Yet, if you can program, have access to someone who can, or can have a user interface tailored to your needs, GRAFkit provides graphics power you might not find elsewhere.

A Wish List

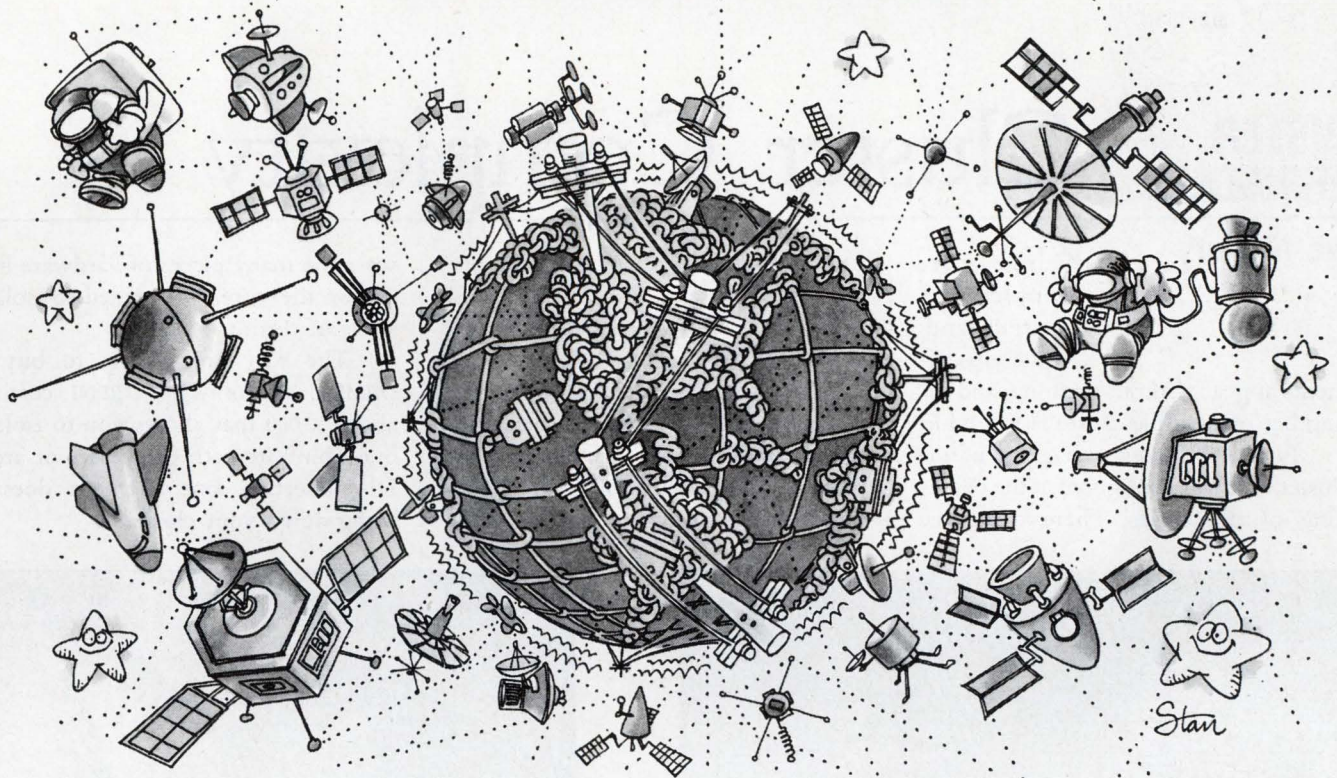
GRAFkit could benefit from an interface for non-programmers, smoother curves and a few more type fonts. Also for programmers, some interactive help and debugging would be nice.

Its documentation is plentiful, consisting of a binder of instructions and another of examples. ICEX's material is organized, including installation instructions, specific and general graphics information, indices and appendices. The description of each routine offers guidelines on use and parameters, and the general methodologies used for implementation.

If you have a variety of equipment to interface, such as microcomputers and VAXs, GRAFkit might be not only your best choice, but your only one. —David G. Goldstein is a Philadelphia-based freelance writer.

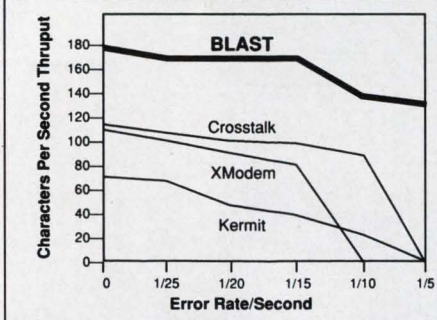
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CLUSTER CHRONICLES

Dave Mallery

Cluster Complexity

Things are complex in cluster land. Mysterious ailments appear without warning, and the number of possible causes is too wide.

Figure 1 shows a diagram of the cluster as it was configured at the beginning of this series. There were two

Ethernets: one for the Xyplex and one for everything else. There were several protocols active on the second Ethernet: LAVC, DECNET and XNS.

We were too vulnerable in the Ethernet; everything was strung on a single ThinWire circuit, leaving us at the mercy of people on another floor who might decide to move a printer. There

were too many pieces of hardware living on the wire. We needed to isolate some of them.

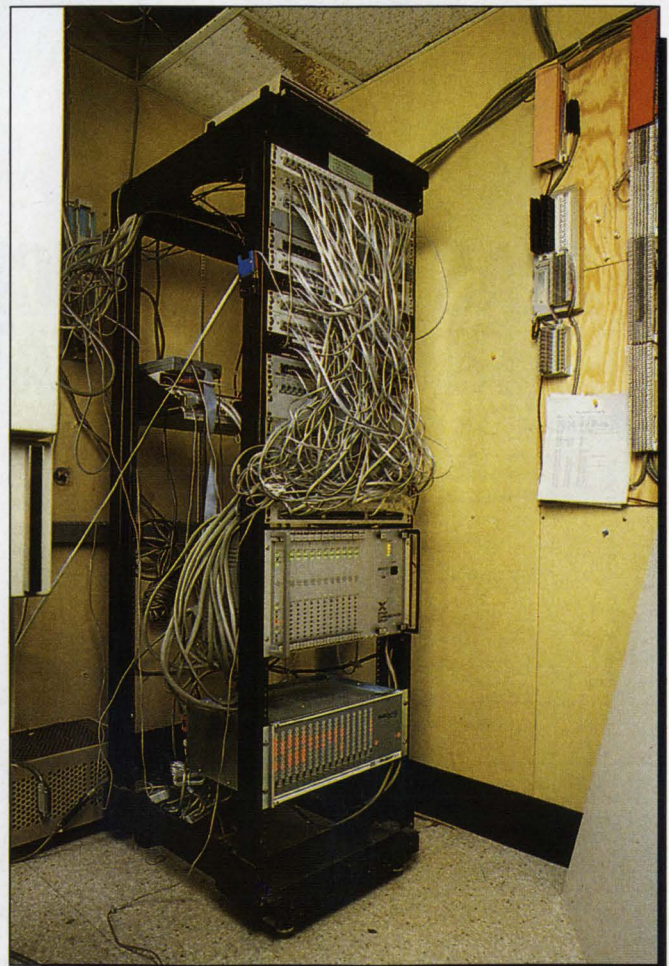
The easy solution is to buy a DEMPR, a ThinWire DELNI costing about \$3,000 that allows you to isolate one ThinWire path per device or area. Disconnecting one segment doesn't bring down your cluster.



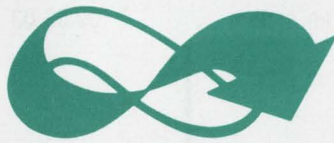
Here are the 10 cluster controllers, extra DELNI and only one of the 10 sets of cables and connectors that we eliminated.



The Sniffer is packaged with a Compaq AT. If you wish, you can buy the software alone and run it on your own properly configured machine.



The Maxserver sits below the MOD-TAP patch panels and above the modem rack. The single DELNI and 3Com ThinWire tap sit on a shelf in the back. All cluster controller cards are connected directly to patch panel groups via single 25-pair cables.



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The Sniffer

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An alternate and more flexible solution, particularly if you own a DELNI and the one we used, involved taking the MESTAs off the 750 and the MICROVAX II. We then cabled them to a DELNI in the traditional manner. This ensures that the basic backbone of the cluster will stay up, even if someone mucks up the ThinWire. Next, we used a 3Com device to convert another DELNI port to ThinWire. We then connected GOLLUM:: (MICROVAX 2000), the other printers and the Logcraft 386ware to it. Ideally, we'd have several of these transition devices and use the multiple ThinWire segments to isolate PCs from Logcraft from MICROVAX 2000s, etc.

A few vendors now are offering a device that will simplify this problem. It's a rack mount frame into which you can plug combinations of traditional (DB15), ThinWire and optical Ethernet boards, forming a customized hybrid DEMPR/DELNI combination. Allied Telesis had a prototype at DEXPO East, and we're trying to get one to test and review.

When we went through the above transition, we ended up with our Ethernet going through one DELNI. We were confident that we could get away with it because of actual traffic measurements we were making with The Sniffer from Network General of Mountain View, California.

Maxserver

Our Maxserver arrived from Xyplex of Concord, Massachusetts. Before MAX, we had a stack of 10 Xyplex cluster con-

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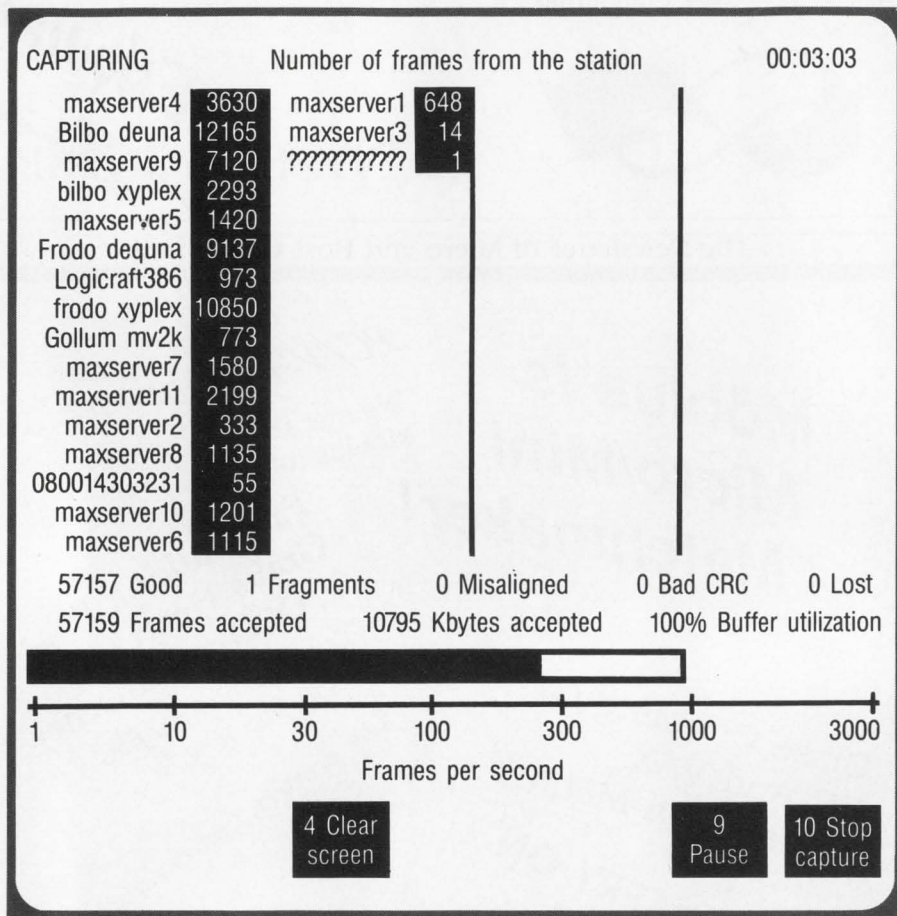
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Screen 1: Display of The Sniffer during frame capture.

trollers, cabled to two DELNIs. Each cluster controller had eight MOD-TAP connectors on the back, feeding through an eight-way octopus into a 25-pair cable that ended up on the back of one of our patch panels. That's a lot of cable, expense and extra connections where something could go wrong. Plus, there's the added cost of more than \$2,000, considering the connectors and DELNI. The Maxserver offers design features that reduce the cabling. The Ethernet is carried in the unit's backplane, eliminating the DELNIs and all associated cabling. It enters the backplane via an Ethernet half-repeater board. You can add a second unit to use either as a redundant entry point or as the other half of a repeater, bridging the network to another segment. We're using it to

bridge to the ThinWire portion of our network.

This eliminates the mess of RS232 connectors and MOD-TAP octopi. There's a single Amphenol 25-pair connector on the back of each cluster controller board that connects directly to the back of our MOD-TAP patch panels; no special cross-wye wiring is needed.

Maxserver reduces the hardware to a single power supply. Power supplies for data communications gear measure times between failure in decades. This kind of rack mount, OEMed power is preferable to the smaller, less rigorous units found in the standalone units. The change eliminated nine power supplies in the cluster controllers and a 10th in the second DELNI.

There's another major simplification concerning system management. The configuration file needs the serial

number of each discrete controller. Previously, whenever we had to replace a broken one, we had to edit the configuration file before restarting it with the new serial number. Now, the Maxserver box has a single serial number with the slot number appended. You can change cards on the fly while it's still running without changing the configuration file. The unit has a convenient connector on the front panel for an anti-static cuff (supplied) for board changes.

Performance of the unit is about the same as the previous unit's (see "The Trials and Tribulations of ThinWire," May, 1988, p. 152). After all, the configuration is the same, and the cluster controller hasn't changed.

There are several software enhancements concurrent with this hardware release. TCP/IP support is now available, allowing you to use Xyplex to access other UNIX-based machines on your network. This also permits you to skip the Xyplex-supplied Ethernet boards (HIUs) and use other TCP/IP boards (such as Excelan) that you already own. But, if you do that, you're paying a performance penalty, as you are opting not to use Xyplex's customized terminal driver.

Our unit was delivered with a total of 11 cluster controller boards; i.e., 88 terminals. We have a 12th on order and have room for two more boards before we have to buy another box.

In addition to serving the two major VAXs on the cluster, some of the ports are connected to our old RSTS system on an 11/73. In this mode, the Maxserver simply serves as a data PBX. There's no Ethernet connection on the RSTS machine.

Installation went smoothly. There were no hardware glitches. It took about a day to rearrange cables.

We're pleased with the Maxserver as a logistical improvement to our operation. We've reduced the number of discrete components and increased system reliability. We benefit from the reduced system overhead of the Xyplex servers, because the cluster controllers

When Used Isn't Good Enough

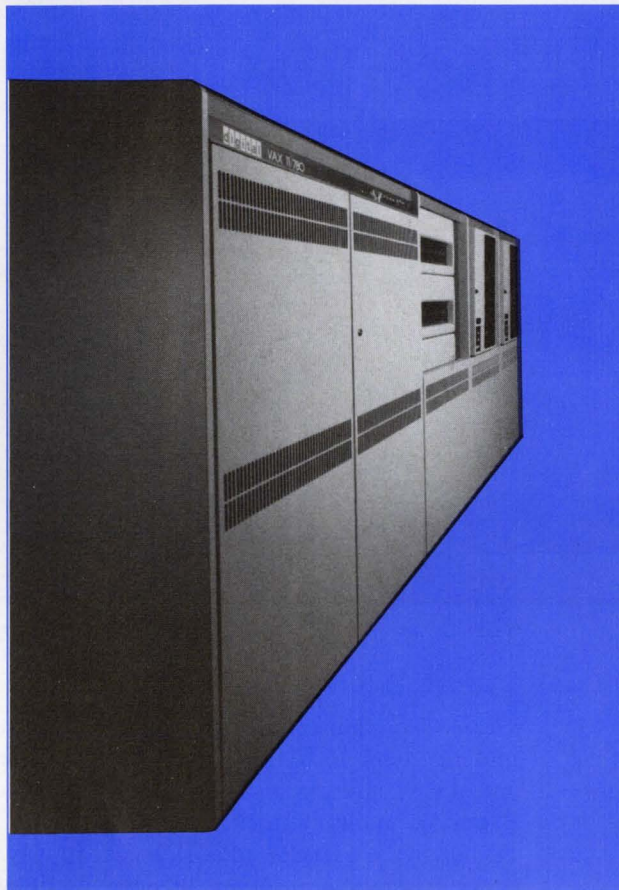
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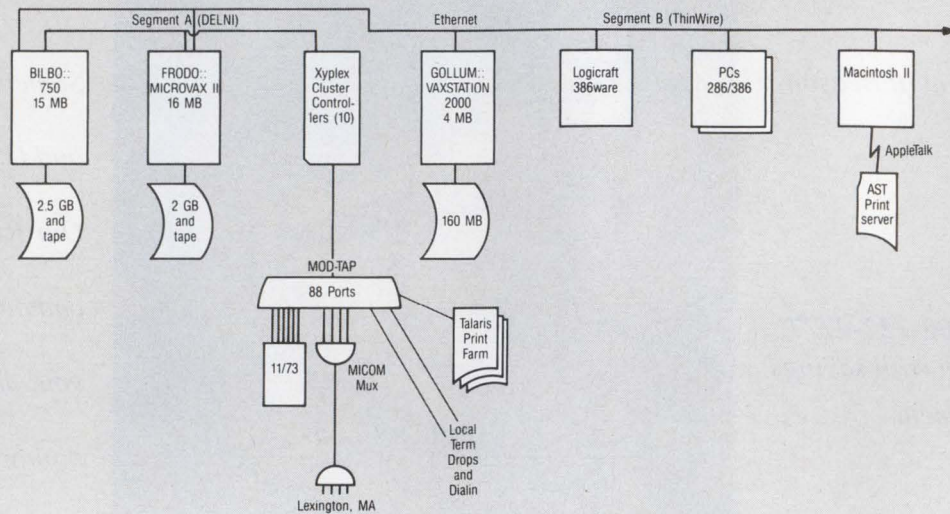
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F**FIGURE 1.**

The cluster as it was configured at the beginning of the Cluster Chronicles series.

handle much of the character overhead. The measured Ethernet overhead of the 88 ports going full speed clocks in at 200-300 frames per second.

The Sniffer

I've been running The Sniffer on our Ethernet for about three weeks, trying to get a feel for the amounts of traffic and cable loading. The Sniffer is a Compaq portable AT with the high-bandwidth Ethernet board plus software from 3Com in Santa Clara, California.

Because the Ethernet is a bus, every station on a segment sees every frame transmitted by any station. If an Ethernet board enters the "promiscuous" mode, it simply can look at everything that goes by without making its presence known to the network. That's what The Sniffer does. It's equipped with programs that can decipher many of the standard Ethernet protocols. Unfortunately, the LAVC protocol isn't among them.

Even lacking the detail presentation (which is a sure thing for a future

release), The Sniffer can tell you vast amounts about your cluster. In its capture mode, it gives you a real-time display and an auditory geiger counter indication of the traffic on your network. Figure 2 shows our current Ethernet configuration.

We're using DECNET, LAVC, XNS (both for Logiccraft 386 and Xyplex) and TCP/IP (for a printer we're reviewing for publication). The DELNI is the hub. The Xyplex Maxserver has two halves of a repeater formed from its redundant Ethernet cards. This repeater isolates the ThinWire segment of the network from any fragments in the DELNI half.

The Sniffer can be configured to observe either ThinWire or traditional Ethernet. This is a matter of changing a large dip switch on the Ethernet board. Getting inside the Compaq requires a set of Torx screwdrivers, but that's the only complexity. I changed our unit to ThinWire when it arrived.

The Sniffer captures Ethernet frames into a buffer (size depends on available memory in the PC). These frames are available for inspection both

in summary and full detail. After the buffer is full, the contents flush continually, being replaced by fresh frames. The Sniffer can filter frames, keeping only those that interest you. That can be by type or by some data content. Sets of captured frames can be stored on disk and replayed later for detail inspection.

The Sniffer has a menu system that's a horizontal tree structure. The screen is divided into three regions. You traverse option branches by moving to the right with the arrow, going deeper into the root system while retaining two higher menu levels to your right on the screen.

When you first activate The Sniffer, you're faced with an undecipherable array of Ethernet addresses. Your first task is to assign device names to these addresses. The Sniffer stores these in a file and uses them (unless instructed otherwise) on subsequent captures.

It's a useful device, even if you're not a network diagnostician. It sits on my desk and gives me a constant audible

(but not intrusive) background noise that measures the use of the network and the condition of the cluster. The purring noise of the network on The Sniffer is very comforting and not intrusive. When trouble does occur (like a cluster transition), the silence immediately is deafening.

The capture display gives you a bar graph at the bottom of the screen that gives you instantaneous traffic (either in packets or in network utilization percent) with a high water mark. Our network with full traffic will average 300-500 packets per second and peak at 1000 several times a minute (see Screen 1).

On a busy morning, we'll pass 1 million frames that contain a total of 200 MB in 100 minutes. It really increases your respect for RG/58 coax. After a few hours of capturing, it became obvious

to me why DEC now is supporting multiple Ethernets on the larger machines.

When I first started using The Sniffer, I had the LAVC ThinWire separate from the Xyplex terminal server and Logcraft box. The traffic generated by the LAVC was running at about 200 frames per second with an average frame

size of 340 bytes. Peak frame size on the LAVC seems to be around 1,500 bytes. After we combined the networks, the average frame size dropped to about 150 bytes, because the Xyplex frames are mostly about 80 bytes each. Even with our full load of about 50 users on three systems, the network seldom hits 25 percent of full capacity.

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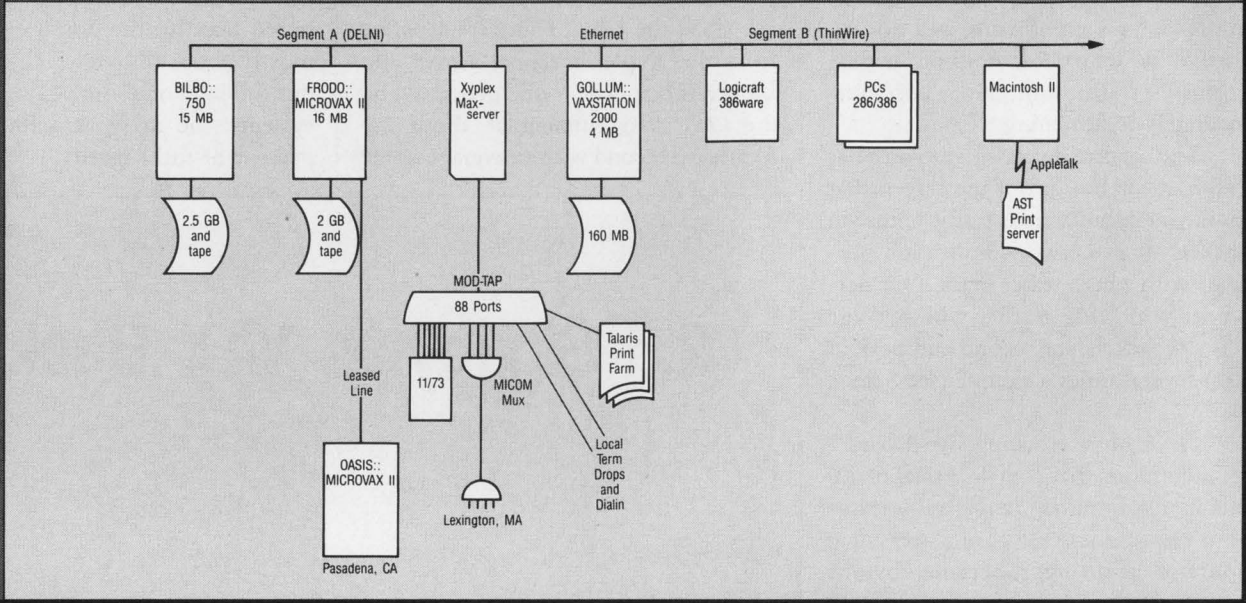
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FIGURE 2.



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As I'm writing this at 7:00 a.m., there are two batch jobs running on FRODO::, getting all their I/O from BILBO:: over the network. The cable is passing about 10 MB per minute or about 15 percent of capacity. That translates to a data rate of about 250 LAVC (big) frames per second. I made all these measurements from the capture screen, switching options to change between percent net utilization to packets per second.

A security note: Because The Sniffer is a tapping device and Ethernet frames aren't encrypted, you could gather enough data from the traffic to acquire a system password. It would take persistence, but it's possible. This unit should live in a secure area.

The Sniffer has two diagnostic functions. It's capable of generating a known load on the network by sending repetitive messages to itself or another node. This will allow the expert to load a network on demand for capacity testing.

The other feature is Time Domain

Reflectometer (TDR), which often is provided by another piece of hardware. In TDR mode, The Sniffer sends out a pulse and looks for echos, like radar. By timing the return reflections, it can tell you how far down the coax the problem (unterminated or shorted cable) lies. If you buy The Sniffer, it's a good idea to calibrate on an off day by unterminating the cable at known points and comparing the distances to those measured by The Sniffer. That will save you when problems arise.

The Sniffer is a tool that deserves a wider audience than network diagnosticians and network software developers. It's a window onto the network with enough information to deserve a place on the desk of any serious system manager.

Cluster Progress Report

We've ordered a leased line from our offices in Spring House, Pennsylvania, to our Pasadena, California, office. We will do DDCMP DECNET with the MICROVAX out there via DMV-11s. That makes our network coast-to-coast.

With the advent of third-party BI hardware, we feel it's imperative to have a test bed. (We're seriously looking for an 82xx as this is written.) Then we'll have every bus structure served by the third party here in our Spring House Lab. Our processing load has grown in the last few months and that extra 1.6 mips will be consumed on arrival.

Our lab philosophy is to test equipment in a real environment; i.e., one in which real data is processed. We're building this network and cluster, because that's what most of you are doing out there in your shops. We believe that the testing environment is as important as the test. How a unit integrates into the real world counts. Our employees bear the brunt of occasional foul ups, but we feel that real environment testing is worth the cost.

Incidentally, if you have a new product, hardware or software, that you would like us to test and report on, please contact David Miller in our Editorial Department. ■

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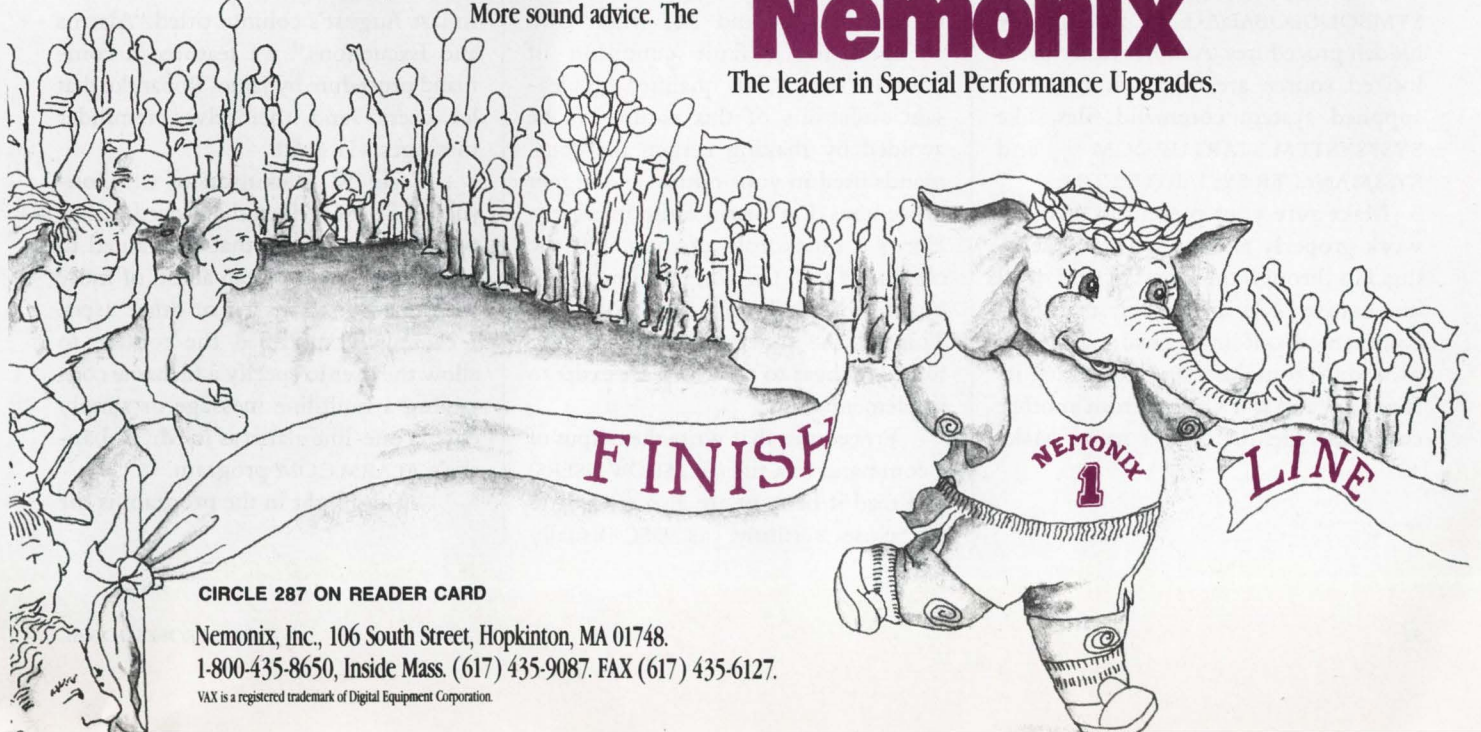
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Kevin G. Barkes

The Five-Oh Defense

There's nothing that makes a DCL hacker quiver like the anticipation of "a future major release of VMS."

With the impending introduction of 5.0, a lot of people are shaking like parts of California during an earthquake. Some can't wait for the rumored enhancements to DCL; others, remembering some of the conversion problems from 3.7 to 4.0, simply are quaking in fear.

Depending on the approach taken, converting your DCL code to run properly under 5.0 can be a dream or a nightmare. If you observe the following recommendations, the chore will be less onerous.

1. Get a hard copy of all your DCL command files.
2. Produce a listing of all the files, along with their purpose and where they're invoked. This can be tougher than it seems. At many sites, symbols used for activation of .COM files have been around for so long that the procedures they call may be forgotten. Do a SHOW SYMBOL/GLOBAL/ALL to pick up any hidden procedures. Another easily overlooked source are calls within DEC-supplied system command files, like SYSS\$SYSTEM:STARTUP.COM and SYSS\$MANAGER:SYSTARTUP.COM.
3. Make sure your present procedures work properly and are self-documenting. Go through them and get rid of all inoperative code, invalid comments and commented-out lines. Ensure that each procedure contains a line explaining its function, and if it's called from another command file, the caller's name. Make

certain they work as intended. When you're finished, print them out again.

4. Classify the procedures as critical (needed for system startup and configuration), urgent (needed for proper application operation), non-critical (nice to have, but you can live for a while without them) and trash. Trash procedures (i.e., ones not used for ages, that never did work or are of unknown purpose) should be written off to tape for just-in-case safekeeping and deleted; you probably will need the extra space for 5.0.

Of course, only blow away files in any SYSS\$ directories when you're sure they're not DEC-supplied, and therefore non-essential. Now is a good time to move command files that aren't specifically system-related to site-specific directories, and remember, the \$ is a DEC-reserved character.

5. Study the release notes, making sure that you understand all the changes in DCL command syntax. Command qualifier default changes and alterations in command display output are the two most common sources of problems.

For instance, much grief was caused in versions 3.4 and 3.5, when DEC changed the default condition of BACKUP's /REWIND qualifier. Unpleasant situations of this nature can be avoided by making certain the commands used in your critical and urgent procedures don't use defaults implicitly. Here's a quick rule of thumb: If the command will fail when a non-default qualifier is used, include the qualifier. This has the added benefit of making future changes to the .COM file easier to implement.

Procedures that write the output of a command to a file (i.e., SHOW USERS) and read it back in are also candidates for close scrutiny, as DEC usually

enhances command displays with each new release. The F\$EXTRACT call that presently pulls out a user name might return nothing but spaces, under 5.0.

You can expect procedures using MONITOR and SHOW to require modification; it's likely that queue management commands also will need tweaking.

6. Avoid temptation. Don't try initially to implement the marvelous enhancements to DCL. Your first job is to get your system up and running and your applications humming along. Make as few changes as necessary; after everything's operating reliably, you can start adding your improvements.

Major operating system upgrades are painful in any environment, but fortunately DEC goes to great pains to automate the process and provide the system manager with all information required to effect a smooth transition. The installation procedures and documentation will contain detailed instructions and explicit directions; follow them carefully.

Mail Reminders

In last August's column titled "Alarms and Excursions," we featured a command procedure by James Robanske that let users send themselves reminder messages via MAIL.

Craig W. Dickinson of GE Consulting Services liked the procedure but wrote to me saying that he wanted to be able to "... send an alarm of more than one line to myself or other users. I eventually modified the routine to allow the user to specify a filename containing a multiline message or simply enter a one-line alarm as in Mr. Robanske's ALARM.COM program.

"A highlight in the program is the

fact that the INQUIRE statement was not used while prompting the user for message input. By using the READ statement, blank lines could be entered easily, and the user could exit simply by entering CTRL-Z. . . ."

I hope Craig doesn't mind, but I also added a few bells and whistles of my own to MESSAGE.COM, mainly support for MAIL distribution lists. This little procedure now can send a message to users in a .DIS file at a scheduled time in the future.

Have a handy procedure you'd like to share with our readers? Send it to my office at the address below.

BBS Copies

A reminder to electronic bulletin board users who'd like a copy of all the DEC-related FidoNet BBSs in the United States: Send a self-addressed, stamped envelope to BBS List, Kevin G. Barks Consulting Services, 4107 Overlook Street, Library, PA 15129.

Or, you can obtain the information

you need online by calling my BBS, SYS\$OUTPUT, at (412) 854-0511. Look for DECBS.LST in the VAX or Rainbow file areas. Other recent additions to the board include VAX, PDP-11 and MS-DOS versions of KERMIT and some nifty VAX-related utilities and editors. First-time callers now have download capability. Check in and check it out! —Kevin G. Barks is a Pittsburgh-based independent consultant, specializing in VAX/VMS training, tuning, configuration and facilities management services.

PROGRAM.

```

$! See description at end of file.
$!
$! Set error handling:
$ SET NOON
$!
$! If in batch mode, go directly to the mailer:
$ IF F$MODE().EQS. "BATCH" THEN GOTO DOIT
$!
$! Set control y interrupt:
$ ON CONTROL_Y THEN GOTO ERR_HANDLER
$!
$! Check command line for parameters 1, 2 & 3
$ IF P1 .NES. "" THEN GOTO GOT_P1
$!
$ GOT_P1:
$! Get the mail delivery time:
$ INQUIRE P1 "When"
$ IF P1 .EQS. "" THEN GOTO GET_P1
$!
$ GOT_P1:
$ CHECKTIME = F$CVTIME(P1)
$ IF .NOT. $STATUS THEN GOTO GET_P1
$ ON WARNING THEN GOTO ERR_HANDLER
$!
$ GOT_P2:
$! Determine the recipient:
$ IF P2 .NES. "" THEN GOTO GOT_P2
$ INQUIRE P2 "Who (<cr>=self)"
$!
$ GOT_P2:
$! If P2 is a mail distribution file, check for its existence
$! and construct a legal mail recipient-name string.
$ IF F$EXTRACT(0,1,P2) .NES. "0" THEN GOTO CHECK_P3
$ DN = P2 - "0"
$ DN = F$PARSE(DN, "DIS")
$ IF F$SEARCH(DN) .NES. "" THEN GOTO BUILD_DIS
$ WSO "Distribution file ",DN," does not exist."
$ P2 = ""
$ GOTO GET_P2
$ BUILD_DIS:
$ QU = ""
$ P2 = QU+"0"+DN+QU
$!
$ CHECK_P3:
$! Will a message be entered on-line or a file used?
$ IF P3 .NES. "" THEN GOTO GOT_P3
$!
$! Build the name of the file in which the message will be stored.
$ GOT_P3:
$ FILETEST = "F"
$ TMPDIR = F$STRNLNM("SYSS$CRATCH") + F$GETJPI("","PID")
$ RAWFN = F$ELEMENT(1," ",F$TIME()) - ".:" - ".:"
$ FN = TMPDIR + RAWFN
$ OPEN/WRITE MFILE 'FN'
$ IF P3 .EQS. "" THEN GOTO GET_MESSAGE
$ WRITE MFILE P3
$ GOTO END_MESSAGE
$!
$ GET_MESSAGE:
$ LINE CNT = 1
$ WRITE SYSS$OUTPUT "Enter message (up to 15 lines)"
$ WRITE SYSS$OUTPUT "Enter control-z when completed."
$!
$! Write message to file:
$!
$ MESSAGE LOOP:
$ READ/PROMPT="Line 'LINE_CNT': " /END=END_MESSAGE SYSS$COMMAND MESSAGE
$ WRITE MFILE MESSAGE
$ IF LINE_CNT .EQ. 15 THEN GOTO END_MESSAGE
$ LINE_CNT = LINE_CNT + 1
$ GOTO MESSAGE_LOOP
$!
$ GOT_P3:
$! Exit if the message file does not exist...
$ ETEST = F$SEARCH(F$PARSE(P3))
$ IF ETEST .EQS. "" THEN
$ WRITE SYSS$OUTPUT P3," does not exist."
$!
$ IF ETEST .EQS. "" THEN EXIT
$ FN = F$PARSE(P3) ! otherwise, use P3 for the message
$ FILETEST = "T"
$!
$ END_MESSAGE:
$ CLOSE MFILE
$!
$! Queue message request:
$!
$ IF P2 .EQS. "" THEN P2 = F$EDIT(F$GETJPI("","USERNAME"),"TRIM")
$ SUBMIT/NOPRINT/NOLOG/PAR=( 'FN', 'P2', 'FILETEST' ) -
$ /AFTER=" 'P1' " 'F$ENVIRONMENT("PROCEDURE")
$ EXIT
$!
$ ERR_HANDLER:
$ WRITE SYSS$OUTPUT "Unable to queue message request..."
$ SAVE MESSAGE = F$ENVIRONMENT("MESSAGE")
$ SET MESSAGE/NOF/NOI/NDS/NOT
$ CLOSE MFILE
$ SET MESSAGE 'SAVE_MESSAGE'
$!
$! Delete the file FN created by this routine only; don't delete
$! any existing files if P3 was a file specification.
$!
$ IF FN .NES. "" .AND. P3 .EQS. "" THEN DELETE/NOCONFIRM 'F$PARSE(FN)'0
$ EXIT
$!
$! Process message request
$!
$ DOIT:
$ MAIL/SUBJECT="AutoMessage" 'P1' "'P2'"
$ IF P3 THEN EXIT
$ DELETE/NOCONFIRM 'F$PARSE(P1)'0
$ EXIT
$!
$! Procedure info:
$!
$! message.com
$!
$! Original procedure (alarm.com) by H. Robanske (11/15/86)
$! U.S. West Network Systems, Inc., Bellevue, Washington
$!
$! Modified by C.W. Dickinson (11/19/87)
$! GE Consulting Services, Syracuse, New York
$!
$! MAIL distribution file support and minor changes
$! by Kevin G. Barks (2/13/88)
$!
$! synopsis: send a message (up to 15 lines) or a file to
$! any user or legal mail distribution list (@MAIL.DIS)
$! (defaulted to user invoking the procedure), scheduled
$! for delivery at a specific time. The message, if
$! entered online, is ended by typing CTRL-Z.
$!
$! syntax: @message [(time)] [(username)] [message_filename/1-line message]
$!
$! parameters:
$!
$! TIME - may be expressed in absolute or combination time.
$!
$! Absolute time: dd-mmm-yyyy:hh:mm:ss.ss
$! TODAY
$! YESTERDAY
$! TOMORROW
$!
$! Combination time: An absolute time + or - a delta time (dd-hh:mm:ss.ss)
$!
$! USERNAME - any valid username, may be used with VAX networks.
$!
$! MESSAGE_FILENAME - any standard VAX file, which may contain more than
$! the 15-line message maximum for interactive message
$! generation.
$!
$! 1-LINE MESSAGE - The user may optionally enter a 1-line message that
$! must be contained in quotes (""), replacing the
$! message_filename. NOTE: The omission of quotes will
$! result in only the first word of the message being
$! sent via mail.

```


FIELD SERVICE

Ron Levine and Warren Haeberle

Self-Maintenance Requires A Partner

More reliability is being engineered into data processing systems. System downtime is declining, but there always will be a need for maintenance. To meet this need, some companies have chosen to handle their own computer repairs, becoming self-maintainers.

Self-maintenance doesn't mean self-sufficiency. Self-maintainers need a partner in pursuit of computer repair independence. For example, many computer equipment problems can be corrected by replacing one of the unit's circuit boards. Few self-maintenance companies, however, have the expertise, documentation or equipment to continue to the next step — isolating the problem on the board. That type of capability generally isn't viewed as cost effective.

It's less expensive to repair a board than to buy a new one. But, where do you have this service performed? The OEM may be one source. Another might be the independent depot repair facility.

Send It In

Depot repair, or fourth-party maintenance as it has come to be called, has existed since computers began breaking down. Depot repair companies don't send service representatives to a site. Instead, customers send their defective parts or equipment to the repair facility by mail, parcel post or other means of commercial shipping. Although self-maintenance companies historically have been the primary customers for this type of service, OEMs use independent depot repair to handle work overloads.

Because OEMs offer depot repair

More reliability is being engineered into data processing systems.



In addition to repairing boards and other items, many fourth-party maintenance vendors provide board swapping and/or immediate replacement of parts.

services, why would you consider an independent repair service? The answer is the same reason for becoming a self-maintainer in the first place — price. Independent depot repair prices are approximately 20 to 25 percent lower than those of the OEM. Turnaround time usually is faster too; for example, circuit boards are returned in a few days, not weeks.

In certain situations, you can't choose the OEM for depot repair. Sometimes, the OEM doesn't offer service on less popular models or has discontinued service on equipment no longer in production. With self-maintenance on the rise, depot repair has become an important factor in this maintenance market.

Importance Of Parts And Service

To repair computer equipment, a repair depot must have access to parts. Obtain-


ing the parts necessary to keep a system online sounds simple but it's not. Certain OEMs maintain close control over parts distribution.

Therefore, before you select a depot repair service, take a close look at its inventory, making sure it has the right parts for your system. The depot repair company not only should be willing to disclose inventory levels but also encourage physical inspection. By visiting the facility, you'll be able to see which quality control measures are in effect.

Quality Control

Another area of concern is how the parts and your original equipment are handled by the repair depot.

Static electricity, for example, if uncontrolled, can ruin delicate components



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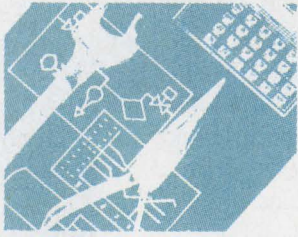
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CIRCLE 272 ON READER CARD

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CORPORATE HEADQUARTERS: 50 East Swedesford Rd., Frazer, PA 19355

TELEPHONE NUMBER: (800) FOR-INFO

CONTACT: Dick Cooper

CLASSIFICATION: Independent service vendor

TYPES OF SERVICES OFFERED: Field service, remote troubleshooting/diagnostics assistance

KINDS OF SERVICE AVAILABLE: Contract — on-site, four-hour response; non-contract — call

STANDARD SERVICE DAY: 7:00 a.m.—6:00 p.m. (Mon.-Fri.)

EXTENDED SERVICE DAY AVAILABLE: Yes — per agreement

LENGTH OF SERVICE CONTRACTS: One year, multiyear

VOLUME REQUIREMENTS: May be required in some remote areas

EQUIPMENT SERVICED: Most DEC computers; IBM, IBM clones, Amdahl, HP and AT&T computers; most peripherals, modems, and add-on PCBs

MARKETS SERVED: Customers — OEMs, VARs, dealers, end-users, most verticals; geography — national

IN BUSINESS SINCE: 1971 (Sorbus was created as a division of MAI)

PRICING: Fixed on contracts; time and materials on others. Note: Sorbus isn't a discount vendor, but prices are usually lower than manufacturer's service.

REMARKS: Number one TPM company in the U.S., providing service for more than 400 brands. DEC maintenance may be price guaranteed on a multiyear basis when included in an equipment leasing agreement.

Sorbus is the number one third-party maintenance vendor in the United States. DEC-based systems service was added to the product lines maintained in November 1987. More than 400 brands of computer-related equipment are serviced, making Sorbus an excellent choice for single-source field maintenance.

Sorbus is a Bell Atlantic Company, employing more than 200 FEs out of 200 nationwide offices. More than 60,000 sites, for approximately 45,000 customers, currently are maintained.

Sorbus maintains a complete parts inventory of more than 230,000 different items (more than 6,000,000 parts total) for all products serviced. Diagnostics used by field service are both system and component level. Parts replacement may be new, refurbished or on an exchange basis. Average repair turnaround time is five days.

CIRCLE 514 ON READER CARD

or negate complex repairs. The result may not be apparent but, in time, a problem caused by static discharge can cause a circuit board to function improperly.

3M antistatic measures have become the standard in the industry. A depot service concerned with quality control will incorporate these standards in its operation, including:

1. Grounding employees who handle circuit boards or components.
2. Keeping circuit boards in antistatic bags when not being repaired and when being returned to the customer.
3. Storing spare parts and components in specially designed antistatic bins.
4. Using specially laminated tabletops at workstations to minimize static electricity.
5. Using environmental safeguards, including temperature and humidity controls.

Automatic Upgrades

Data processing systems don't remain constant. Through engineering change orders (ECO) or field change orders (FCO), the OEM can alter the function of the circuit board. The OEM automatically makes these revisions when servicing the circuit boards.

This service can be obtained through a quality depot repair facility, provided the company has an engineering department and access to the circuit board schematics. Although such a service isn't universally available, it's becoming more prevalent.

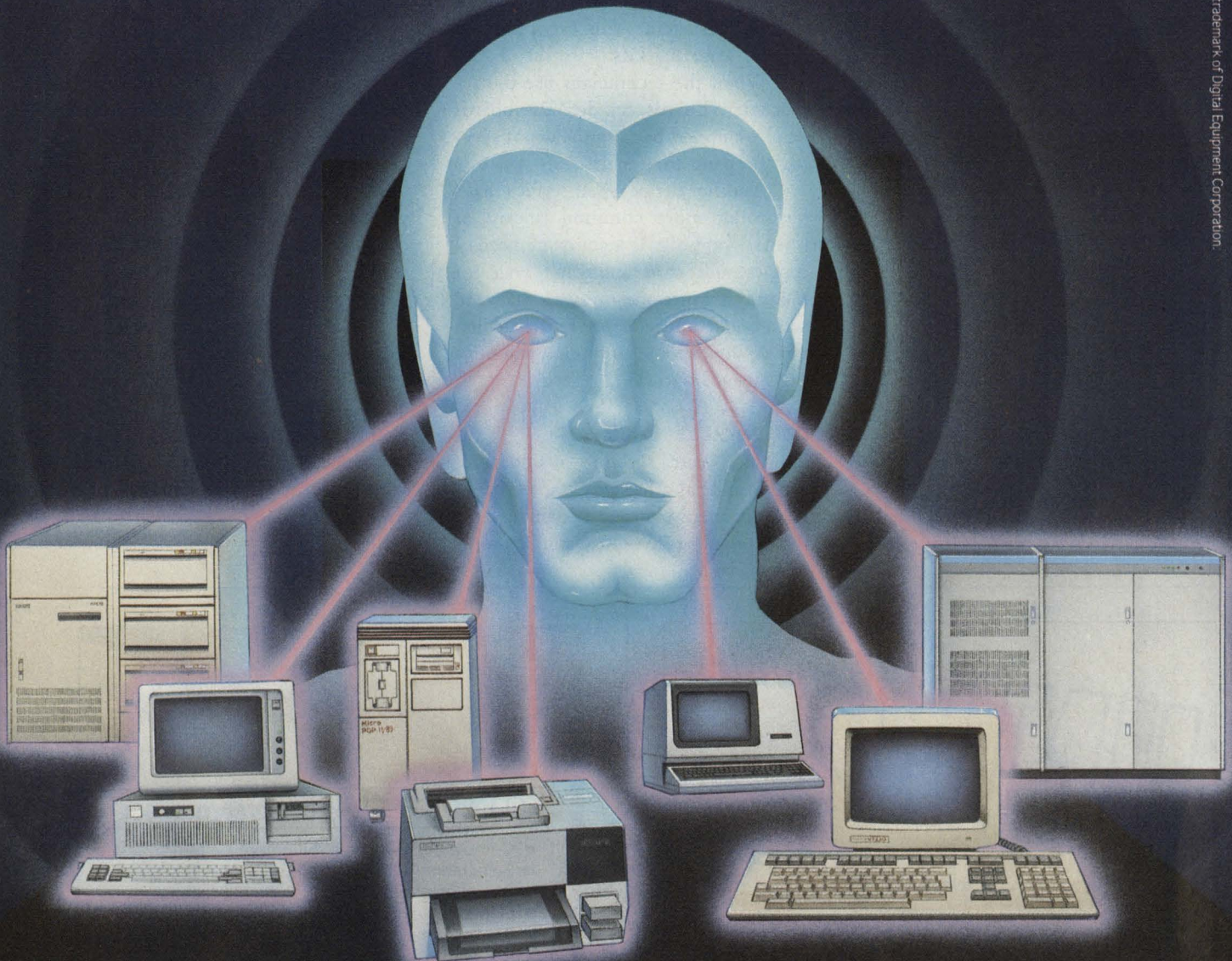
Response Time

A company that becomes a self-maintainer must have the expertise on site for both daily computer upkeep and emergencies. For the company technician to perform his duties correctly and efficiently, he must have the parts and tools available. If the computer is down because of a bad circuit board, replacement must be at hand.

The ideal solution is a spare parts kit, easily obtained through a qualified independent depot repair company. The kit comes with a complete line of

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Troubleshooting Tip

Before lugging out the Oscop on a disk drive problem, check to ensure that the drive has been set up properly, that cables are connected correctly and that the drive's unit address is selected properly. Most disk drive trouble calls are due to improper setup of the disk drive subsystem.

If additional drives are available on site, switch drives using the same controller. If the new drive works, the problem has been isolated to the original drive. Using diagnostics, run the faulty drive on one head at a time; this will locate any bad head(s). Likewise, use only half of the cylinders (tracks) during a test to pinpoint possible media or positioning faults.

Most disk drive problems are simple and can be identified quickly at this level.

—Ron Levine

statically protected and tested circuit boards, specifically designed for your particular system. You can purchase, rent or lease the kits.

When the technicians use the replacement boards, the defective boards can be shipped back to the depot service company for repairs.

Another depot repair service that's becoming more common is card or board swapping. If a company needs a replacement card and can't wait for repairs, it can trade or swap that card with one from the depot repair facility, saving the expense of finding and buying a new board.

Parts And Service

Training your system's maintenance force can be another area where a depot repair company can assist. Training from the original equipment manufacturer is

expensive and frequently unavailable when needed. Additionally, in many cases, the courses are fixed and can't be modified to meet your needs.

Some depot repair companies provide regularly scheduled instruction on a broad spectrum of equipment. Others tailor courses to match customer requirements. Some repair schools provide assistance after completion of the course. If your technician becomes stumped on a problem, he can call the school for advice or to repair parts.

To be a successful self-maintainer, a company must be able to secure both parts and outside repair assistance quickly. A reliable depot repair facility supplies occasional, but necessary, assistance. —Warren Haerberle is president of Electronic Service Specialists Ltd., a Bell Atlantic company, Menomonee Falls, Wisconsin.

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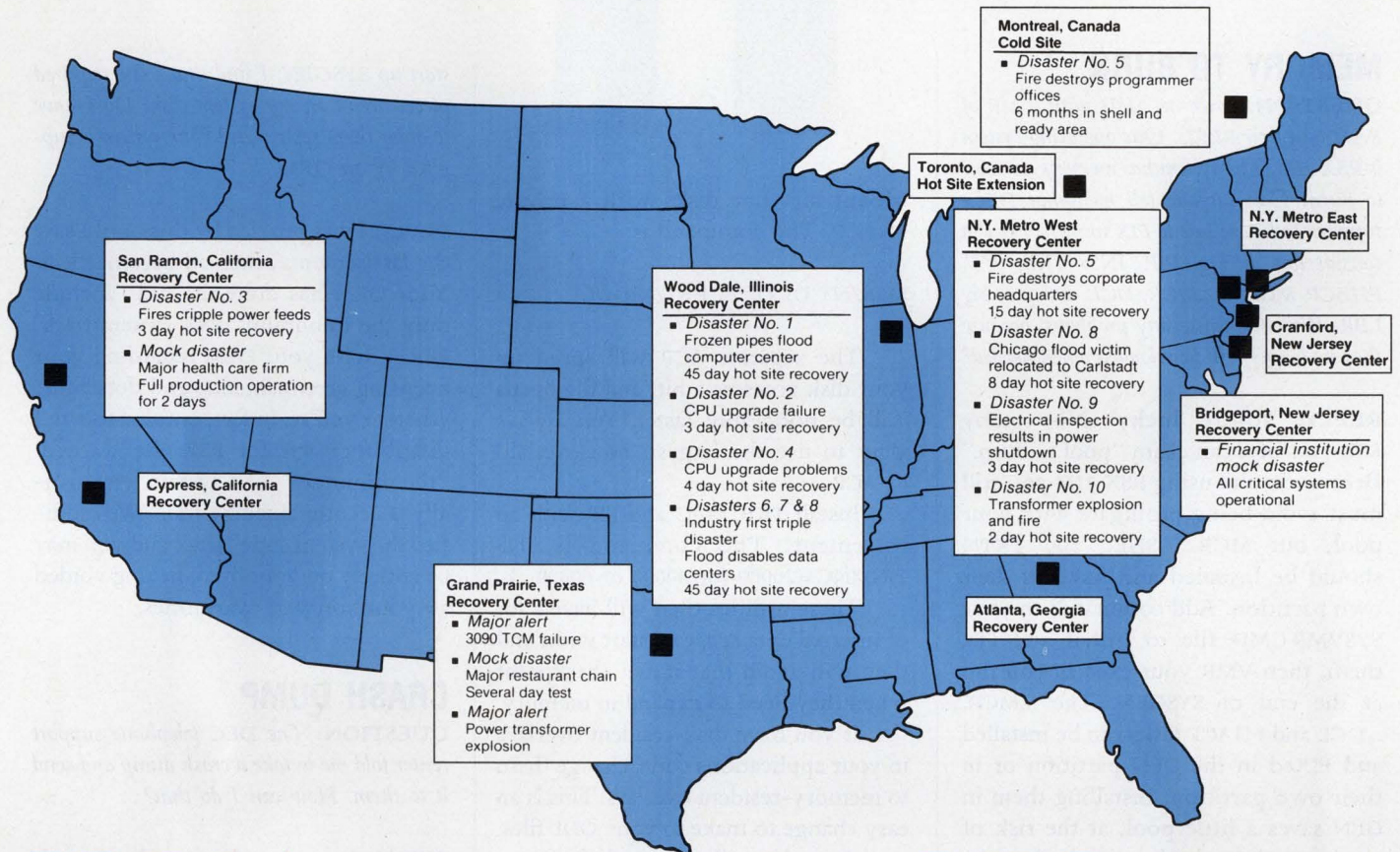
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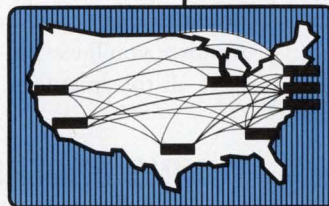
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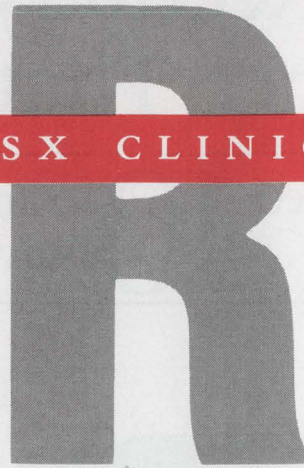
Or call 312/698-3000.



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CIRCLE 109 ON READER CARD



MEMORY TO BURN

QUESTION: I run an 11/73 with 2 MB of RAM and four RL02s. Our operating system is RSX-11M. The system has memory and pool to burn. Can anyone tell me what DEC-supplied tasks are safe to FIX in memory? I'm considering fixing PIP, INS, TKB, F77, F11ACP, MCR..., ...MCR, DCL and possibly LBR. Will this cause any problems, because they no longer will be reloaded when needed?

REPLY: You're lucky. Not many RSX-11M sites can claim "pool to burn." Because you're using RSX-11M you still must avoid being profligate with your pool, but MCR..., SHE... and TKTN should be installed and fixed in their own partition. Add commands in your SYSVMR.COMD file to install and FIX them, then VMR your exec as you did at the end of SYSGEN. The ...MCR, ...DCL and F11ACP tasks can be installed and FIXed in the GEN partition or in their own partition. Installing them in GEN saves a little pool, at the risk of getting F11ACP checkpointed when the GEN partition becomes full.

The language processors and utilities (F4P, TKB, LBR, F77, MAC, PIP) are best just installed. I don't see where FIXing them will pay back much, except a little time on the initial task load, not much to be saved in light of all the overlay loads these tasks do as they run. Some even may have a problem if you FIX them. They may assume that they always are reloaded from disk and, therefore, may make corresponding assumptions about their internal data areas.

Other things you might do with your luxurious memory come to mind.

Mount all your disks with a private F11ACP. The command is:

```
MOUNT DLxx:/ACP=UNIQUE
```

The separate ACP will speed up your disk accesses a bit, and file opens will be noticeably faster. You always want to use the largest, non-overlaid F11ACP.

Install TKB, MAC and PIP with an increment. The command is INS TKB/INC=20000 (or 40000 or 60000...)

These utilities then will have a lot of internal data space to start with, and they will avoid that initial checkpoint when they need to expand in memory.

If you have disk-resident overlays in your applications code, change them to memory-resident overlays. This is an easy change to make to your .ODL files, and the tasks will run much faster.

Last, add a RAM disk. Use the FXDRV from DECUS or any one of the commercially available products. Put your TKB, F77 and PIP task images on the RAM disk and INStall them from the RAM disk. Reassign the work files for TKB (LUN 8), F77 (LUNs 6,7) to the RAM disk.

Keep an eye on pool while you're doing all this. It will be the first critical resource you'll use up, even though you have all that memory.

TUNING ORDERS

QUESTION: I want to do some system tuning to my system, including a new SYSGEN to change a few things in the exec. When I

start up SYSGEN, I find that some required pieces aren't on my system disk. Do I have to order them separately? Our system is supplied by an OEM.

REPLY: I was puzzled by this until I saw the last sentence, then all became clear. Your OEM has done the old "Include only the minimum" RSX system trick. Check with your OEM regarding your licensing arrangements, and determine whether you're, in fact, entitled to a full distribution kit for RSX. Be warned: "the minimum" RSX system trick usually is accompanied by the, "We modified the system code" trick and you may be entirely on your own, having voided all your software warranties.

CRASH DUMP

QUESTION: The DEC telephone support center told me to take a crash dump and send it to them. How can I do that?

REPLY: Assuming that you have crash dump support included in your SYSGEN, do the following:

1. Halt your machine. How you do this will vary with the model of PDP-11 you're using, but you'll usually find a button or switch labeled HALT on the panel. If not, try hitting CTRL-P on your console terminal.
2. Once the system is halted, change the contents of the Program Counter (PC) to an octal 40 and the contents of the Processor Status Word (PSW) to an octal 30340.
3. Hit the switch or command your processor to CONTINUE.

The operating system will jump

into the system crash code and prompt you to insert a scratch disk or tape into the crash dump drive, and then it will halt. When you again proceed, the machine's memory will be dumped onto the crash dump drive. Send this, along with machine-readable copies of your LB:[1,54]RSX11M.STB and LB:[11,10]RSXMC.MAC files to Digital. And include a completed SPR form.

This is the simplest, most graceful and, therefore, most boring way to crash a system. My list of all-time favorite system crashes has at least 12 other ways to cause system crashes, but these are best left out of print.

BRU ERRORS

QUESTION: *HELP! Our Virtual Disk driver (VE:) from DECUS causes us problems. We're trying to BRU files from the virtual disk onto a tape and keep getting errors from BRU.*

REPLY: A modification to BRU in the RSX-11M-PLUS 4.0 and RSX-11M 4.2 release is causing this. It's a fairly simple problem to fix. You want to edit the database file for the virtual disk driver and then rebuild the driver. Edit the file VETAB.MAC (it may be called VETBL.MAC). Find the line that says:

```
.WORD DV.MNT!DV.F11 ; U.CW1
```

add the attribute bit DV.MSD to this list, so that it now reads:

```
.WORD DV.MSD!DV.MNT!DV.F11 ; U.CW1
```

Then rebuild the virtual disk package. The virtual disk driver package you mention contains a command file to rebuild the package. Just invoke it, then reinstall the virtual disk driver. Your existing virtual disk container files won't be affected.

Please mail your questions to RSX Clinic, DEC PROFESSIONAL, Professional Press, Box 503, Spring House, PA 19477-0503. Questions also can be submitted through ARIS.

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FROM THE LAB

Dave Mallory

Break In!

There's an old saying that goes, "If you wait around

long enough, everything will happen." Recently, the adage came to pass at a colleague's installation.

At about 1:00 p.m., a heart-stopping message appeared on every terminal in his building:

IT WAS A VERY BAD IDEA TO LEAVE THE PASSWORD ON THE FIELD SERVICE ACCOUNT

Down went his system, and we got a plea for help.

This is really about what we did to fix it, rather than how he got there. He arrived there because no one reset his password after his last Field Service call a month earlier. DEC was on the machine from Colorado, looking at the configuration. He hadn't cleaned up. Years of vigilance negated by a moment's distraction.

What follows is the sequence of events we followed as an emergency drill immediately after the event.

First, we powered down all modems in the computer room. A sober look at the broadcast message revealed that the intruder had been on a local dialin line.

We then did a full dump of the UAF file to the printer. We divided the listing, and everyone got to look at all of it over the next hour. We found a single account that the artist had created that had SETPRV.

We checked the modification date of all the system files for stability. The local lines remained pulled, pending changing all their numbers. Fortunately, we live in a world of computerized

phone exchanges and wholesale number changes only cost money. They can be done in hours.

Because the system seemed stable, work continued. The next step was to do a \$BACKUP/COMPARE on the disks using the last full system backup. This will find any modifications or patches made to VMS or any component. Anything found by this method should be replaced from a distribution tape. The single account in the UAF could just be a decoy and the real damage could be elsewhere in the system.

Fortunately, the comparisons were equal, so we had confidence that we were hit by a rather benevolent ego tripper. The worst thing is that you can never be totally sure.

The morals of the story:

1. Change your dialin numbers every few months. When you change them, request non-sequential numbers.

If you have to give the numbers to people, changing them and only revealing on a need-to-know basis is the best technique.

Use AUTHORIZE to flag both SYSTEST and FIELD for audit. Remember to unflag them before authorizing and reflag afterward.

2. Use a program that runs automatically and scans a UAF dump looking at the privilege settings. The program has to be automatic and has to scream bloody murder when it finds accounts with priv that are enabled and aren't in a list. It also should scream about any new accounts it finds. Screaming can be accomplished by sending mail to a distribution list that includes management.

3. Use SET/AUDIT/ALARM/ENABLE = (ACL,INSTALL,MOUNT,AUTHORIZATION,BREAKIN=ALL) in your SYSTARTUP to enable alarm messages.

“

Years of vigilance negated by a moment's distraction.

”

Also add SET ACL SYS\$SYSROOT: [000000]SYSTEST.DIR/ACL = (SECURITY, ACCESS = READ + WRITE + DELETE + CONTROL + FAIL + SUCCESS) along with a clone for SYSMOINT.DIR to SYSTARTUP. This enables alarms on the field and test accounts.

Use REPLY/ENABLE = SECURITY (with OPER and SECURITY priv) in your LOGIN.COM to get the alarms.

After a few hours of constant interruption on your terminal, you will decide that a permanently logged in hardcopy terminal is a better receptacle for these messages. The problem is that you actually have to look at it several times an hour.

Another consideration is a system password. If you choose one, the dialin user must give the password (with no prompt) on connect before the username prompt is given. If you change this monthly and tell only your current authorized dialin folks, you probably could change phone numbers less often.

Editor's note: A break in like this can happen to the most knowledgeable system manager. All it takes is a moment's distraction. There are a number of articles in this issue that can help you tighten your security. See Betty Steele Adukoski's "The Scheme Of Things" on page 50." New VAX managers will find Robert Hansen's "Security For The New VAX Manager" on page 58 helpful. ■

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CIRCLE 195 ON READER CARD



FROM THE LAB

David B. Miller

PAKMANAGER

As a VAX system manager, you may face frustrations regarding sorting and managing your disks. A disk-wide directory can show junk all over the place: duplicate files in at least 15 different directories, 25 versions of a COBOL billing program replete with smaller test data files; files so old that their names are written in Latin; lots of files with nothing in them; and subdirectories so deep that you need oxygen to get to the bottom.

This could take hours or even days to clean up. Besides, what's important and not important? You needed an additional disk drive anyway.

Before you do anything rash, check out *PAKMANAGER* from DEMAC Software Ltd. of Ottawa, Ontario. It's designed to help system managers clean up and manage their disks as well as to keep them clean forever. We tested *PAKMANAGER* version 1.1 to see if it could help us.

Installation

Installing the software involved using *VMSINSTALL* and calling DEMAC for our personal software key numbers. A nice feature about the key numbers is that extending your license after an initial demo period simply requires another phone call to DEMAC for new numbers. No new installation step is required. If *PAKMANAGER* is installed on a CPU in a cluster, any disk in the cluster can be monitored. If you wish to run *PAKMANAGER* from multiple CPUs in the cluster, you need to obtain a separate installation key for each CPU on which you wish to run the program. There is no additional charge for this service.

PAKMANAGER can be run interactively or from the DCL command line. Command line report qualifiers exist for each of the individual reports on the interactive main menu. In command line mode, you also may direct output to specified files and devices, rather than view them on the screen.

It may take a while for *PAKMANAGER* to come up, because it must analyze the disk first. It does this by examining the device's *INDEXF.SYS* file. If a */VMS* qualifier is added when *PAKMANAGER* is invoked, it searches the device for information based on directories, instead of the *INDEXF.SYS*

FIGURE 1.

FRAGMENTED FILES ON "USER3:" (AT LEAST 2 FRAGMENTS)
 PAKMANAGER Version 1.1x
 Copyright (c) Demac Software Ltd. — 1987,1988
 Mon, April 18, 1988. 2:57 pm

SIZE	EXTENTS	FILE NAME
300000	46	[CIRC.DECOLD] PROSUB.DAT;1
30003	37	[CIRC.DECSUB] HPSUB.DAT;1
80001	35	[CIRC.HPSUB] PROSUB.DAT;1
17190	29	[CIRC.HPSUB] MARTIN.DAT;1
15888	12	[CIRC.HPSUB] OCS.DAT;1
19104	6	[ZIP9] F1000.DAT;2
2067	6	[000000] INDEXF.SYS;1
1890	4	[CIRC.HPSUB.BPA] HP_V16_NOV87_RRN.SLC;1
303	4	[CIRC.HPSUB] PDPVAX.DAT;1
16773	4	[CIRC.HPSUB] PROSUB.ALF;1
72	3	[000000] BADBLK.SYS;1
1905	3	[CIRC.DECOLD] BPAF1000B.SLC;1
21	3	[CIRC.HPSUB.BPAWORK] HP_V2_QUALITY.LOG;4
27	3	[CIRC.HPSUB] V24QDTZIP.LST;1
6	2	[CIRC.DECNEW] CONVERT.LOG;2
6	2	[CIRC.HPSUB] CONVERT_MARTIN.LOG;1
3006	2	[CIRC.HPSUB] ELSUB.DAT;1
6	2	[CIRC.HPSUB] FIXCOD11THRU3.LOG;1
3984	2	[CIRC.DECSUB] HPSUB.ALF;1
12	2	[CIRC.HPSUB.BPAWORK] HP_V16_BPA_QUALITY_TEST.LOG;1
1926	2	[CIRC.HPSUB.BPA] HP_V21_JAN88_RRN.SLC;1
18	2	[CIRC.HPSUB.BPAWORK] HP_V23_MAR_ADDZIP.ACC;1
6	2	[CIRC.HPSUB] LOGIN.COM;24
78	2	[CIRC.DECNEW] PROCODE.DAT;1
6	2	[CIRC.DECNEW] SELECT_ALL.LOG;2
21	2	[CIRC.HPSUB] V24CODB.LOG;1
6	2	[CIRC.HPSUB] VNEWQDT.COM;4
426	2	[ZIP9] XXX.DAT;1

Report Summary
 File ownership mask : [**]
 Number of files : 28
 Total blocks allocated : 494751
 Largest size : 300000
 Average size : 17669
 % of disk used : 45.88

Fragmented Files report.

PAKMANAGER Version 1.1x
 Copyright (c) Demac Software Ltd. - 1987, 1988
 Fri. April 15, 1988. 4:35 pm
 Device is 'User3:'

KEY	MERGEABLE REPORTS	FILES
A	Aged Files	0
B	Files needing Backup	11
D	Duplicate Files	0
E	Expired Files	407
F	Fragmented Files	31
L	Large Files	28
O	Over Allocated Files	1
P	Placed Files	3
V	MultiVersion Files	9
Z	Zero Length Files	19

KEY	OTHER REPORTS/OPTIONS	FILES
S	Summary	407
T	Directory Tree	17
R	ACL Restricted Files	3
I	Interesting Files	0
C	Cluster Factor Analysis	-
U	Space Usage by Owner	-
/	Setup Menu	-
H	Help	-
X	Exit PakManager	-

Enter any KEY to select a report or option.
 Enter several KEYS to combine MERGEABLE reports
 Enter '*' KEY(s) to alter report parameters.

Select a report or option key :

Screen 1: PAKMANAGER's Main Menu.

file. The /VMS start up is slower but is required if interesting files are to be reported.

The main menu screen of PAKMANAGER (see Screen 1) tells the story. Each choice except Help and Exit produces a report. Figures 1 through 4 show four of these reports to give you an idea of the kinds of things PAKMANAGER will do.

The main menu screen contains:

1. Aged Files (A) — Based on a file's last revision date, this choice displays the oldest files on the disk in terms of lifespan in days.
2. Files Needing Backup (B) — As the system manager, you decide what files are to be backed up regularly. PAKMANAGER allows you to do this based on file size. All files meeting the requirements you specify will be reported here. The Backup report can help a system manager gauge how much disk or tape space may be required to do the backup.
3. Duplicate Files (D) — This reports all files with duplicate names in all direc-

tories. Care is needed here, because files such as LOGIN.COM probably aren't duplicates; they simply have the same name.

4. Expired Files (E) — If a volume's retention period has been set, this report will point out all files violating their expiration date and could be potential candidates for archive.
5. Fragmented Files (F) — This report points out which files are fragmented and the number of fragments used by those files (see Figure 1).
6. Large Files (L) — Figure 2 illustrates how PAKMANAGER reports those files meeting and exceeding a specified file size as well as the number of extents used for those files. The specific file size to be met or exceeded is determined by the system manager.
7. Over-allocated Files (O) — Files that have more space allocated to them than they're currently using are reported.
8. Placed Files (P) — This points out all files with placement control on them. Too many placed files could cause problems with fragmentation for other files.
9. Multiversion Files (V) — It reports all files with multiple versions and the size

of the oldest version of each file.

10. Zero Length Files (Z) — This lists files with allocated space but none of that space is used.
11. Summary (S) — This summarizes all PAKMANAGER reports (see Figure 3).
12. Directory Tree (T) — It provides a directory-by-directory report of all files on the disk and how space is being used. Directory nesting also is indicated, giving you an idea of where directory nesting may cause a slowdown in performance because of degraded access time.
13. Files with ACLs (R) — This displays all files with Access Control Lists (ACLs). ACLs have their security uses, but they should be reviewed from time to time to see if they're justified. ACLs degrade file access times.
14. Interesting Files (I) — Reported here are all files that meet at least one of the following: they contain bad blocks; are multiheader or multivolume files; they take more space than allocated; new files or directory/header name mismatch;

they're alias files or they're lost, locked or privileged.

15. Cluster Factor Analysis (C) — This report provides information concerning different cluster sizes and what kinds of tradeoffs would be required if the disk's cluster size were changed (see Figure 4). It reports the number of wasted blocks, the number of files that fit into the reported cluster size and the size of the BITMAP.SYS file for each reported cluster size. You then can examine this report to make decisions about whether a disk's cluster size should be changed.

16. Space Usage By Owner (U) — File information such as number of blocks, percentage of disk space consumed and

number of files and directories are displayed along with the owner UIC and name.

17. Setup Menu (/) — The setup menu allows you to alter parameters, such as output to the screen or a disk file, naming a DCL command file to be created and report sorting options.

Features

PAKMANAGER sports a few other conveniences worth mentioning. Any of the available reports can be combined by selecting them as mergeable. Merged reports display all information that meets the criteria of all specified reports. Simply enter all of the letters cor-

“
Any of the available reports
can be combined
by selecting them
as mergeable.
”

responding to the desired reports. For example, entering LF generates a merged report showing all fragmented files that also meet the large file criterion.

Report criteria is controlled by the system manager, who can change any of PAKMANAGER's default settings. You as the manager determine what is a large file for your site, what you consider to be the degree of fragmentation necessary to warrant a report, etc. Report criteria can be changed interactively from the main menu or from the DCL command line.

Whether you use the DCL command line format or run PAKMANAGER interactively, you can specify parameters for maximums and minimums for reports that need them. Sets of parameters then can be saved to files and loaded when necessary. This allows you to create custom parameter files for different disks and CPUs and will save you the bother of having to re-enter the desired maximums and minimums every time PAKMANAGER is run.

Also available is a time-saving feature that creates DCL batch files containing a separate DCL line for each file that meets the report specifications. For example, a command line to create a DCL command file to delete all zero length files on DISK0: would be:

```
$pakman disk0:/ZERO=(COMMAND=
"Delete",SWITCH="/log")/DCL=
DeleteZero.COM/OUT=Zero.Out
```

where:

1. ZERO is the PAKMANAGER report to be produced (zero length files).
2. COMMAND = "Delete" is the DCL

F

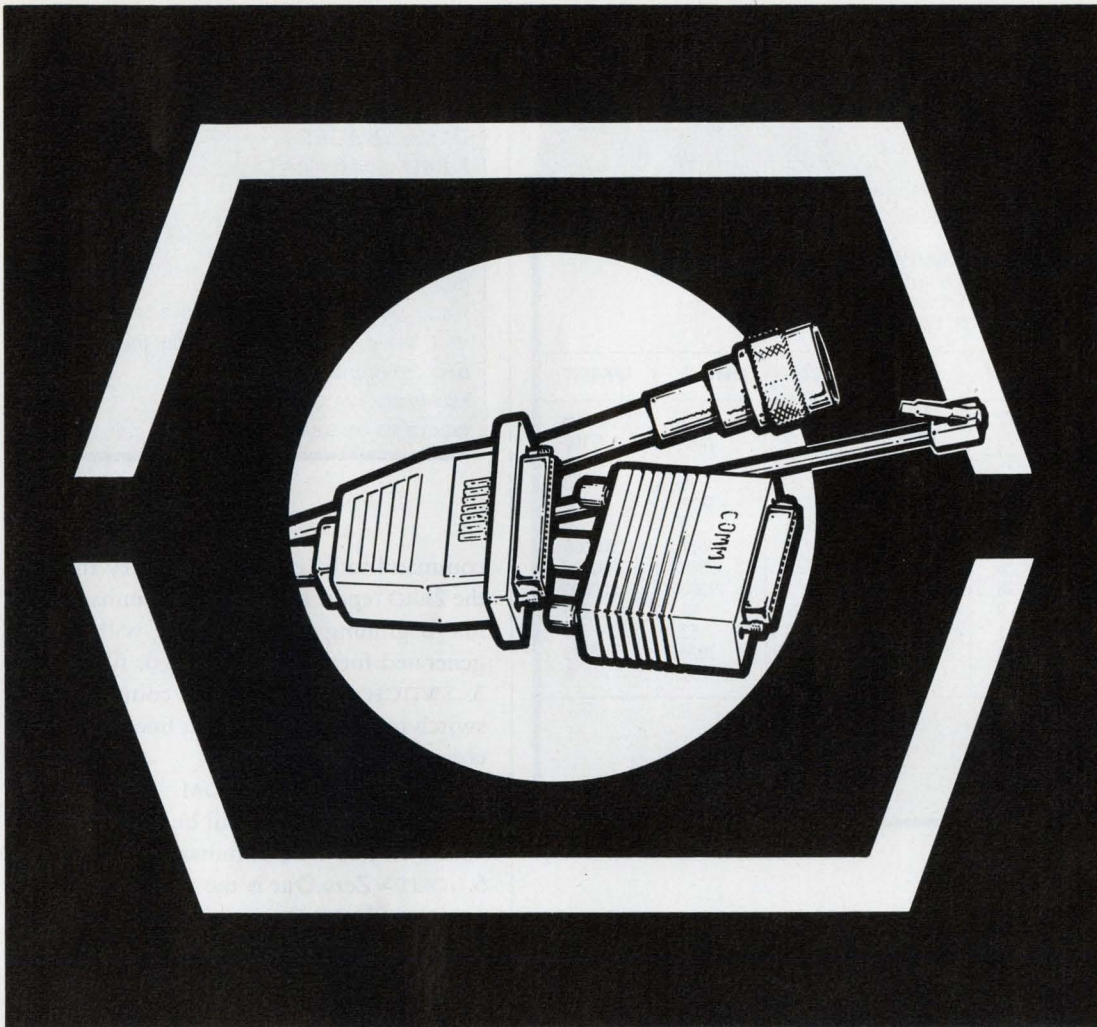
FIGURE 2.

LARGE FILES ON "USER3:" (AT LEAST 1000 BLOCKS)
PAKMANAGER Version 1.1x
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SIZE	EXTENTS	FILE NAME
300000	46	[CIRC.DECOLD] PROSUB.DAT;1
80001	35	[CIRC.HPSUB] PROSUB.DAT;1
32772	1	[CRASHDUMP] GOLLUM.DMP;1
32772	1	[CRASHDUMP] GOLLUM.DMP;2
30003	37	[CIRC.DECSUB] HPSUB.DAT;1
21648	1	[ZIP9] ALL_COMPANYES_ZIP9.DAT;1
19104	6	[ZIP9] F1000.DAT;2
17190	29	[CIRC.HPSUB] MARTIN.DAT;1
16773	4	[CIRC.HPSUB] PROSUB.ALF;1
15888	12	[CIRC.HPSUB] OCS.DAT;1
5637	1	[ADFIX] NOTES.JSR;1
3984	2	[CIRC.DECSUB] HPSUB.ALF;1
3006	2	[CIRC.HPSUB] ELSUB.DAT;1
2382	1	[CIRC.HPSUB] MANAUTO.DAT;1
2067	6	[000000] INDEXF.SYS;1
1950	1	[CIRC.HPSUB.BPA] HP_V23_MAR88_RRN.SLC;2
1950	1	[CIRC.HPSUB.BPA] V23QDT.SLC;1
1947	1	[CIRC.HPSUB.BPA] HP_V24_APR88_RRN.SLC;3
1947	1	[CIRC.HPSUB.BPA] V24QDT.SLC;1
1926	1	[CIRC.HPSUB] HPCLEANUP2.SLC;2
1926	2	[CIRC.HPSUB.BPA] HP_V21_JAN88_RRN.SLC;1
1926	1	[CIRC.HPSUB.BPA] HP_V22_FEB88_RRN.SLC;2
1926	1	[CIRC.HPSUB.BPA] V22QDT.SLC;1
1905	3	[CIRC.DECOLD] BPAF1000B.SLC;1
1890	4	[CIRC.HPSUB.BPA] HP_V16_NOV87_RRN.SLC;1
1890	1	[CIRC.HPSUB.BPA] HP_V17_DEC87_RRN.SLC;1
1488	1	[CIRC.HPSUB] INREX_VEGAS.DAT;1
1440	1	[CIRC.HPSUB.BPA] V21REN.SLC;1

Report Summary
File ownership mask : [**]
Number of files : 28
Total blocks allocated : 607338
Largest size : 300000
Average size : 21690
% of disk used : 56.33

Large Files report.



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FIGURE 3.

FILE AND FREE SPACE SUMMARY ON "USER3:"
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 Mon, April 18, 1988. 2:57 pm

REPORT TYPE	MIN	COUNT	BLOCKS	% DISK	AVERAGE	LARGEST
Files	-	397	615768	57.11	1551	300000
Free Space	-	179	462423	42.89	2583	47106
Directories	-	17	81	0.01	4	24
Aged files	365	0	0	0.00	0	0
Backup Needed	0	22	85299	7.91	3877	80001
Duplicates	3	0	0	0.00	0	0
Expired files	- *	397	615768	57.11	1551	300000
Fragmented	2	28	494751	45.88	17669	300000
Large files	1000	28	607338	56.33	21690	300000
MultiVersions	3	9	618	0.06	68	240
OverAllocated	5	1	53	0.00	53	53
Placed files	0	3	21060	1.95	7020	16773
Zero Length	0	17	18	0.00	1	6
Cluster Factor :		3				
Total Blocks :		1078272				
Bad Blocks :		72				
Owner :		[*]				

PAKMANAGER Summary.

PAKMANAGER

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command to be executed on every file the ZERO report finds. A DCL command line beginning with \$ Delete will be generated for every zero length file.

3. SWITCH="/log" is a DCL command switch to be applied to each line of the command file.

4. /DCL=DeleteZero.COM specifies that DeleteZero.Com will be the name of the created DCL command file.

5. /OUT=Zero.Out is the name of the output file containing the report generated by the /ZERO report qualifier.

Documentation

PAKMANAGER is simple to use and contains a good online help facility. Its documentation is concise and helpful in explaining each report and the information it contains, although the program is so self-explanatory that you won't need the documentation very long.

The technical support personnel at DEMAC informed me that user response to PAKMANAGER has been overwhelming and many suggestions for additional features are being implemented. Therefore, when you obtain a demo or purchase the product, don't be surprised to see some extras not mentioned in this review. DEMAC is open to user feedback and takes it seriously.

PAKMANAGER provides a flexible, easy-to-use and powerful system to help you manage VAX disks effectively. If teamed with a disk compression and defragmenting utility such as DEMAC's SQUEEZPAK, the two tools will provide a solid one-two combination to fight against disk clutter. ■

F

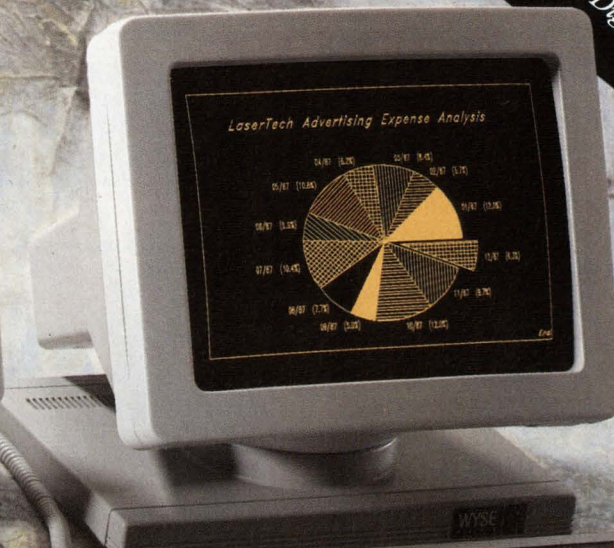
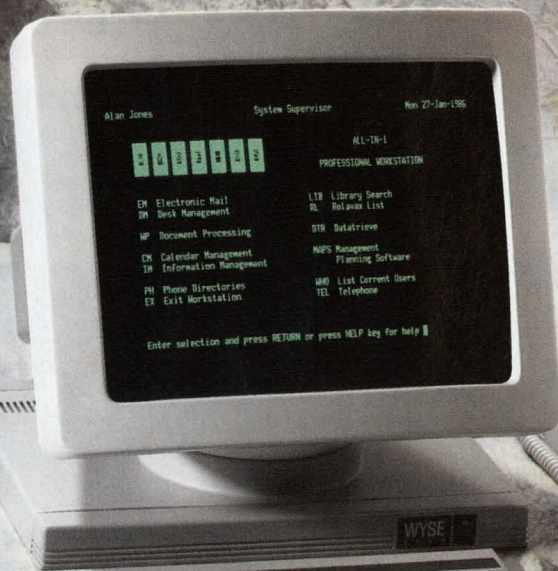
FIGURE 4.

CLUSTER FACTOR ANALYSIS ON "USER3:"
 PAKMANAGER Version 1.1x
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 Mon, April 18, 1988. 2:57 pm

CLUSTER FACTOR	WASTED BLOCKS	HIT RATE	BITMAP SIZE
1	0	100.00	264
2	202	49.12	132
3	425	28.21	88
4	516	24.94	66
5	705	18.39	53
6	884	15.11	44
7	1022	9.57	38
8	1024	11.34	33
9	1178	9.32	30
10	1210	8.82	27
11	1394	7.81	24
12	1400	8.31	22
13	1507	7.05	21
14	1638	6.80	19
15	1625	6.05	18

Cluster Factor Analysis report.

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make corners, tee off and reduce the track size.

The plastic track is installed using the adhesive strip on the back. Cut the track to length, peel the tape off the adhesive strip and stick it into place (the baseboard is the safest place to apply it).

“

**DEC made offices easier
to wire by developing
terminal servers and
MICROVAXs.**

”

Use a hacksaw to cut the plastic. When all the wires are laid in the track, snap it closed.

Typically, you install receptacles close to where a terminal or printer is to be placed, or at evenly spaced intervals, such as every eight feet. There are dozens of modular receptacles available with your choice of 66-clip or screw-down terminations.

Standard three pair (six conductor) telephone wire or Telco cord runs inside the track between your distribution frame and receptacle boxes. Distances (between distribution frame and receptacle) of several hundred feet are possible; however, for the best performance, runs under 250 feet are suggested.

To couple the terminals and printers to their receptacles, use short lengths (six to 10 feet) of Telco wire. Telco wire uses modular plugs that crimp on, in two easy steps, with a small hand tool. Several modular plug types are available. The most popular are the standard RJ11 type (like your telephone uses) and the new Modified Modular Jack (MMJ), which is compatible with the DECCONNECT system. I promote the use of the MMJ, as it prevents someone from plugging its terminal into a telephone jack (detrimental to your office phone system).

When crimping modular plugs onto the Telco wire, make sure the wire

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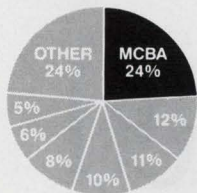
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CIRCLE 237 ON READER CARD

is well seated into the plug, and don't reverse the wires between the two ends. The best way to keep yourself from reversing the wires is to use a system. WHITE IS NOT RIGHT works for me; that is, the white wire always faces to my left as I crimp. If you follow this method, you can use the standard color code as your guide.

To adapt your terminal equipment to the modular wiring system, you use a DB25 (25-pin oval connector) to modular jack adapter. The adapters screw onto the equipment's RS-232 jack and, presto, you've been converted. If you already have equipment with modular jacks, such as the VT320 or VT340, an adapter isn't required. If you have terminal servers with DB25 connectors or if you're connecting directly to a VAX/MICROVAX with DB25 connectors, you'll need to install modular jack adapters here, too.

The adapters are available with standard RJ11 or MMJ connections and

in different wiring configurations. Adapters for the computer side of the equipment are called Data Terminal Equipment (DTE) System and those for the terminals are called DTE Drop. For modems, a Data Communications Equipment (DCE) Drop adapter is used. When purchasing equipment, be aware that terminal servers and DH/DZ/DMF cabinet kits are available with modular jacks. Purchasing these models will save

you the expense and trouble of adapters.

For offices to be wired with Thin-Wire Ethernet, the RG58 coaxial cable can be run inside the plastic track, beside the RS-232 cables. If you're not using Ethernet (Thin- or ThickWire), but you think you might someday, install it up front while you're running other wires.

There are many receptacle face plates available that support various combinations of modular jack, BNC,

“
When purchasing equipment, be aware that terminal servers and DH/DZ/DMF cabinet kits are available with modular jacks. Purchasing these models will save you the expense and trouble of adapters.
”

What you don't need
is a lecture on the
advantages of a
spreadsheet designed
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fiber couplings and other connections. My personal favorite is the Mod Barrel Plate by MOD-TAP Systems of Harvard, Massachusetts. On a single Mod Barrel Plate, I can install phone, RS-232, Thin-Wire Ethernet and video connections for about \$22 (versus DEC's DECONNECT faceplate at \$42).

To connect the RG58 (ThinWire Ethernet) to each receptacle, you must splice a tee connector into the cable. This isn't as complicated as it sounds. For each splice, you cut the RG58 cable and install two BNC connectors. A BNC is a half-twist, quick connect/disconnect connector.

BNC connectors have three parts: the connector body, a sleeve and a tiny signal probe. They're installed in seven steps:

1. Slide the sleeve over the RG58.
2. Strip off 1/2-inch of outer insulation from the end (don't cut through the braided ground).
3. Strip off 1/4-inch of the braided

ground and inner nylon insulation (be careful not to cut or nick the center conductor).

4. Using a BNC crimp tool, crimp the signal probe onto the exposed RG58 center conductor.

5. Spread back the braided ground wire, and slip the BNC body over the signal probe. The center nylon insulation should be 1/4-inch into the neck of the BNC, and the signal probe must be flush with the top.

6. Push the braided ground wire over the neck of the BNC; then slide the sleeve up to the BNC body as far as it will go.

7. Use the BNC crimp tool to crimp the sleeve onto the neck of the BNC.

After you've put a BNC on each end of the RG58, which you have cut, you can put a BNC tee connector between them. The tee then is connected to the receptacle plate. There's nothing to it.

At the wire closet or distribution

frame, you have several options for termination. The most popular is to use a modular jack patch panel. The individual terminal lines are wired directly to the back of the patch panel. Short patch cords, with modular plugs, make the connection to your terminal servers or other data lines. In this way, you're free to change connections, if problems arise or your configuration changes.

If you have only a few connections, and your wiring is being run through a phone closet, you can make use of individual jack boxes. If none of these situations suits you, MOD-TAP has two quick-and-dirty adapters: the octopus and the harmonica. The octopus concentrates eight modular connectors into a single 50-pin connector. The harmonica distributes signals to eight modular jacks from a single 50-pin connector.

Modular office wiring is quick, easy, flexible and less expensive than fixed wiring methods. ■

What you do need is proof.

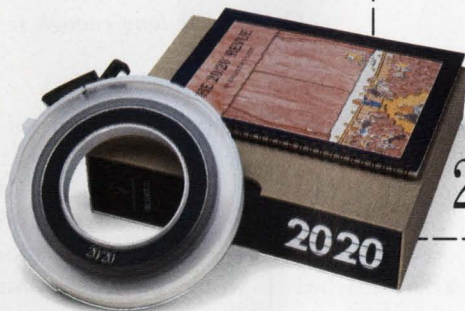
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CIRCLE 196 ON READER CARD



FROM THE LAB

John F. McGlinchey

Digi-Data's Gigastore

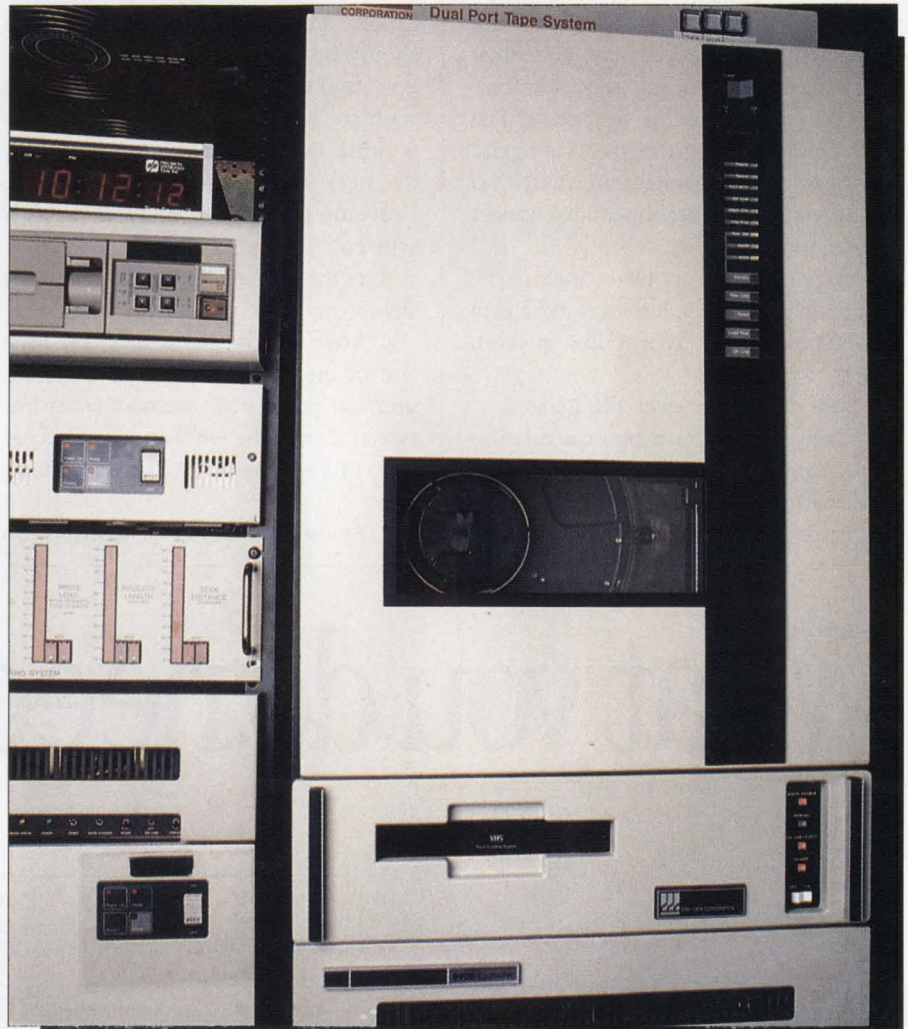
I was dreaming the other night that I could back up all 2+

GB of my disk storage without having a computer operator to attend to reels of nine-track tape. It was wonderful to put a small cartridge into a rack-mounted tape device at the end of the day and know that, while I slept, the system would back itself up without any intervention. I awoke with a sigh and came to work only to have Dave Mallery drop off a Gigastore VHS backup system from Digi-Data Corporation of Jessup, Maryland, in my office for review.

I installed it on a Q-bus MICROVAX II and then on a UNIBUS VAX 11/750 with relatively no problems. It uses a standard DILOG tape controller, so it looks like a TS11, device MSA0:. If you already have an MSA0: device, Gigastore can be modified so it won't conflict. For instance, if you already have an MSA controller, changing the device address will cause VMS to recognize the controller as MSB, etc.

The real configuration problem is that the drive must reside on the same machine with the data. It's not possible to drive the Gigastore to full throughput using data transfers over the LAVC coax. When we installed it on FRODO: (our MICROVAX II), we had no difficulty backing up the 300 or so megabytes on its system disk, because that was local. BILBO:, our 750 cum disk farm, has about 2.2 GB on board and thus is an ideal test bed for capacity testing.

It's a true tape streamer. It starts moving tape on the first write operation and doesn't stop between files. It will run the tape for the length of the tape,



Gigastore fits in with our other devices. We installed it into a 19-inch H960 rack. Cables were long enough to reach anywhere.

which is six hours on a VHS T-120 cassette. It's up to you to enable your system to put the 2.5 GB of disk storage on that tape within the allotted time.

If you're in a situation where the CPU to which your disks are attached has an intensive schedule during your backup period, you might not be able to put all the data on the tape in six

hours. This is true of any of the new drives that use a video tape as their base.

Here's the rub. The machine will need six hours from the first write. If you start the operation at 3 a.m., you won't be done until 9 a.m. Our

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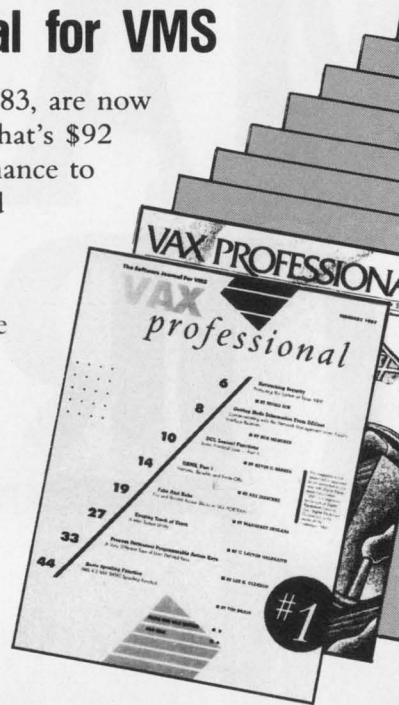
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machines, like most real-life operations, run heavy batch schedules at night. These are not optional. I doubt that there are six contiguous hours in 24 available for dedicated backup service.

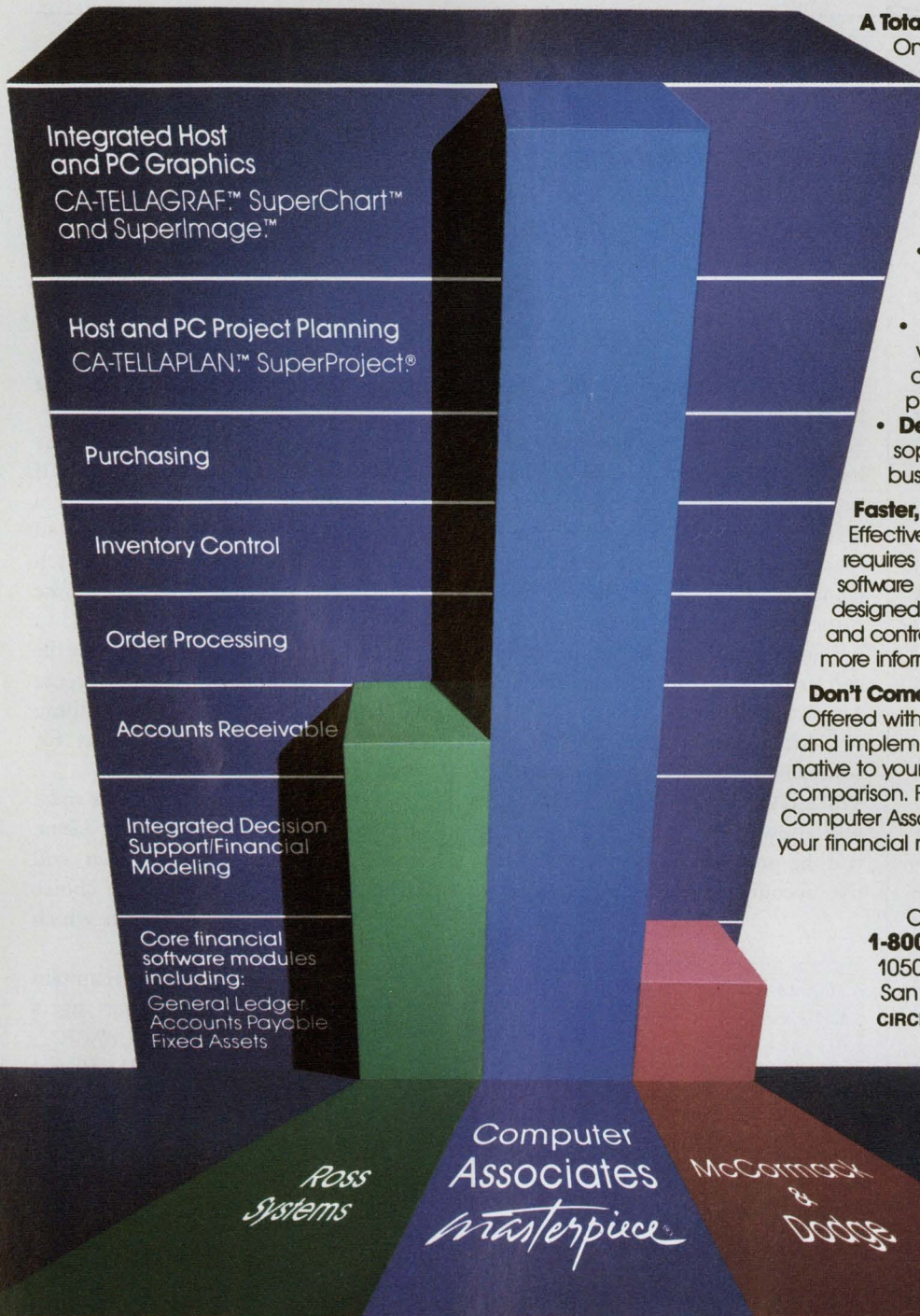
So, the ideal of a full image backup every night, devoid of operator attendance, is an illusion on our system. Daily image backups of subsets of the entire data farm are possible. The problem is that the concurrent batch load is a heavy determinant of the amount of data that actually will end up on the VHS tape during the available six hours.

Because we have no way of guaranteeing that the load will be low enough to attain the necessary data rate to the drive, we are limited to perhaps 1 GB or less of guaranteed capacity. If you can either guarantee full processor power for six hours, or have considerably less than the 2.5 GB as a backup requirement, then you seriously should consider VHS as a backup medium. The labor savings alone will buy the unit for you in six months.

A replacement TSDRIVER is included with Gigastore, which enables you to perform fast searching of files during restore operations. Without this Fast Search capability, restoring a file at the end of the tape would take six hours; i.e., the amount of time it takes to get to the end of a VHS tape in Play mode. With the driver, it takes less than 10 minutes. We did this by getting the very last file on a fully loaded tape. The driver takes advantage of the tape drive's ability to Fast Forward.

All in all, this could eliminate the need for anyone to do daily backups. Insert a VHS tape before going home at night, and let a batch job do a full backup while you're dreaming. ■

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FROM THE LAB

Howell D. Rasor

Magic Menu

Have you ever come across a utility program that you couldn't live without? *SideKick*, from Borland International, Scotts Valley, Arizona, for example, is a classic. *SideKick* found its way into my PC about three years ago, and I've used it religiously ever since.

Magic Menu by EMETEK of Los Angeles, California, is also one of these useful little utilities. Only this time it's for VAX/VMS users. *Magic Menu* is an interrupt key menu system that works like, well, magic. It turns even the most average VAX/VMS user into a SPAWN-O-MATIC professional.

I like productivity from a VAX system. Lately, with the mounds of work I've had to do, a single terminal session simply wasn't making the grade. Once I installed *Magic Menu*, however, I was instantly converted into a multi-processor; I can perform several tasks at once.

Being an avid interactive computer user, I was skeptical about a menu system, especially one that claims to be magic. I've seen menu systems before and they weren't very impressive. You always had to finish with one menu choice before running another. *Magic Menu* breaks the mold.

Magic Menu employs what EMETEK calls the "magic key" (CTRL-]). The magic key lets you return to the menu without having to finish what you're working on. As long as the program you're leaving doesn't request user input, it will continue processing while you go on to other work. If the program you left does require input, it will wait for you to return.

“
The system manager can maintain *Magic Menu* or grant other users maintenance access using the *MAGIC_MENU* identifier in the *SYSUAF*.
”

Magic Menu comes with a three-page installation guide, which is simple and informative. The first page and a half describes installation for most sites and the rest has special instructions for systems running DIBOL programs. It seems that DIBOL translates terminal names into numbers via a table of device names. So, in order to deal with this unique situation, EMETEK provides a command procedure to build a table for *Magic Menu* users.

After installing the product, two command procedures must be modified: SYSTARTUP and SYLOGIN. The changes will allow those using *Magic Menu* to run the program by typing MM. Capitive accounts can use *Magic Menu* by

putting the MM command in their log in procedures.

All menus are stored in SYS\$COMMON:[SYSLIB]MMINFO.DAT. If this is unacceptable for your site, a system-wide logical name called MMINFO may be defined which translates into the full path name for the new location.

When the program is started for the first time, it prompts the user for license validation. This is done by calling EMETEK to get a special number for your installation.

Certain parameters may have to be changed for users running *Magic Menu*. If this is the case, *Magic Menu* will prompt the user when a menu choice fails to start and also tells him which parameter caused the failure.

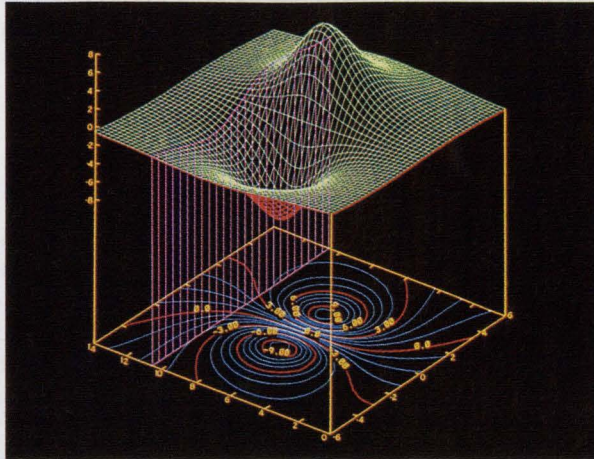
The system manager can maintain *Magic Menu* or grant other users maintenance access using the *MAGIC_MENU* identifier in the *SYSUAF*. Users with the *MAGIC_MENU* identifier have complete control over all menus.

Defining a menu within *Magic Menu* is, of course, menu driven. Simply choose the Maintain function from the Main Menu and the Menu Maintenance Menu appears. This allows you to edit your menu, or, if you're the

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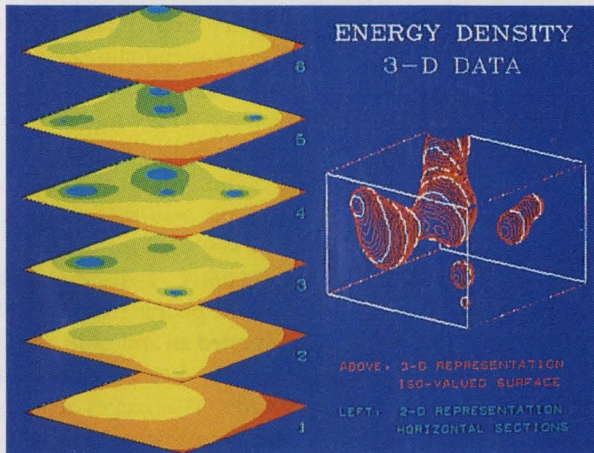
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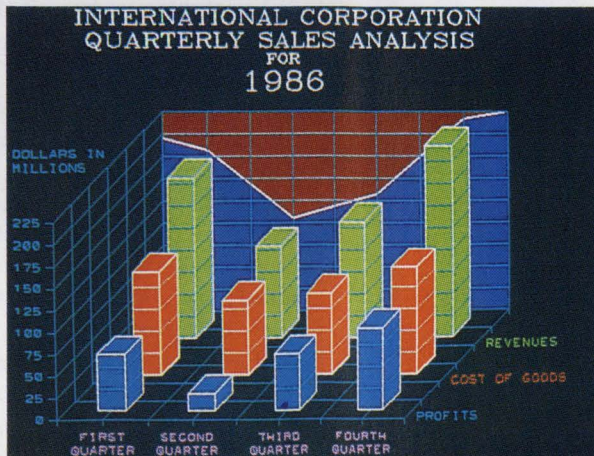
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menu manager, define special menus, add users or modify existing menus. It's also possible to set up group menus for users who perform the same functions.

To change an existing menu or create a new one, you enter the number from the menu where you want the new choice to appear. Next, you enter the menu title, then enter the command that will be executed by that menu choice. When entering the command, you have some options to consider:

1. P — To pause after the program exits and before it returns to the menu.
2. Y — To enable CTRL-Y during program execution.
3. T — To enable CTRL-T during program execution.
4. I — To enable an interactive DCL session after executing the DCL command specified.
5. * — To prompt you for information.

For example, if you decide to have menu option 1 give you a directory

listing of the default directory, you would enter DIRECTORY for the description of option 1 and DIR *(/P) to pause after the directory. To return to the menu you would press RETURN.

All of the switches (P,Y,T and I) must be enclosed within parentheses and the parentheses must be preceded by an asterisk. Switches may be mixed to suit your needs.

The most recent release of *Magic Menu* incorporates a print function on all user menus. This function lets the

“

The only problem I had with the program was the magic key; it's the same key used for exiting a connection in KERMIT.

”

user print a full screen of information from any of the active menu choices. When choosing this function it prints the screen of the menu choice last active to the printer of your choice. This is a useful function for many types of applications.

Magic Menu does nothing more than create a subprocess (SPAWN) for every menu choice you have active. Because of this, *Magic Menu* can be a memory hog. I ran eight of the nine possible menu choices, effectively nine processes, and used a total of 2.4 MB of memory. This could be a sore point for systems with limited resources.

The only problem I had with the program was the magic key; it's the same key used for exiting a connection in KERMIT. I discussed the problem with the people from EMETEK and they suggested an amicable solution: Change the exit key within KERMIT (SET ESCAPE 33 changes it to open square bracket instead of close square bracket).

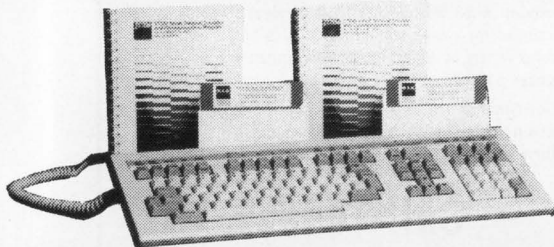
There are two terminal situations under which *Magic Menu* failed to operate: remote terminal (SET HOST) and VAXSTATION VT100/220 emulation windows. The terminal types WT and RT aren't recognized.

If you run into problems, telephone support is available from EMETEK. They also are open to suggestions for product improvement. For the money, it's well worth the capability it provides.

Editor's note: EMETEK has recently added *Magic Menu* to VMS V5.0. It works with VT100/200/240/320/340 and compatibles, in ANSI alphanumeric or line drawing mode. —Howell D. Rasor is a senior personal computer consultant at Bynon & Associates, Silver Spring, Maryland.

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CIRCLE 132 ON READER CARD

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```
SUMMARY—Delta t      From 7.45      From 7.52
2  0.2827  SCP CONN  D=17 (FAL/DAP,U4) S=OAL
8  0.0049  MSP DATA Link  D=1413 S=BC39 ACK=9 SD=1
9  0.0024  MSP DATA Link  D=BC39 S=1413
10 0.0047  MSP ACK  Oth-Data D=1413 S=BC39 ACK=1
11 0.0064  DAP OS=VAX/VMS FILSYS=RMS-32
12 0.0598  MSP ACK  Data    D=BC39 S=1413
13 0.0308  DAP OS=VAX/VMS FILSYS=RMS-32
14 0.0041  MSP ACK  Data    D=1413 S=BC39 ACK=1
15 0.0061  DAP Directory List SYSSMANAGER* EXE*
17 0.0019  MSP ACK  Data    D=BC39 S=1413
18 0.0024  DAP Vol=SYSSYSROOT: Dir=ISYMGRL
19 0.0166  MSP ACK  Data    D=1413 S=BC39 ACK=2
20 0.0096  SCP DISC  Reason=0
21 0.0025  MSP CTRL Disconn Confirm D=BC39
32 0.1328  7.47      +7.52  DRP ENDMODE Hello S=7.52 BLKSZ=
33 0.3271  7.47      +7.55  DRP ENDMODE Hello S=7.55 BLKSZ=
34 0.1660  7.47      +7.53  DRP ENDMODE Hello S=7.53 BLKSZ=
35 0.0780  7.47      +7.54  DRP ENDMODE Hello S=7.54 BLKSZ=
37 0.5942  7.47      +7.50  DRP ENDMODE Hello S=7.50 BLKSZ=

1  2 Set  5  6Display 7 Prev 8 Next  10 New
Help mark  Menus options frame frame capture
```

```
SUMMARY—Delta t      DST      SRC
2  0.0174  09002B0000F+A0004001D0C LAT Change Mode=ERD131, Desc=ERD
6  0.2277  09002B0000F+A0004000A20 LAT Service Mode=ATHEM, Desc=non
16 1.0818  09002B0000F+A000400022C LAT Change Mode=NCUAXZ, Desc=none
17 0.1628  09002B0000F+09002B04F30 LAT Change Mode=TSRU20, Desc=NMF
20 0.2443  09002B0000F+A0004003B00 LAT Service Mode=RSXTST, Desc=Tes
21 0.0488  09002B0000F+A0004003300 LAT Service Mode=MAXT, Desc=none
26 0.4496  09002B0000F+A0004001A0C LAT Change Mode=CADDE, Desc=ESD v
33 0.4342  09002B0000F+A0004000F00 LAT Service Mode=MAXK, Desc=none
59 0.7602  09002B0000F+A0004000114 LAT Service Mode=CIRCUS, Desc=***

DETAIL
LAT: 0000 001. = Undefined
LAT: ... ..0 = Host is accepting new sessions
LAT: Node groups:
LAT:
LAT: Node group length = 2 bytes
LAT: Group byte 0, Groups , , , 3 enabled
LAT: Group byte 1, Groups , , , 12 enabled
LAT: Node name = "TSRU20"
LAT: Node description = "NMFECX CMPTRS"
Frame 17 of 511
Use TAB to select windows
1  2 Set  4 Zoom 5  6Display 7 Prev 8 Next  10 New
Help mark  in  Menus options frame frame capture
```

Unveil what protocols hide!

The Sniffer's DECnet protocol interpreter handles key protocols, including SCP, NSP, and DRP, as shown in this SUMMARY analysis of Ethernet frames. You can CAPTURE information based on lower level protocol content, node addresses, pattern matching, and/or frame error conditions, then INSTANTLY DISPLAY information in the format you prefer for analysis and understanding.

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And in moments, you'll see your LAN's protocol and traffic information laid out in the display format you choose for analysis and action.

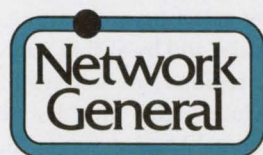
The Sniffer takes you inside the critical networking protocols.

All the key DECnet protocols: LAT, MOP, DRP, SCP, NSP, DAP, and NICE. And there are software modules for TCP/IP, Sun protocols (including NFS), ISO/MS-Net, XNS/MS-Net, and Novell NetWare®, with more on the way.

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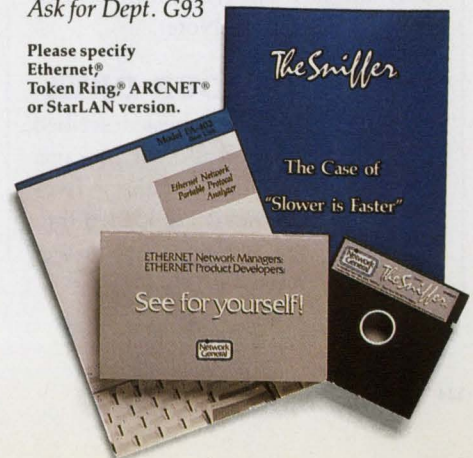
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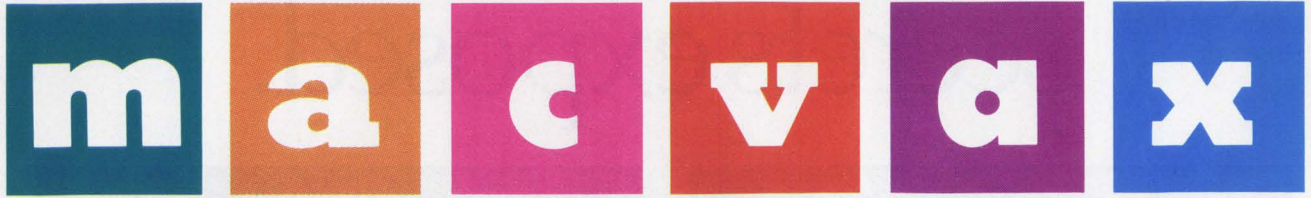
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Helix Revisited

A look at two new data
reduction tools from Odesta.

BY AL CINI

WORKING TOGETHER, a Macintosh and a VAX are a great team; VAX capacity and power controlled through Macintosh graphics. Driven by the right software, VAX information viewed through the uniquely seductive Macintosh user interface makes for a powerful and flexible decision support system.

In "The Networked Mac/VAX" (December 1987), we saw how Odesta Corporation of Northbrook, Illinois, combined the graphics front end of its *Double Helix* relational database product (see Screen 1) for the Macintosh with a VAX-based back end database record server, introducing this combo as *Helix VMX* and hinting of advanced data analysis and reduction tools to come (see Editor's Note).

MAPPING YOUR DATA

ODESTA'S *GEOQUERY* IS best described as a map-based spreadsheet package. Once data records containing five-digit ZIP Code fields are loaded into *GeoQuery*, the package can answer

complex geographic questions about them.

GeoQuery accepts data records in standard Macintosh row-column format: input data records consisting of their component fields, separated by tab characters, each record ending with a carriage return character. Data in this format naturally is produced by most VAX terminal emulators' COPY TABLE option, as well as by the data dump/export facilities provided by *Helix* and other Macintosh database applications. Thus, information can be extracted easily from any Macintosh or VAX data source for use with *GeoQuery*.

Initially, *GeoQuery* displays a complete map of the United States, partitioned into regions by state boundaries. The *GeoQuery* view of the U.S. can be reduced to a particular area of interest by selecting and cutting unwanted states, and by slicing states into smaller regions (see Screen 2). *GeoQuery* includes atlas files describing the continental United States, Alaska

and Hawaii. Optional atlases available from Odesta include regional and county U.S. maps, partitioned into smaller areas by several popular criteria; e.g., Areas of Dominant Influence.

GeoQuery refers to input data records, located by their component ZIP Codes, as pushpins. *GeoQuery*'s Load pushpin function asks for the name of the input file containing the data records, reads the first record in the file and displays its fields through three vertical scrolling areas. A *GeoQuery* user specifies the record location of the ZIP Code by scrolling through and selecting these input fields. Record identification and classification fields, which assist in subsequent analysis, also can be selected. The *GeoQuery* package includes pushpin records for U.S. cities.

With pushpins loaded and geography narrowed, the *GeoQuery* user can add landmarks interactively; e.g., towns, buildings, etc., by specifying their names and ZIP Codes. The distances between landmarks and pushpins can be measured by *GeoQuery*'s ruler mapping tool, and the records found within a given distance from a landmark or within a defined region can be found. Simple summary reports of located records can be obtained within *GeoQuery*; for more complex analyses, records can be copied through the Mac's Clipboard into other applications (see Screen 3). *GeoQuery* maps also can be copied into drawing packages, such as *MacDraw*, for manual enhancement.

While the product works well in the sometimes restrictive environment of a Macintosh Plus or SE, *GeoQuery*



File Edit View Special

Confused?

New Folder
Open ⌘O
Print
Close

Get Info ⌘I

Duplicate
Put Away

Page Setup...
Print Catalog...

Eject ⌘E

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- Learn how to use and evaluate Macintosh terminal emulators.
- Learn how to develop VAX-based Macintosh database applications.

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DECnet, AppleTalk
- Network Hardware •
Ethernet
LocalTalk
Bridges
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- Network Management •
- Terminal Emulators •
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MAC/VAX

SCREEN 1.

Name	Zip	Gross\$	Expense\$	Sq Ft
PizzaPalace	19145	\$110000	\$101000	2500
Luigi's	19106	\$132000	\$106000	2800
Ernesto's	19136	\$225000	\$198000	4000
PizzaVie	19151	\$85000	\$81000	1800
House of Pizza	19142	\$320000	\$286000	5500
Sal & Joe's	19155	\$65000	\$66500	1200
PizzaTime	19121	\$305000	\$281000	5100
Tom Pie's	19116	\$151000	\$115000	2900
Judy's Pizzas	19160	\$175000	\$150000	3200
Touch of Naples	19127	\$206000	\$180000	3500
PizzaRama	19111	\$81500	\$78000	1800

Pizza restaurant example *Double Helix II* database definition.

really can use a Macintosh II's greater speed, larger monitor and color display capabilities, especially for big analysis jobs. On both large and small screens, though, demographic information comes alive through *GeoQuery*. Geographic trends in data such as sales information and subscription lists, which might be impossible to discern with traditional reporting tools, become apparent immediately through *GeoQuery*.

THE STATISTICS CONNECTION

AS *GEOQUERY* IS to geographic data, *Data Desk* is to observational data. *Data Desk* is a fairly complete statistical analysis and graphics package whose features are especially powerful in exploratory statistical analysis.

Like *GeoQuery*, *Data Desk* can accept data records in row-column format. Unlike *GeoQuery*, however, *Data Desk* also can import its data (*Data Desk* refers to them as variables that correspond to a record's fields) directly from a *Double Helix* database (see Screen 4).

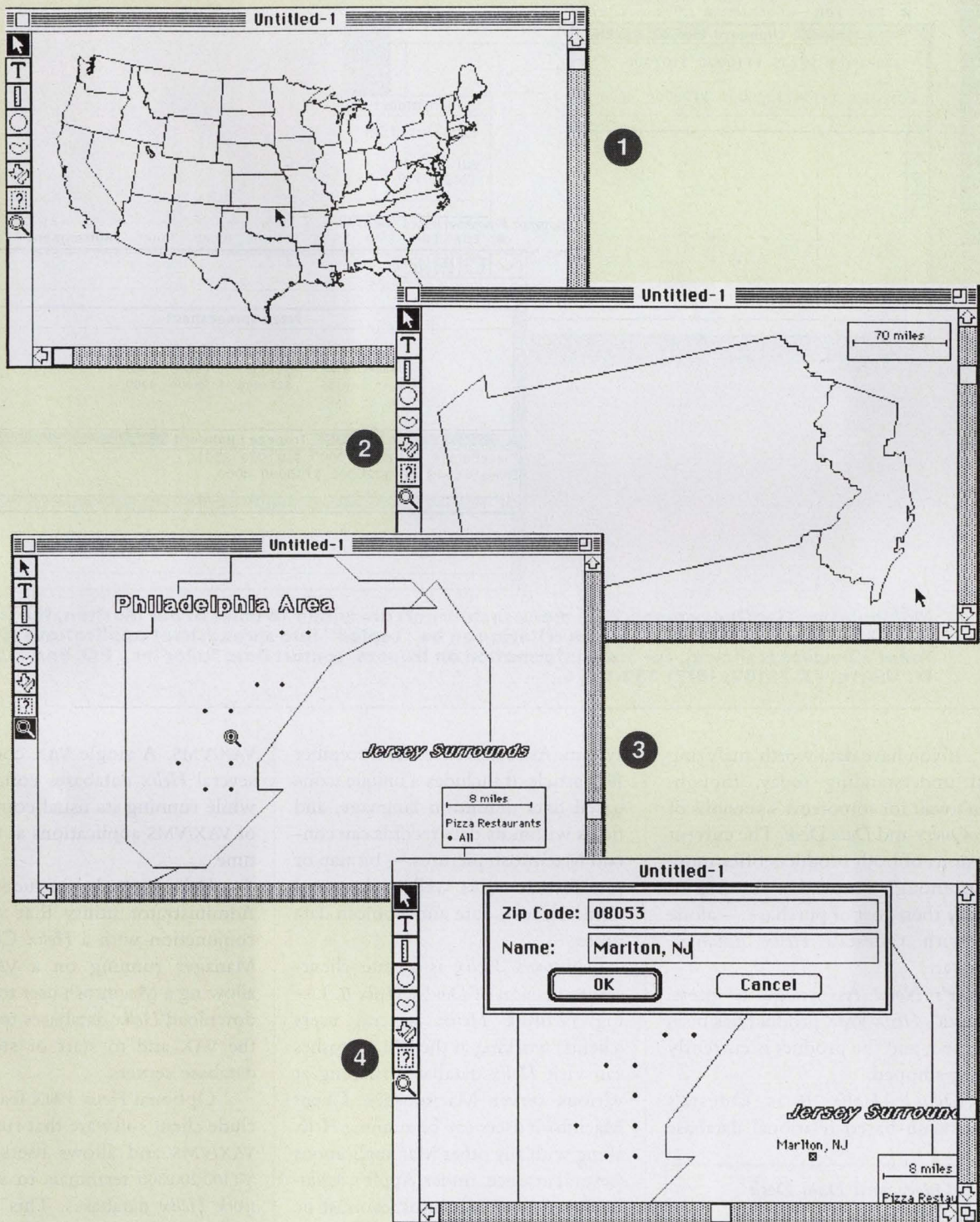
Built-in *Data Desk* graphics capabilities include the usual two-

variable scatterplots, as well as a very sophisticated multivariate 3-D plot. *Data Desk*'s 3-D plots can be viewed from different angles by rotating them on the screen using one of several *Data Desk* plot tools. With a mousstroke, a *Data Desk* user can get these plots spinning and lean back and watch their data points revolve in orbit around the center of the graph. Think you see something in the data? Ask *Data Desk* for a correlation, regression or analysis of variance report and view the numbers through separate windows alongside your spinning graph (see Screen 5).

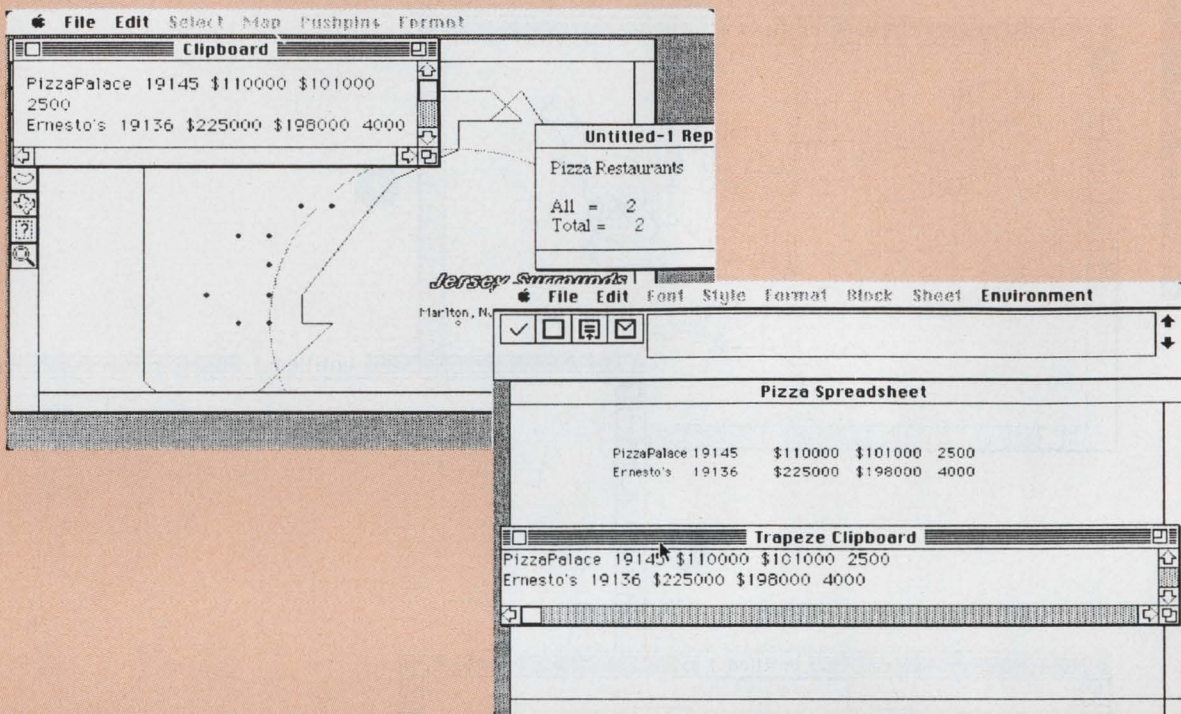
WHAT'S MISSING?

GEOQUERY COULD USE some sort of map exaggeration feature to raise states or regions in proportional relief to the percentage of data records contained within them. Also, *Data Desk* should be able to import variables from a networked *Helix* database, such as *Helix VMX*, and *Helix* variables should be accessible from *GeoQuery* directly, without an intermediate dump-load operation. Odesta claims it's working on a closer integration with all versions of *Helix* for both products.

SCREEN 2.



GeoDesk map query features. 1. Initially, a U.S. map is displayed. 2. States can be selected and "cut" from the map, leaving PA and NJ area of interest. 3. PA and NJ can be "sliced" into parts; example data points appear as "pushpins" on the new map. 4. "Landmark" reference points can be added interactively, located on the map by ZIP Code.



Manipulating GeoQuery maps. How many restaurants are within 16 miles of our Marlton, NJ, landmark? Data records selected by such criteria can be "copied" into spreadsheet applications (Data Tailor's Trapeze is shown). For more information on Trapeze, contact Data Tailor Inc., P.O. Box 11530, Ft. Worth, TX 76109; (817) 332-6836.

If you have data worth analyzing and understanding today, though, don't wait for tomorrow's versions of *GeoQuery* and *Data Desk*. The current versions of both products offer more than enough innovative features to justify their cost of purchase — alone or with Odesta's *Helix* database software.

Editor's Note: As we go to press, Odesta's *Helix VMX* product has been released, and the product is currently being shipped.

Double Helix II is Odesta's Macintosh-based relational database

GeoQuery and Data Desk

Odesta Corporation
4084 Commercial Ave.
Northbrook, IL 60062
(312) 498-5615

CIRCLE 547 ON READER CARD

system. As reviewed in the December 1987 article, it includes a unique icon-based data definition language, and fields within its data records can contain Macintosh pictures — bitmap or pict format — as well as the usual numeric, text, date and Boolean data types.

Network Helix is a true client-server version of *Double Helix II*. Using *Network Helix*, several users (clients) working at their Macintoshes can visit *Helix* databases running at various server Macintoshes. Client Macintosh users can be running *Helix* along with any other Mac applications (several at once, under Apple's *Multi-Finder*). Server Macintoshes must be dedicated to running *Network Helix* server software.

In operation, *Helix VMX* replaces the dedicated Macintosh database server with processing running under

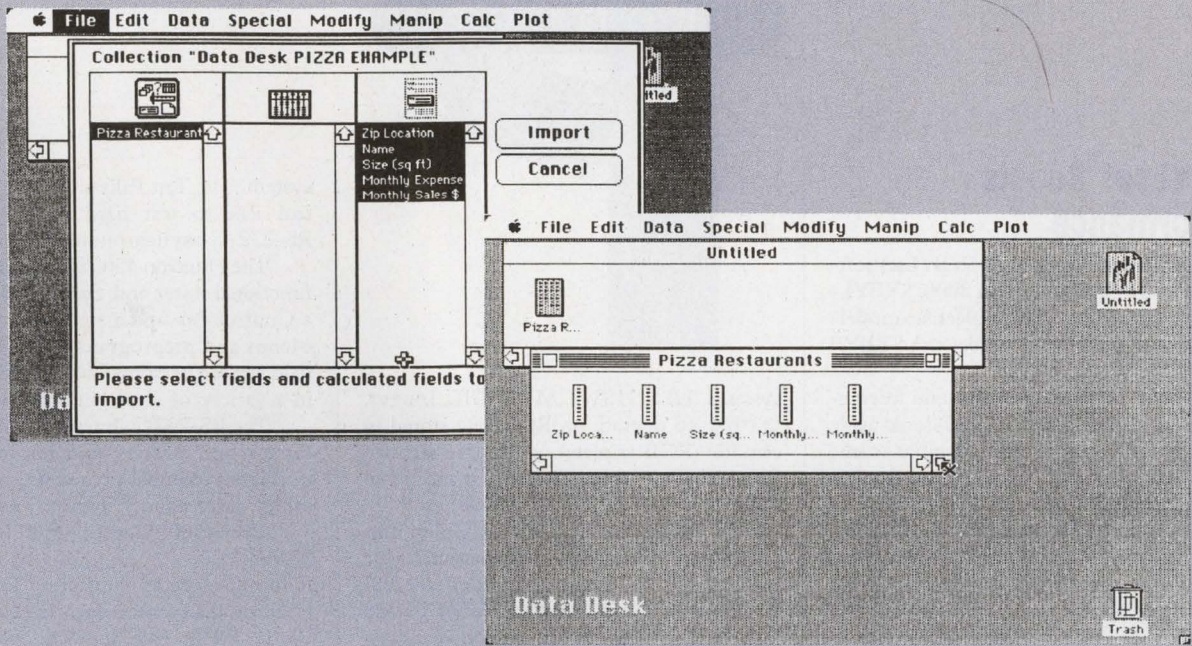
VAX/VMS. A single VAX could offer several *Helix* databases concurrently while running its usual complement of VAX/VMS applications at the same time.

Helix VMX also includes a *Helix Administrator* utility that works in conjunction with a *Helix Collection Manager* running on a VAX host, allowing a Macintosh user to up- and download *Helix* databases to or from the VAX and to start or stop *Helix* database servers.

Optional *Helix VMX* features include client software that runs under VAX/VMS and allows users at DEC VT100/200/300 terminals to visit *Network Helix* databases. This interface does a heroic job of simulating Mac's windows and pull-down menus on the character-cell-oriented VT screen — ignoring Macintosh-only pictures and fonts, of course.

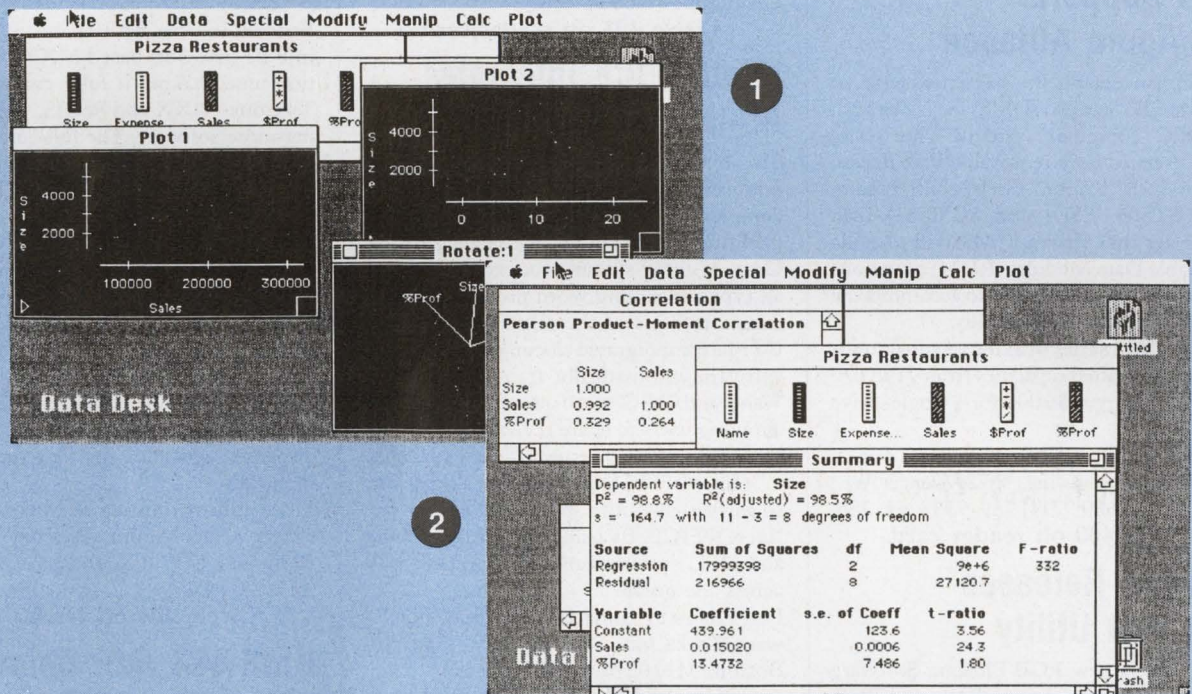


SCREEN 4.



Data from *Helix* collections can be "imported" directly into the *Data Desk* for statistical analysis.

SCREEN 5.



Once imported, database variables: 1. Can be studied through numerous *Data Desk* plotting features, including "3-D" plots for multivariate analysis. 2. Can be reduced using statistical procedures, including regression and variance analysis.

SYBYLset Boosts Performance

Tripes Associates announced SYBYLset software on the new VAXstation 8000. SYBYLset, an integrated suite of molecular modeling software modules, includes the SYBYL and MENDYL packages.

SYBYLset provides full-menu interaction (pop-up, pull-down, and look-aside menus are all options) and flexible iconic mouse-driven modeling tools. These features offer an intuitive, easy-to-use system for researchers in molecular modeling. User interfaces also can be customized for individual needs, allowing the researcher to assemble a personalized toolkit.

Find out more by contacting Mary Woodward, Tripes Associates Inc., 6548 Clayton Rd., St. Louis, MO 63117; (314) 647-1099; (800) 323-2960.

Circle 409 on reader card

DMS Supports DEC/Apple Alliance

CMS Enhancements Inc. has a new series of Data Module Stations (DMS) for Macintosh and DEC computer systems. This series allows users to have removable disk drives. The 5¼-inch "Station" can be configured to accept ST506, ESDI and SCSI 5¼-inch Winchester disk drives. CMS will provide Removable Data Modules (RDM) of various capacities and disk interfaces to accommodate a variety of data requirements.

The DMS series of external subsystems ranges in formatted capacities from 71 to 670 MB. Prices start at \$6,000 for a single-drive subsystem.

For further information, contact Ted James, CMS Enhancements Inc., 1372 Valencia Ave., Tustin, CA 92680; (714) 259-9555 ext. 258.

Circle 400 on reader card

Versatec Releases RGB Plot Utility

Versatec has a new RGB Plotting Software Utility that lets the direct plotting of RGB (red, green and blue) data on Versatec plotters. It supports all Versatec electrostatic and thermal transfer color plotters.

The RGB Plotting Software Utility supports user customization in the following ways: to be used with these additional color

systems (HLS, HSV, CMYK: CIE, L*u*v*, L*a*b*); to operate on RGB data stored in one file (RGB triplets) or in three separate files (red, green, blue); to support additional plotters for producing gray scale; etc.

The RGB Plotting Software Utility runs on VAX and MicroVAX computers under the VMS operating system. It's written in ANSI FORTRAN 77 and distributed in VAX/VMS format. The utility is a standalone package.

The RGB Plotting Software Utility costs \$500.

Obtain more information by contacting Versatec, a Xerox company, 2710 Walsh Ave., Santa Clara, CA 95051; (800) 538-6477; in CA (800) 341-6060.

Circle 401 on reader card

InterOFFICE Integrates All-IN-1 And OFFICE

The Boston Software Works Inc. has announced InterOFFICE, which provides complete and seamless integration of the OFFICE and ALL-IN-1 messaging systems. Users of either system can send messages of all types, including word processing documents, to users of the other system. InterOFFICE's integrated document conversion software automatically translates between Wang and DEC word processing formats, allowing users to share revisable word processing documents between the two systems.

InterOFFICE operates over a serial line, so any system with a spare serial line can run InterOFFICE. By using modems, the Wang and DEC systems can be connected easily across the ocean.

Learn more by contacting The Boston Software Works Inc., 120 Fulton St., 2nd Fl., Boston, MA 02109; (617) 367-6846.

Circle 402 on reader card

Test Paks Added To The Huntron 4500

Huntron Instruments has added two Test Paks to its Huntron 4500 universal diagnostic

system. The Test Paks allow the 4500 Control Pak to test hard disk systems and RS-232-C asynchronous equipment.

The Huntron 4500 is a simulation-based functional tester and exerciser consisting of a Control Pak and a selection of Test Paks. Menus and preprogrammed tests allow for field service personnel to isolate board faults in a variety of electronic hardware.

The RS-232IT (Interface Tester) Test Pak can test and exercise modems, multiplexers, intelligent terminals, communications ports, cables, laser printer, plotters, etc.

The 4500 Control Pak is priced at \$2,995.

Find out more by contacting Jim Crosson, Huntron Instruments Inc., 15720 Mill Creek Blvd., Mill Creek, WA 98012; (206) 743-3171; (800) 426-9265.

Circle 403 on reader card

Tek, ReGIS Built Into 16 MHz 386 Workstation

Pericom Inc. has built on-board emulations into its new 386-based MX7000 Workstation unit, making it fully compatible with Tektronix 41XX and ReGIS, without needing more software. The full complement of emulations include VT220, Retrographics VT640 and Westward 3220.

The workstation gives you access to host-based applications with no degradation of performance over a conventional graphics terminal. It also gives extra speed and power to users running standalone applications, including those using its enhanced EGA mode. In this mode, the MX Workstation simulates an EGA resolution close to the display's normal viewable resolution of 1K x 780 and dispenses with the need for a separate EGA monitor.

More information can be obtained by contacting Diane Smith, Pericom Inc., 2219, 205th St., Ste. 103, Torrance, CA 90501; (213) 618-9190.

Circle 404 on reader card

NMX-464 AVP Enhances VAXstation 8000

Numerix Corporation has announced the availability of the NMX-464 Attached Vector Processor (AVP) for the VAXstation 8000. The dual precision hardware capabilities of the NMX-464 allow the compiler

to select the correct precision for each segment of code based on the required precision of the user-declared valuables. The NMX-464 is fully supported with a FORTRAN integrated vector processing (IVP) software system, a traditional attached processor FORTRAN development system, more than 400 Math Library functions and diagnostic software support. Both FORTRAN environments include an optimizing compiler that supports many of the VAX FORTRAN extensions and a screen-oriented debugger.

The NMX-464 supports DEC's entire family of workstation systems, including the Q-bus and UNIBUS interfaces. Find out more by contacting Jeanne McColl, Numerix Corp., 20 Ossipee Rd., Newton, MA 02164; (617) 964-2500.

Circle 405 on reader card

New VAX/VMS System Management Tools

EVA-TUNER and EVA-BACKUP are the latest products of EVA Systems Software BV. EVA-TUNER gives VAX system managers exact data about the performance status of their VAXs and tells them how to tune their systems for optimal performance. It starts by loading and analyzing the nominated VMS monitor file automatically before entering in an interactive dialog with the user. Once the user has answered some questions, EVA-TUNER writes a VAX/VMS performance assessment report and advises the user how to tune his VAX for maximum performance.

EVA-BACKUP is fully automatic. The system manager can set a time during off-peak hours for the backup. At the preset time and day, EVA-BACKUP will wake up automatically and perform all aspects of its job. Get more information, by contacting Christian Rothemeyer, EVA Systems Software BV, Amsterdamsstraatweg 23, NL-1411 AW Naarden, The Netherlands; +31-2159-43304; FAX: +31-2159-45714.

Circle 406 on reader card

ASCII Terminal Aimed At DEC Market

Memorex Telex announced a new ASCII display terminal. The Memorex Telex 0220 ANSI Display Station is a plug-compatible alternative to the VT220, VT100 and VT52 display terminals and can be used in the DEC and IBM environments.

The 0220 displays the full DEC supplemental and special graphics character sets and any VT220-compatible, downline-loadable character sets. It also supports 15 different international character sets.

The Memorex 0220 can connect directly to a DEC CPU or any other system that sup-

ports the ANSI X3.64 communications standard.

The Memorex 0220 ANSI Display Station costs \$545.

Find out more by contacting Tom Lustnader, Memorex Corp., 611 South Milpitas, CA 95035-5473; (408) 957-1000.

Circle 415 on reader card

Diskeeper Introduced For VAX 8840

Executive Software Inc. has a Diskeeper for the VAX 8840. It's modified to operate on VMS 5.0 to accommodate the new 8840. Diskeeper for the 8840 prevents the 8840's disks from becoming fragmented and impacting the processing capabilities of DEC's most powerful VAX. Diskeeper will manage these disks, eliminating the fragmentation of files to allow data to be read at maximum speed while also grouping free space at the front of the disk for efficient and contiguous creation of new files.

Diskeeper prices start at \$249 for VAX-stations including the 8000, to \$4,500 for the VAX 8840.

To obtain more information, contact Leland Thoburn, Executive Software Inc., 3131 Foothill Blvd., Ste. F, La Crescenta, CA 91214-2699; (818) 249-4707.

Circle 407 on reader card

BIOSYM Ports Software To VAXstation 8000

BIOSYM Technologies Inc. is porting two of its products to operate on the VAXstation 8000 workstation. The two software packages are Insight

and Discover. Both products now are used in protein engineering, drug design and chemical research applications in the U.S., Europe and Japan. Insight is a powerful 3-D real-time, computer graphics program. Discover is a rigorous program for molecular dynamics and simulation for small and macromolecular systems. Used to analyze the interactions of proteins, nucleic acids and organic molecules and polymers, Discover also is used in protein engineering and drug design.

Learn more by contacting Christine Shepard, BIOSYM Technologies Inc., 10065 Barnes Canyon Rd., Ste. A, San Diego, CA 92121; (619) 458-9990.

Circle 408 on reader card

Cameo Systems Announces CAMSTAT

Cameo Systems Inc. has announced CAMSTAT, a powerful data analysis software tool. CAMSTAT is an integrated set of statistical functions, designed to monitor, detect, help correct processes and improve quality control. CAMSTAT was designed for use by operators, technicians and engineers responsible for the daily problems encountered in a modern manufacturing facility.

The menu structure ensures that a user is productive immediately. The use of color and graphics, together with visual displays, make interpretation of the results fast and simple.

CAMSTAT simultaneously supports parametric, attribute, character and data



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variables. It also has full-screen data entry and editing.

For further information, contact the Product Marketing Department, CAMEO Systems Inc., 2880 San Tomas Expwy., Santa Clara, CA 95051; (408) 986-9200.

Circle 410 on reader card

VAX/VMS System Tuning Guide Offered

In conjunction with its VAX/VMS system software, Software Techniques is offering a practical guide to system tuning. Written for novice or experienced system managers, *System Tuning — For Better Performance* provides information on basic performance issues such as how to perform tuning benchmarks, achieve better disk performance and tune system caches. Tuning tools available in VMS and from third-party vendors are discussed, and special attention is given to the problem of handling file and free space fragmentation. For a free copy, contact Sharon Donnelly, Software Techniques Inc., 6600 Katella Ave., Cypress, CA 90630-5105; (800) 332-8650 ext. 771.

Circle 412 on reader card

Hard Launches The 645-ISDN

Hard Engineering has launched the ISDN Basic Rate field service protocol tester. The 645-ISDN handles 2B+D monitoring, emulation and protocol decode.

All three protocol layers are analyzed including the diagnostic codes. The large super-twist LCD display is easy to read, and statistics and data are shown on the same screen. The device can analyze and record to disk at speeds up to 256 Kbps.

The 645-ISDN costs \$7,995.

For more information, contact Michael Leigh, Communications Test Equipment Division, Hard Engineering, 3005 L&N Dr., Huntsville, AL 35801; (800) 367-3126.

Circle 411 on reader card

D-MON Reduces Downtime

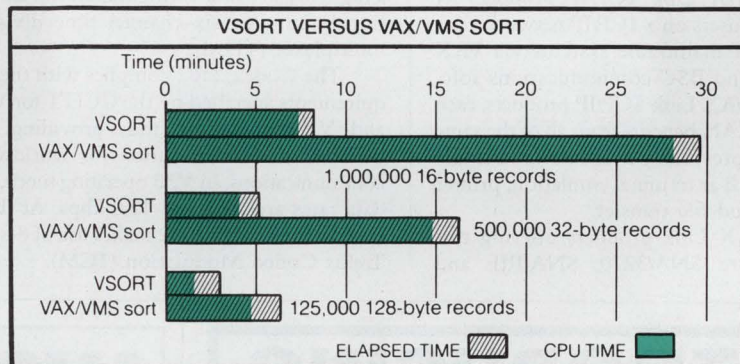
D-MON is new software from Bear Computer Systems for VAX/VMS, which allows the system manager to monitor the disk resource use of all accounts on the system accurately and efficiently. D-MON reduces downtime due to disk storage exhaustion.

D-MON maintains an automatic database of past and present use by directory and file owner without disrupting prime-time use. It generates reports that pinpoint which directories have fluctuated in disk storage space and monitors all disks on the system, including disk volume sets, and reports the

VSORT AND VSELECT

The fastest way to sort and extract records on a VAX.

If you spend too much time sorting with the VAX/VMS sort utility, spend less — up to 75% less — with VSORT from Evans Griffiths & Hart, Inc. Compare the following elapsed and CPU times for VSORT (V03.07) and the VAX/VMS (V4.2) sort utility running on a VAX 11/780.



VSELECT, the fast sequential record extractor.

VSELECT is also fast and efficient. Running stand-alone on a VAX 11/780, VSELECT often exceeds scan rates of 1,000 blocks per second. It can select and reformat records from an indexed file much faster than the VAX/VMS CONVERT utility can unload the same file — often three or four times faster.

For RSTS/E, use FSORT3 and SELECT.

If you run RSTS/E on the PDP-11, we invite you to join the hundreds of users and OEMs who, for the past ten years, have relied on FSORT3 and SELECT for the fastest possible record processing.

Other software products for VAX/VMS and RSTS/E

- *ROSS/V* a RSTS/E operating system simulator under VAX/VMS.
- *KDSS* a multi-terminal key-to-disk data entry system. (Also available for RSX-11M.)
- *TAM* an efficient screen formatter for transaction processing applications. (Also available for RSX-11M.)
- *DIALUP* a data communications package that links RSTS/E and VAX/VMS systems to remote computers.
- *BSC/DV* a device driver for DEC's DV11.

For more information, call (617)861-0670 or write: Evans Griffiths & Hart, Inc. 55 Waltham Street Lexington, MA 02173 TWX: 710-326-0103

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&
Hart, Inc.

EG&H

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CIRCLE 282 ON READER CARD

totals and subtotals in every directory and all files not contained in any directory. It operates a three-tiered alarm mechanism that alerts the system manager of impending disk space shortages.

Find out more by contacting Candee Foster, Bear Computer Systems, 5651 Case Ave., North Hollywood, CA 91601-9985; (818) 508-1894, outside CA, (800) 255-0662.

Circle 418 on reader card

TCP/IP LAN Versions Available

Systems Strategies Inc, an AGS company, has a new version of its VAX Link connectivity software which runs across TCP/IP LANs. The new VAX Link TCP/IP products let workstation users on a TCP/IP network connect to IBM mainframe systems via VAX Link SNA and BSC communications software. With VAX Link TCP/IP products, each user on the LAN benefits from all of the same capabilities previously available on a single machine, such as terminal emulation, printer emulation and file transfer.

The VAX Link products offering this capability are SNA/3270, SNA/RJE and

BSC/RJE running under the ULTRIX operating system.

Pricing for the software residing in the VAX server ranges from \$3,500 to \$7,000. Pricing for each VAX node on the network ranges between \$1,000 and \$3,500 for each VAX Link product.

Find out more from Lynn Paffman, System Strategies Inc., 225 W. 34th St., New York, NY 10001; (212) 279-8400.

Circle 419 on reader card

Codex 2362 Provides High-Speed Data Transmission

Codex Corporation has introduced the 2362 point-to-point leased line data modem. It has a high-density nest configuration and an optional four- or six-channel time division multiplexer (TDM).

The Codex 2362 complies with the requirements specified by the CCITT for V.33 and V.29 operation, thus providing the benefits of standardization for worldwide communications. In V.33 operating mode, the data rates are 14.4 and 12.0 kbps. At these speeds, the Codex 2362 makes use of 8-state Trellis Coded Modulation (TCM).

The Codex 2362 also can be nested in a Codex 2000 Series Nest Enclosure. It has an easy-to-use front panel soft-strapping, a 16-character user-friendly display, CQMS line parameter monitoring and full diagnostics including integral EPG.

Contact Kristen Sloan, Codex Corp., Maresfield Farm, 7 Blue Hill River Rd., Canton, MA 02021-9903; (617) 364-2000 ext. 5339.

Circle 421 on reader card

ezSNA/RJE Interfaces DEC, IBM Systems

Datanex Inc. now interfaces VAX and MicroVAX systems with IBM and compatible computers running DOS/VSE/POWER, in addition to JES2 and JES3. ezSNA/RJE software provides IBM 3777-4 SNA/RJE Workstations functionality to VAX and MicroVAX systems.

ezSNA/RJE uses standard DEC interface hardware (DMB32, DMF32, DPV11), can operate on a single VAX system or with its RJE net option can provide RJE and file/transfer services to several VAX systems in a DECnet network and/or on a VAXcluster.

The product is priced at \$7,500 for the

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WORKHORSE.

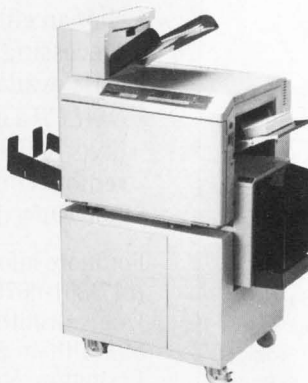
The DeRex S-3000 II: A heavy duty page printer without peers.

Fast, quiet, reliable and cost effective, the S-3000 has been designed specifically as a high-volume printer. And it is thoroughly backed by the expertise, technical support and nationwide service of DeRex.

- 30 pgs. per min./Up to 150,000 per month
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- Remote or local attachment
- Compatible with IBM (including channel attach) DEC, H-P, Prime, UNISYS and most other popular computers
- Forms overlay—up to six forms
- Versatile output: up to 32 character sets

For heavier output, the S-6000-II is another DeRex field-proven, high speed, reliable printer. At 75 pages per minute, with both portrait and landscape orientations, it provides great versatility of output at higher speeds.



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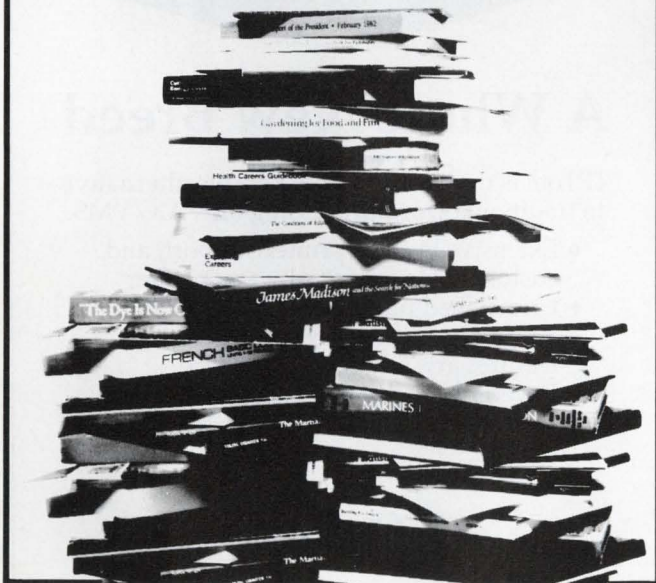
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Our warehouses here at the Government Printing Office contain more than 16,000 different Government publications. Now we've put together a catalog of nearly 1,000 of the most popular books in our inventory. Books like *Infant Care*, *National Park Guide and Map*, *The Space Shuttle at Work*, *Federal Benefits for Veterans and Dependents*, *Merchandising Your Job Talents*, and *The Back-Yard Mechanic*. Books on subjects ranging from agriculture, business, children, and diet to science, space exploration, transportation, and vacations. Find out what the Government's books are all about. For your **free copy** of our new bestseller catalog, write—

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CIRCLE 119 ON READER CARD

MicroVAX 3000 and VAX computers and at \$3,750 for the MicroVAX II.

For further information, contact Datanex Inc., P.O. Box 1728, Eugene, OR 97440; (503) 687-2520.

Circle 422 on reader card

Enhanced RAM System Quadruples Capacity

A single wide word 2000 memory system from Dataram Corporation captures up to 640 MB in 3.2 seconds, to meet needs for ultra-speed data in signal/image processing, state analysis, artificial intelligence, etc.

The rackmountable 15 3/4- x 19- x 24-inch units can be combined for total capacity up to 80 GB. A single wide word system provides a memory transfer rate of 200 MB/sec and permits easy interface with as many as eight I/O peripheral devices.

A multiported bus system provides easy interfaces for VAX, MicroVAX and Gould computers; Star and Numerix array processors; VME peripherals and various high-speed A/D devices.

Learn more by contacting Rick Plis, Dataram Corp., P.O. Box 7528, Princeton, NJ

08543-7528; (800) 822-0071; (609) 799-0071.

Circle 423 on reader card

CAE Tool Improves PCB Reliability

Systems Effectiveness Associates Inc. has introduced THERMAL, an engineering analysis program for use on PCs and VAX processors. This package lets engineers analyze the thermal aspects of printed circuit board designs. Component layout, use of cooling fins, air temperature, flow rate and direction all may be evaluated.

THERMAL promotes a responsive investigation of thermal and positional parameters by letting engineers change those characteristics and quickly review the effect on temperature distribution across the board.

License prices for THERMAL start at \$3,500 for PC environments; VAX-based systems licenses start at \$8,000.

Obtain more information by contacting Systems Effectiveness Associates Inc., 20 Vernon St., Norwood, MA 02062; (617) 762-9252.

Circle 424 on reader card

QLC-1000 Has Speed Capacity And Space

Qualogy Inc. has announced the DEC-compatible QLC-1000 optical controller. Because the QLC emulates a TK-50 tape drive, rather than the magnetic disk emulation, and because no more translation software is required, you can write files up to three times faster and read operations are up to five times faster. Optical media requires much less shelf space than tape and provides more storage capacity.

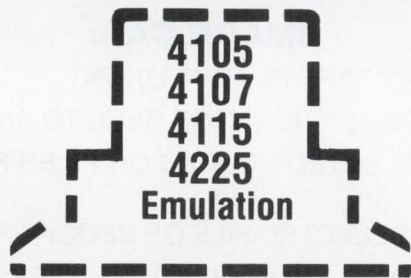
If you need more information, contact Qualogy Inc., 2241 Lundy Ave., San Jose, CA 95131; (408) 434-5200.

Circle 420 on reader card

Laser Printing Applications Enhanced

Enhancements to the DATA-NET peripheral sharing systems from Integrated Marketing Corporation provide features designed to ease applications in desktop publishing, CAD/CAM plotting, file transfer and conversions.

For A Full-Featured
Tektronix Graphics Terminal,
Just Add Your PC,
Mac II or Workstation



Grafpoint, the technology pacesetter in terminal emulation, offers the broadest range of powerful terminal emulation packages for PCs, PS/2s, Macintosh IIs, and workstations. Grafpoint's emulation products are available for both asynchronous or networking environments.

Grafpoint's devotion to product innovation, compatibility, and customer support makes us the leader in Tektronix emulation. Grafpoint products have a 30-day no-risk guarantee, free updates, and technical support for 1 year. Find out why Grafpoint is the technology leader in Tektronix emulation. Call today for the Grafpoint distributor nearest you: (800) 426-2230, in CA call (408) 446-1919, Grafpoint, 1485 Saratoga Avenue, San Jose, CA 95129.

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CIRCLE 124 ON READER CARD

Introducing ...

TPT/ool

A Whole New Breed

TPTool is the practical, inexpensive alternative to traditional word processing on VAX/VMS.

- ◆ Extensive built-in printer support, and customizable to virtually any printer
- ◆ Unmatched price/performance
- ◆ 80+% of traditional word processing features at a fraction of the price
- ◆ Priced from \$345 to \$1295 per CPU
- ◆ Free on-line demo available

Another fine software product from:

 **GrayMatter**
Software & Consulting

(206) 285-7414

CIRCLE 278 ON READER CARD

Four different models let you connect many computers and peripherals in a network environment. The enhanced products meet the changes in plotting applications, desktop publishing software and file conversion from the 5¼-inch format to the emerging 3½-inch format standard.

Each of the DATA-NET ports can be selected individually by the user as input or output ports, while any or all ports can be designated as the chosen output.

DATA-NET products are priced from \$795.

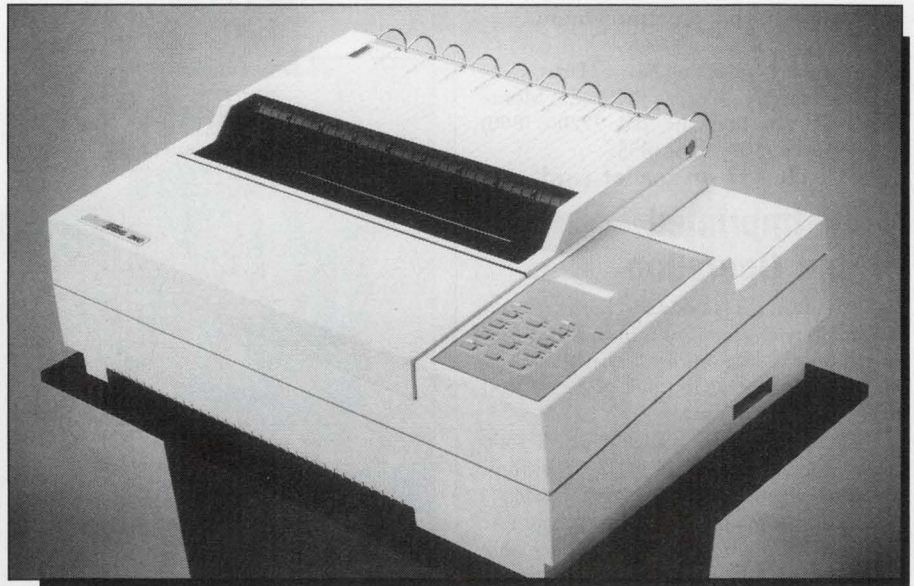
More information is available from Integrated Marketing Corp., 1031-H East Duane Ave., Sunnyvale, CA 94086; (408) 730-1112.

Circle 425 on reader card

OTC 2161 Targets MIS, Networking Environments

Output Technology Corporation has announced its compact 600 LPM matrix line printer, the OTC 2161, aimed at heavy-duty MIS and networking environments, in both the PC and mini/mainframe worlds.

The printer's ability to deliver consist-



Output Technology Corporation's 600 LPM line printer.

tent 600 LPM speed while printing both upper- and lowercase characters is a great benefit. The 2161 uses OTC's TriMatrix (3-headed) print mechanism to achieve its

high speed and also incorporates a proprietary, patent-pending two-line-per-pass printing technique. Two complete lines of text are delivered at a full 600 LPM, all with

Q-BUS SYSTEM PACKAGES

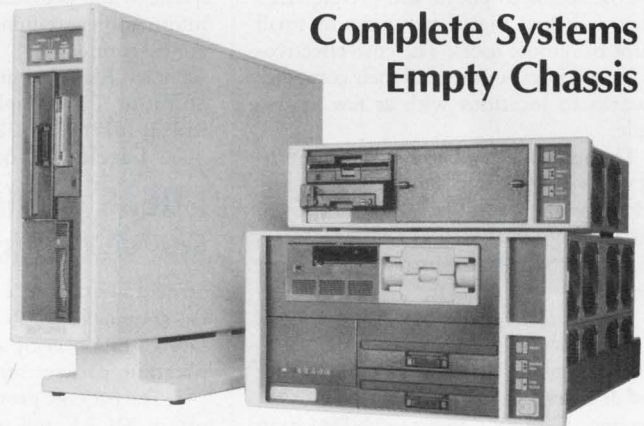
Zoltech's modular design allows literally thousands of configurations to be built with its V-series family of system chassis. Zoltech will deliver anything from empty metal shells to completely tested turnkey systems: You decide what you want to do and Zoltech will do the rest. Q-Bus and VME systems are our specialty, but we also do custom designs.

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ZOLTECH DELIVERS — CUSTOM OR STANDARD

Complete Systems
Empty Chassis



ZOLTECH CORPORATION

7023 Valjean Avenue, Van Nuys, California 91406 USA
(818) 780-1800 Telex 755451

CIRCLE 174 ON READER CARD FOR Q-BUS

a single pass of the print mechanism.

The printer costs \$6,450.

Learn more by contacting Marie Hartis, Output Technology Corp., 9922 E. Montgomery, Ste. 6, Spokane, WA 99206; (800) 422-4850 or (509) 926-3855.

Circle 417 on reader card

MICR Imprinted In One Operation

The MicroVAX II-based Checkprinter from Ramstar Corporation prints both MICR and alphanumeric data on blank check stock in one operation at an output of up to 400 documents per minute.

Three models are available. The T-1500 prints alphanumeric data in 136 positions, spaced 10 characters per inch. Print speed is 300 checks or payment coupons per minute with a standard 48-character set. Model 2002 prints up to 400 documents per minute. Model 2000 prints 160 characters in width at 360 documents per minute.

The price of the T-1500 is \$146,400.

More information is available by contacting Ramstar Corp., 222 Agricultural Bldg., The Embarcadero, San Francisco, CA 94105; (415) 362-1525.

Circle 416 on reader card

mMUX Benefits Small Business Offices

Gandalf Data's new mMUX multiplexer and PAD (packet assembler/disassembler) brings line savings, local switching, contention and low-cost access to public and private X.25 packet-switched digital networks to small groups of remote users. The cost-effectiveness lets corporations extend their computer networks to locations with as few as five people.

The mMUX can be used as a component of a MUX 2000 System multipoint network, providing local switching for up to eight subscribers as well as network access to Gandalf's Starmaster virtual connectivity system.

The four-channel mMUX costs \$995, the eight-channel mMUX is \$1,495.

Find out more by contacting Kerry Hawkins, Gandalf Data Inc., 1020 South Noel Ave., Wheeling, IL 60090; (800) GANDALF; in IL, (312) 541-6060.

Circle 427 on reader card

QUEMAN Automates Queue Processing

Data Center Software's new product, QUEMAN, automates the complete control and processing of all output (print, terminal and server) queues, batch queues and print



The Checkprinter from Ramstar Corporation prints both MICR and alphanumeric data in one operation.

forms in a VAX environment.

QUEMAN's full screen displays of all queue activity easily monitors, detects and corrects any problems such as stalled or runaway jobs, stalled printers, batch queues stopped, special forms jobs, etc.

A special ZOOM feature lists detail information with reference to each job in the queue while providing specific processing information pertaining to jobs that currently are executing.

Contact Alan J. Finkelstein, Data Center Software, 218 Maple St., Danvers, MA 01923; (617) 777-1221.

Circle 428 on reader card

I-DEAS Available For VAXstation 8000

Structural Dynamics Research Corporation has announced SDRC's I-DEAS (Integrated Design Engineering Analysis Software) applications package for the VAXstation 8000.

The package provides powerful tools for use in MCAE and may be used with any VAXstation family of workstations. Its also supported by DEC's Local Area VAXcluster Systems. I-DEAS will support the Local Area VAXcluster for the VAXstation 8000 when available from DEC.

I-DEAS runs on the VMS operating system. An average configuration on the VAXstation 8000 ranges from \$32,000-\$35,000.

Find out more by contacting Jere Brooks

Hunter, Structural Dynamics Research Corp., 2000 Eastman Dr., Milford, OH 45150-2789; (513) 576-2400.

Circle 429 on reader card

Ethernet Expander Introduced By RAD

RAD Data Communications has introduced its LE-6, a miniature Ethernet expander that provides an extended twisted-pair interconnection between the transceivers and controllers of any Ethernet LAN. Replacing the bulky AUI cable with two shielded twisted pairs, RAD's LE-6 lets Ethernet V1.0, V2.0 and IEEE 802.3 run on a universal cabling system such as IBM's.

LE-6 features include 10 Mbps transmission, SQE testing ("Heartbeat"), AC/DC coupling, back-to-back frames and signal compatibility with all Ethernet standards.

The LE-6 set sells for \$445.

More information is available by contacting Jeff Kahn, RAD Data Communications, 151 West Passaic St., Rochelle Park, NJ 07662; (201) 587-8822.

Circle 430 on reader card

CAD/CAM Productivity Boosted With Euclid-IS

MATRA DATAVISION announced its support of the VAXstation 8000. When the VAXstation 8000 is combined with EUCLID-IS, it delivers a state-of-the-art

CAD/CAM/CAE solution to address the many and complex needs of the modern engineering environment.

EUCLID-IS combines solids and surfaces to solve design and manufacturing problems. This combination lets the engineer describe the most demanding geometry exactly. The visualization of this geometry is what the VAXstation 8000 is designed for. The anti-aliasing and depth cuing produce clear images that are displayed at 500,000 vectors a second. This performance leap is brought about through multiple dedicated processors. This pipeline architecture allows the EUCLID-IS software to be decomposed to boost the interactive speed and productivity of the engineer.

More information can be obtained by contacting MATRA DATAVISION, 30 Commerce Way, Woburn, MA 01801; (617) 938-1230.

Circle 431 on reader card

Storage Solutions For Q-bus Market

A new line of DEC-compatible mass storage subsystems has been announced by Winchester Systems Inc. This 5¼-inch family provides more than 5,000 configuration alternatives for Q-bus and UNIBUS computers. DEC users can choose from different drives, enclosures, controllers and storage media to configure a fully integrated subsystem.

Winchester Systems supports 40 different disk drives. These drive options include fixed Winchester disk, removable Winchester disk, ¼-inch streaming cartridge tape, 2 GB cartridge tape, optical disk and floppy disk units. The various disk drives serve as building blocks for the complete subsystem. The drives support ESDI, ST506 and SCSI interfaces.

Learn more by contacting Michael Veneto, Winchester Systems Inc., 400 West Cummings Park, Woburn, MA 01801; (617) 933-8500; (800) 325-3700.

Circle 432 on reader card

Lion Cabinets Unveils New Products

Lion Cabinets recently introduced new products for the DEC-compatible market. The L23A-AR 19-inch rackmount kit is BA23A-AR equivalent. Wide J-style end panels allow side-to-side ventilation of mounted computer equipment. They're for the BA23A chassis and are compatible with the DEC J-style end panels used in MicroVAX II (Q5) configuration.

The 22-inch wide cabinets (40 or 60 inches high) are designed to mount DELNIs, DEC server 100/200 and other communications equipment.

Find out more by contacting Lion Cabinets Ltd., Buslingthorpe Green Industrial Estate, Meanwood Rd., Leeds LS7 2HG; (0532) 624040; FAX: (Group 3) (0532) 623476.

Circle 434 on reader card

Select Any Media Type With MMAC

Cabletron Systems has introduced the Multi-Media Access Center (MMAC), a two- or

eight-digit card slot unit that supports unshielded twisted-pair, fiber optic, RG-58 coax cable and/or standard AUI transceiver cable connections.

MMAC users can select up to seven interface cards per enclosure. (The eighth slot must contain an intelligent repeater module.) The interface cards can be mixed within the MMAC or the unit can comprise all one media interface.

The MMAC also has Remote LAN-

AVERAGE DISK ACCESS TIME... 6.39 msec.

What can this kind of performance do for you? Add one of MasterDisk's disk storage systems to your DEC computer and discover what you can do with significantly increased speed and storage:

- Make a MicroVAX II outperform a VAX 8600*
- Double the number of users on the system and get a better performance for each user*
- Improve disk system throughput by as much as 450%*

MasterDisk is the most convenient and cost effective means available to attain the maximum throughput from your existing DEC system.

Storage Capacities - 152 megabytes to 2.93 gigabytes

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Warranty - Exclusive TWO YEAR WARRANTY with Nationwide service and support

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Delivery - Within 30 days, complete and ready for simple customer installation

* Actual field application data reported by some of our enthusiastic customers

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CIRCLE 178 ON READER CARD

FILE-PACER™

You can buy time
for your VAX...

by piercing layers of
inefficient file I/O and still
maintain total VMS compatibility.



If file-I/O intensive applications are consuming your system's resources FILE-PACER will buy you marked improvements in performance. This means increased throughput or extended life for your current hardware. However you look at it you're buying time for your VAX.

FILE-PACER is a layered software product consisting of I/O routines which substitute for built-in I/O statements in any VAX/VMS language. It makes all RMS parameters accessible in all languages providing a homogeneous interface to RMS. FILE-PACER improves performance of all RMS file types, even across DECNET. Up to 50% improvement has been observed.

Call for information including a detailed benchmark study and how to obtain our demo.

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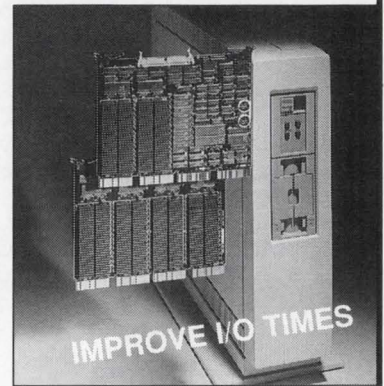
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CIRCLE 157 ON READER CARD

Build Your Own Mainframe Computer System For Under \$8K!


Recipe: Start with one PC-386/286 computer running PC/MS-DOS and/or SCO Zenix,*
Add one or two of your own SMD disk drives,
Add one SMD disk controller for PC-286 bus (we provide),
Format each disk drive up to 512MB/volume in DOS,
Add our PC/MS-DOS or Zenix software disk driver for the drives.

Load: Software disk driver with formatter/partitioner on diskette media.

Modify: Config.sys file and reboot.

Voila! You now have a micro computer system that looks like a minicomputer and possesses the power, reliability and properties of a mainframe.

For further information, contact:

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Phone: 215-825-0505
FAX: 215-828-8618

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CIRCLE 187 ON READER CARD

VIEW and management, allowing you to remotely or locally configure the unit and to gather network statistics.

Cost varies from \$500 to \$900.

To find out more information, contact Bob Levine, Cabletron Systems Inc., P.O. Box 6257, Rochester, NH 03867; (603) 332-9400.

Circle 437 on reader card

AirMail Operates On The VAX

MiniSoft has announced a new electronic mail system designed to operate on the VAX. Features include distribution lists, message archiving, message forwarding, full screen editing on any terminal or PC and automatic mail notification.

Its best feature is its integration with the Universal ACCESS operating environment. AirMail takes advantage of Universal ACCESS's file transfer, windowing and printing features. On any terminal or PC you can run AirMail in one window while continuing to work on other applications in other windows. AirMail will monitor the mail system and alert you to any incoming messages. Once the messages are answered, AirMail users can return to their other applications, where they left off.

For more information, contact MiniSoft Inc., 16315 NE 87th, Ste. B101, Redmond, WA 98052; (206) 883-1353; (800) 682-0200.

Circle 438 on reader card

Conversionware Family Expanded

Rapitech Systems Inc. has added a VMS FORTRAN to ANSI FORTRAN-77 translator to its family of automated computer-language translation products known as Conversionware.

The technology is available on a wide range of UNIX-based computers. FORTRIX-VMS (V1.0) recognizes and translates a set of the most popular extensions to the FORTRAN language as implemented on VAX/VMS computers.

Get more information by contacting Dr. Larry Woodruff, Rapitech Systems Inc., Montebello Corporate Park, Suffern, NY 10901; (914) 368-3000; (800) FORTRIX.

Circle 436 on reader card

PlanTRAC/EasyPLAN Is Easy To Use

The Small Products Division of Computerline Inc. has unveiled PlanTRAC/EasyPLAN, a computer-aided project planning tool that brings the power of PlanTRAC to those who aren't project planning professionals. EasyPLAN now is included free with each PlanTRAC system.

To create a project plan with EasyPLAN,

define activities and relationships between activities using the arrow and function keys. EasyPLAN displays the project plan as it's being built and helps you by checking the planning logic automatically as each activity or relationship between activities is entered.

EasyPLAN has a single-key schedule calculator function that calculates the proj-

ect schedule based on the project plan, duration and progress entered for each activity.

PlanTRAC is available on VAX and MicroVAXs and prices start at \$5,995.

For more information, contact Susan Carroll, Computerline Inc., P.O. Box 308, 52 School St., Pembroke, MA 02359; (617) 294-1111.

Circle 441 on reader card

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If you have ever had to use ARTEMIS or PROJECT/2, you will appreciate VISION. As easy to learn and use as a micro system and with the power of your DEC VAX, Prime or IBM mainframe.

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CIRCLE 232 ON READER CARD

CentreCOM Features Heartbeat Switch

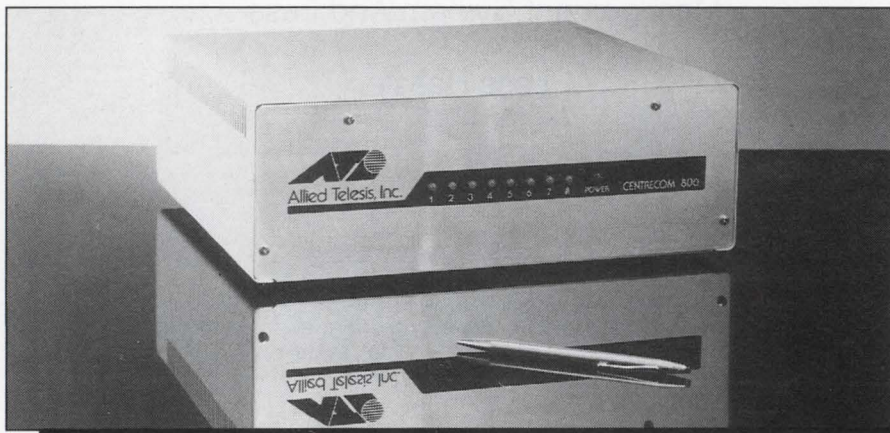
A tabletop 8-port transceiver recently introduced by Allied Telesis Inc. features a user-selectable heartbeat switch for applications in baseband Ethernet LANs. CentreCOM 800 permits network updating or off-line operation by changing the switch setting. A two-color LED shows the heartbeat status.

A single CentreCOM 800 connects 8 stations for remote operation through a single Ethernet coaxial cable tap. Eight more CentreCOM 800s can be "cascaded" from the original unit to serve 64 stations. Existing baseband LANs can be expanded without adding costly coaxial cable or taps.

CentreCOM costs \$795.

Learn more by contacting Allied Telesis Inc., 2685 Marine Way, Ste. 1220, Mountain View, CA 94043; (415) 964-2771.

Circle 426 on reader card



CentreCOM 800 is a baseband multiport transceiver.

FCX Saves Time And Cuts Costs

Innovative Computer Systems has introduced FCX, a file compression/expression utility designed to streamline file transfer operations. FCX V1.0 is for use in VAX/VMS environments.

FCX can reduce the time and cost normally required to transfer files over local and wide area networks and save disk space. It permits one or more files of any type or size to be compressed into a single file, with space savings ranging from 30 percent to 70 percent. Files then can be expanded selectively from the compressed format file to their original size, when needed.

Obtain a brochure by contacting Ann

Stephenson, Innovative Computer Systems Inc., 72 Crooked La., Cherry Hill, NJ 08034; (609) 779-1422.

Circle 439 on reader card

FORTRAN Enhancements Help DEC Users

Computer Translations has enhanced its VM77 converter to run on VMS-based computers. VM77 is a conversion tool that identifies and converts non-standard DEC extension in FORTRAN programs, producing highly portable FORTRAN code conforming to the ANSI-77 FORTRAN standard.

Pure ANSI-77 FORTRAN is supported on most modern UNIX systems, thus allowing the easy migration of VMS-based programs toward UNIX, including VAX equipment running ULTRIX.

Additional aspects of the DEC extensions have been incorporated into the VM77 converter to provide even greater automatic

conversion of source code. The new extensions include associate variable, close options, find and rewrite, logical inside IF, define file and byte data types.

More information can be obtained by contacting Joe Chisolm, Computer Translations, 2235 W. Potter, Phoenix, AZ 85027; (602) 582-9515.

Circle 440 on reader card

Microcom Debuts The MLB/1500

Microcom Inc. has announced the MLB/1500, an Integrated Services Digital Network (ISDN) Basic Rate Interface that connects two geographically separated LANs with a dial-up connection through an ISDN network.

The Microcom LAN Bridge is a Media Access Control (MAC) level transparent bridge. It passes LAN packets, unaltered, from one LAN to another. Networks using Novell Netware, 3COM 3+, DECnet or TCP/IP can be connected without users knowing they're attached to a geographically remote network.

The MLB/1500 is priced at \$12,500. Learn more information by contacting Microcom Inc., 1400 Providence Hwy., Norwood, MA 02062-5078; (617) 762-9310.

Circle 443 on reader card

Psi Software Enhances PLANNER

Psi Software has released version 5 of PLANNER project management software for VAX systems. The new release has enhanced user interface, improved VMS functionality, greater speed, better reporting and advanced networking capabilities.

PLANNER is an interactive, multiuser system that offers managers a cost-effective and accurate tool for scheduling and managing project activities and resources. It's easy to learn and use, and so flexible it can be used in many project environments, from aerospace and banking to health care and engineering.

Find out more by contacting Maureen B. Murphy, Productivity Solutions Inc., 128 Technology Cntr., Waltham, MA 02254-9164; (617) 899-8900.

Circle 442 on reader card

SQR Release 1.5 Now Available

SQ Software has release 1.50 of its Structured Query Report Writer (SQR) for the Oracle database. SQR combines a structured procedural approach to report writing with a straightforward command syntax to create a powerful tool for developing reports and other applications. SQR is available for the Oracle database on VAX/VMS, etc.

Features include unlimited program size and the ability to store programs in run-time files. Programs of any size with any number of queries, columns and variables may be written. Run-time files are prescanned SQR programs that eliminate the analysis and initialization steps and begin executing immediately. Run-time files may be distributed without program source code for added security.

Versions for VAX/VMS range from \$1,500 to \$16,800.

More information is available from SQ Software, 2000 Lee Rd., Ste. 120, Cleveland, OH 44118; (216) 397-0551.

Circle 447 on reader card

INTRODUCING THE BRIGHTEST IDEA EVER IN VAX COMMUNICATIONS SERVERS.

The MAXserver™ 5000 from Xyplex.

Before you buy a terminal server, look at what Xyplex has to offer.

Xyplex introduces the MAXserver 5000, with more performance, more reliability, and more capability than anything Digital has to offer. All at a much lower price! Here are just some of the eye-opening facts:

Blazing performance. Digital's DECserver™ 500 is based on an old single-processor design so it slows down as you add users. But the MAXserver 5000 uses advanced parallel processing, so you get the same high performance with 120 users as you get with one user.

Shining reliability. Did you know that when one DECserver 500 component fails, the whole server can fail? Not with MAXserver 5000. Xyplex has designed it for uninterrupted service, with redundant

power supplies and multiple network interfaces. Plus our "hot-swap" serial cards allow you to change cards without disrupting the network.

LAN and WAN brilliantly integrated.

MAXserver even integrates both LAN and WAN, as well as TCP/IP connectivity, in one package. Its open architecture and expandable design means you'll be able to communicate with existing and emerging industry-standards, with simple, straightforward connections to UNIX-based systems.

A brighter approach to packaging.

The MAXserver 5000 can serve up to 120 users in one-sixth the space it takes with 8-port terminal servers. With computer room space at a premium, the MAXserver has a smaller footprint, uses less power, and gives you two or three times the number of ports as a DECserver 500 *in the same amount of space.*

See the price and see the light.

Here's the clincher: Xyplex offers all of the above advantages – and more – for a much lower price. See for yourself how Xyplex delivers more server for less money.

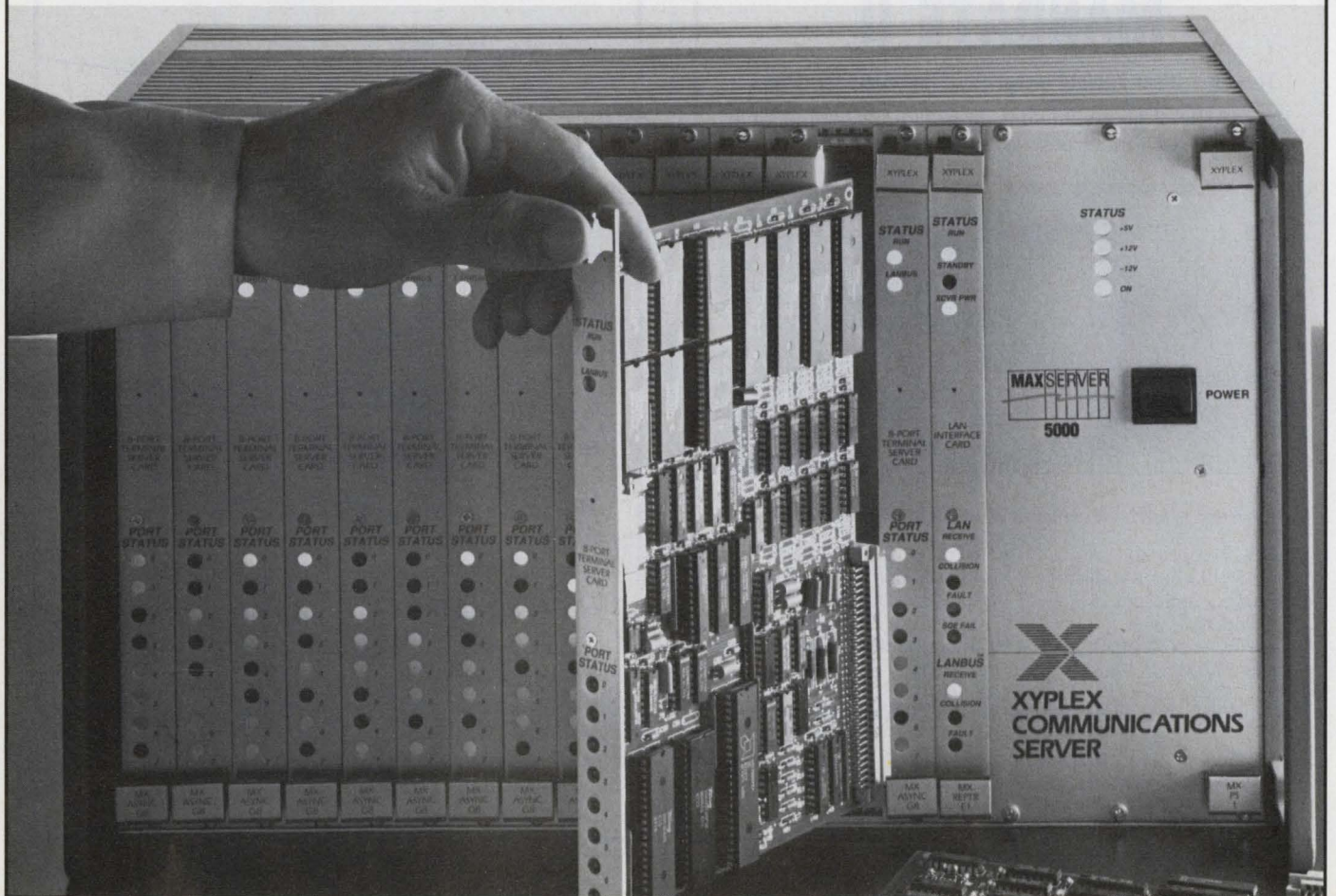
Shouldn't you find out about the brightest VAX communications server ever offered? Call Xyplex for complete product information and a free in-depth report comparing the MAXserver 5000 with the DECserver 500.

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Xyplex, Inc.

100 Domino Drive
Concord, MA 01742
1-800-338-5316



CIRCLE 171 ON READER CARD

R68802 Offers Single Chip Solution

The Semiconductor Products Division of Rockwell International Corporation has announced its LNET R68802 LAN. This offers computer and communications OEMs a single-chip solution supporting the Cheapernet (10BASE2), StarLAN (1BASE5) and Ethernet (10BASE5) versions of the IEEE 802.3 Carrier Sense Multiple Access with Collision Detect (CSMA/CD) access method standard.

In addition to managing the CSMA/CD algorithm, performing parallel-to-serial/serial-to-parallel conversions of data streams up to 10 Mbps and assembly and disassembly of packet formats, the R68802 provides a versatile DMA interface with a large 32-byte FIFO buffer for both transmitter and receiver data. Other features include support for eight- and 16-bit processor data busses and an interface to the Manchester Code Converter (MCC) used to connect the R68802 to an IEEE 802.3 defined Media Attachment Unit (MAU). To learn more, contact the Semiconductor

Products Division, Rockwell International Corp., 4311 Jamboree Rd., P.O. Box C, Newport Beach, CA 92658-8902; (714) 833-4700.

Circle 450 on reader card

Model 572 Offers Hardware Solution

Telebyte Technology has announced a hardware solution for a problem that has plagued designers of VAX/MicroVAX multiuser systems: how to simplify the wiring between the CPU and remote terminal clusters. The Model 572 allows up to eight terminals/printers to communicate with the CPU over a single, 2-twisted pair cable.

Packaged on a DEC dual PC board, the Model 572 installs in the CPU where it draws power from the computer bus. The input/output signal interface is compatible with the DHV-11- or DLV-11-type multiplexers. A ribbon cable connects the DHV/LV-11 to the Model 572.

The multiplexing controller system consisting of the Model 572 sells for \$395. The Model 570 Quick Mux sells for \$548. The total system costs \$943.

Find out more product information by contacting Telebyte Technology Inc., 270 E. Pulaski Rd., Greenlawn, NY 11740; (516) 423-3232, (800) 835-3298.

Circle 448 on reader card

Dorlen Releases Enhanced Water Detector

Dorlen Products, manufacturer of Water Alert, a surface water detection system, introduced its newest version, Model SS-3(T). The SS-3(T) is designed to be used with Dorlen's PS-3(T) power/supply/ tester. The SS-3(T) doesn't require batteries and is capable of being remotely tested from the PS-3(T) location. DPDT isolated contacts are provided making the detector ideal for interfacing with existing alarm/security systems. Sixteen SS-3(T) detectors can be connected to a single PS-3(T).

Monthly or quarterly testing provides assurance that the system is operating properly.

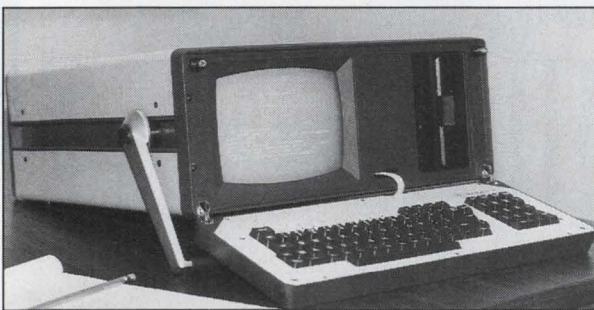
For complete information, contact Len Woloszyk, Dorlen Products, 7424 W. Layton Ave., Milwaukee, WI 53220; (414) 282-4840.

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MANDATE II

The First Ideal Travel Partner For Mini Computer Users

The MANDATE II is a fully integrated completely portable system in an easy to transport package.



The system is fully self-contained and has the following features:

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CIRCLE 130 ON READER CARD

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The only integrated VAX office system with the architecture and capabilities to satisfy the demanding professional user. Alis has all the benefits of communications-based office automation systems. And combines them with the advantages of graphics-based personal computer applications and the presentation quality output of desktop publishing systems. Multi-window Alis networks workstations, PCs, and terminal-based multi-user systems company-wide, making full use of the graphics capabilities that each device offers.

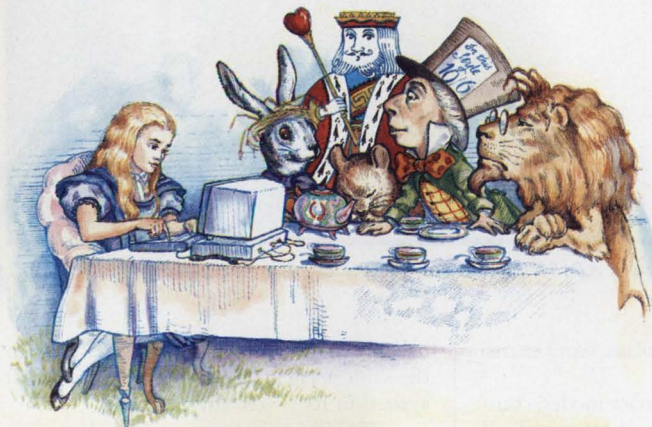
Alis. The multi-vendor office system.

Alis' multi-vendor networking allows VMS and Ultrix VAXs and VAXstations, 68000-based workstations and MS-DOS PCs to be combined into one integrated office system.

To find out more, call John Butler, V.P. of Marketing, at Applix (617) 870-0300.

Alis combines text, spreadsheets, graphics and database in single, always editable documents handles proportionally-spaced and multiple-size fonts WYSIWYG-style provides automatic formatting of reports, letters, memos, etc. sophisticated equation-solving spreadsheet drawing, scanned images and business graphics personal and office databases integrated electronic mail and meeting scheduling multiple windows supports graphic workstations, PCs and terminals.

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CIRCLE 238 ON READER CARD

Emerson's New Series Is VAX-Compatible

The Industrial Controls Division of Emerson Electric Company has a new series of online, plug-compatible uninterruptible power systems (UPS) configured expressly for VAX 11/725, 11/730, 11/750 and 8200/8300 computers.

The AP101/VAX Series provides users and resellers with a streamlined connection between the electric power source, the UPS system and the computer system.

For optimum performance, DEC recommends voltage and power input frequency be maintained within five percent and 1 Hz, respectively. The AP101/VAX improves on these specifications by guaranteeing that voltage will stay within two percent and frequency within .03 Hz.

List prices range from \$8,500 for 3 KVA to \$16,500 for 10 KVA models.

Find out more by contacting Deb Behrens, Emerson Electric Co., Industrial Controls Division, 3300 S. Standard St., P.O. Box 1679, Santa Ana, CA 92702-1679; (714) 545-5581.

Circle 452 on reader card

Novell Announces NetWare VMS

Novell Inc.'s NetWare VMS lets VAX/VMS computers function as a network file and print server for IBM PCs and compatibles operating with NetWare V2.0a. NetWare VMS is compatible with NetWare V2.0a and NetWare V2.0a applications and also operates with NetWare V2.1.

Only the standard VAX Ethernet controllers are required to connect the VAX to the PC network. NetWare VMS can coexist with DECnet and LAT networks concurrently. NetWare VMS also can be used to connect to remote VAX systems. PC users can log in through NetWare VMS and access file and printer resources at the remote VAX running NetWare VMS through DECnet.

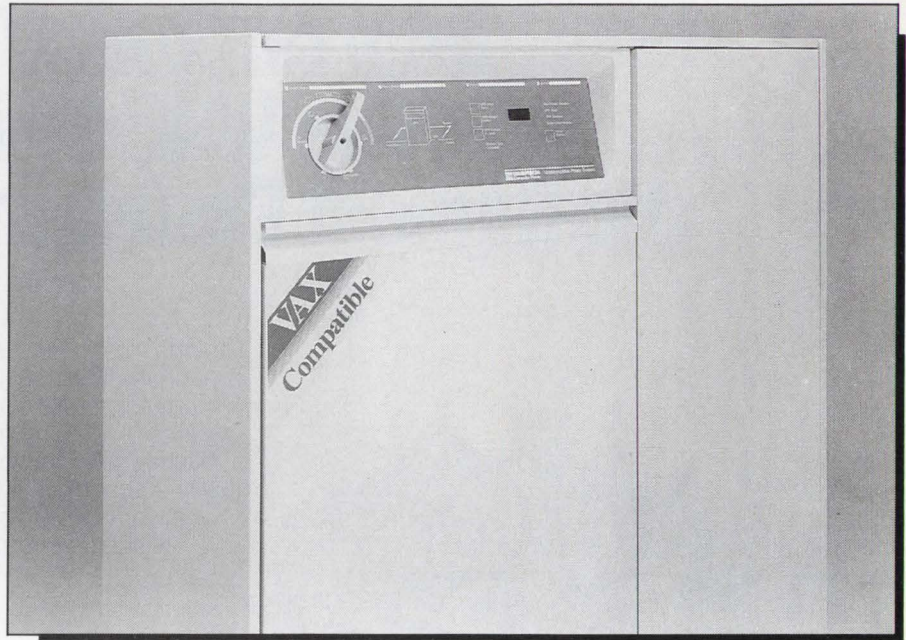
NetWare VMS pricing is server-based and ranges from \$5,500 to \$26,500.

Receive more information by contacting Cheryl Snapp, Novell Inc., 122 East 1700 S., Provo, UT 84601; (801) 379-5900, (800) 453-1267.

Circle 449 on reader card

Interactive Drawing Package For VAXs

Precision Visuals has introduced a graphics product for interactively creating, revision and displaying line drawings. DRAW can be used to generate logic diagrams, training aids,



Emerson Electric's AP101/VAX line of UPS is plug compatible with VAX.

engineering designs, floorplans, word charts, maps, etc.

DRAW has three interface modes: command mode for fast operation, graphical menu mode for novice or occasional users and tablet mode for maximum precision and for digitizing line art. Output can be directed to a wide range of hardcopy devices including DEC.

DRAW's primitives include polyline, polygon, arc, circle, ellipse, markers, rectangle, text and library symbol. DRAW's system library contains more than 300 symbols.

DRAW runs on VAX/VMS systems with VT240, and VT340. Pricing starts at \$3,500.

For information, contact Chris Logan, Precision Visuals Inc., 6260 Lookout Rd., Boulder, CO 80301; (303) 530-9000.

Circle 451 on reader card

i-Logix Releases V1.2 Of STATEMATE

i-Logix Inc. has announced V1.2 of STATEMATE. This version includes real-time functions in the simulation process and extensions to the dynamic tests for reachability, deadlock and non-determinism.

STATEMATE is a graphical system engineering environment that's suited for use in the specification and design of real-time systems. Now you can build specification models incorporating a user-definable lock. This allows the specification to be tested in a simulated real-time environment. The

behavioral model can thus be exercised with the same accuracy as running the proposed system in its target environment.

STATEMATE's basic package, Kernel, is priced at \$10,000 per standalone workstation. The analysis and simulation package, Analyzer, is \$25,000. The product runs on VAX/VMS.

More information is available by contacting Elizabeth McKinley, i-Logix Inc., 22 Third Ave., Burlington, MA 01803; (617) 272-8090.

Circle 445 on reader card

Relief From Storage Bottlenecks Announced

Westford Disk Systems Inc. has relief from storage bottlenecks for MicroVAX machines trapped in BA23 chassis. This provides up to 240 MB of formatted storage capacity in less than one-half cubic foot on the desktop.

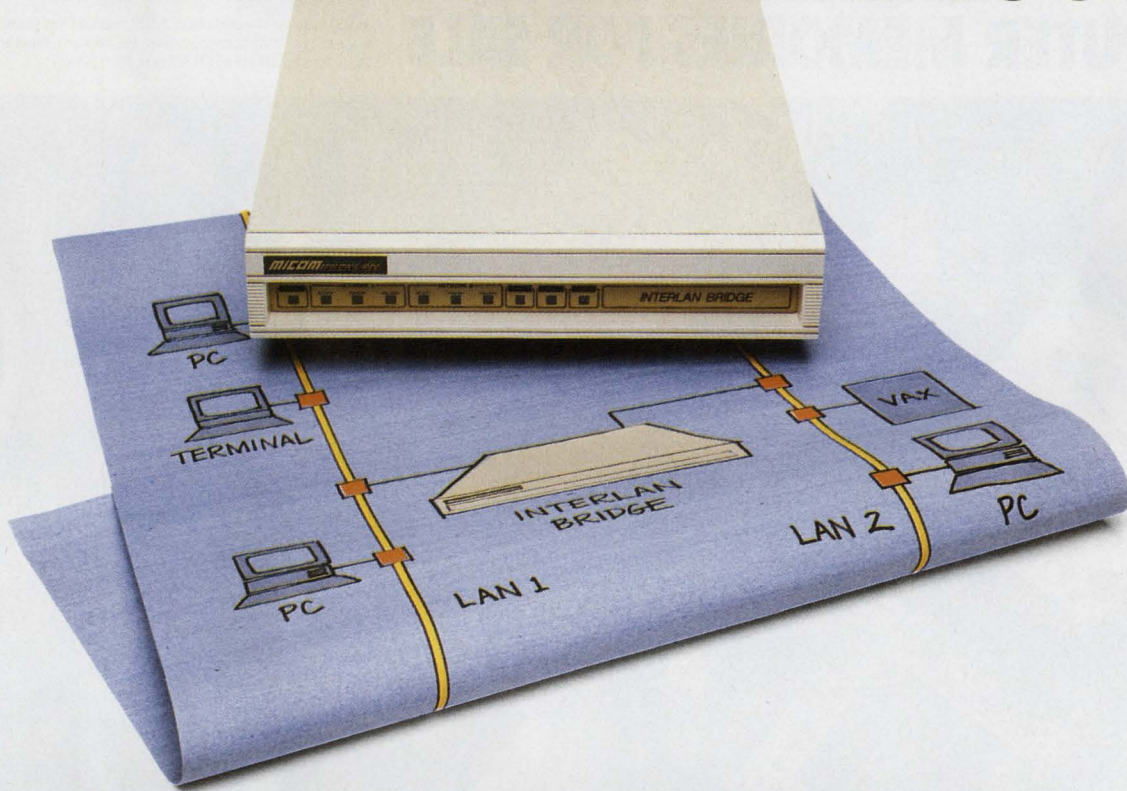
This provides a solution for users of the BA23 MicroVAX II. It provides large amounts of high-speed disk storage, while using little space on the desktop and only one Q-bus slot inside the MicroVAX chassis. Benchmark tests show the effective transfer rate to be 3.4 to five times faster than an RD54.

Prices start at \$5,800, and at the high end, run down to \$11 per MB.

For further information please contact Martin Galligan, Westford Disk Systems Inc., P.O. Box 43, 224 South St., Carlisle, MA 01741; (617) 371-7015.

Circle 446 on reader card

FROM MICOM INTERLAN: MORE BRIDGE FOR THE BUCK.



THE POWER OF THE DEC LANBRIDGE 100 FOR HALF THE PRICE.

Here's good news for anyone who's ever needed a DEC LANBRIDGE 100, but hesitated to plunk down eleven grand for it.

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Introducing MICOM INTERLAN's IB3000 Data Link Bridge. It's everything you've always wanted in a network bridge. All the performance and features of DEC's LANBRIDGE 100 — for just \$5495.

Make the most of your network — and your budget.

The IB3000 is actually more than just a bridge. It's a whole family of bridge products, all distinguished by high performance, interactive network management, and IEEE 802.1 support. From a fully upgradable starter product to the top-of-the-line IB3000, with an aggregate listening rate of 28,000 packets per second, the IB3000

family combines advanced design with exceptional price/performance.

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The IB3000 Bridge family is the latest in a long line of MICOM INTERLAN products combining innovative hardware architecture with advanced network management software. Whether you're looking for a better bridge, or simply a better deal, we're the people to talk to *before* you make your choice.

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CIRCLE 140 ON READER CARD

Remember how computers remembered? Mercury delay lines? Punched cards with 90 columns and round holes? Hand-wired magnetic cores? In case your memory needs refreshing, The Computer Museum would like to share its memories with you.

The Computer Museum Memory Poster
We have created a limited edition, 20" x 32" poster of the picture shown below. Printed in

CIRCLE 268 ON READER CARD

COMPUTER MEMORIES FOR SALE

full-color, it includes an identification key to help you recall the memories you've forgotten. To get your poster, along with an information kit on museum membership, exhibits and activities, send a tax-deductible contribution of \$25 or more to:

Memory Poster, The Computer Museum,
300 Congress Street, Museum Wharf,
Boston, MA 02210.

Please allow six weeks for delivery.

YES! Please refresh my computer memories. A tax-deductible donation of \$25 or more made payable to The Computer Museum is enclosed.

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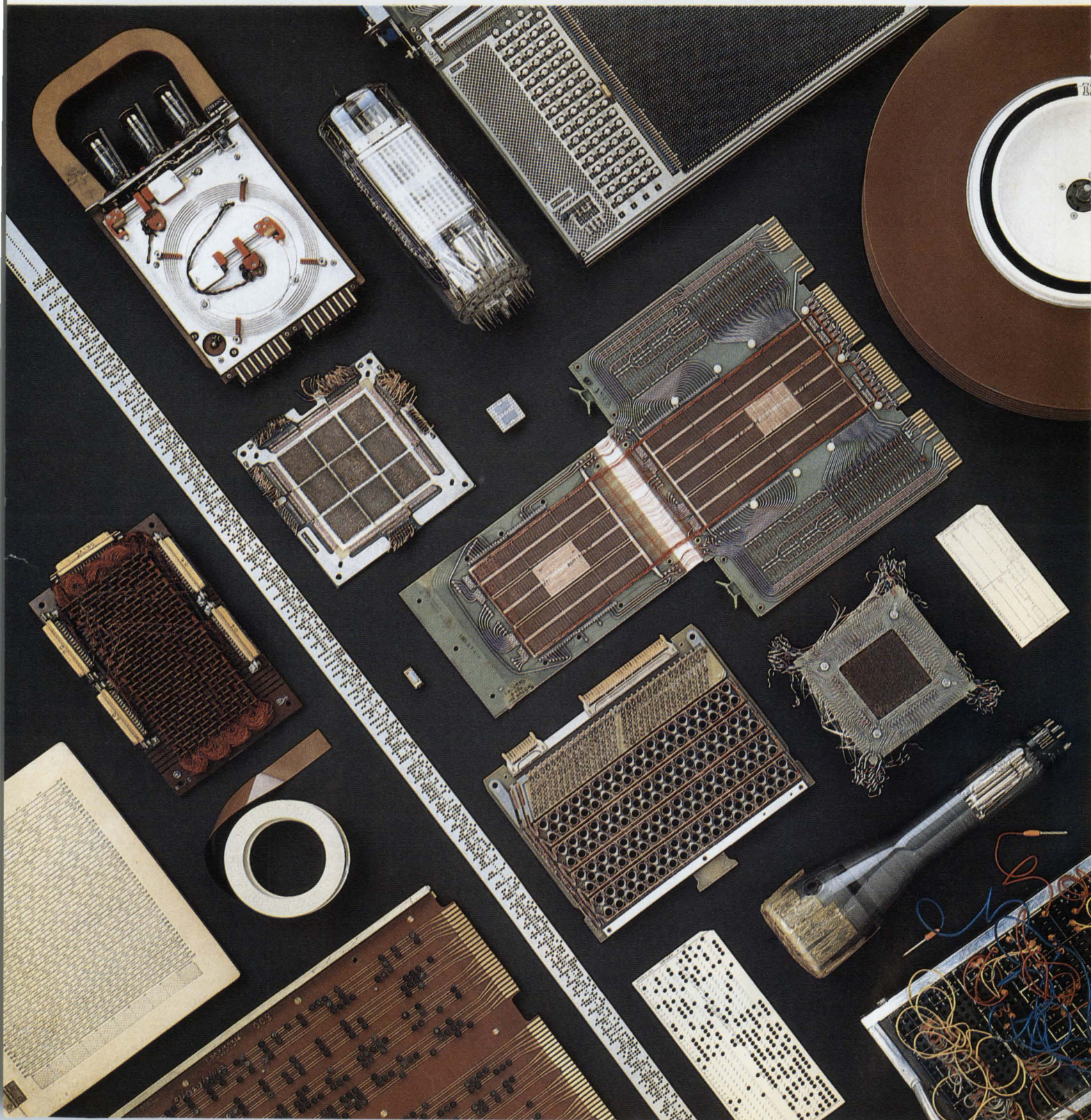


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CIRCLE 154 ON READER CARD

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TCP/IP Networking Software...

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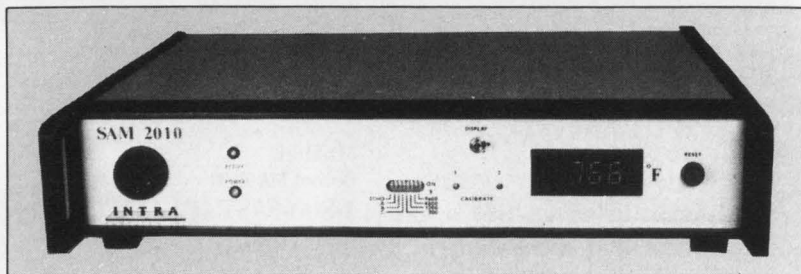
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MegaTape Produces New Backup Subsystem

MegaTape Corporation has combined its field-proven MT-750 cartridge backup streamer with a new controller to produce a VAXBI-compatible backup subsystem.

The MT-750 VAXBI subsystem is attached directly to the VAXBI bus via the new MegaTape MBI-101 Controller. It provides a storage capacity of 630 MB in a single cartridge and operates using the TMSCP driver and backup utility resident in the VMS operating system.

The MBI-101 Controller is a standard VAXBI Module and occupies a single slot. It has a transfer rate of 4 MB per second and is TMSCP compatible. Model MT-750 streamers are currently in use on PDP-11, VAX and MicroVAX systems.

The MT-750 VAXBI subsystem is priced at \$18,900 and includes all items required for installation and initial operation. To learn more, contact MegaTape Corporation, 1041 Hamilton Rd., P.O. Box 317, Duarte, CA 91010-0317; (818) 357-9921.

Circle 455 on reader card

CDRS Expands Disaster Recovery

Comdisco Disaster Recovery Services Inc. (CDRS) has added DEC and Tandem equipment plus an IBM System 38 to the IBM hardware currently available at its eight hot sites.

CDRS' Cranford, New Jersey, hot site now offers VAX 8700, VAX 11/780 and PDP 11/70 equipment.

CDRS' DEC offerings are dedicated solely to disaster recovery.

For complete information, contact Comdisco Disaster Recovery Services Inc., 6400 Shafer Ct., Rosemont, IL 60018; (312) 698-3000.

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Control Cable's *Product Catalog* now is available, featuring equipment needed for data processing and networking applications. Included are data cables, manufacturer's equivalent cables, bulk cable, connectors, data switches, adapters, null modems, wall plates, tools, test equipment and surge protection. In this version, Control Cable introduces its new product lines of baluns, LAN accessories, fiber optic cable and accessories, protocol devices, modems and multiplexers. To receive a free catalog, call or write Control Cable, 7261 Ambassador Rd., Baltimore, MD 21207; (301) 298-4411.

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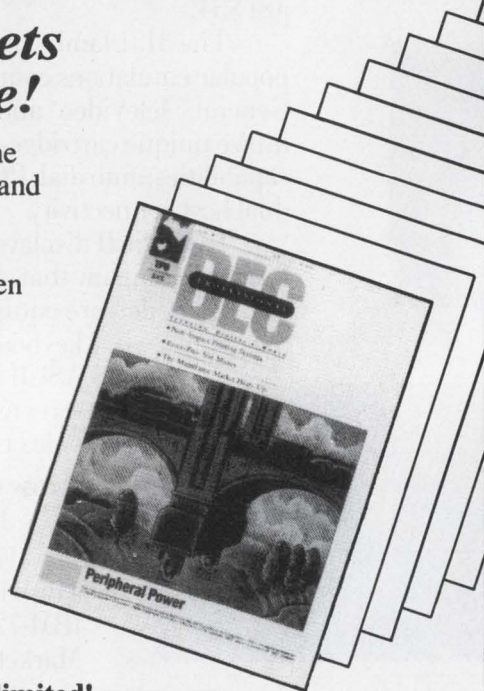
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PURVIS Introduces DEC Interface

PURVIS Systems has introduced an MIL-STD-1397 interface for PDP-11 and MicroVAX Q-bus computers. The Q-bus/NTDS interface allows DEC computers to directly communicate with tactical computers or peripherals, using MIL-STD-1397 functional and electrical characteristics, for the purpose of transferring digital data.

The Q-bus/NTDS, MIL-STD-1397 interface is a single quad-size card that plugs directly into the backplane of the Q-bus. The card supports 16- and 32-bit, full-duplex I/O transfers in all categories of operation.

The interface is available in three versions to support Type A (slow), B (fast) and C (ANEW) classifications. The Q-bus/NTDS is supplied with I/O driver and test software, wrap test cables and a user manual.

The price is \$3,400.

To receive more information, contact Roy Hiipakka, PURVIS Systems Inc., 1272 W. Main Rd., Middletown, RI 02840; (401) 849-4750.

Circle 454 on reader card

OASYS Announces 80386 Development Tool-Kits

The OASYS 80386 development tool-kit is now available on VAX/VMS, ULTRIX and other 68000-based systems. OASYS' 80386 compilers use extensive global optimization techniques and employ superior register allocation in generating dense code. Full support is provided for two floating point units, the Intel 80387 and the WEITEK 1167.

The OASYS C 80386 compiler may be used with host system debuggers, such as dbx, or with the OASYS C and FORTRAN Source Level Debuggers for debugging in cross mode. OASYS' Designer C++, an optional C++ front-end preprocessor, also is available with the OASYS 80386 C compiler. The 80386 compilers operate with other components of the OASYS 80386 Tool Kit, for example, editors, profilers and math libraries.

Find out more by contacting Michael Olfe, OASYS, 230 Second Ave., Waltham, MA 02154; (617) 890-7889.

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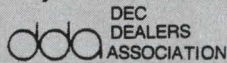
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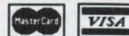
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BACK END

John C. Dvorak

This is turning out to be a strange year. It's getting

more weird as time goes by. Let's review some of the strange occurrences.

1. Sun Microsystems shenanigans — First, AT&T buys a piece of Sun Microsystems. People suspect a plot to corner the UNIX market. Meanwhile, Sun rolls out an 80386 machine, a 68020 machine and has a SPARC machine with its own proprietary chip inside it.

Can't these guys make up their minds? I always thought that Sun was supposed to compete with DEC. Now they're going in every direction and AT&T is riding shotgun. Weird, I'd say.

2. Chip wars — People are worried about Sun's SPARC chip. So Motorola rolls out an 88000 RISC chip, while Intel is hinting about its 80486. Micro-processor wars are just beginning.

3. IBM's indecision — At IBM, Bill Lowe, Entry Systems Division chief, makes noise about how IBM will never license the PS/2 patents. A few months later, someone else at IBM says it will license the architecture. Immediately, every Larry, Moe and Curly scramble to get a microchannel machine ready for shipping.

So much for all the malarkey that we'll see two IBM standards: microchannel and non-microchannel. By this time next year, the non-microchannel implementations will be fading faster than the S-100 bus did after the IBM PC was announced. Curiously, the ANSI specification has just come through committee for the S-100 bus, an incredible waste of time for the participants.

4. DEC/Apple silliness — DEC and Apple joined hands to skip around the Maypole for who knows why. VMS on a Mac should be amusing. Perhaps Apple will see how to do multitasking, and

DEC will learn how to do marketing.

5. Apple/Microsoft silliness — Apple decides to sue Microsoft for infringing on its patents and copyrights. Apple says that *Windows* release 2.03 goes beyond a 1985 agreement between Apple and Microsoft. Meanwhile, clumsy HP, a company that doesn't do anything right except pocket calculators and certain expensive instruments, gets caught in the web of intrigue because it brings out a Window-based interface called *New Wave*, which is, at best, a hokey copy of the Mac user interface. "Another John Young innovation!" chimes a friend of mine who's critical of the HP CEO. I have to agree. Even the name *New Wave* is so passe' that it's an embarrassment. I hope nobody at DEC worries about HP as a competitive threat in the years ahead.

6. UNIX to inherit the throne? — The above lawsuit results in grumbling from developers who hoped to make a killing by porting their Mac programs to the IBM environment. Everything is put on hold. The Microsoft chairman begins to fret and notices an ominous trend: People are spending too much time talking about UNIX as an operating system. They wouldn't be doing so if MS-DOS had what it takes to carry the ball of progress. But, it's stuck at 640K.

We must have OS/2 — a performance-sapping memory glutton which requires hot new machines to run efficiently. But, UNIX is a performance-sapping memory glutton, too. The machines that can handle OS/2 can handle UNIX, can't they? So now everyone's talking about UNIX like they did in 1982, as if it were the perfect answer.

7. Program upgrade jokes — All our favorite programs are being updated, *Wordstar*, *dBASE* and *Lotus 1-2-3*. The upgrades have a common denominator: The program size is larger and the pro-

gram isn't as sleek as the original. As the newer machines grow faster with more memory space, the software grows slower requiring more memory space. We're back where we started.

8. Network mania — The funniest event, to me, is the sudden popularity of networks and a surging increase in multiuser systems. I remember in 1977 when the first micros hit the market. The experts laughed at the little things. They only ran at about 100,000 instructions per second or .1 mips. "Not enough power to be called a real computer," said the skeptics, aware that an old IBM 1701 was no powerhouse. Now that 80386-based desktop machines are clocking in at four or more mips (with 10 mips just around the corner), the same skeptics are trying to push every single-user machine onto a network. Why are people so set against single-user machines? At first, they didn't have any power to be single-user machines; now they have so much power that they should be hooked to a network to sap their performance.

9. Laser printers as white elephants — Every Japanese company with a plastic extrusion plant is rolling out its version of a laser printer. It's beginning to look like the early days of the VCR wars when outlandish oddball formats like the Quasar cassette or the Sanyo V-Cord format were promoted. The battle ended when BASF gave up trying to push its crackpot streaming video recorder that ran the tape by a stationary head at an ungodly speed only to reverse at the end of the tape and race back the other way.

So in 1988, we're shown one laser printer after another, each with an incompatible cartridge system.

These are nine reasons why things are getting confused. Remember the year is only half over.



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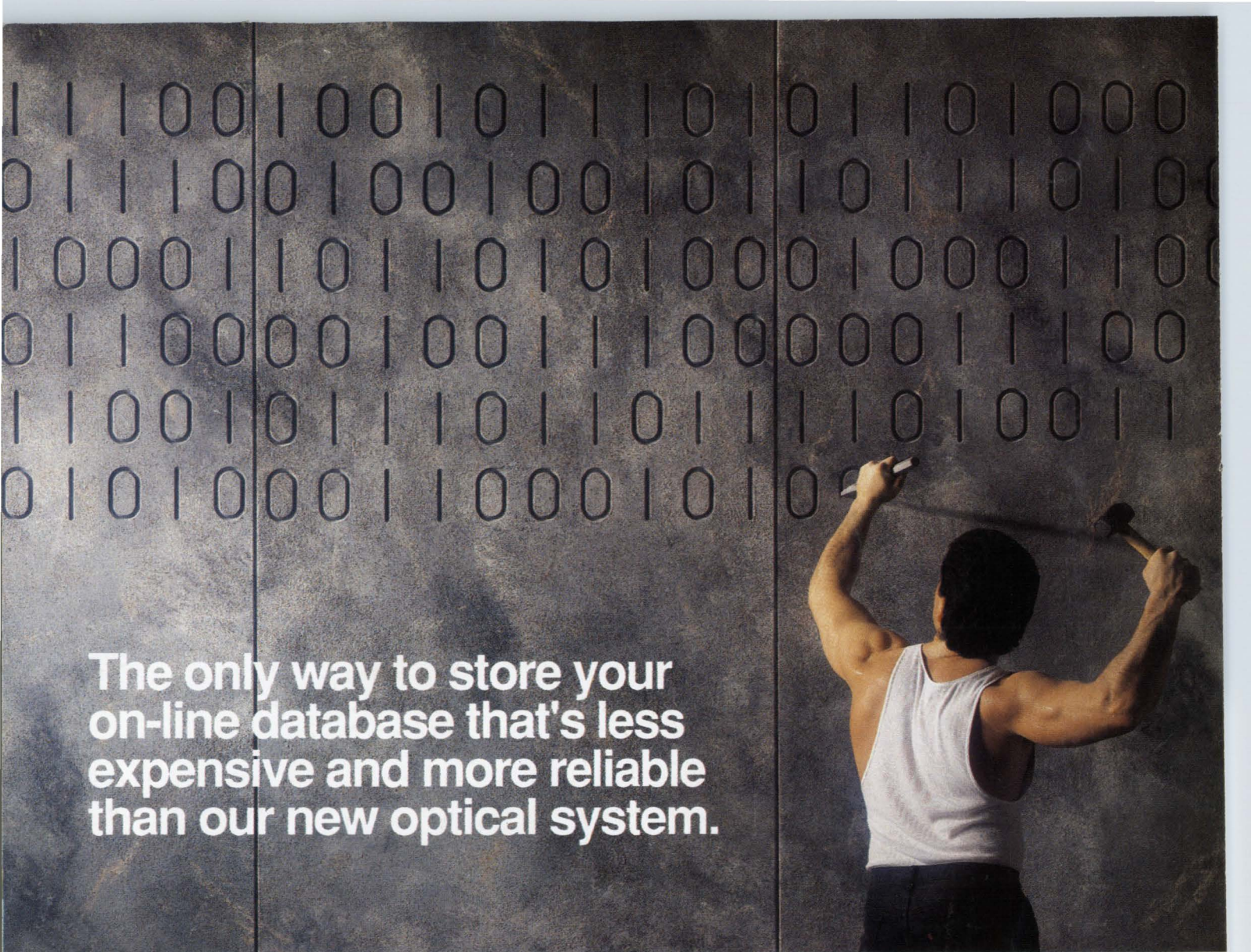
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