April 1990

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The Magazine of the North American Data General Users Group

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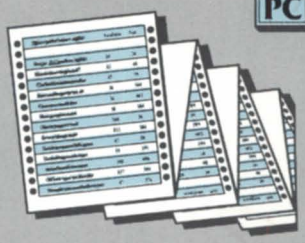

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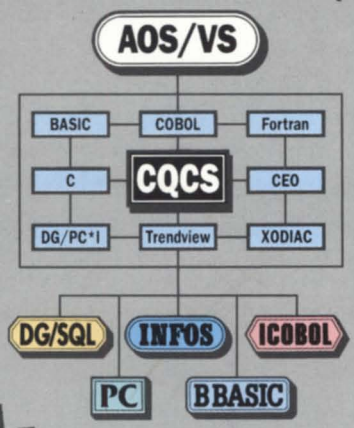

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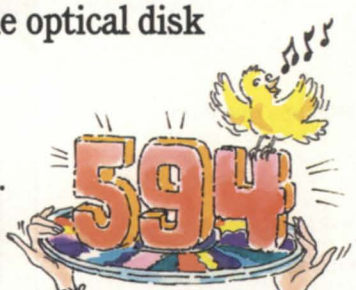

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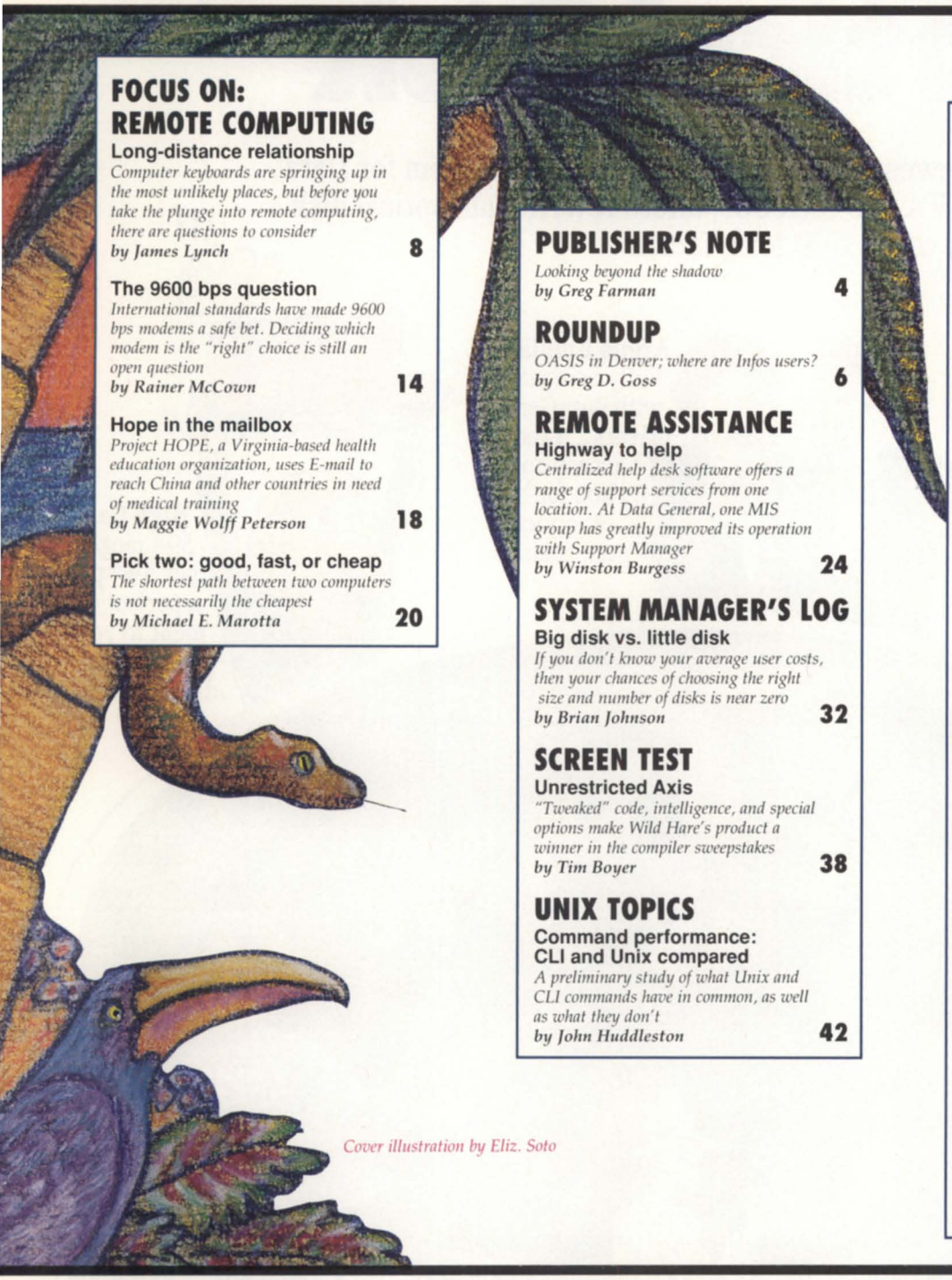

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Cover illustration by Eliz. Soto

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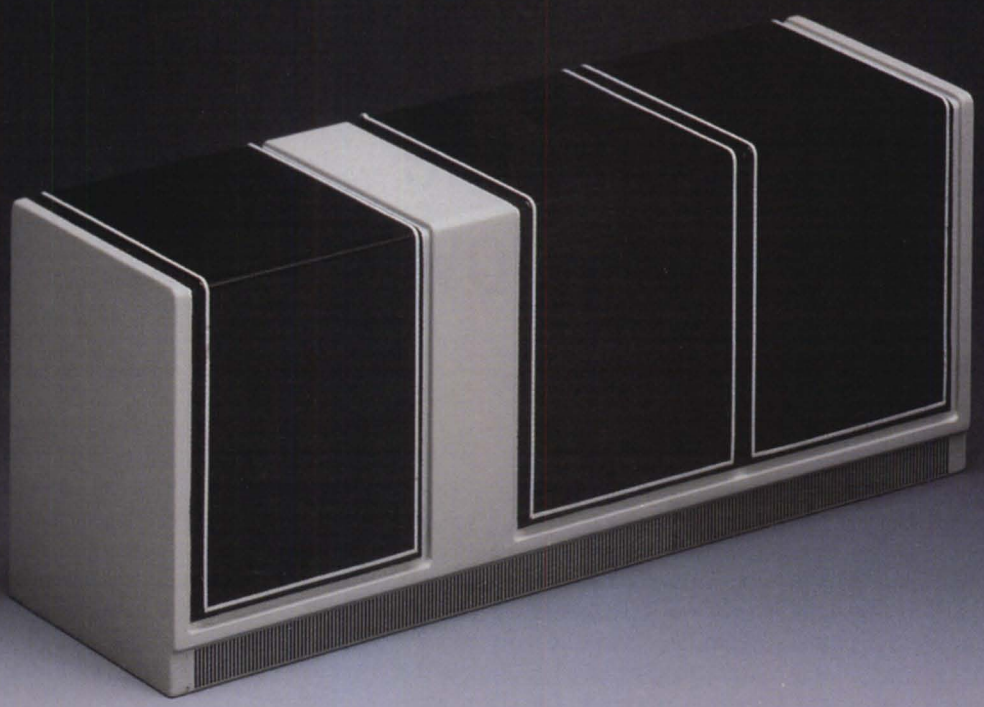

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TRBA

Looking beyond the shadow

How much confidence can you have in the business opinions of somebody who apparently considers it a reasonable thing to consult a fat marmot for its long-range weather forecast?

This obtuse line of thought came to mind because my Ground-hog Day celebration was interrupted this year by a very long phone call from one of the editors at *Computerworld*. She had made a curious observation while doing background work for a story about Data General's annual shareholders' meeting. As she had talked with some of the customers whose names DG had provided, she picked up an attitude that seemed odd to her. "The sense I get," she said, "is that users really love DG's products, but they feel extremely frustrated by the company." She wanted me to tell her whether it was true.

I had to admit that it wasn't the first time I'd heard the sentiment expressed. But I added that I considered "extremely frustrated" to be quite an improvement over what I used to hear about Data General. And I wasn't just being flippant.

I had a hard time explaining what I meant to the *Computerworld* editor. There has been a moderately antagonistic relationship between Data General and its customers for as long as I've been following this market (about eight years now). However, I don't think this in itself is unusual for our field.

In DG's case, however, the normal friction with customers has on a few occasions broken into near warfare. Perhaps you remember the early 1980s, when DG bought out DCC, a competing minicomputer company, then promptly dropped support for the EOS operating system. One disgruntled (and unbalanced) VAR was so upset he carried a handgun to the next user group meeting. Then there were the VAR wars of the mid-80s, when DG sales reps were openly competing with their VARs. And who could forget AOS /VS II?

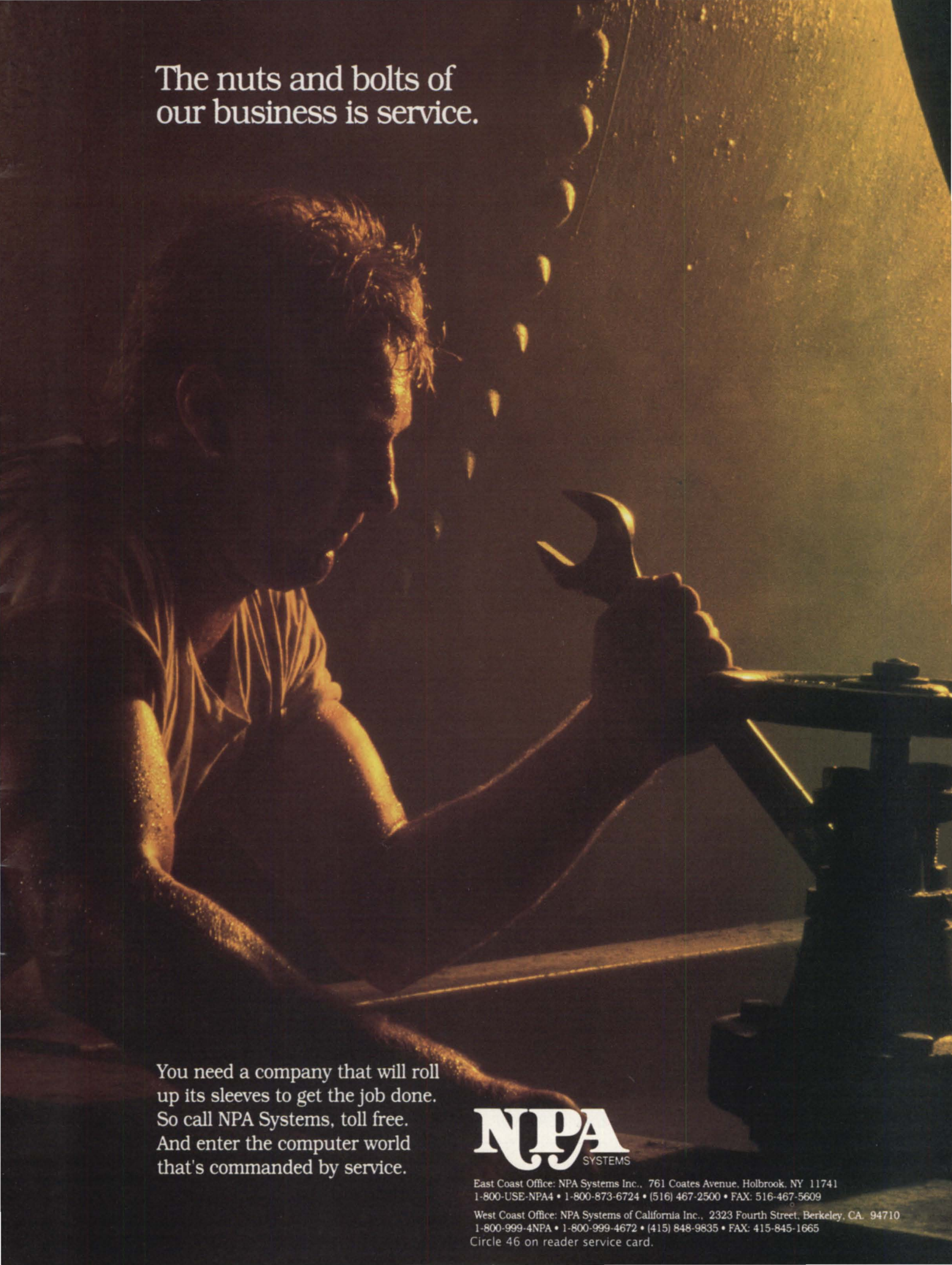
The first point I tried to make with the *Computerworld* editor was that Data General indeed has some serious blots on its history of customer relations, but nonetheless has a lot of very loyal customers. If you discount the theory that we are all masochists, you have to fall back on some other explanation. In my view, those of us who stayed in the DG fold did so because the good quality and excellent price/performance made it worth the hassle.

My second point was that I think things are changing. Perception frequently lags behind reality. The decision-makers at DG appear to realize that the competitive environment they now face doesn't allow for the kind of shenanigans that used to seem like standard operating procedures. Customer service is becoming one of the more powerful tools a company can use to promote customer loyalty. With all the changes in management that have occurred during the wrenching changes of the past three years, it seems that today's Data General is not the same company that earned the wrath of customers.

I see in Data General a company that looked at itself about three years ago and didn't like what it saw. It was organized along proprietary lines that assumed customers would continue to accept pretty much what they were given. The company's leaders deserve credit for recognizing that customers of the nineties wouldn't be in the mood to buy products that would tie them to just one vendor. Give them still more credit for determining—correctly, I think—the kinds of products the company could successfully produce and market to customers of the nineties. Yet more credit is due for coming up with a plan for transforming the company into an entity that can compete under the prevailing conditions of the nineties.

It's still too soon to tell whether the plan will succeed. Certainly, we can already see the kinds of products on which the company is betting its future, and they appear to be gaining a foothold in the Unix marketplace. That's a good sign. It's also apparent that DG is not turning its back on its current customers: several new MV processors promised for this year will make it a lot more attractive for users to stay with their current architecture. I also see results from the stronger emphasis on customer satisfaction. This last is a very good sign, although it will probably take a long time to make customers forget and forgive the past. As I said, perception frequently lags behind reality.

That was my long answer to the *Computerworld* editor's short question. Yes, users are loyal yet frustrated, but the frustration seems to be more a shadow cast by past actions than something earned by current decisions. Certainly, frustrated customers are better than angry customers, but not nearly as good as happy customers. So even though Data General has embarked on a course that is taking it in the right direction, the journey is far from finished. Δ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OASIS in Denver; where are Infos users?

OASIS (Office Automation Special Interest Subcommittee) will present a seminar May 17-18 at the Sheraton Denver Tech Center. Topics include hardware /software support, a Wordperfect vs. CEOwrite debate, CEO Object Office, encrypting documents, and local area networks. There will also be an open forum for information exchange. Registration cost (before May 4) is $250. For more information, contact **Charlene Kirian** at 704/251-9551.

■

The **Law Enforcement Data General's User Group (LEDGUG)** will hold its seventh annual training conference May 6-9. Billed as the "World's Greatest One Time Deal," the conference will be held at the Ramada Ocean Front Resort in Satellite Beach, Florida, and hosted by the Cocoa Beach Police Department. Call **Al Devitt** at 402/593-2334 for more information.

■

The next meeting of **LA EDGE (Los Angeles End Users of Data General Equipment)** will be Tuesday, May 1, at 7 p.m. at the Brookside Country Club in Pasadena. A reception hosted by DMS will begin at 6 p.m., followed by presentations from different vendors of utility software.

For more information about LA EDGE and its activities, contact **Mark Speer** at 818/897-7777 or **Carolyn Naber** at 818 /793-2141.

■

Are you interested in exchanging ideas and knowledge with other users of Infos? Would you like to help define and prioritize enhancements to the Infos product? How about meeting once a year with other users of Infos? These are all functions of a special interest group devoted to Infos users.

If you are interested in being a part of the Infos SIG, please call me at 1-800 /877-4787. I will send you a questionnaire prepared by **Jim Siegman** of the **Infos SIG**, who is interested in finding out what other users of Infos are looking for in a special interest group. You may reach Jim directly at 708/673-1700.

■

The annual conference of the **Data General User Group** (for users in the United Kingdom) will be held April 5-6 at the Cumberland Hotel in London. DG President and CEO **Ron Skates**, and **Mike Harrison**, the UK's general manager, will present a program on DG's strategy for the nineties, both generally and specific to the UK.

One afternoon session, organized by user group Executive Committee members **Chris Everett** of **Hamlet Computer Group** and **Nick Pond** of **Heron Homes Limited,** will be devoted to users of smaller Data General systems. The session is geared toward those using small MVs running AOS/VS, Data General PCs, RDOS, Business Basic, and ICobol. Δ

Greg D. Goss is the RIG/SIG coordinator for NADGUG. He may be reached at ***Focus*** *magazine, 4807 Spicewood Springs Rd., Suite 3150, Austin, TX 78759; 1-512/345-5316 or 1/800-USR-GRUP.*

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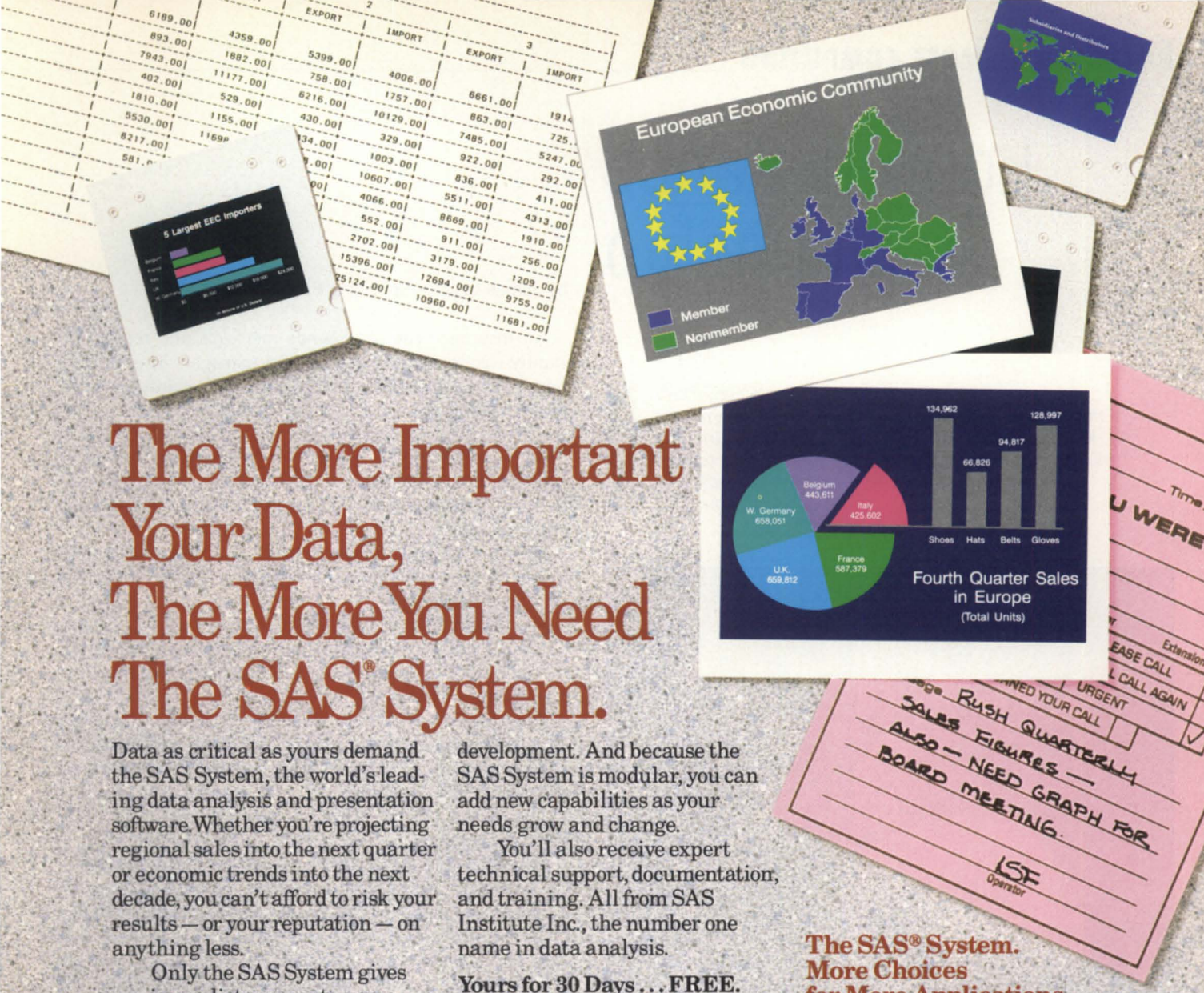

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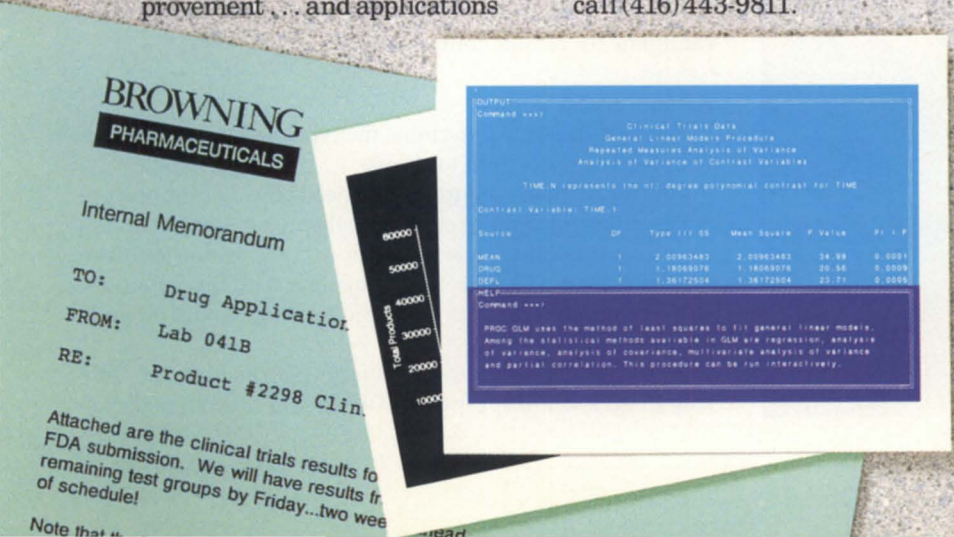

Long-distance relationship

by James Lynch • Special to Focus

SYNOPSIS

PC or terminal? On-line or distributed? Computer keyboards are springing up in the most unlikely places, but before you take the plunge into remote computing, there are a number of questions to consider.

An insurance company sends messages and reports instantly, electronically to its field sales managers. The information is downloaded from central mini and mainframe computers to sales offices all over the country.

A manufacturing company communicates with its remote plants electronically. The plants use PCs for local processing and then upload the data to the home office. They also use terminal emulation to run order entry programs on the home office computer.

An office supply company uploads daily transactions from its retail stores each night, updating financial and inventory data bases on the MV.

A traveling sales rep visiting a customer uses a portable terminal to dial into the company's minicomputer to enter the customer's order, check for back orders, and build a quote on some future business.

These are examples of remote computing being done today with Data General systems. Before you attempt to build a remote computing network of your own, there are several issues you need to consider.

Your environment

First, let's examine the flow of information within your organization. Information flow includes data, orders, reports, phone messages, phone calls, faxes, overnight mail, UPS, and other mailings to people or processes within or connected to your organization. How does your company operate today? What is done manually, rather than electronically? Follow the flow of paper through the organization and determine where it can be transferred electronically.

Do you have remote sales people or branch offices that need to communicate between themselves and the home office? Do you have remote manufacturing or service facilities that need to share centralized information and data bases? Do you have customers, dealers, or distributors that would like to place orders electronically and receive their order status reports daily instead of once or twice a week? If you answered yes to any of these questions, your organization is a candidate for remote computing.

Remote access

The first step is to determine the type of data or programs your remote users need to access.

On-line. If all the programs you need already exist and operate on the home office computer, then your best option is a direct connection with a terminal, or a PC with a terminal emulator over a leased or dial-up line. Usually, minicomputer programs and data bases are too large to distribute to all the remote locations.

When you need up-to-the-minute information, the only way to go is on-line, especially when you need to make ac-

count inquiries and updates. The latest twist in the on-line scenario is a peer-to-peer connection between the PC and the MV. The PC runs a menu-driven forms front-end that interacts with local data bases on the PC, as well as an Oracle data base on the MV. This is complex, but you will see more applications like this as data base vendors develop application program interfaces that work over networks.

Distributed/Wide Area Networks.

When your data is not time-critical, or when you have a large number of remotes, it's better to distribute some of the home office applications onto PCs in the field.

PCs can be used for data entry. PC software pre-processes the data as it is entered and formats it before sending it to the home office. This reduces the load on the home office computer and places the responsibility for data integrity onto the remote locations.

PCs can be used for file transfer. After the data is entered on the PC, you can transmit the data to the home office to be read into data bases or programs, or sent to other users. For example, orders can be entered in the field and sent to sales administration for electronic processing; customer information can be sent in to update the customer master file at the central site; sales activity reports can be sent to management, where they are compiled into one spreadsheet that computes your quarterly forecast.

PCs can be used for data display and reporting. Do you print reports in the home office and then mail them to your remote locations, branches, and customers? Why not mail them electronically? The reports get there instantly, the data is more accurate and timely, and you save both postage and paper. You can design reporting applications on PCs using spreadsheets and word processing so your remote users can manipulate the data to meet their needs.

Electronic mail is the glue that brings all these pieces together into an overall application platform. Mail is a concept that even novice users can grasp. Data, reports, and messages can be routed to programs, data bases, or other users within the network. E-mail also cuts the amount of phone calls into and out of your company.

Know your users

The type of users in your remote locations often determine which applications you distribute and which you keep centralized.

Company employees: If the users are employees, you have some control over the environment. You can usually mandate that they use certain software or hardware, and you can call on management if there are problems.

Customers and distributors: If you provide remote computing to someone outside your company, then you have to give them an incentive to use your service. What does remote computing do for them? Will their orders be filled more quickly? Can they get up-to-the-minute order status information? Can they communicate with their in-house sales ad-

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ministrator? Once you build these services, they become a competitive advantage and can lock-in customers to your business.

International locations: These require special attention because they are *very* remote. Leased lines are expensive. Line noise on dial-up lines can result in disconnections or bad characters. Terminal emulation works for minor applications that don't require much screen manipulation. The least expensive way to communicate with these sites is to use an error correcting file transfer protocol or error correcting modems that support MNP or V.42 standards. If you can afford the investment, the best way to communicate internationally is through X.25 packet switching public data networks. These networks have local connections in business centers throughout the world for dial-up and PAD support.

Time, and other constraints

Are your users PC literate? Or can they barely handle a typewriter? You don't want to start your users out with a mouse-driven Windows application if they've never seen a PC before. The easier the remote software is to use, the less time you have to spend hand-holding.

Are the users responsible? Will they log off the network correctly before they go home for the weekend? This determines how you write your software, and whether it is distributed or on-line.

What about security? If you allow on-line dial-up terminal access to your system, you must first build a password and security system that protects your home office system from hackers, disgruntled users, or competitors. A good solution is a modem call-back setup where the users dial in and prompt the home office system to call them back. That way you have a record of the phone call as well as another layer of security.

If you have problems with people dialing into your system, then the distributed approach may be more appropriate. You can limit connections to your machine to file transfer only, with no terminal emulation. If anyone or anything tries to run something other than a file transfer, they are automatically logged off.

Do you have 5 distributors or 105? Branch offices that employ five or more people can usually justify a leased line with multiplexors for terminal access to the home office system. However, if you have 100 salespeople located throughout the country, consider a distributed approach.

Look at the frequency the remotes will need to access your system, and see if your system can currently handle it. Will you be able to add more ports for on-line usage or will you have to buy an expansion chassis or upgrade the system?

Phone charges are another major issue. With leased lines, you can determine the costs up front, but with dial-up, your remote users determine the usage. On-line terminal access charges add up quickly. You can also run into a port contention problem.

For example, at 9 a.m., everyone on the East Coast logs on to the system, then at 10 a.m., eastern standard time, everyone

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in the Midwest logs on. By 11 a.m. EST, no ports are available for the western region. These people have to wait until after 5 p.m. EST to get a port. If you can't add more ports, then you'll need to assign times when people can use the system, or go to a distributed approach.

PC or terminal at remote sites?

This issue focuses mainly on people who are considering the on-line approach. A terminal is much easier to support. If you have problems with software, it's all on the MV and not on a PC. There is also a difference in the cost of the hardware. You can get a terminal and a modem for under $500, but a low-end PC and modem will be between $1,000 and $1,500. The potential for expansion is much greater with a PC. You can add word processing, spreadsheets, data bases, and other applications that may justify the cost. Many locations may already have PCs. In that case, all you'll need is a modem and the software.

The support of a remote PC network can be taxing on your time and resources if your users are not PC literate. Data security and backups are vital on a PC, and less vital with a terminal. It's entirely possible for a PC user to reformat his or her hard disk and destroy all the data if they don't know what they're doing. It may be easier to start with terminals and then add PCs later, if you do not have a support organization in the home office or at the remote sites.

Distributed remote solutions

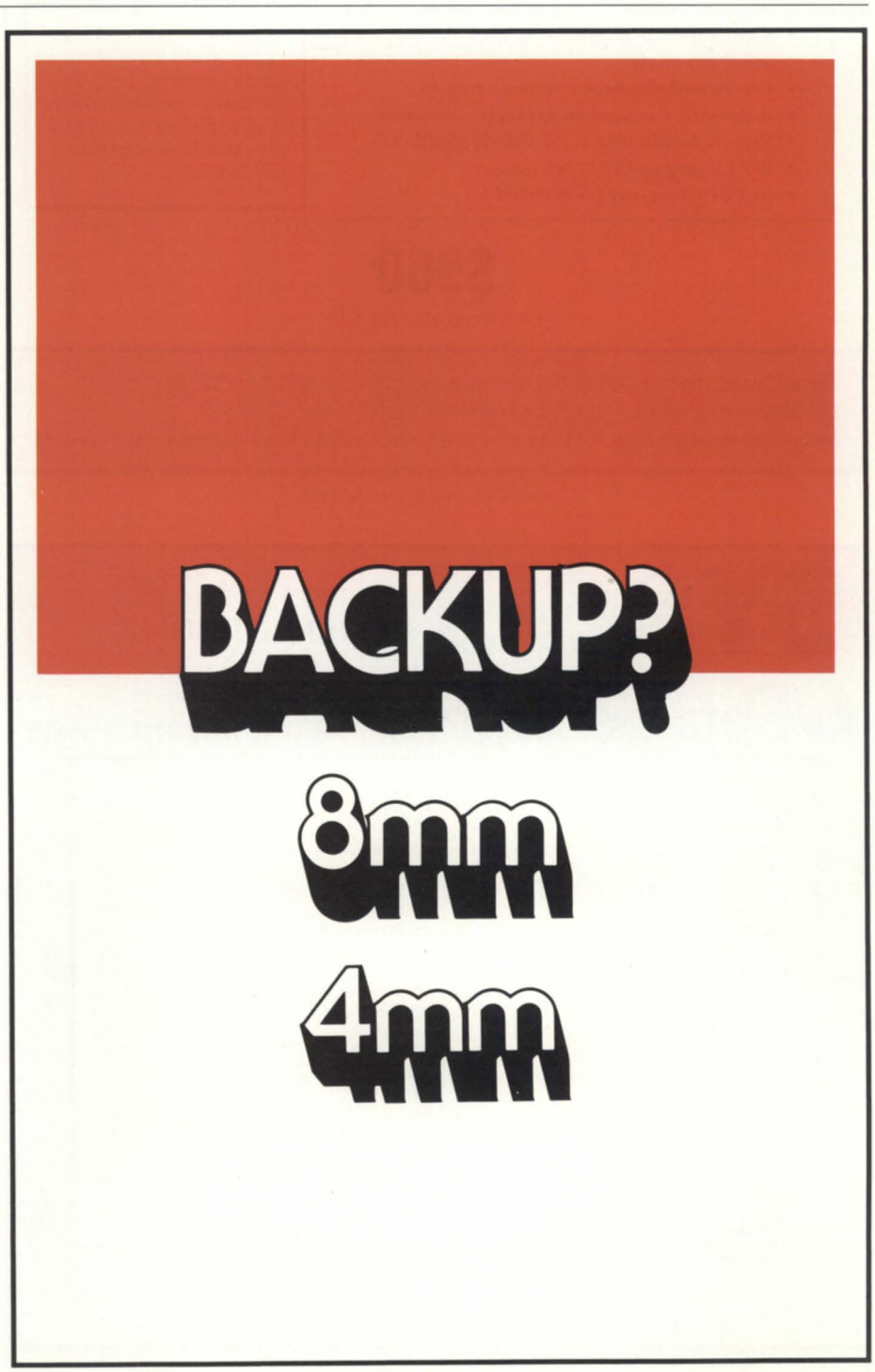
When you make a list, you always run the risk of leaving someone out. Keeping that in mind (plus my own personal biases), here is a list of solutions for remote computing with Data General computers.

1) *US&T Express,* a software platform /network supporting CEO compatible electronic mail, application front-ends, file transfer, and minicomputer and mainframe interfaces. There is a terminal emulator available for on-line access and a built-in script interpreter for complex dialing sequences. US&T Express supports large numbers of remote PCs, and is easy to use, even for first time PC users. It can be modified to meet your customers' needs. Express is primarily designed for the distributed approach.

2) *PC/Remote* combines terminal emulation with LAN-like service, virtual disk and file transfer services, remote printing (printer redirection to MV printers), electronic mail and mail notification, remote CLI command execution, and a powerful transport-layer interface for user-developed applications. It is a well established product with a growth path to LAN products. PC/Remote is suited for on-line and distributed environments.

3) *Terminal emulators with file transfer:* Smart Term 410 and 470, Pop Term 410 (part of PC remote), EMU470, @ConPC—all of these packages work very well and are installed at many DG sites. They all support file transfer along with terminal emulation.

4) *CEO Connection:* A combination of terminal emulation and Blast. Connection is halfway between distributed and



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- *WP Library and CEO interfaces*
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on-line. To use CEO, you must be on-line, but you can transfer files from the PC to the MV (Blast is built into the product.)

5) *Blast*, the old standard. If you need to transfer files from computer to computer, Blast will do it. Blast supports everything from PCs to Apples to mainframes.

6) *Various X and Ymodem protocols:* Turbotran is available from Data Bank Associates, Inc. TEX and ACK are MV-based programs providing emulation and file transfers from the MV. They can also work in slave mode to allow file transfers from a remote site. On the PC you can use any of the popular PC comms packages like Crosstalk, Procomm, and Boyan. There are also many products available on bulletin boards. These are loosely supported, but if you are a hacker, you can usually get them working and save yourself some dollars.

7) *Compression:* WFFCA, ARC, and ZIP. If you will be transferring files, then you should use a compression algorithm on the PC and the MV. Compression will decrease the amount of data that you transmit between 30 to 70 percent, depending on the type of file. This means reducing your phone bill between 30 and 70 percent. US&T Express and Blast-II have integrated file compressors built into the products.

On-line terminal access solutions

Terminal with modem for dial-up or leased line: Any DG-compatible terminal will do, and you can pick up a 2400 baud modem for just over $100. Leased lines are expensive, and are only justified if you are weighing the cost of putting another minicomputer in the remote location versus terminals. The installation of the line will cost between $1,500 and $2,500, depending on the distance, and the monthly fee will be between $500 and $1,200. These charges will vary depending on whether the lines are in-state or AT&T long distance lines.

PC with a modem and a terminal emulator: Here all you need is a modem card for your PC or an external modem and a serial port on your PC. Load up one of the terminal emulators described in the previous section and you're in business. All of the terminal emulator vendors will be glad to help you with the setup.

D:Drive does exactly what its name describes. It creates an MS-DOS compat-

ible drive on the MV that can be manipulated from the PC. A terminal emulator is included for on-line access and modem support. Information generated on the MV can be accessed by personal computer applications.

Walkabout portable terminal with modem: The Walkabout was designed to support DG, DEC, and IBM terminal emulation all in one box. The product is very light and portable and has some nice built-in features like a notebook for text editing, a phonebook for storing dial-up scripts, a reminder facility, built-in 1200 or 2400 baud modem, and rechargeable batteries. Just remember that this is not a PC. It is a portable terminal with a built-in modem. This is an excellent product for people who travel or move around frequently and need to access MV applications. Call your local DG sales rep for more information.

Selling the benefits

Remote computing can be a tough concept to justify because some of its benefits are intangible. However, there are enough major tangible benefits that give you the ammunition to get the ball rolling. Let's examine these tangible benefits first:

- A reduction in your phone charges if you use the distributed approach. Companies save thousands of dollars each month by eliminating on-line usage where it is not necessary and reducing telephone tag and chit-chat between the field and home office personnel.
- Lower costs for postage for mailing reports and memos. Look at what your company is spending on mailings to the field, overnight mail, and UPS charges. If you're not printing out as many reports at the home office, you can get rid of that 1200 lpm printer.
- Fewer faxes going to the field. Faxes get the information there, but it starts out as paper, and ends up as paper. Why not keep it electronic?

Some of the intangible benefits:

- Your orders will get processed faster, and sales reps will get commissions faster.
- Faster flow of information through the organization.
- A reduction in the number of steps and time involved in a process. Instead of two weeks to turn around an order, do it in a day. You'll also get paid faster.
- More accurate, timely information, and a competitive advantage—another service you can offer your customers.

Jim Lynch is the vice president of marketing at Unified Solutions and Technologies, Inc. He can be reached at 5 Airport Drive, Hopedale, MA 01747; 508/478-8211.

Final comments

You now have many questions to ask yourself and your company. Get the answers *before* you spend any money, or you may end up wasting your time and money on a solution that just doesn't work with your environment. Look at your business. Look at the steps involved in the process. Get pilots and loaners with software and hardware before you implement your companywide solution. Most important of all, keep it electronic! Δ

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Price Includes Controller	YES	YES	YES	YES
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Supports ANSI Labeled Tapes	YES	NO	YES	NO
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Runs all Revs AOS/VS & VSII	YES	NO	YES	NO

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Tabletop Enclosure	YES	Not Available	Not Available	Not Available
Automatic CPU Sharing	YES	Not Available	Not Available	Not Available
Number of Shared CPU's	3	Not Available	Not Available	Not Available
Supports ANSI Labeled Tapes	YES	Not Available	Not Available	Not Available
Runs DG DMTRELI	YES	Not Available	Not Available	Not Available
Runs all Revs AOS/VS & VSII	YES	Not Available	Not Available	Not Available

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The 9600 bps question

SYNOPSIS

International standards make 9600 bps modems a safe bet. Deciding which modem is the "right" choice is still an open question.

by Rainer McCown
Special to Focus

I remember thinking 20 years ago that it would be great to upgrade my communications from a 110 baud teletype to a 300 baud TI Silent Writer terminal. My boss gave me the same arguments we get today: Why change what we know works? The other end doesn't have one, so why should we? They charge more for the high-speed line! You can't read that fast anyway! Most of the time is spent doing things other than sending files and so the extra speed is just wasted! You can't justify the cost!

Needless to say, we eventually went to 300 baud, then 1200 bps (bits per second), and now 2400 bps. Now I can buy what I want, but I still have these same arguments with myself (the advantage is that I always win).

The decision to buy

If you are in the market for a new

How do modems achieve high bit rates?

The bandwidth of the telephone line is generally assumed to be between 300 to 3000 hertz. Full duplex operation means that data can be transferred in both directions simultaneously; this requires that one half of the bandwidth be devoted to each direction. The word modem comes from MOdulate DEModulate. The thing that was modulated was a tone sent over the phone lines.

Two tones are required to send a bit of information. A "one" bit is represented by one tone and a "zero" bit by a second. Thus, the four tones (two in each direction) each have one quarter of the band width; this limits the band width to about 675 baud (3000-300=2700, 2700/4=675).

To get more data throughput, we can encode multiple data bits into each "tone." In addition to the multiple tone encoding technique discussed in the main article, we can use different amplitudes for each tone. Thus we can encode two bits of information into each packet (or baud) by using four different states (two tones times two amplitudes). The early low-speed modems used tones to represent different states.

Then it was discovered that using the phase change of the signal rather than frequency change was better because phase-locked loops (PLL) could be used to detect signal changes with more accuracy. The 9600 bps modems have so many predefined states (combinations of phases and amplitudes), that special circuits are used to recalibrate the modems on every state change.

Another technique to achieve high bit rates is to use statistical principles to keep the overall error rate low. The acceptable data error rate puts limits on the bit packing densities. By using error detection and correction techniques, the transmission bit error rates can be allowed to rise considerably, letting the error correction circuits hold the overall error rate down to acceptable levels. Δ

modem, now is a good time to buy a 9600 bps model. The technology is reasonably settled and international standards have been adopted. A modem purchased today will be useful for many years to come. The "settled technology" issue means that buying a 2400 bps modem now and buying a 9600 bps modem "in a couple of years when the price comes down" is not economically justifiable. The price will not come down enough to compensate for the price of the slower modem purchased today.

If you don't need a new modem, the decision to buy a 9600 bps modem is not as clear cut. In some cases, you can demonstrate a cost advantage by showing that the reduction in long-distance charges will eventually pay for the new modem. Perhaps a 9600 bps modem would improve the impact of an on-site or convention booth demonstration. The possibility of increased sales is a "gut feel" justification. If you have customers that dial into your system or bulletin board, then being able to mention your 9600 bps, autobauding modem could be worth it from the advertising potential.

Once you decide to buy a new modem, how do you know which one is right for you? The purpose of this article is to shed light on the subject by defining the terms and features associated with modems.

Baud vs. bps

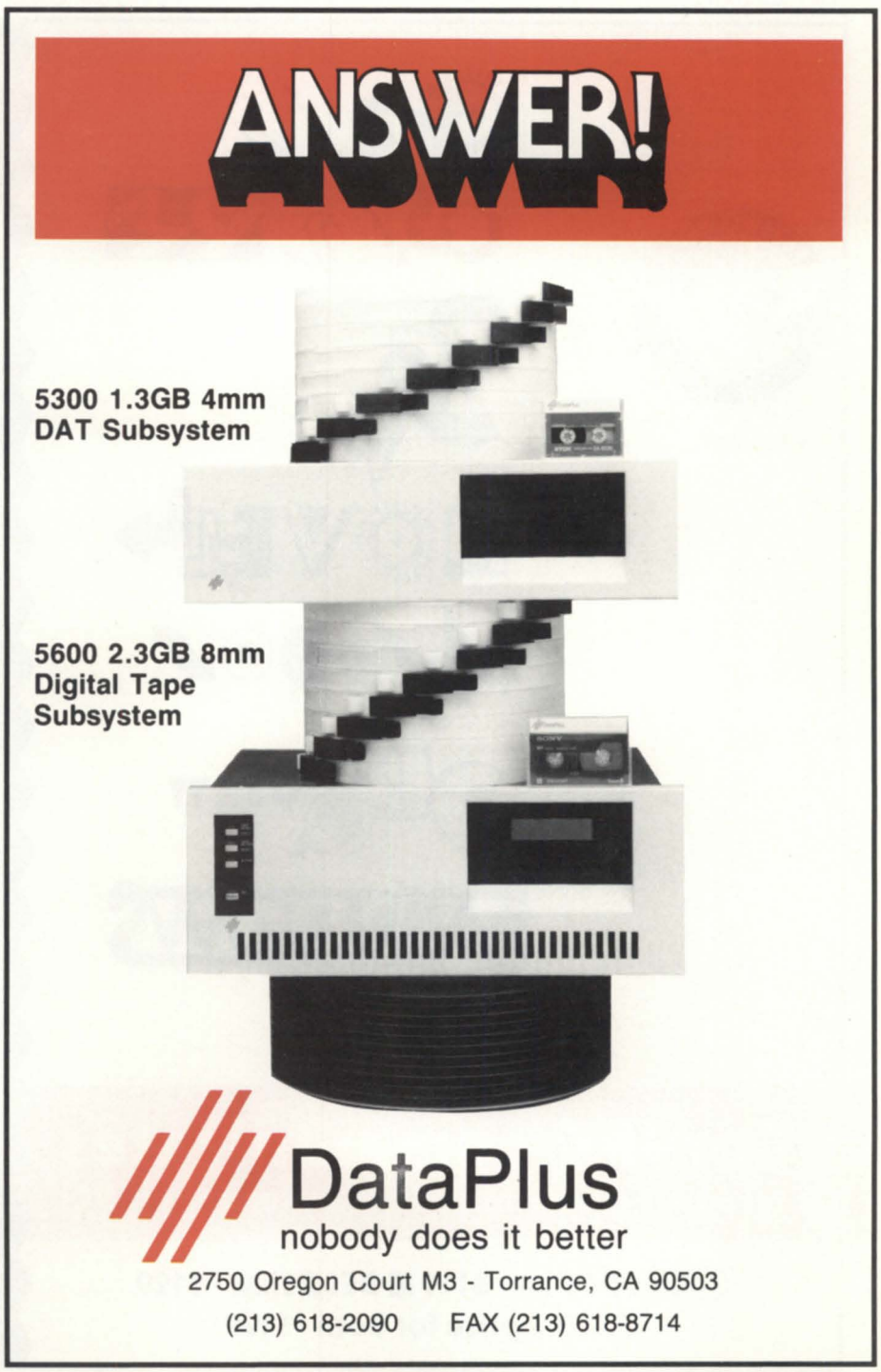
The bps is the number of bits per second transferred between computers (it takes 8 bits to define one extended ASCII character). In high-speed modems, information is transferred in baud (packets of bits). Baud refers to the number of times that information changes, while bits per second (bps) is related to the total amount of information transferred. A baud is one information packet.

For example, let's pretend that we need to send binary 111 (3 bits). The modem needs one of eight different tones to send three bits. The first tone is for the 000 bit combination; the second tone is for the 001 combination; the third tone is for the 010 combination; the fourth tone is for the 011 combination; the fifth tone is for the 100 combination; the sixth tone is for the 101 combination; the seventh tone is for the 110 combination, and the eighth tone is for the 111 combination.

Thus, the modem sends the eighth tone to represent the original 3 bits. That tone is one baud. A modem might transfer 1800 bps, but run at 600 baud rate (1800 /3 equals 600). The number of bps will be equal to or greater than the baud rate. (See the sidebar for a basic understanding of how this is done.)

Data compression

V.32 is the international standard protocol definition for 9600 bps full duplex modems as defined by the Consultative Committee for International Telegraph and Telephone (CCITT). Besides the protocol standards, data compression and error correction techniques are being standardized. Microcom has been a leader in defining data compression and error correction techniques with different class levels 1 through 9. As the class number increases, the definitions become more



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sophisticated and efficient. Each class is a superset of the lower classes.

Microcom Network Protocol (MNP) class 5 has become the de facto standard for data compression and error correction for most modem manufacturers. CCITT has entered the data compression and error correction standards arena with V.42 and now V.42bis.

A benefit of data compression is that the modem can adjust to various data rates. It can talk to the computer at a rate different from the rate it talks to the phone lines. This is because data compression between the modems will effectively vary the data rate to the computer depending on the compression efficiency. For example, a 9600 bps modem can be connected to a Data General asynchronous port at 19,200 bps and talk to a user at 2400 bps. It is not necessary for the Data General computer to adjust to the caller's modem rate. On the down side, neither transfer time estimates based on the file size nor the computer port rate are very meaningful.

Bigger, hotter

Several characteristics typify the 9600 bps modems currently available. The footprints are slightly larger than those of their 1200 or 2400 bps cousins. The average 9600 bps modem measures 1.5 to 2 inches high, 7 to 8.5 inches wide, and 11 to 12.5 inches deep. The cabling is done at the back, so extra room is required there. Built-in speakers keep you informed of the line status until the modems have connected. Front panel lights indicate line/modem status.

An external power transformer at the end of the power cord keeps much of the heat out of the modem itself. The trend appears to be toward the external power supply, which in my opinion has several annoying characteristics. It can be so big that it blocks the other outlets on the same location, and it is always on, drawing power even if the modem itself is turned off. (You can verify this by noting that it tends to stay warm even if the device being powered is off.)

Modems compared

In a future article, I will compare and test 9600 bps modems from several of the top manufacturers: the Multi Tech Multi Modem V32 with MNP class 5 and transfer rates of 9600/4800/2400/1200/300 bps; the USRobotics Courier HST dual standard that combines the original HST protocol (used by many PC bulletin boards) with the V.32 standard; and the Microcom QX/V.32c modem with MNP class 9. Data types to be tested will include straight text, compressed text, executable binary (program files), and image data. I hope my experience with these modems will shed some light on the plethora of products available. Δ

(Copyright © 1990, by Rainer McCown.)
Rainer McCown is president of Rhintek, Inc., a Data General system software ISV since 1977. He has been heavily involved in interconnecting PCs and DG minis. He may be reached at P.O. Box 220, Columbia, MD 21045; 301/730-2575.

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Hope in the mailbox

SYNOPSIS

Project HOPE, a Virginia-based health education organization, uses E-mail to reach staff in China and other countries in need of medical training.

by Maggie Wolff Peterson
Special to Focus

Right now, in an office somewhere in the developing world, a clerk is composing a message critical to the operation of a multi-million dollar health education program being directed half a world away.

The clerk sits down at his PC, executes a few uncomplicated commands and a message screen appears. He types his message, a request for review of his regular, quarterly report. With a single keystroke he appends the report, written in Wordperfect, to his message. Then he types "enter," and the machine automatically accesses the nearest X.25 data network, logs on, calls headquarters, transmits the message, checks for return mail, and hangs up. The process takes about two minutes.

This clerk is not a computer wizard. He may have never touched a computer—or even a typewriter—before beginning work with Project HOPE (Health Opportunities for People Everywhere), a nonprofit international health education foundation based in Virginia.

But with US&T Express, software developed for use on Data General hardware, the clerk can send electronic mail from his PC to the main computer at HOPE Center, Project HOPE's headquarters in the Shenandoah Valley. The program's user-friendliness allows the clerk to use it with little more than training by telephone.

Quick, easy, reliable communications are essential to Project HOPE. With program sites on five continents, and in nearly every time zone, HOPE has information to handle at every hour of the day.

There are medical supplies to be ordered, program changes to be approved, updates to be transmitted. A wait of weeks, or even days, would be wasteful to an individual program scheduled for only a year or two.

"Typically, the people that use this in the field are secretaries and support people," said Mark Fuller, HOPE systems administrator. "Many times, English is not their primary language. Support is done on the telephone. Anything that's complex is difficult to support."

Expense is another consideration. HOPE is known around the world as a cost-effective organization that spends about 90 percent of donated funds on services and very little on administration.

Since 1958, Project HOPE has brought the world improved health through education. American physicians, nurses, and allied health personnel are sent to countries that request HOPE's help. HOPE professionals teach advanced medical techniques to indigenous health personnel, who then extend the improvements throughout their own health systems.

From 1960 to 1974, Project HOPE was based on the S.S. HOPE, the world's first peace-time hospital ship. It was common during those years to see the HOPE featured on television newscasts as she embarked with a cargo of medical personnel for a destination eager for her arrival.

The seventies were a time of relocation and growth for HOPE. The ship was retired, programs became land-based and HOPE's reach around the world expanded to a current roster of program sites in 20 countries.

Today, HOPE's electronic mail network includes program sites in Belize, Brazil, China, Costa Rica, Grenada, Guatemala, Honduras, and the United States. Connections to Swaziland, Indonesia, Poland, Portugal, Ecuador, and Soviet Armenia are planned. As HOPE's scope of work broadens, the need for expedient, reliable, inexpensive communication increases.

We have to go through multiple networks; from Armenia, you go through the Moscow network, IASNet. Then you reach multiple gateways to the rest of the world.

— Mark Fuller, HOPE systems administrator

Before international electronic mail, HOPE communicated with program sites via telephone, telex, or mail. But telephone lines are not reliable in many of the countries in which HOPE has programs. International mail service can take up to 10 days. And telex communications can become muddied when messages are shortened to reduce costs.

Originally, HOPE's electronic mail system was based on using a PC running a terminal emulator, accessing data networks via telephone, and typing messages

while connected long-distance. Messaging costs of $600 to $700 per month per program site were typical.

Besides expense, unreliability was a constant problem. The routine failure of international telephone communications resulted in many half-finished messages.

Now, messages are composed before telephone lines are accessed. According to Ernie Borgel, HOPE's director of information management services, connection time has been reduced by 80 to 90 percent, with consequent savings in costs and transmission failures. According to Borgel, now it is nearly impossible for a single transmission to exceed $10, even for a long document.

"You compose your message, dial up and connect with the host, pick up any messages waiting for you and hang up," Borgel said. "Your connection time becomes data transfer only."

"Your answer comes back to your desk in minutes," said John Wilhelm, M.D., regional director of programs in Central America, South America, and the Caribbean.

Dr. Wilhelm was on-site program director in Grenada in late 1986, when HOPE established an electronic mail link there. "It became an essential tool," he said. "It's appropriate to show advanced computer technology to our counterparts when our mission is based on teaching them advanced methods of all sorts."

At HOPE Center, US&T Express integrates with a CEO in-house mail system, allowing program administrators to check their international in-box without having to learn many new keyboard functions. Because the system can import files as they were originally formatted, it is easy for administrators to work jointly with site personnel thousands of miles away.

"In China, they send a message during their daytime and it arrives at HOPE Center during our night," Fuller said. "We work on it while they sleep and they get their answer when they come to work in the morning."

US&T Express also makes it easy to convert electronic mail to paper with the touch of a print key. "A phone call is not as focused as this," said Dr. Wilhelm, who oversees programs in 12 countries. "You get a hard copy, so you can document what is said."

Software developer Stan Gula created US&T Express in 1985 for an American insurance company that needed to communicate with its agents in the field. Equipped with laptop computers and modems, agents could send orders and other information. In 1988, Gula formed his own company, Unified Solutions and Technologies, to market the product. At that time, US&T Express was rewritten to improve its performance and marketability. Project HOPE was the first organization to use US&T Express internationally.

The program is designed around the personal computer, Fuller said. "It uses the PC the way the PC keyboard is laid out. Everything is very intuitive."

Three features that attracted Fuller to US&T Express are its ability to compress data for faster transmission, its 32-bit CRC that makes transmission "effectively error-free," and its Zmodem protocol that "only sends back NAKs," Fuller said. "It assumes all the data is good."

Zmodem is an especially effective protocol for international electronic mail. Typically, packet delays on international networks run 10 to 15 seconds. "If you want to turn it around (receive to transmit), you have to double that," Fuller said. "If you turn the line around after every block, your transmission time gets that long."

The biggest challenge, Fuller said, has been securing initial access to data networks around the world. Each network requires a different sequence of commands that Fuller must learn, then program into US&T script processing language, where it is automatically repeated each time a transmission is made. Fuller uses a PC at HOPE Center to call each data network and work through the series of commands necessary for transmission.

The connection to Armenia, on which work is now beginning, will be a special challenge. "I can't direct dial to Armenia," Fuller said. "It's not a public data network over there. We have to go through multiple networks; from Armenia, you go through the Moscow network, IASNet. Then you reach multiple gateways to the rest of the world." Δ

Maggie Wolff Peterson is a writer and editor for Project HOPE, a nonprofit international health education foundation based in Virginia. She may be reached at Project HOPE, Millwood, VA 22646; 703/837-2100.

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Pick two: good, fast, or cheap

by Michael E. Marotta
Special to Focus

SYNOPSIS

The shortest path between two computers is not necessarily the cheapest. Controlling communications costs requires some compromise.

The key to efficient teleprocessing is to identify all of the costs and then control them. The old saw "time is money" means that talking to someone right now for 10 minutes is better than exchanging notes over several days. However, it takes time to earn money and you can spend it faster than you make it. There is a limit to how valuable instant communication really is.

Communication breakdown

When you consider all of the factors that go into telecommunication, you realize that you have a rich array of opportunities to control costs. Hardware and software are only two factors and not necessarily the most important.

It costs less to send data on Sunday night than Monday morning. Linking DG products across the MV line is more effective than connecting a slew of ASCII devices, which in turn is cheaper than linking with an IBM mainframe. A trained operator is more effective than an unskilled one. Automated transactions are better than manual monitoring. Compressed files cost less to transmit.

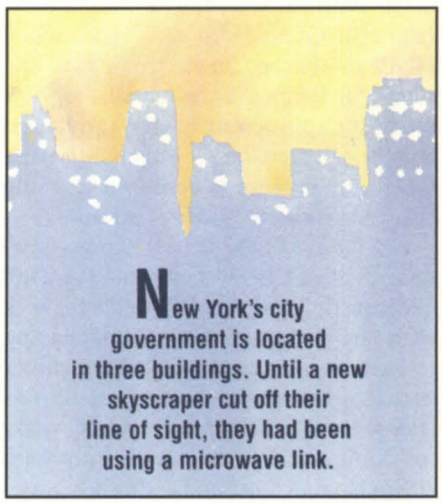
Obviously, sending data at 1200 baud is generally more expensive than using 9600 baud. However, if you are transmitting across the continent and there is a thunderstorm in Iowa, the 9600 baud transmission is more open to errors. The effective error rate depends on many factors and there are several approaches to solving each problem.

Your communication expenses may be driven by factors that are not inherent to long distance processing. Disk access is usually faster than 1200 baud, but it may not be if your system load is near maximum. You can have phone lines waiting for data on a second-by-second basis, eating into your telecommunication budget.

Hardware

Data General and its many supporting vendors sell the hardware you need for telecommunication. Selecting the right hardware depends on forecasting and balancing your present and future needs. Rich Tibbets is in charge of the MV/15000 used by the New York City Council. He chose 10-port multiplexors (muxes) because he "wanted to stay small and flexible"; however, he has selected a 16-port mux for his next upgrade. He also relies on one 4-port mux. The smaller muxes cost less and carry fewer lines. A bigger mux costs more up front, but the per/line cost is lower.

One of Tibbets' other considerations is that New York's city government is located in three buildings. Until a new skyscraper cut off their line of sight, they had been using a microwave link. Now they lease four direct lines.



New York's city government is located in three buildings. Until a new skyscraper cut off their line of sight, they had been using a microwave link.

Using any kind of voice-grade telephone line means using a modem. Today, you would be hardpressed to find a 300 baud link. However, a broad range of devices, from 1200 to 19,200 baud, are in active use. The faster devices cost more. Larry Briggi rides herd on the MV machines used by Webster and Sheffield, a New York City law firm. To Briggi, "The cost of a high speed modem pays for itself with savings of volume."

Such savings depend on high speed modems at both ends of a link. Typically, personal computers like the DG/One run

at 1200 or 2400 baud, though 9600 baud modems are gaining acceptance, especially for the Dasher/386. This means that the highest possible baud rates are generally effective for MV-level, peer-to-peer communication, and less so for DG/Ones connected as workstations to an MV host.

Software

Once your MV host machine is programmed for asynchronous communications, almost any software can be used on a DG/One or Dasher/386 to establish communication. Procomm and Telix are shareware products; Bitcom comes free with many brands of modems for personal computers. Crosstalk is the best-known package for DG/One compatibles.

None of these offers terminal emulation for Data General systems. If your MV is programmed to communicate in ANSI-standard "flat ASCII," then all is fine. If, however, your MV expects to find a DG terminal at the other end, then your users need other software.

Several packages provide Dasher emulation for non-DG personal computers. Burke Murray of Communications Research Group claims that Blast's asynchronous file transfer is the fastest and most error free. "You can call from a phone booth or a cellular phone," he says. He cites a user who dialed in to the Communications Research MV machine in Baton Rouge from a roadside phone booth while visiting Unix Expo 89 in New York.

Providing automated tasking (especially for untrained users) is one of the hidden costs associated with telecomputing. Jon Lusk of Digital Dynamics points to the fact that their product, d:Drive, is transparent to most Dasher /386 software systems such as dBase and Magellan. "The user is not just an MV user who happens to have a Dasher/386 on his desk. We designed d:Drive for the DG/One and Dasher/386 user." This means that if you know MS-DOS, you don't need to learn any new commands. You can write your automatic procedures in Basic, or batch, etc.

Larry Briggi likes the fact that he can create "Blast macros that batch themselves every half hour or every hour to Washington DC and Houston." This removes the need for training users. His routines "check for files to be sent, then autodial, and then verify file size, and then check for files to bring back and then log off . . . This has been a help to me," he says, "because you can define a level of detail" for error checking. He notes that with a macro or script, users don't have to wait for prompts or menus. Briggi points out that his law firm relies on data bases such as Lexis where an improper logoff can cost up to five minutes extra several times a day as the terminal sits idle, yet connected.

File compression software relies on mathematical algorithms to identify and encode repetitious characters. Compressed files are 30 percent to 60 percent smaller and so are cheaper to send and receive. Software for file compression is offered by several vendors. Brian Johnson notes that his :WFFCA runs in standalone mode while Blast has file compression as a built-in feature. Johnson points

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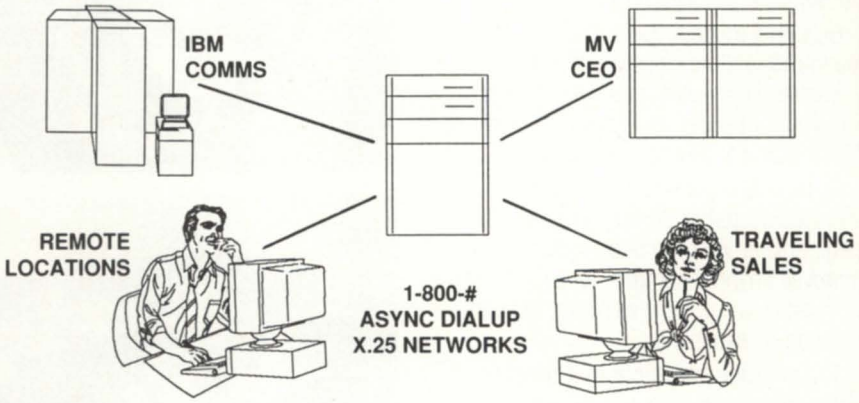

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out that if you are transmitting archival material (such as last year's payroll figures) you may never need to decompress it.

Say what?

Error checking is critical to telecomputing and, as always, there are many means for catching errors. The Cyclic Redundancy Check (CRC) is simply a means of asking the receiver to send the data back again. Xmodem protocol was invented by hobbyist Ward Christenson for personal computers running under the CP/M operating system.

With the advent of MS-DOS and the industry standard DG/One, Xmodem became available for MV machines. There are other algorithms. Xmodem verifies 128 bytes at a time; Ymodem works on 256 bytes. Thus, Ymodem passes good data faster, but more data must be retransmitted for every failure. Dasher/386 users can also rely on Zmodem, Kermit, CompuserveB, and several others. While not available for the DG mainframes, these error-checking algorithms do meet the needs of DG microcomputer users who must connect with non-DG equipment.

Error checking increases the front-end cost of telecomputing. Regardless of the algorithm, time is spent verifying each block of data. If you do not use error checking, you run the risk of receiving wrong data or being stuck with useless garbage. You can figure out that 1braham %incoln was the z6th president of the Gnited Etates. Is your company willing to spend $1(5,yw3 for new UF*@d to be installed on Juny 12, 199#?

People

Training is always a hidden cost in any endeavor. Clearly, if your operations people understand the fundamentals of telecomputing, irregularities are easier to handle. A knowledgeable operator can take one look at a screen full of garbage and say "Your baud rate is wrong" or "You need eight bits with one stop bit and no parity."

There is an upfront cost to this level of awareness, but consider the alternatives. You can be awakened in the middle of the night because the third shift has a problem or you can come in the next morning to discover that the data wasn't sent (or received) because "It went fine for a while then something happened and it wouldn't work and we tried it again but we didn't know what was wrong."

There is no reason to accept this kind of occurrence. Digital, binary, stored program computing is 40 years old. There should be nothing mysterious about it. The best problem you can have is ignorance, because ignorance can be cured with training. Even if you rely on automated transfers, you owe it to your organization and your people to teach them how to understand error conditions and exceptions.

Other costs

Rich Tibbets points out that his telecommunication needs are part of a much larger picture and that the City of New York is in a position to bargain for rates

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based on volume. In fact, almost anyone is in a position to bargain for the cost of carrying a message.

The Bell operating companies and AT&T are but one alternative. Allnet Communications provides long distance service with the help of Data General hardware. Other companies are also available.

Playing the time zones also lets you trim telecommunication costs. Chicago is one hour behind New York and an hour ahead of Denver. You get reduced rates when you call from Chicago at 7:45 a.m. to New York where things are booming at 8:45 a.m. Likewise, 5:15 p.m. central time is only 4:15 p.m. in the Rockies. You can rely on reduced rates in your zone and reach people who are still enjoying business hours a thousand miles away. Thus, you can transfer millions of characters of information in time for it to be used in the same business day.

Computer hobbyists enjoy several networks for sharing messages and programs. For instance, users of Fido-Net Opus send and receive via local bulletin board systems (BBSes). During the wee hours of the morning, BBS system operators exchange files.

Often, files are sent only as far as necessary to give them an electronic push. Files move from BBS to BBS and in a few days, someone in Los Angeles gets a message from someone in Boston. It isn't fast, but it *is* cheap.

This is not exactly the way most businesses would handle matters. However, if your office in Atlanta is sending data to Chicago, Denver, and Seattle, it may not be necessary for Atlanta to do all the calling. Files can be passed from system to system in a few hours without spending as much money. The reduced cash expenditures are reflected in a variety of journal entries, including earned interest.

The bottom line

Pick two: good, fast, or cheap. You control costs at the expense of quality and convenience. Unfortunately, it is possible to pay top dollar and not get full value for your money. Containing costs means evaluating your equipment and programming.

Hardware defines the number of users you can serve at once and the rate at which they can send and receive data. Software defines the error checking and the user interface.

Training allows your people to deal with the failure of "automatic" systems and it increases their ability to offer creative, cost-effective alternatives to your telecommunication needs. The shortest path between two computers is not necessarily the cheapest.

If you attack the cost of telecomputing in a "value-added" or "quality" way, you can improve your position a few percentage points a year. If you can trim 3 percent of your costs each year, you will cut them in half by the end of the decade. Even better, you can re-invest that money in improved service. Δ

Michael E. Marotta is a technical writer with a decade of experience on Data General and other equipment. He works in manufacturing and business environments.

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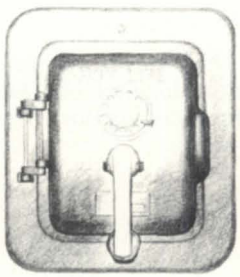

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Highway to help

SYNOPSIS

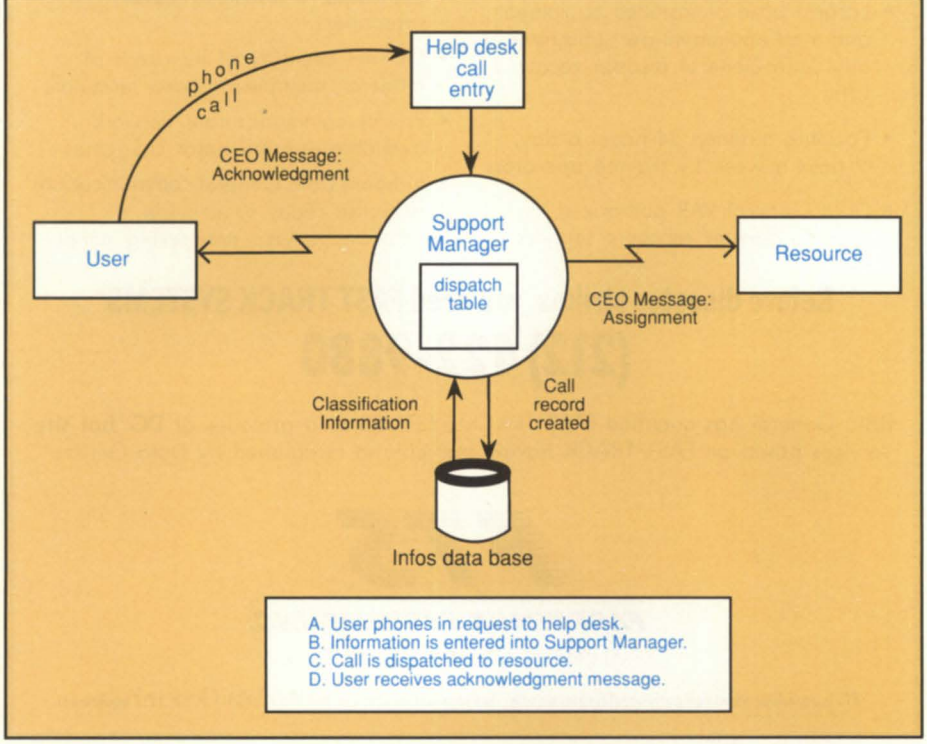
Centralized help desk software offers a range of support services from one location. At Data General, one MIS group greatly improved its operations with Support Manager.

by Winston Burgess
Special to Focus

As the needs of non-technical users force software and hardware systems to become more complex, the scope and importance of support services is growing. One of these services is help desk, a centralized location where support requests can be sent, recorded, and dispatched. Support requests can range from traditional "trouble ticket" (hardware, software, communications, etc.) problems to requests for services, materials, or even personnel.

The expanding role of the help desk in all facets of a company's operations challenges a help desk administrator's capacities to keep track of, and follow through on, increasing numbers of help requests.

Figure 1: Call entry



To meet these challenges efficiently, Data General's Information Management group (IMG) automated its Westboro CEO/Network Support help desk with Support Manager software.

Constant evaluation

The goal of a good MIS help desk system is to ensure timely and efficient solutions to calls it receives. Achieving this goal becomes more important as the number of calls being processed increases. Without some automation, maintaining a help desk of this quality becomes extremely difficult.

Standards must be used when entering, classifying, and assigning calls. There must be a reliable method to keep all concerned parties updated on the status of a call. Each step in the resolution of a call must be stored in a manner that allows for quick access and statistical analysis. Finally, the system must be able to grow and be modified to meet the needs of a changing company.

The Support Manager system provides a comprehensive method to organize and run a help desk. The software queries users for all the information that's necessary to classify and dispatch a call. Calls are logged, resources assigned, and users acknowledged through the CEO mail utility.

A server process constantly examines the data base for unresolved calls and reassigns them using a method known as "call escalation." An Infos data base maintains all call information. The same data base contains the information used to classify and assign calls. Utilities that maintain, query, and generate reports from this data base are also included.

A big job

The Westboro IMG CEO/Network Support help desk maintains a wide variety of hardware and software for roughly 8,000 users. The user base is diverse, ranging from technical to clerical to manage-

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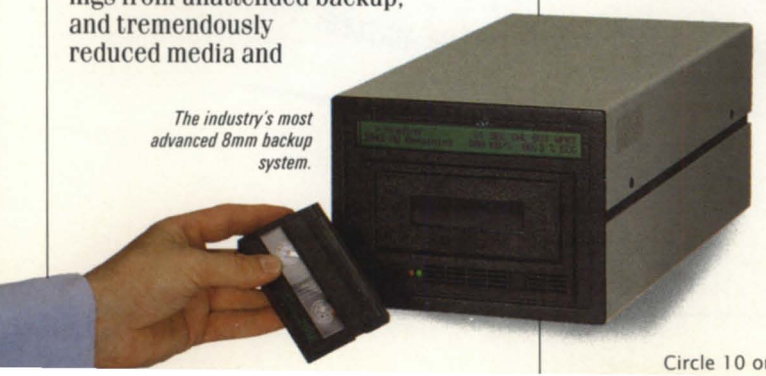

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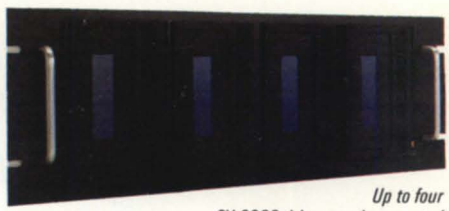

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rial staff. A complex network links together 40 CPUs scattered throughout a number of buildings within a 20 mile radius of Westboro. These systems are primarily responsible for running the major administrative tasks of the corporation.

The help desk is staffed from 7 a.m. until 6 p.m., five days a week. The help desk staff logs each of the 450 or so calls received per week. Most calls are requests for service or information, as opposed to problem resolution. These are directed to support staff (resources) in one of five specialized groups responsible for problems within their area of expertise.

IMG's old system provided a data base into which help desk staff entered calls phoned in by users. Calls fell under a few generic categories. There was no method to notify individuals of a call's status. Support personnel queried the data base constantly for new calls.

If a help desk staff member felt a call needed immediate attention, he or she notified the appropriate resource to fix the call. The help desk staff would also examine the data base for resolved calls and notify the caller of the resolution. There was no call escalation. Periodically, the help desk administrator browsed the data base for calls that had not been resolved in a timely manner. If the administrator believed the problem was being ignored or had been missed, he or she had to find the responsible person to find out what the problem was.

The old system provided a limited accounting ability, but little else.

Not so big a job

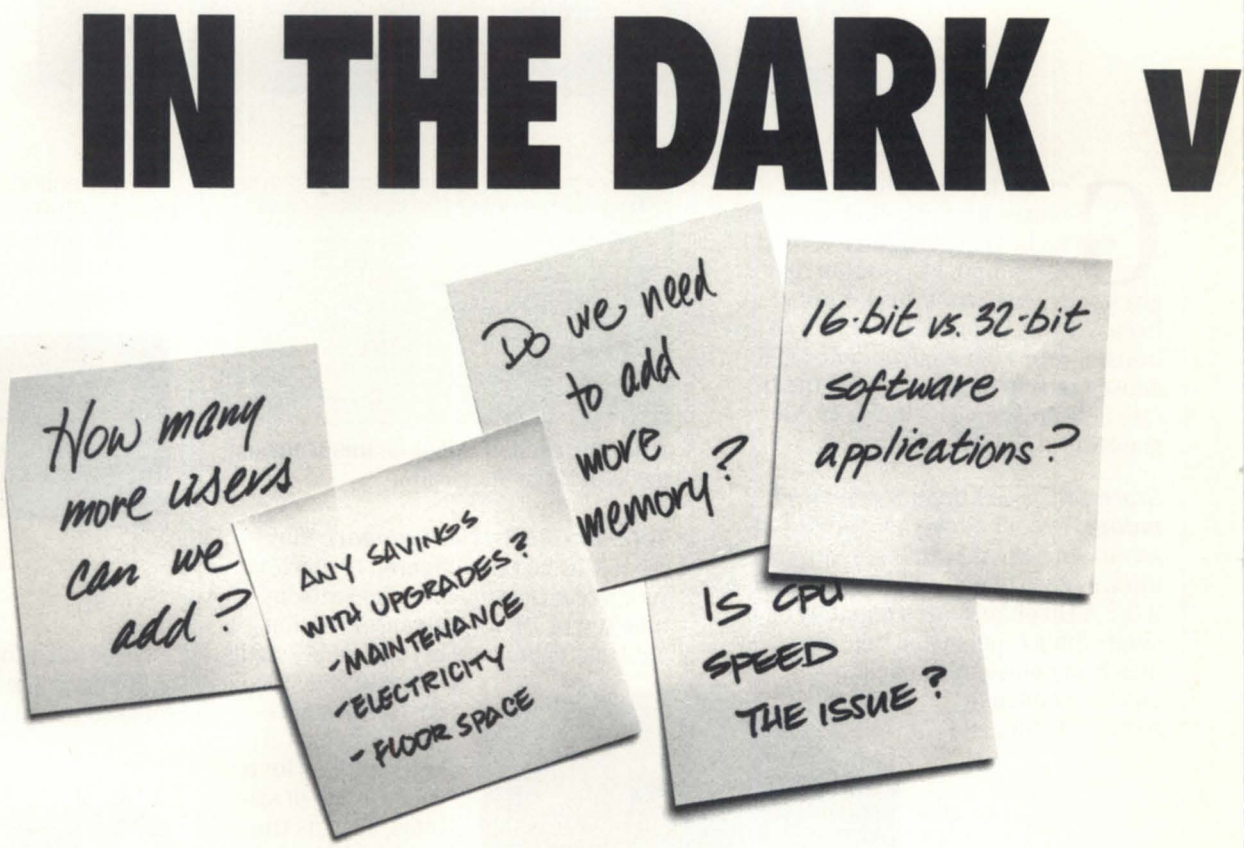
After just two weeks of setup time and training, the IMG help desk administrator automated these processes using Support Manger. The majority of this time was spent entering the information required for call entry. Approximately 300 call types and their corresponding routing records and keywords were provided to the administrator by the managers of each support group. These were entered initially.

A call type classifies and determines escalation times for a call. Routing records are used to determine who will fix the call. Keywords further classify the call and provide support personnel with information to resolve it. After the initial information had been entered and some short training sessions completed, the system was ready to accept calls.

Let's trace the path a typical call takes through the Support Manager system from the time it is phoned in until its resolution (see Figure 1, page 24).

Users who require help or service from the IMG support staff usually initiate calls by phoning in a request to the help desk. A member of the help desk staff, guided by Support Manager's call entry utility, queries the caller about the request. The Call Entry utility requires at least the username and host of the caller, the username of the person taking the call, the call type, one keyword, and a brief description.

IMG's help desk administrator set the system up to ask additional questions



such as the mail stop, console number, and line number of the caller. Call types and keywords can be indexed from an on-line list maintained by Support Manager. When the call type and keywords are entered, information may be displayed that will help resolve the call immediately. The staff member presses a function key to enter the call and is ready to take another.

A server process reads the call information to determine the call type and the originating host. Using this information as a key into the dispatch table, Support Manager initially assigns "Resource 1," a staff member named Lisa (not her real name), to the call. The call information, including time stamps and the assigned resource, is inserted into the data base.

Support Manager sends Lisa a CEO message notifying her that she has been assigned to the call. Finally, an acknowledgment containing call information and a reference number is generated and sent to the user who has the problem.

After Lisa fixes the problem, she closes the call with the call resolution utility. She enters the call number, her name, a brief resolution description, and the time she resolved the call. The call record is then updated, time stamped, and marked "resolved." A resolution message is automatically generated and mailed to the user who had the problem (see Figure 2, page 28).

Exceptions

In the case where a call is not resolved, call escalation may occur. Support Manager periodically examines all the unresolved calls in the data base to determine if any of them need to be escalated. A call's priorities can be escalated three levels—medium, high, and urgent. Each priority has a time interval defined in the call type record and as each interval is exceeded, the call is escalated to the corresponding priority.

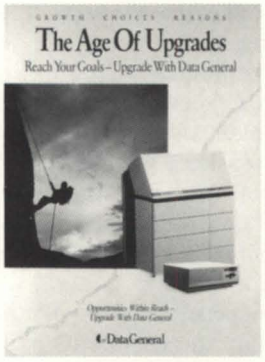
Suppose Lisa did not resolve the call within the first escalation interval. The call will now be escalated as illustrated in the call escalation diagram. Support Manager reassigns the call to Resource 2 and automatically updates it with the new resource and priority. Resource 2 receives a CEO message with the call assignment. Lisa receives a message stating the call has been reassigned. If desired, a manager or other person can also be notified of the escalation.

Calls can also be re-routed. If Resource 1 determines it is a problem that is different than originally thought, she can change the call type to automatically reassign the call and notify the appropriate resource.

Whenever any type of change—such as re-routing or call escalation—is made to the call record, all previous information is maintained. This provides a start-to-finish record of how the call is resolved and by whom.

Calls can be entered remotely. Support Manager can read CEO messages containing the call information and log them into the system at the central site. The call is then processed in the normal way. This allows more sophisticated users the abil-

S. IN THE KNOW



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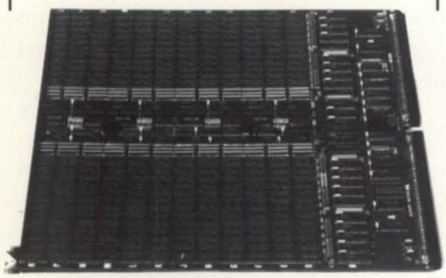

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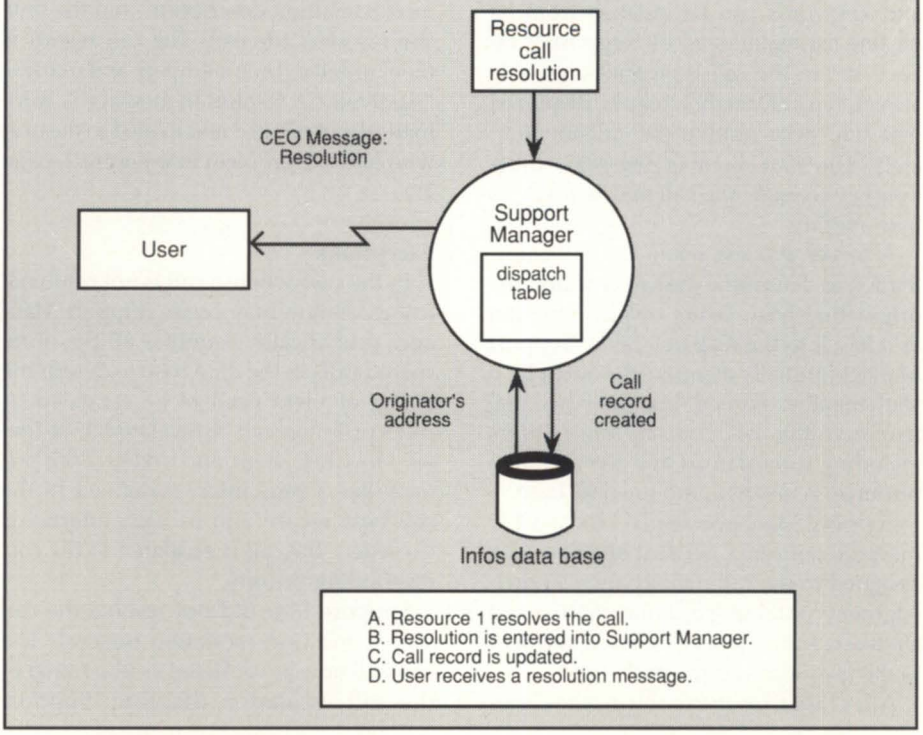
Figure 2: Call resolution



ity to circumvent the help desk entirely by directly entering the call from any host that has CEO mail access to the Support Manager host.

The verdict

With Support Manager, the IMG help desk administrator can check on-line the status of any call. He or she can manually escalate or re-route a call without leaving the desk or questioning each resource to find out how a call is progressing. Call types, routing records, keywords, and other system parameters can easily be changed. According to Data General's CEO/Network Support help desk Manager, John Provost, "I do a lot less walking. [Support Manager] lets me run the entire operation from my desk."

One of the most important features of this system is its ability to generate reports from the data base. In addition to some generalized reports for basic accounting, Support Manager consolidates various pieces of information into one system. This allows a wide variety of customized reports to be generated.

For example, IMG's help desk administrator was asked to produce a report covering the 10 most frequent problems and the time spent fixing them. This report was generated in just a few hours using the CQCS report generator. Reports that reflect the productivity of the support staff, or detect patterns of requests and problem areas are also possible. This information is extremely useful in planning for hardware allocation, staffing, or user training.

Support Manager is clearly a success at IMG. It allows support personnel to concentrate on fixing problems, rather than on help desk operations. The help desk administrator has instant access to all the information. Call histories and their resolutions are categorized and stored in a single accessible data base. And as more calls are entered, the data base will become increasingly useful.

John Provost sums it up this way: "Support Manager is invaluable to me. I can now answer my boss's questions with exact figures and reports. I can concentrate on improving the help desk instead of just maintaining it." Δ

Winston Burgess is a software engineer at Data General in the Software Products and Services Division, which specializes in custom and packaged application software for Data General users. For more information, call 1-508/898-4183.

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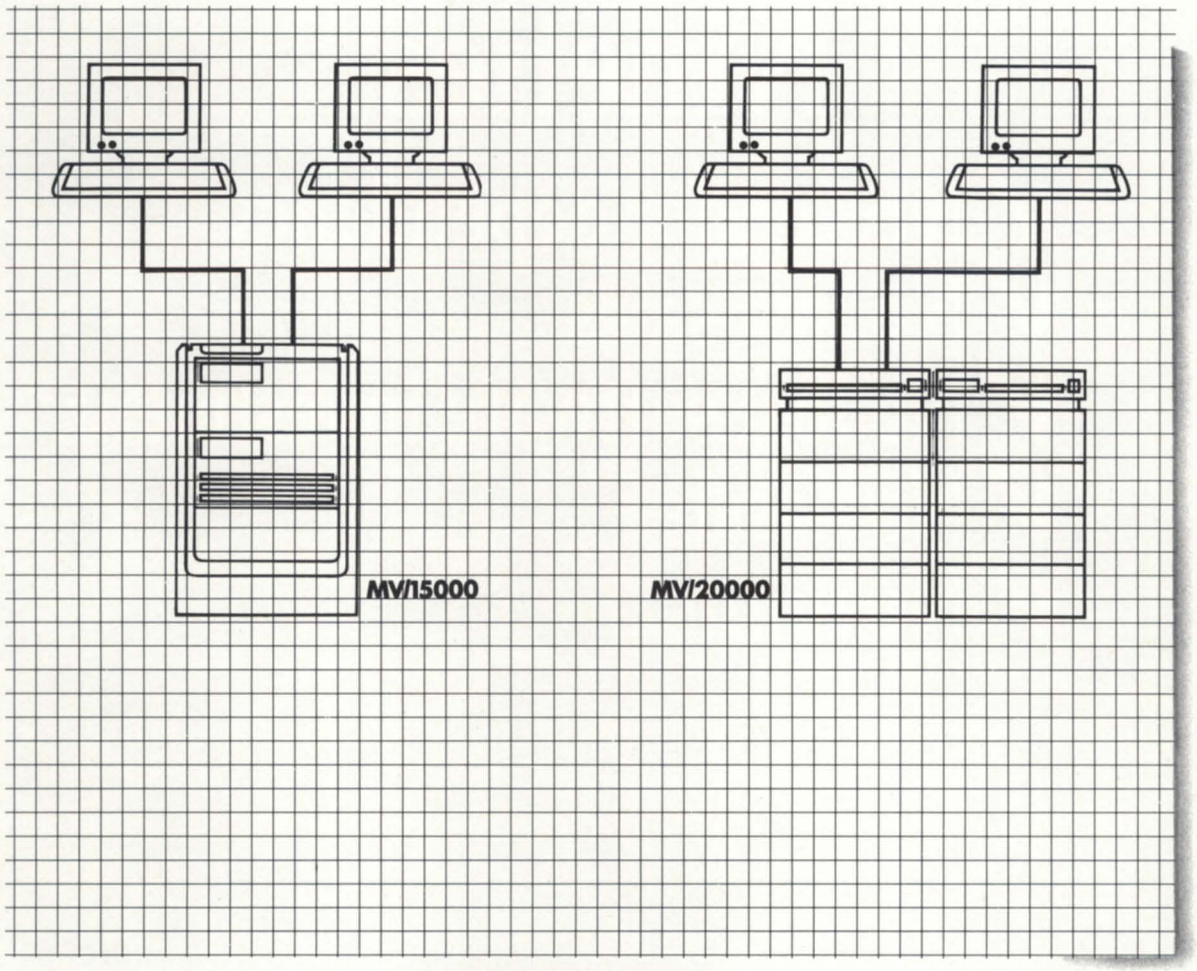

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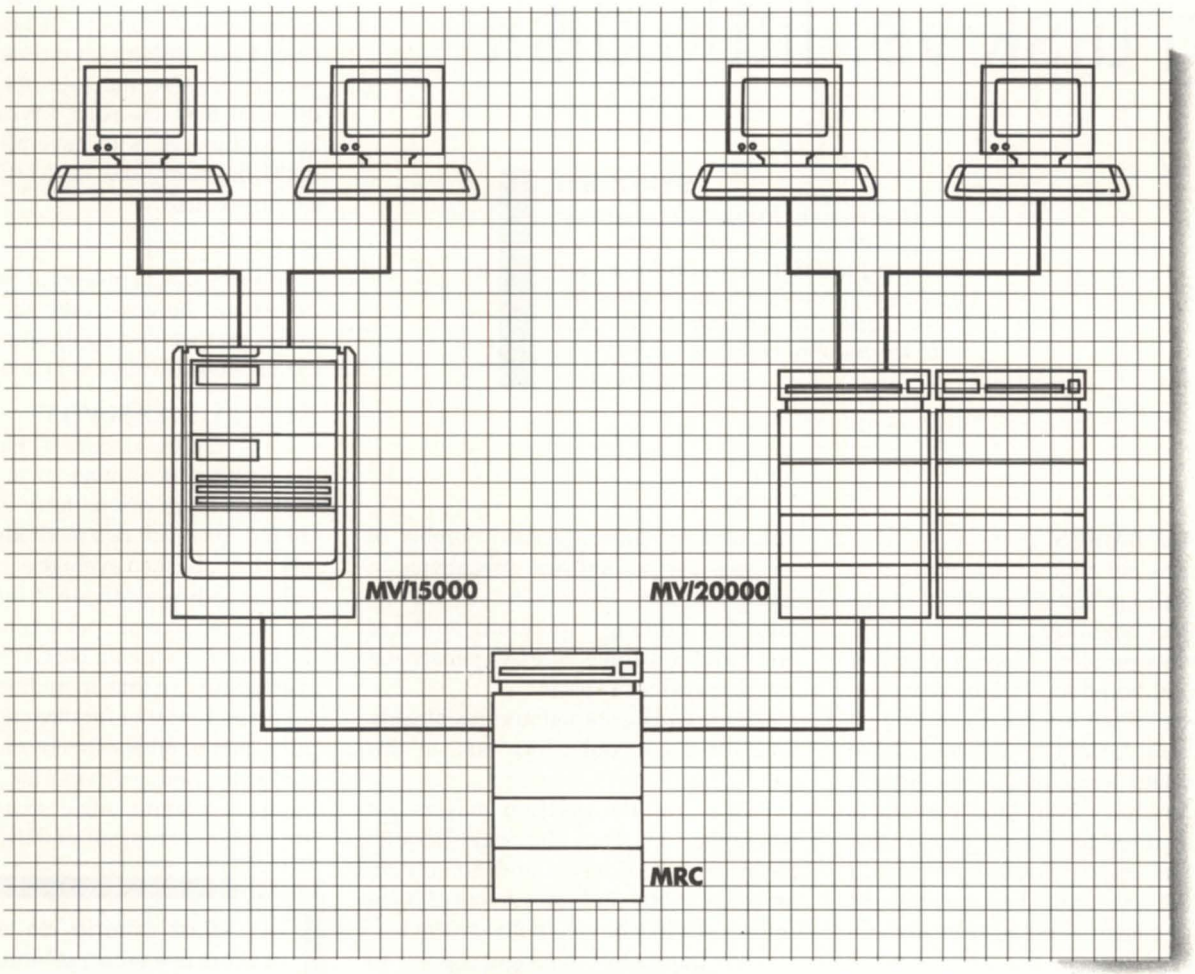

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Big disk vs. little disk

SYNOPSIS

If you don't know your average user costs, then your chances of choosing the right size and number of disks is near zero. Here's a step-by-step guide to figuring these costs in terms of accesses/second and megabytes.

:BACK_TO_BASICS

No, this is not another one of my continuing diatribes against my least favorite computer language.

I have this problem. I have a very low threshold of boredom. I figure that once I've written about a topic, I can leave it alone as long as nothing new surfaces to change what I wrote previously. As several readers have been kind enough to point out, there have been one or two new subscribers to this rag since I started writing these columns back in 1985. So for you old timers, I apologize in advance if this looks like a re-hash of old stuff.

:DISKS

Several times last month I ran into users with problems caused by the big disk vs. small disk dilemma, so it looks like it's time for a review of how to determine how many disks you need and what size they should be.

If, like me, you're one of those people who keep little mottos posted above your desk amidst the Bizarro and Far Side cartoons, then add this one to your collection:

Disk unit == (accesses/sec + MB) – $
Users == $ – (accesses/sec + MB)

Translated to English, the first line says a disk unit provides a certain number of accesses per second and megabytes of space, but costs dollars. The second line says that running a program produces profit and consumes accesses per second and megabytes of space.

We've hardly started and it's already time for a pop quiz. (See box on this page . . . .)

That's how the decision makers got where they are. They slice right through the performance issues and go straight for the best-buy and lowest cost of ownership. Just like buying delivery trucks.

From the system manager's point of view, the problem is completely different. We are charged with the responsibility of making sure that a) there's enough disk space available to store all necessary files, and b) there are enough drives available to provide enough accesses per second so that the users access rates do not result in any drive being more than about 25-35 percent busy.

I'll be using those 25-35 percent busy limits during the rest of this column. The reasoning behind these limits for on-line use has to do with queuing theory and was covered in more detail in my Jan/Feb '87 columns. To make a long story short, those columns show that the time it takes to do a disk access decreases *linearly* with the busy percentage below 25-35 percent busy, and increases *exponentially* above 25-35 percent busy. During batch loads, disk busy percentages of 100 percent are OK; the rules for batch are different than the rules for on-line. For batch, the goal is to have all resources (CPU, memory, and disk I/O) saturate simultaneously.

:STEP_BY_STEP

Solving the problem of how many drives and how big they should be requires that we first apply some numbers to the two equivalences I cited above.

:STEP_BY_STEP:SUPPLY

Let's take the disk first. Figuring out the maximum number of accesses per second a drive can perform is relatively simple. There are two methods. One is to take the published average access time in milliseconds and divide it into 1,000 to get average accesses per second. Alternatively, you can fire up DISCO and use the average service time in milliseconds.

I prefer the latter for three reasons. The published numbers are notoriously inaccurate for some drives, the published numbers assume single sector accesses (four are more typical), and the published numbers assume an average seek distance of one third of the cylinders on the drive.

Experience shows that the average seek distance under normal (25-35 percent busy) on-line loads is nearer to one sixth to one quarter of the cylinder count. You can verify this yourself by comparing the average seek distance reported by DISCO to the number of cylinders on your drive. Most drives have between 800 (Zebra, Kismet, Argus) and 1600 (RAMS) cylin-

Q: What criteria do most decision makers use when selecting disk drives for a computer system?

Q: What effect does achieving minimum $/MB and maintenance costs have on performance?

(answers page 35)

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Listed above are NADGUG's current special interest groups. If you are interested in making the connection with one of these groups, or if you have an interest that needs a group, please contact NADGUG's RIG/SIG coordinator, Greg D. Goss, at 1-800-USR-GRUP (512/345-5316 outside U.S.) for further information.

ders. Consult the applicable DG data sheet or technical reference manual for the exact number.

In the case of the Argus controllers, there's a second reason why the published numbers should be avoided; there's the small matter of a controller startup /shutdown overhead of about 5 ms associated with isolated requests. And most requests are isolated when the drive is only 25-35 percent busy, as is the case under on-line usage.

Figuring out how much space is available on a disk is relatively easy—take the nominal size of the drive in megabytes and multiply it by 0.75. The primary reason for limiting the amount of space used on a disk to 75 percent of the available space has little to do with performance; it's actually more of a system management issue. As the drive exceeds 75 percent full, the probability of the dreaded "insufficient contiguous blocks" error rises exponentially.

It's also true that full disk drives have longer average access times than empty drives, but if we took that reasoning to its logical extreme, then the optimum solution would be an infinite number of nearly empty drives. That's clearly crazy. It makes much more sense to keep the drives comfortably full and simply buy enough drives to provide the needed average number of accesses per second.

:STEP_BY_STEP:DEMAND

Each user is responsible for owning or sharing some number of megabytes of disk, and each user causes some number of accesses per second. So how do we measure them?

Well, first let's get the matter of the main user out of the way. "Who's the main user?" you ask. Easy—the operating system. Play it safe and allocate at least one disk just for the operating system. Generally, this rule of thumb should only be violated for tiny systems involving a handful of users. A handful is certainly less than 10, and more commonly, less than five.

I said "at least one disk" because at high PID counts it's entirely possible for the traffic to the immovable root, PER, PROC, PAGE, and SWAP directories to consume all the available accesses per second on the system disk. Everything else, and I do mean *everything* else, will need to be on one or more other drives. In general terms (your mileage may vary), a dedicated minimal system disk is de rigueur at PID counts above about 300 to 400.

Megabytes is the easier of the two disk resources, so let's do that first. You usually know in general terms the size of the system software, the data bases, and the user directories. If not, get some advice on the system software size from DG and estimate the other two. Once you've got the sizes, the matter of computing average megabytes per user involves plugging the values into this formula:

Disk MB = (system MB + (data base MB + user MB)/users)/0.75)

Now, to quote the Queen's subjects, "On to the sticky bit." How do we guesstimate average accesses per second per user?

Unfortunately, AOS/VS [II] does a pretty dismal job of attributing physical disk accesses to individual processes. For example, you can do "F/AS/S #" all day long, with nary a single I/O charged to your process. Also complicating the problem is the way that AOS/VS [II] charges processes for the shared page I/O used by most data base software. It charges the process as if the I/O was a page fault.

The only alternative for us is to ignore the per-process statistics and instead calculate average per user access rates from the raw user count and raw average disk access rates.

The raw user count is obtained by simply counting the number of active users, i.e. the ones whose fingertips are in close proximity to their keyboards.

The average disk access rate for each disk unit can be determined by recording the total disk accesses for each unit at the start and end of a typical hour, computing the difference, and dividing it by 3600 (secs/hr) to get average accesses per second.

Dividing average user count into total average accesses per second gives average accesses per second per user.

Trying to pin down the average access rate per user for specific files or data bases is a little more difficult, unless the file or data base occupies one or more disks all by itself. If it does, then the determination is relatively simple.

:CAVEAT

Measures of per-user access rates

should only be done when the system is running with all resources below saturation, meaning at least 15 percent idle CPU, with disks less than 25-35 percent busy, and not in a state of memory contention. The reason for this is that when saturation is reached, the operating system kicks in and starts making trade-offs to alleviate shortages. For example, a memory shortage causes I/O due to paging and /or swapping. A CPU shortage causes extra scheduling overhead. Overly busy disks have different average access times because as the busy percentage rises above 35 percent, the average seek distance starts upward toward one third the total cylinder count.

:CASE_STUDY

Let's assume that you've got a medium-sized system where each user has a collection of private files and you've also got a single large global data base.

You've done the necessary measurements for your system and determined the following.

Users
Average user count:
~150 (~50 system PIDs plus ~100 user PIDs)
Average space
Average user files:
~300MB (excluding the global data base)
Global data base:
~900MB (including differential volumes!)
Average access load
User files: ~0.2 acc/sec/user
Global data base: ~0.5 acc/sec/user
Average access capability (assuming 35% busy)
354 MB Argus:
~12 acc/sec ((1000/~30ms)*0.35)
234 MB CSS:
~14 acc/sec ((1000/~25ms)*0.35)
500 MB RAMS:
~22 acc/sec ((1000/~16ms)*0.35)

I've used the old slow 234 MB version of the CSS disk because I'm overdue on this column and it was the only data sheet I could find. It's not important; it's the technique that's important here, not the specific numbers.

First of all, we'll need one small system disk; something in the range of 200 to 300 MB. As a first cut, we'll try putting on all the system software, including CEO, compilers, UTILities, and the immovable stuff. If we can't achieve 25 percent busy or less, then we'll move stuff off to other under-busy drives one at a time until 25 percent busy or less is achieved.

For the user files, the total access rate is 30 accesses/sec (0.2 x 150). If we use 354 MB Argus disks, we'll need 30/12=3 disks to handle the accesses/sec, but they'll only be 38 percent full (300/(3 x 354 x 0.75). If we use 234 MB CSS disks, we'll need 30/14, or three disks to handle the accesses/sec, and they'll be 56 percent full (300/(3 x 234 x 0.75)). If we use 500 MB RAMS disks, we'll only need 30/22=2 disks to handle the accesses/sec, and they'll be 40 percent full (300/(2 x 500 x 0.75)).

For the global data base, the total access rate is 75 accesses/sec (0.5 x 150). If we use 354 MB Argus disks, we'll need 75/12, or seven disks to handle the accesses/sec, and they'll be 48 percent full (900/(7 x 354 x 0.75)). If we use 234 MB CSS disks, we'll only need 75/14, or six disks to handle the accesses/sec, but they'll be 85 percent full ((900/(6 x 234 x 0.75)), so we'll actually need seven disks to get down to 73 percent full, and that's cutting it close (remember, we're *estimating* here). If we use 500 MB RAMS disks, we'll only need 75/22, or four disks to handle the accesses/sec, and they'll be 60 percent full ((900/(4 x 500 x 0.75)).

The number of volumes to use for the global data base is simply the number of disk units; seven for the Argus and CSS disks and four for the RAMS disks.

Now that we know the number of each type of disk required, we can plug the cost and maintenance figures into a spreadsheet and see which option makes the most financial sense.

As you can see, disks above 500 MB would be a disaster for this system. The temptation would be to use the extra empty space. In the process, we would exceed the access/sec limits, the disk busy percentages would rise, and response time would go down the toilet exponentially.

:RULES_OF_THUMB

Who should buy those huge disk drives with nice low $/MB numbers? Huge drives only make sense for a) large data bases with low access rates, or b) large quantities of rotating archive files (e.g., history files).

Who should buy those small disk drives with terrible $/MB numbers? Small drives make perfect sense for a) individual volumes of large high-activity data bases, b) small high-activity data bases, c) high activity users, or d) system disks.

When should data bases be broken into multiple volumes and/or have their index and data base volumes on separate drives? When the total physical access rate to the index and data base portions exceeds the number of accesses per second that its disk unit is capable of. In this case, the data base and index should be broken up into sizes appropriate for the disks involved (don't forget to take the 75 percent limit and differential volume space requirements into account), and leave lots of expansion space in the last volumes.

A: Minimum $/MB and minimum maintenance costs.

A: It's usually inversely proportional to the probability of achieving good response time.

If you don't even have a rough idea of your average user cost in terms of accesses/second and megabytes, then your chances of getting your disk situation right are near zero.

:SURVEY

Recently, a caller to the NADGUG BBS expressed the opinion that my discussion of the Sleaze Tour held at each year's national conference was an inappropriate topic for this magazine. If you agree, please let me know by phone, fax, or mail. If more than a handful of people agree then I'll apologize and try to clean up my act. If not, stay tuned for a report on the initial Seattle scouting reports. Δ

BJ is the President of B.J. Inc., a San Francisco based consultancy specializing in system auditing, system management, and performance analysis. :SYSMGR is a division of B.J. Inc. BJ can be reached at 109 Minna St., Suite 215, San Fransisco, CA 94105, 415/550-1444 (voice) or 415/550-1072 (fax). The :SYSMGR bulletin board number is 415/391-6531 (300/1200/2400 with optional MNP class 4, CHAR/605X/CHARLEN=8/PARITY=NONE/AUTOBAUD) or 415/550-1454 (voice).

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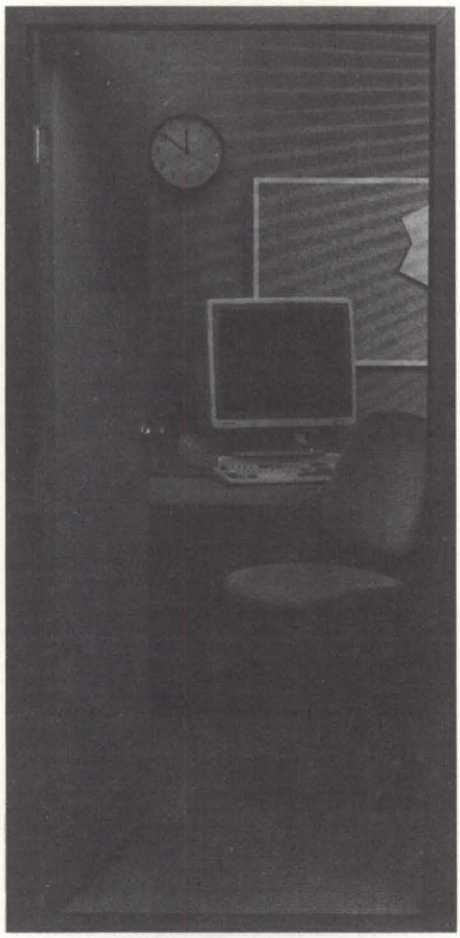

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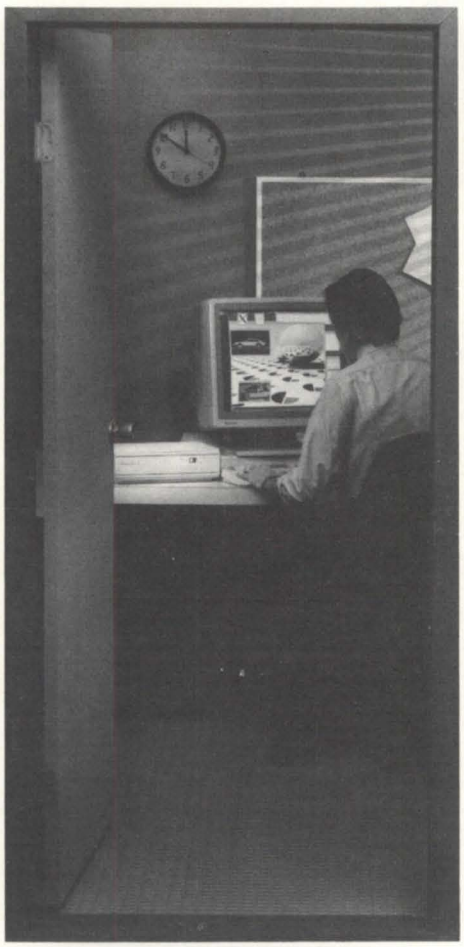

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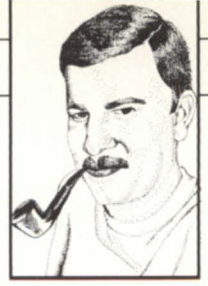


Unrestricted Axis

SYNOPSIS

"Tweaked" code, intelligence, and special options make Wild Hare's product a winner in the compiler sweepstakes.

A few months ago, I reviewed a couple of ICobol compatible (and not so compatible) compilers. This month, I looked at another—the Axis compiler from Wild Hare Computer Systems.

How compatible is it? How's this—you can move your program to a PC, compile it without *any* changes, move the .PD and .DD back to the mini—and it will run under DG's ICobol runtime system. Now *that's* compatibility!

The Axis compiler was developed for users of Wild Hare's Choice! runtime system. Choice! runs ICobol code under MS-DOS, OS/2, Macintosh, Unix, VMS, and many other operating systems. Axis will compile to either ICobol 1.5, 1.3, or even ICOS 4.5 object files, depending on switches specified. For users of Choice!, there are language extensions unavailable to those of us running vanilla ICobol. The screen section includes constructs like COLOR IS (foreground color) ON (background color), BRIGHT-ON, UNDERLINE-ON, and REVERSE-ON.

The first thing that I noticed about the compiler was its speed. I tried compiling a rather long (4,500 lines) program to see how long it would take, and went off to do something else. I shouldn't have bothered—the compiler finished in 14 seconds, at over 19,500 lines per minute. In fact, the compiler doesn't list compile speed in lines per minute—it's displayed in thousands of lines per minute. My MV/8000 compiled the same program in 4:16, for a little over 1,000 lines/minute, with nobody else on it. Impressive. At the speed that this code runs, it's actually faster to compile on the PC and Blast the code up than it is to compile on the MV.

Just for the heck of it, I decided to run benchmarks. I didn't expect to find any differences—after all, the same source running on the same machine ought to give the same time, right? Not in this case—in certain operations, Axis was up to 20 percent faster. Apparently, they've done some code tweaking. A simple DIVIDE A BY B GIVING C, for example, is seven instructions in ICobol, but only five in Axis. It's not going to make a tremendous difference in your execution speeds, since 100,000 divides took 2:58 instead of 3:42—but every bit helps.

Axis was obviously designed with cross-development in mind. In addition to the fact that it doesn't require starting in the right Cobol areas (one of my biggest gripes about RMCobol and Micro Focus), the program is intelligent enough to handle long names in the copy statements.

If your source has a statement like "COPY OERECEVNGS.SL," you'll have problems with most PC Cobol compilers. The copy filename on the PC, in order to comply with MS-DOS's 8-character limit, is going to be OERECEVN.SL, and the compiler won't find it. Not Axis—it as-

sumed that when it matched the first eight letters and the extension that it found the file I wanted, and compiled without a hitch.

In addition, it's possible to set up a logical name translation file. This is just a text file that tells Axis that when it runs into, say, EMPLOYEEFL.NX, it should look under C:\TIM\EMPLOY.NX. I just *know* that no one out there is hard-coding disk or directory names into their filenames, but should such a miscreant exist, it's possible to tell the translator to change, say, every occurrence of :DEO to D:\FILES.

Like most (if not all) compilers available for the PC, Axis will accept both lower and upper case letters. I program in Turbo Pascal on the PC, and it's amazing how much more readable a program is when it uses lower case. If you've ever logged on to a bulletin board, one of the more annoying denizens is the person who insists on TYPING EVERYTHING IN CAPITAL LETTERS. It looks like you're being shouted at.

Programs are the same way, and I find a day of looking at a Turbo Pascal program much less stressful than a day looking at ICobol. This just *couldn't* be a hard change for the ICobol folks to implement—they must have done it for Unix already, and I'd like to see it ported over to the MV world.

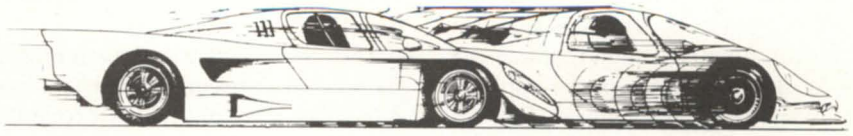
In the meantime, Axis includes a compiler switch, /uppercase, that allows only upper case symbol names and keywords, so that your source program may be safely moved back to the MV. I just wish a switch wasn't necessary.

The Axis command line uses VS-type minimally unique switches, so that you don't have to type /uppercase;/u or any combination in between is sufficient. It is also possible to have text files that contain command-line arguments. If you named your text file OPTIONS, the file would look like this:

```
! Axis command file
!
/statistics/symbols/nocolor
!
```

and the command line would be AXIS @OPTIONS <filename>. Command files can be nested up to five levels deep, so that OPTIONS could contain another file specifying which programs to compile, and so on.

FAST vs. FASTER



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In addition to the normal ICobol command-line options, Axis contains some extra options. Some are useful only in certain environments. The /copycase switch, for example, tells Axis that if a certain copy file isn't found, search the disk for the same name in the opposite case—something useful only in Unix. An option that I found useful is the /copypath=<pathlist> option, which tells Axis to search in another directory for the copyfiles. Continuing this a little further, why not a /object=<pathlist> switch that would put the .DD and .PD into another directory?

The /make switch is useful for those of us who are absent-minded, and can't remember if we did that last compile or not—it compiles the source only if it has a TLM later than the existing object files. The /symbols switch is similar to the ICobol /X switch, which produces a cross-reference listing. With Axis, however, all unreferenced symbols are marked with an asterisk. Using this listing, you can quickly find any data names that aren't being used. A useful addition would be to flag unreferenced paragraphs. Of course, then you'd have to go back and flag data names that are only referenced in unreferenced paragraphs, and . . . well, this is getting recursive, so I'll stop now.

Getting rid of unreferenced data names and paragraphs is an exercise that I used to perform diligently in the ICOS days, when every byte counted. I, like a lot of other programmers, have gotten a bit sloppy of late. Axis helps a little in this regard, because the compiler doesn't reserve space for unreferenced variables. I tried a simple program that had a line like this:

```
03 A OCCURS 100 TIMES PIC X(200).
```

and never referred to it in the procedures. ICobol compiled the .DD to 20,026 bytes, while the size under Axis was 44 bytes. Of course, if you're setting up 20K arrays that you don't use, you need more help than this column can give you—but it's nice not to have to worry about it.

I have an early version of Axis. The documentation is skimpy, even by DG standards. The whole manual is 35 pages long, including 4 appendices. Wild Hare's intent is obvious, since a line on the first page states that "The compiler follows the source guidelines contained in the appropriate Data General Interactive Cobol manuals." Hint, hint. The compiler diagnostics page consists of the notation "<to be provided later>." There is no debugger included, although the last page, titled "Things to be added," shows a debug switch—so I assume that one is coming. One hopes that it in no way, shape, or form resembles ICobol's "debugger."

As in any early release, there are problems—most of which are easily correctable. Although the code is ICobol 1.50 compatible, including the new ACCEPT . . . FROM ENVIRONMENT constructs, somehow the WRITE IMMEDIATE verb was left out, and generates a compiler error. Axis also won't work with any Screen Demon calls, although the routines called from the hot keys (mail, call

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CLI, etc.) work perfectly.

This aside, Axis is an excellent compiler, and it's only going to get better. There have been many inquiries on the NADGUG bulletin board about what to get for a cheap ICobol development system. The answers range from a Falcon board to a Desktop to an S/140. Here, finally, is a real answer. With Axis and an inexpensive file transfer program (Tex on the MV and Pereline on the PC pop immediately to mind), you can do all of your ICobol development on an inexpensive PC, and port the code wherever you like. For those of you running Choice!, MS/ICobol, or IChost, you can now develop and compile the programs on the PC, instead of needing a DG machine just to do compiles. This is a product the ICobol community has been waiting for ever since the announcement of MS /ICobol.

I was going to put a list of machines that Axis runs on here, along with prices. This turns out to be physically impossible. Suffice it to say that the product list runs to 10 full pages, going from Altos to Wicat and everything in between—even versions for AOS and AOS/VS. As far as I can tell, the only thing missing is a Commodore 64, and when Wild Hare reads this they'll probably try to port a version. Pricing runs from $1,000 to $17,000, depending on what you're running it on. For more information, contact Wild Hare Computer Systems at 303 /442-0324, or fax them at 303/440-7916.

Odds and ends department

Finally got a modem hooked up to our MV—a U.S. Robotics HST. We've got to dial into our bank twice a day to get deposit info, and I thought it would be easy to set up some type of automated application. All I needed to do was dial the bank, send a password and account number, and capture the displayed results. Since it was to be done the same time each day, I'd just have the routine batch itself, and the whole process would be automatic. But first, I needed MV communications with a script language.

It turns out that there are only two such packages that I can find—Blast and Tex. Blast won't work. According to CRG's tech support, you can't capture to disk in no-display mode. So much for the expensive program—I tried the shareware program next. Tex is working just fine. Thank you, David Down! Now, all of you people out there who are using Tex and haven't sent in your $45, do it now and give David a motivation for putting GOTOs and IF-THEN-ELSE into the script language.

As promised—the PC of the month was a Memory Masters 386/25, with a 25 ms disk.

Gripe of the month

Why don't companies put their telephone numbers in their documentation? Δ

Tim Boyer is EDP Manager at Denman Tire Corporation. He may be reached at P.O. Box 951, Warren, OH 44482, 216/898-2711 or on the NADGUG bulletin board at 415/924-3652.

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Command performance: CLI vs. Unix

SYNOPSIS

A preliminary study of what Unix and CLI commands have in common, as well as what they don't.

by John Huddleston
Special to Focus

This article compares the use of several related Unix and CLI commands. Since Data General supports Unix on a variety of operating and hardware platforms, I will refer to its implementations as UX environments. The CLI process I will describe is the CLI16.PR program. The 32 bit CLI program, as described in the January 1990 *Focus* issue, contains additional characteristics that I will not consider.

Figure 1 contains a list of UX and CLI commands that are similar in function. Some of us read the commands once to

Figure 1: Abbreviated CLI and UX related commands

Description	CLI command	UX (SystemV) command
access control list	ACL,[!ACL],[!DEFACL]	umask
exit the program	BYE	exit,^D
set & display settings	CHARACTERISTICS	set,stty
console	[!CONSOLE]	tty
copy	COPY	cp,mv,cat
create a file	CREATE	touch,cat
display settings	CURRENT	stty -a
display the date	DATE	date
set access controls	DEFACL	umask
delete a file	DELETE	rm
set & display directory	DIRECTORY, [!DIR]	cd, pwd
print in ASCII and octal	DISPLAY	od
backup file(s)	DUMP_II, DUMP	ar,tar
control logic	[!EQ],[!ELSE],[!END]	if, then, else
display file status	FILESTATUS	ls
help with commands	HELP	man
load a file(s)	LOAD-II, LOAD	ar,tar
move file(s)	MOVE	mv,uucp
display a file pathname	PATH	type
prevent deletion	PERMANENCE	chmod -w
process information	[!PID]	ps, who am i
prompt	PREFIX,PROMPT	PS1,PS2
start background process	QBATCH	nohup,&
cancel a job	QCANCEL	kill
display job status	QDISPLAY	ps
print a file	QPRINT	lp
read input	[!READ]	read, line
rename a file	RENAME	mv
display	SEARCHLIST	echo $PATH
editor	SED	vi
send information	SEND	write
sort	SORT/MERGE	sort
super user	SUPERUSER	su
kill a process	TERMINATE	kill
trace executions	TRACE ON	set -x
display a file	TYPE	cat,pg,more
variable(s)	[!STR] [!VAR0]-[!VAR9]	user defined
who	WHO	ps
print a line	WRITE	echo

know what can be done in the event that we need to create a special shell script (UX) or a special macro (CLI). I also create dummy scripts utilizing various commands that I read when creating new scripts. Your own style will develop as you use these commands.

UX and CLI start up

The PREDITOR.PR program on AOS /VS machines allows the system administrator to establish the user's startup program (:CLI.PR for most users) and initial CLI file. The start CLI macro may be defined by the system administrator to be any file. In contrast, UX administrators use the sysadm function to create users and manage disk space.

UX users operate under the UX shell (Data General supports both System V as well as the BSD C shell). The UX start file is /etc/profile and the user's start file is $HOME/.profile. On our system, we have one startup file for CLI users who use our menu system. This sets some characteristics and the VAR9 variable, depending upon the terminal type accessing the system.

In UX, setting the TERM variable tells all programs what terminfo or termcap file to use for screen-cursor control. The paths are: /usr / lib / terminfo and/etc /termcap respectively.

In the last paragraph, the path separator used in CLI is a colon (:) and in UX it is a forward slash (/). Also, the contents of the variable HOME are usable with the $ character, which is equivalent to the CLI expression :UDD:[!USER]. Setting the TERM variable in UX is equivalent to a CLI characteristics switch. An example UX assignment would be TERM=605X. The equivalent CLI command is char /605x, which emulates a Dasher 2XX series terminal.

UX and CLI operation

Both CLI.PR (CLI) and SH.PR (UX) require a line of text commands to be input from the keyboard or from a file. A significant difference is the use of switches in CLI or options in UX for various commands.

In CLI, the syntax is COMMAND /SWITCHES ARGUMENTS, where both the switches and the arguments are optionally dependent upon the application. In UX, the syntax is command options arguments, where options are typically prefaced by a hyphen (-). If you try to execute a command in UX and send the output to the list file, as in ls/l=@lpt, UX will tell you that the command ls/l=@lpt has not been found. Another difference is that CLI commands can be abbreviated to the most unique set of identifying characters. UX commands must contain the full command name.

Many of the CLI commands are embedded directly into the CLI.PR program. In contrast, most of the UX commands are in a directory /bin. In a lot of systems, another directory, /usr/bin, contains additional UX commands that the user can access. In CLI, the directories that are searched for executable macros or programs are contained in the SEARCHLIST. You would type SEA at the CLI prompt to see the present searchlist. To change the list, you pass directory names as arguments for the new directory list.

In UX, the variable PATH contains the directories to be searched for shell scripts or for executable programs. You type "echo $PATH" at the UX prompt to see the present pathlist. To add a directory to the pathlist, you can execute the command PATH=$PATH:/usr/lbin. This adds a local user bin to the list. To change the pathlist, you can simply reassign the list, separated by colons. For example, to assign /macros and /util, you would type PATH=/macros:/util.

More to come

In my next article, I will compare CLI and UX commands in more detail and design CLI macros and UX shell scripts for more complicated work. A *Focus* editor suggested that I compare AOS/VS CLI commands against Unix commands. After several rewrites, I found that it will take more than one article to describe the similarities and differences.

Looking back at all the articles I have written for *Focus*, I realized that I have not received any feedback from the readers. Write me a note to let me know if I am presenting articles that you want to read. I appreciate your input, especially if you have an application that you want designed (that is also short enough to fit in this article). Δ

John Huddleston is the vice president of the NADGUG SIG.UX. He may be reached at P.O. Box 4611, Portland, OR 97208.

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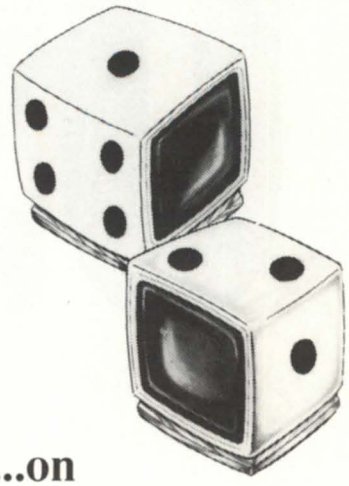

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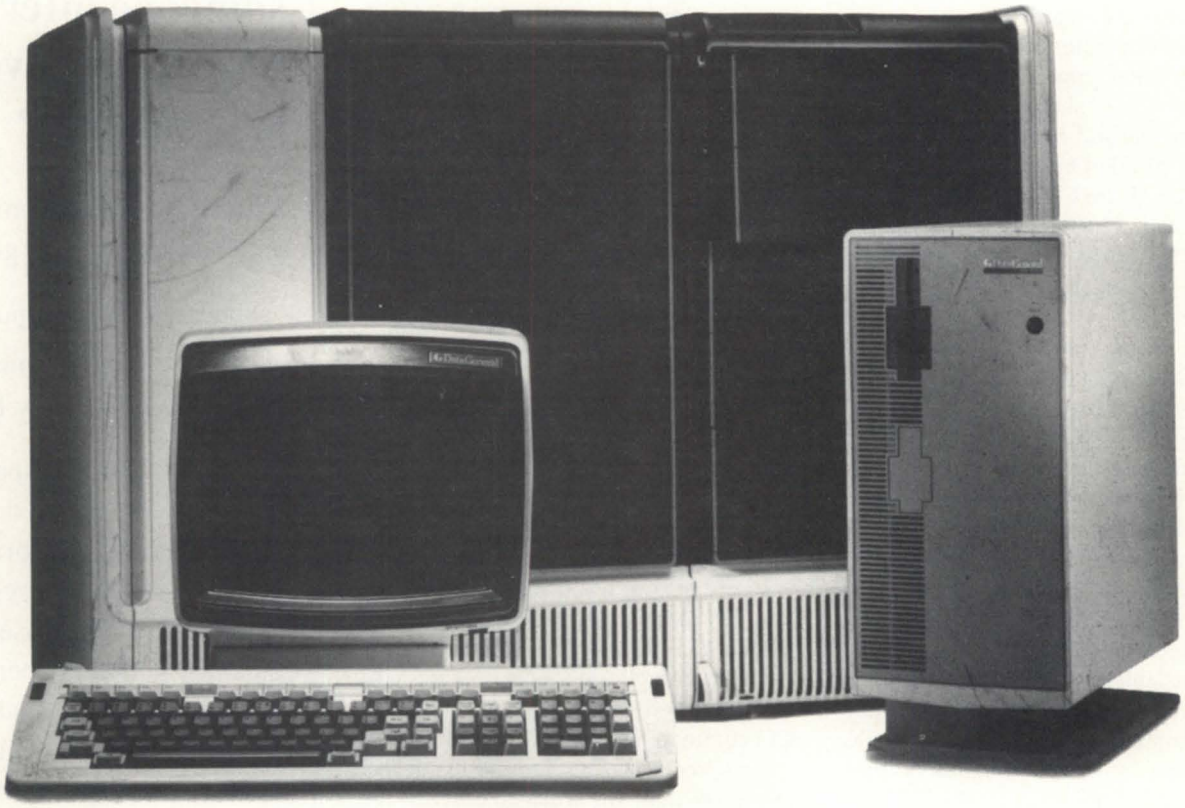

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Terminal schemes II

SYNOPSIS

Doug Kaye discusses the development of MV to PC connection from a historical point of view, and offers a glimpse of the future.

Last month, we examined various schemes for connecting terminals to DG minis, from the simple one-line console interface through the common Intelligent Asynchronous Interface (IAC). We also took a quick look at Xodiac's Virtual Terminal Agent (VTA), so you should now have a pretty clear idea of what's going on inside your MV for both standard terminals (CONxx) and virtual terminals (VCONxx). After a one month breather, we're ready to tackle PCs.

PCs as terminals

The simplest way to connect PCs as terminals is to use terminal emulation software. A program runs on the PC that converts keystrokes into those that would come from a DG terminal. Likewise, those special character sequences for cursor addressing, formatting, graphics, and display attributes are converted from the DG form to those used by the PC. The physical connection is via the PC's COM1 or COM2 serial port over a direct asynch line or modem to an IAC (see Figure 1).

If the emulation is complete, there is no way for AOS/VS or the application program to detect that there is a PC, and not a real terminal at the other end. So long as the emulator is well written and the workstation is of adequate speed, there is no performance degradation in this configuration. The MV treats the PC as a terminal.

There are, however, some well-known exceptions to this. Data General's own CEO Connection includes three terminal emulators, one each for D210, D410, and D460 emulation. The D460 family of terminals supports a number of graphics commands, and rather than attempt to emulate these in the PC, the designers of CEO Connection actually developed a new family of terminal types W410 and W460 ("W" for workstation). In simple character mode operation, these terminal types are identical to D410 and D460 respectively, but they process graphics in an entirely different manner. DG applications such as Trendview and Present are written to operate with either the W- or D-type terminals, but third party applications may only be written to the true D-type specification and may not work with

Figure 1

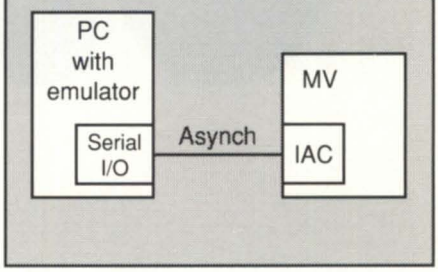


Figure 2

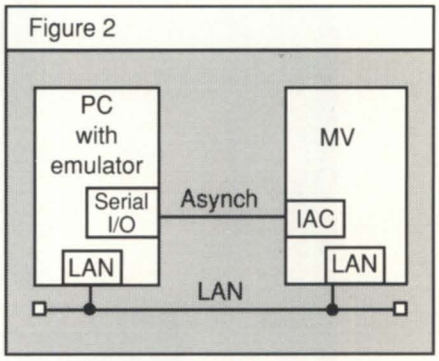
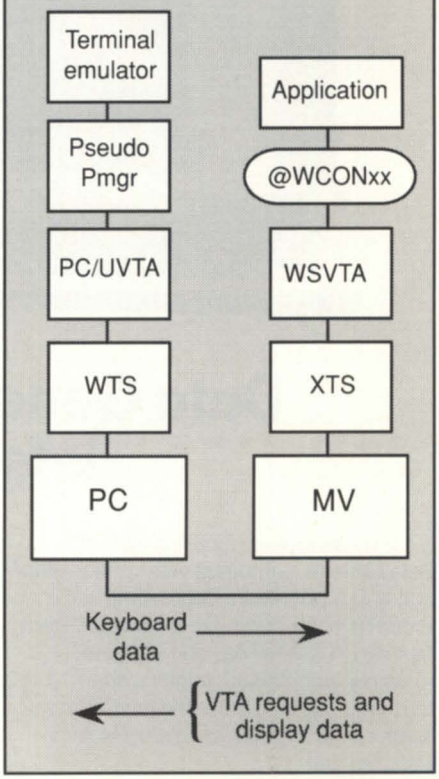


Figure 3



the W-emulators. The W- emulators also accept a number of commands from the MV that are only appropriate for a PC.

PC LANs

With the release of RDS' PC/VS in late 1985, it became possible to connect a PC to an MV via ethernet, and while services such as file and printer sharing were handled over the LAN, one could not use this same connection for terminal emulation. Those who needed emulation in addition to these more advanced services adopted the infamous "two wire solution," in which a LAN was used for file service, but emulation was still done over a separate asynch connection (see Figure 2). While the performance was good, it seemed silly to run the separate wire.

In 1986, Data General announced DG /PC*I, which included PC/VTA. In this scheme, the CEO Connection emulators are combined with the software on the PC necessary to perform the complete equivalent of UVTA. (See Figure 3). This is quite a bit of software, for it includes not just the entire PC*I Workstation Transport Service (WTS) and the terminal emulator, but also must emulate the complete UVTA and PMGR code. In this configuration, after all, a remote SVTA (now called WSVTA) sends a ?READ request to the PC, asking the PC to perform local echoing and line/field editing functions within the workstation.

While PC/VTA substantially reduces the network traffic, the software on the PC is quite complex. In addition, the host MV now has the overhead of treating this terminal as a VCON rather than a traditional console. As regular VTA users will tell you, this leaves something to be desired.

In an attempt to improve the performance of workstations, much of this code has been moved into the kernel (ring 0) of AOS/VS II. Although users are reporting some improvement, we have not yet had the opportunity to benchmark the results. Whether WSVTA and the associated XTS run in ring 0 or ring 7, the fact is that a substantial amount of host processing is required to support any virtual console, and VCONS or WCONS will never perform as well as CONs.

Termservers

At the same time that all of this WVTA stuff was going on, there was a different project underway. It is important to realize that they started separately and are quite independent of one another. That other project was the Termserver.

The easiest way to think of the Termserver (see Figure 4, page 48) is to imagine a statistical multiplexor that just happens to use the ethernet as its mux-to-mux medium, rather than the traditional synchronous connection. The mux-to-mux protocols are proprietary, in this case belonging to 3Com, the manufacturer of Termserver.

Termservers were originally intended to replace point-to-point asynch wiring for large, widely dispersed sites, and to reduce the number of wires coming into a computer room at sites that have many terminals. A virtually unlimited number of terminals (thousands) can communi-

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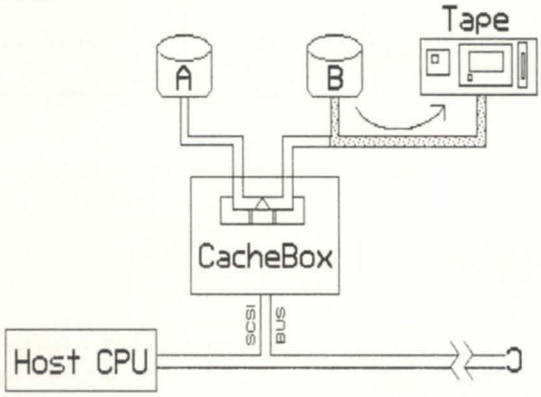

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Figure 4

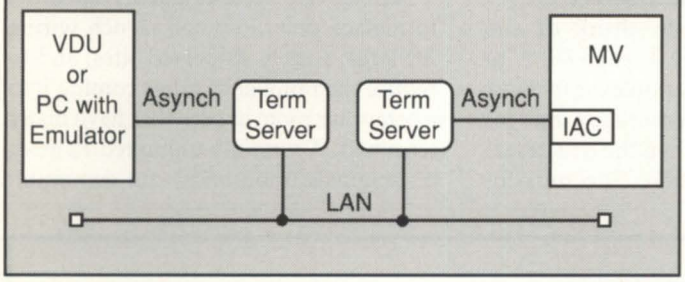


Figure 6

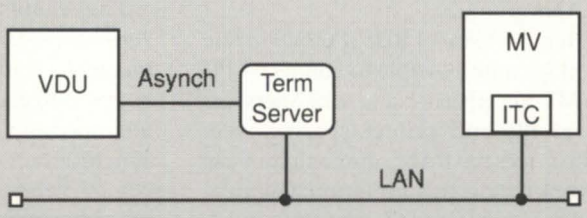


Figure 5

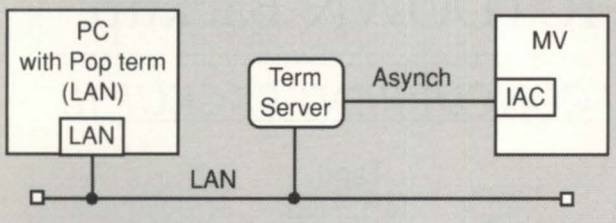
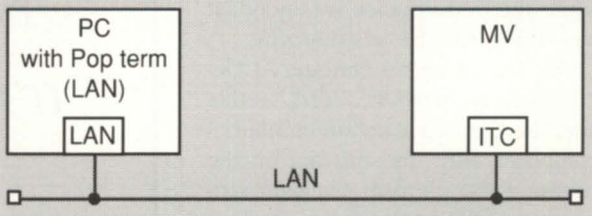


Figure 7



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cate over a single ethernet.

Termservers were not specifically intended for use by workstation PCs. The connection was from a VDU over asynch to the first (multiplexing) Termserver, then over the ethernet to the second (de-multiplexing) Termserver, and finally over asynch wiring to an IAC.

If the VDU happens to be a PC running emulation software, that makes no difference. From the perspective of the MV, the VDU (or PC) is still a regular terminal connected to an IAC. The MV cannot see the Termservers and ethernet in the middle; they are transparent.

Popterm/LAN

The obvious question was raised at RDS: If a PC is already connected directly to the ethernet for file service, etc., why not bypass the Termserver at that end? Whereas PC*I solved this problem using WSVTA, we felt that a virtual terminal scheme was unacceptably slow for most of our customers. Our goal was to perform emulation over the LAN without the overhead of a virtual console.

We went to Bridge Communications (now a division of 3Com) and licensed the technology used in the Termservers. From the specifications provided by Bridge, we were able to "emulate" a one port Termserver inside the PC. Now, by combining our Popterm emulator with 3Com's Virtual Terminal Protocol (VTP) and our ethernet LAN drivers, we could communicate directly over the LAN to the de-multiplexing Termserver and from there into the IAC (see Figure 5). Given the cost of Termservers, this saves between $300 and $400 per port by eliminating the need for the multiplexing Termserver. It also eliminates the need for any asynchronous wiring at the PC.

The ITC

Data General was neither the only nor the first mini manufacturer to utilize ethernet for connecting terminals. Users of large VAXes were already very familiar with ethernet for terminal interconnection as well as for general networking via DecNET. DEC took the lead, and combined its equivalent of the Termserver and the IAC into a single controller board.

DG has now followed suit with the Intelligent Terminal Controller (ITC) and L-Bus Terminal Controller (LTC). These devices are simply Termservers and IACs combined on a single board, resulting in a substantial cost savings.

To clarify, look at Figure 6. A terminal connected via asynch to a Termserver can communicate over the ethernet to an ITC or LTC in the MV chassis. AOS/VS views the ITC as a 128-line IAC. (The LTC looks like a 64-line IAC.)

Here's the quiz to see if you're following all this: Does a terminal connected in this manner appear to AOS/VS like a real console or a VCON? That's right—it's a real console.

Whereas terminals are initially connected via asynch, users of Popterm never see asynch in this scenario (see Figure 7).The PC is connected directly to the LAN and from there to the MV. There is no asynch wiring.

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6392-X D215 Monitor with keyboard	325
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This brings up an interesting question. What is the baud rate of this connection? The answer is: none. The data will flow from the MV over the ethernet and display on the PC's screen as fast as the ITC and PC can handle it. In the case of an 80386 or quick 80286, this can be substantially faster than an equivalent 9600 baud connection. There is also a considerable cost savings, for now *both* of the Termservers have been eliminated.

Until recently, the ability to perform emulation directly through the ITC has been unique to RDS' Popterm, and we've been quite proud of our technology. But we can't be all things to all people and we recognize that some customers would prefer emulators other than Popterm in this environment. For this reason, we have unbundled our VTP technology from our emulation and have licensed the VTP portion to makers of other terminal emulation packages. As of this writing, we have signed an agreement with Rhintek whereby its EMU/470 emulator will operate directly with an ITC, LTC, or Termserver in the same manner as Popterm.

The Term Manager

There is another device (not shown in the figures) which sits on the LAN known as the Term *Manager*, and there has been a lot of confusion regarding its purpose. There are two models of Termservers, one with a floppy disk (model CS/210) and the other without (model CS/200). The floppy disk has two purposes: first to store the software that runs inside of the Termserver, and second, to store the parameters for the Termserver asynch ports. As you would guess, the model without the floppy is less expensive, but it requires an external Term Manager for bootstrapping and parameter storage. Obviously, it takes a fair number of Termservers to make the diskless version more cost effective, but if you are using an ITC, you *must* have a Term Manager, since the ITC never has a floppy disk on which to store such data.

You might wonder, if the ITC is installed inside the MV, why can't the MV provide these services? The answer lies in the very clean separation of the IAC and Termserver functions on the ITC controller. This product was a joint effort of Data General and 3Com and it works as well as it does because the two halves of the board remained independent from one another.

Unfortunately, at $12,500 the Term Manager costs more than the ITC ($9,500), making it an expensive accessory. Down the road, there may be alternatives to the Term Manager. If and when that happens, I think we'll see ethernet as the primary means of terminal interconnection for most new installations of medium- and large-scale MV systems. Δ

Doug Kaye is CEO of Rational Data Systems. He can be reached at 1050 Northgate Dr., San Rafael, CA 94903; 415/499-3354. For a free copy of the RDS Report on PC Integration, contact RDS at 150 South Los Robles Av., Pasadena, CA 91101, 818/568-9991. *Copyright (c) 1990 Rational Data Systems, Inc.*

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A complete listing of the NADGUG software library

ACK • Updated version 1.70. Terminal emulator/file transfer program for both AOS/VS and AOS machines. 365 blocks.

Big Brother • Automatic log-off program written in Fortran 77. Donated by the U.S. Forest Service. 169 blocks.

B.J.'s BBS contributions • About 20 items, including various programs, documentation, and macros. Some of the more interesting items include the :SYSMGR benchmark suite, a continuous incremental backup, a clean-up file maintenance program, a program to find strings in files, and a type-backward program. 6,761 blocks.

CRTEDIT • The old RDOS screen editor ported over to VS. 49 blocks.

DBCHECK • Checks the open status of an Infos file and examines the checkpointing status of a file. 187 blocks.

DUMPLOAD • A Macintosh program to dump and load AOS/VS-compatible dumps on a Macintosh. 137 blocks.

ERP • A process-termination program developed by NASA and modified by Manville. In Fortran 77. 454 blocks.

FILEMNGR • With this new version, you can move, copy, delete, view, and perform several other options faster. This is distributed as shareware. If you try it and continue to use it, you are requested to pay a registration fee. From Kim Geiger. 654 blocks.

Focus • *Focus* magazine articles. 1774 blocks.

FTNCVT • A Fortran 5 to Fortran 77 translator. 232 blocks.

Games • A collection from various places. Enjoy. 19,216 blocks.

IMSLUTIL • A collection of CLI macros, Cobol routines, and assembly routines callable from Cobol. By IMSL of Houston. 4,893 blocks.

JAG_UTIL • JAG_UTIL by John Grant consists of several programs: Filecount, Userspace, Scan, Glossary, Laminate, and Qhelp. 4,325 blocks.

Kermit • A file-transfer protocol developed at Columbia University. Uses 9,697 blocks.

Logout • Another auto log-out system. 178 blocks.

Look • Used to view text files, Look allows you to move forward and backward in a file. Donated by Data General. 202 blocks.

Macros • A collection of macros from various sources. 441 blocks.

MENUDIR • An initial user menu that can chain to other applications and features a password-control system. From the Fed SIG. 486 blocks.

Misc Kerm • An expanded version of AOS Kerm, this now includes other versions of Kermit including DG/One Kermit. 6,709 blocks.

Notify and Prior • Two contributions from Concept Automation. Notify tells you when a process has terminated. Prior lists the priorities of processes. 162 blocks.

RDOS Kermit • Now available. You must request the Kermit tape (rather than the library tape) to get RDOS Kermit.

Softrans • A file-transfer protocol written in Fortran 77 used to communicate with proprietary PC communications packages. 462 blocks.

Spell • Checks the spelling of a word or spell-checks documents. Submitted by Richard Kouzes. 5,108 blocks.

TEX • Version 2.26a is now available. TEX (Terminal Emulator with Xmodem) is a terminal-emulation program written by David Down. He has revised the TEX software to include a command language. TEX is distributed as shareware. At the end of 30 days, either remove it from your system or send the author a $45 fee. 463 blocks.

VT100KER • VT100 emulator from John Grant. 1,043 blocks.

Xfer • A tape-conversion utility. 607 blocks. Δ

All NADGUG members interested in receiving the NADGUG software collection should send a 1,200-foot tape to:
Randy Berndt, Building 4, Suite 321, 5300 North Braeswood, Houston, Texas 77096

MV/2000 and MV/1400 users should send one formatted, error-free tape cartridge. Software contributions should be sent to the same address. Be sure to include your membership number. Allow 4-6 weeks for delivery.

Thanks to Brian Johnson and :WFFCA, the library is now able to provide 1200 ft. copies to AOS/VS rev 6 users. To leave a question regarding non-standard library distribution call 713/988-5342.

Please include a self-addressed envelope with sufficient return postage. In compliance with postal regulations, do not date the postage. Either disable the date printing completely, or set the date to "--" or zeros.

What's new at the top

SYNOPSIS

The base technology of this unbelievably fast MV is like a bride's regalia, but will April showers rain on this marriage of MV and 88K?

During a recent trip to the Boston area on personal business, I had the occasion to spend some time in Westboro. My intentions in visiting buildings 14A and 14B were to find some Eclipse S/120 and S/140 documentation, and to see how some of my old friends were doing.

The visit had an unexpected bonus, in that a few of the people I worked with in Webo told me some of the details of a new computer that they were working on. I know that this column is not the normal forum for product announcements, but I simply could not restrain myself from letting the world know about this exciting new top-end processor.

Exciting is a bit of an understatement! The base technology of this high end machine is like a spring bride's regalia—something old, something new, something borrowed, and something blue.

Something old

The new computer is an MV. It runs AOS/VS or AOS/VS II. Even though there are 88K chips in it, it is not a member of the Aviion family.

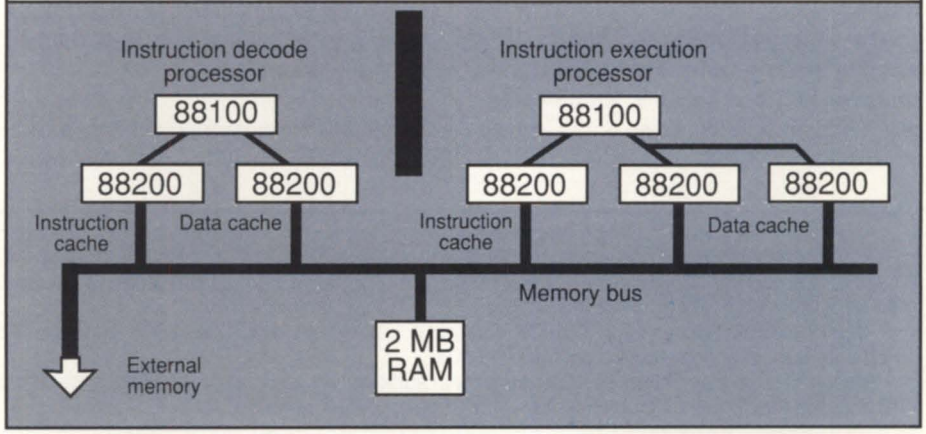
Something new

It is based upon the ECL version of the 88K processor chips, (not yet available to the general public, and available to Data General only by special arrangements with Motorola) in a tightly coupled, highly interleaved, multi-processor arrangement. It is fast. It is very fast. (Current benchmarks show a single processor running almost twice as fast as an MV/40000 HA Model 2.)

Something borrowed

The parts that are borrowed are portions of the design work from the MV/40000, the Aviion series, the PC, and the

Figure 1: MV/8000 processor board



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Something blue

As outrageous as it may seem, the prototypes use a personal computer to initiate the boot sequence and to monitor the internal functions of the various processors. It acts as an SCP.

Implementation

Most are aware that the various members of the MV family are very different in their internal design. Some of them are based upon TTL, ECL, PLAs, VLSI, etc. This machine is also radically different. Its implementation is based upon multiply pipelined, high-speed 88Ks running a memory resident operating system that actually emulates the MV family instruction set. Before getting too far in describing how it works, I would like to introduce Figure 1 (page 52), which shows a standard MV/88000 processor board.

Each of the processor boards consists of two 88100 ECL processors, running at 125 MIPS each, and 2 MB of high speed random access memory. The 88100 chip on the left, along with a pair of 88200 Cache Memory Management Units (CMMU), is used as the instruction decode processor. (The first CMMU is used to feed the 88100 instructions, while the other is the data CMMU.) The instruction decode processor unit takes the MV family instructions from the off-board memory (via the memory bus). The MV family instructions are, in essence, the raw data that this processor handles. The output of this processor goes to the onboard memory and consists of the addresses of instruction emulation code fragments.

The other 88100 uses three 88200 CMMUs, and this processor is used to execute the emulation code fragments that the instruction decoder dictates. CMMU obtains the instructions in the code fragments that the 88100 will execute, the second gets the data, and the third handles the data that the MV family instruction manipulates.

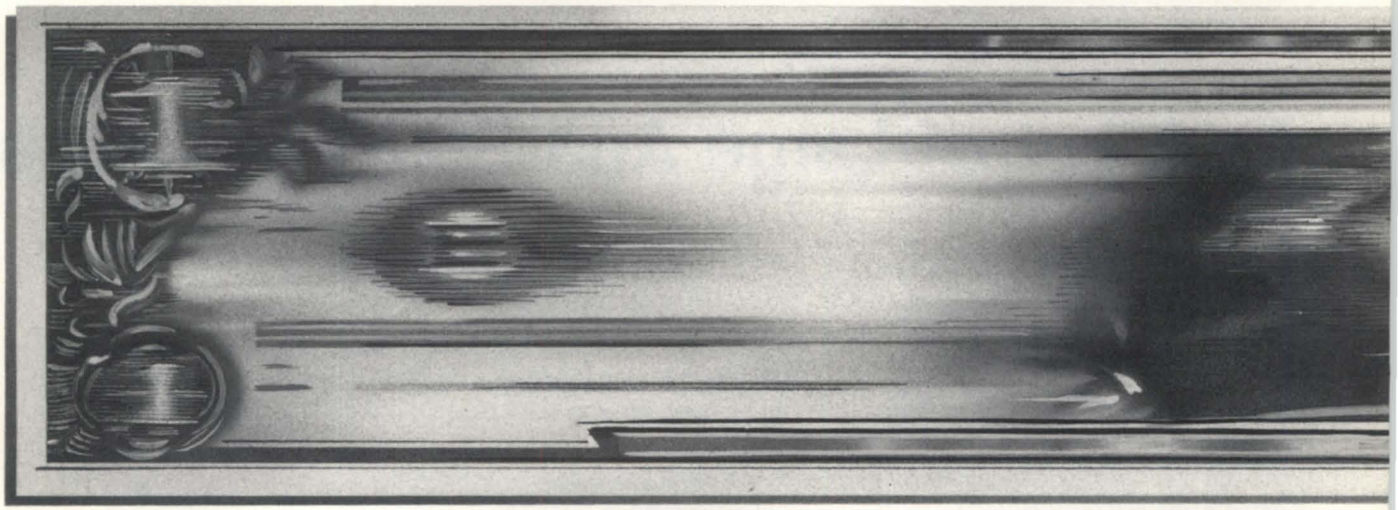
The 2 MB of onboard memory contains the instruction decode program, instruction emulation program, inter-processor communications areas, data stacks and other areas for the two processors, and intermediate storage for onboard requirements.

MV family instructions and data are not stored in the onboard memory, but rather in the main memory as in any other MV. The best way to describe the contents of the onboard memory, is as a 2 MB combination of "microcode" and pipeline. (It can be thought of as microcode, because the execution unit runs the code fragments in a manner similar to the other MVs.)

Registers

It can be seen that the MV instructions are emulated, but what about the registers? Well, if we look at the architecture of the 88100, we see that it is ideally suited for the job, because of the number and variety of the registers. With 32 registers, the 88100 has more than enough registers to handle the requirements to map the MV's registers directly. The requirements

THE ULTIMATE OBJECTIVE:



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of the MV register mapping are shown in Figure 2.

External memory and I/O

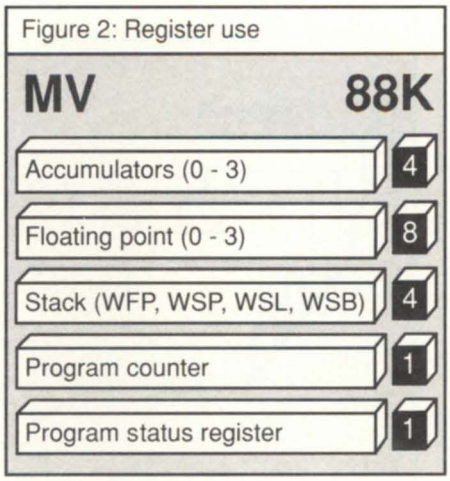
Obviously, 2 MB of onboard memory cannot handle all of the requirements of an AOS/VS system, so the memory bus of the processor boards interfaces through an MV memory adapter to the standard MV/40000 backplane through a Memory Interface Adapter board. Another interface adapter is used to convert the 88x00 bus to the normal MV I/O bus, so all of the standard MV I/O controllers work. Figure 3 (page 56), shows the general architecture of the MV/88000.

Stepping back to memory, for a moment, the 88K is perfect for the job of running AOS/VS, as the 88K can address 4 GB of user space (like AOS/VS and AOS/VS II), and can also address 4 GB of supervisor space. (More than enough to do anything you can dream of!)

How does it work?

It might seem that interpreting the instructions, and then running code to actually perform the instructions might seem like a bizarre thing to do. (Has anyone ever heard of a *fast* emulator?) But, when you are executing your favorite game like EMPIRE2, CEO, SED, or CLI, each MV instruction causes you to execute microcode program fragments. Given the incredible speeds of the ECL versions of the 88K chips from Motorola, and the close mapping of the MV-88K instruction functions, the amount of "microcode" that the execution processor actually performs is very low. This is what gives the MV/88000 the performance figures that it has. (Improvements in the decode and emulator programs will speed up this machine even more!)

Figure 2: Register use



Another feature of using the 88K is that the MV's segment/ring protection is guaranteed by the control registers in the 88200 CMMUs, thereby eliminating the need for the emulation software to perform address validation.

How fast is fast?

The instruction decode processor runs at 125 MIPS. The instruction execution processor runs at 125 MIPS. Floating point operations are executed at one per clock cycle. More processor boards can be added to make this a multi-processing machine. (High availability is achieved by adding these extra processors. To further improve on the HA capability, the

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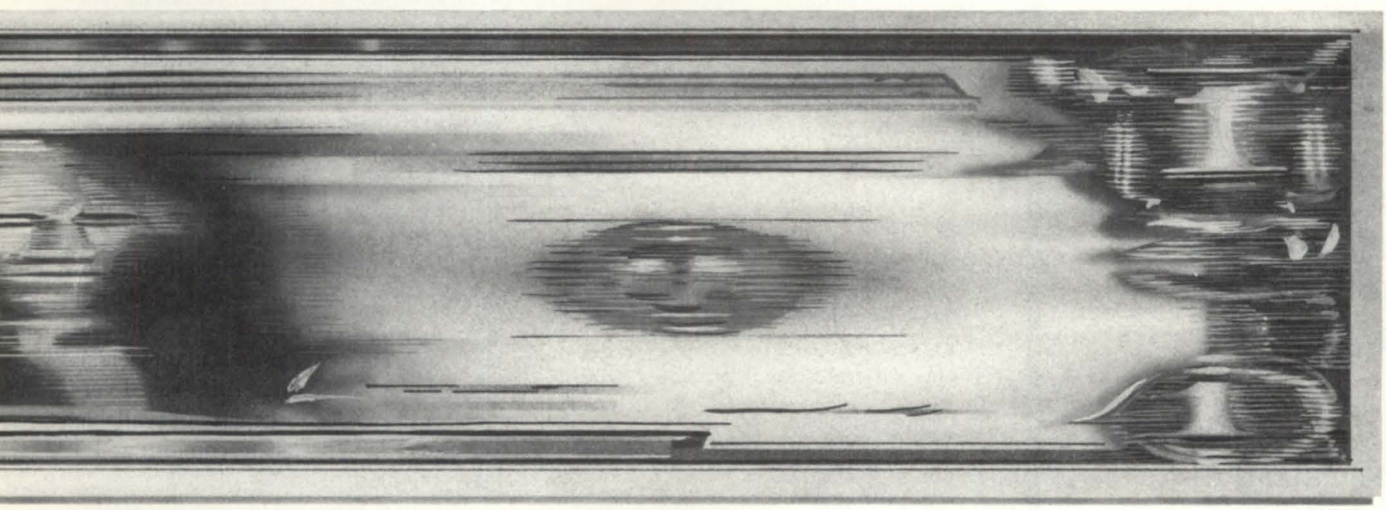

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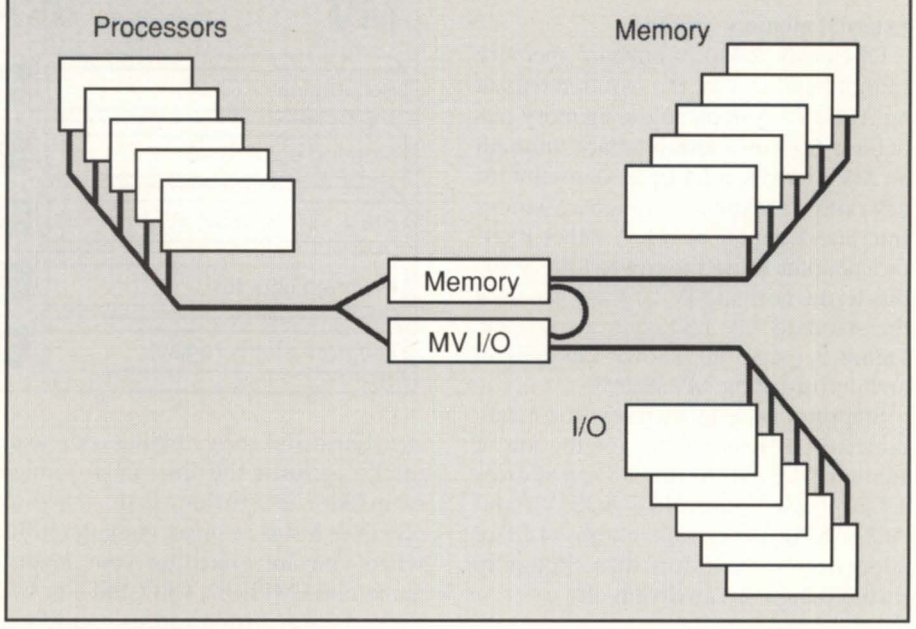
FIGURE 3: General architecture



extra processors are added in pairs, so that a single computer would have 1, 3, 5, 7 . . . processor boards. By having an odd number of processors, there is no need for a master/slave relationship between the boards; arbitration as to which board is at fault is easier.)

Other features

The 88K chips have special address modes called scaled indexing that use a value as a word or byte pointer—ideal for emulating an MV. (And with the flag that specifies which byte is the LSB or MSB, this even gives the MV88K the potential market of replacing other machines, like VAXes.) The timing of the various instructions shows some interesting results:

- slow on conditional branches (due to the delays in returning feedback that the execution processor must give the instruction decode processor)
- outstanding speed in straight line code
- performance on integer operations is mediocre at 17 to 18 MIPS
- blazing fast on floating point
- complex iterative and/or move instructions, such as WCMV, WCMT, WCMP, WGBITBLT, are *very* fast
- simple instructions are relatively slower
- shift instructions are also very fast
- most of the complex instructions execute seven times faster than the MV/40000.

Rumors and conjectures

It seems funny that a small handful of RISC chips emulating a CISC computer, outperforms the same CISC computer. After listening to the details from my friends (with particular thanks to J.C.) several topics were bandied about: The code name for this machine was Strohs, with the instruction decode unit named Labatts, and the instruction execution unit named Molson.

One of the reasons for making a machine with this design philosophy was to sell 88K chips, without having to pay AT&T for Unix licenses.

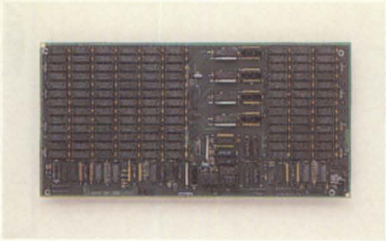
This is a more cost effective method of producing a machine, since it does not rely on proprietary parts (let someone else worry about integrated circuit yields).

Is DEC working on a MIPS-based version for the VAX? Pricing is not available yet, but it is expected to come in at 1.3 times the price of an MV/40000.

Delivery is expected in the fifth quarter of 1990. Fifty-one percent discounts are available to anyone purchasing an MV/88000 on or before April 1st, 1990. By the way, April Fools. Δ

Michael Dupras is senior consultant for the Software Products and Services Division of DG Canada. He may be reached at Data General, 490 boul. St-Joseph, Suite 104, Hull, Quebec, Canada J8Y 3Y7.

Now up to 14MB Total Memory for MV/7800X



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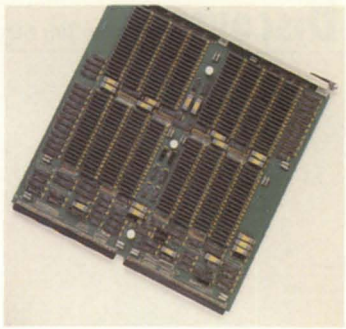
Memory Boards for MV/15000, MV/18000, MV/20000 Computers



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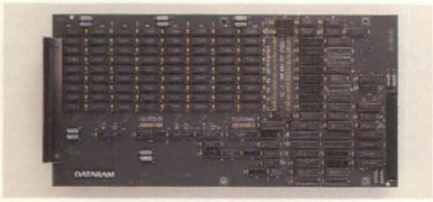

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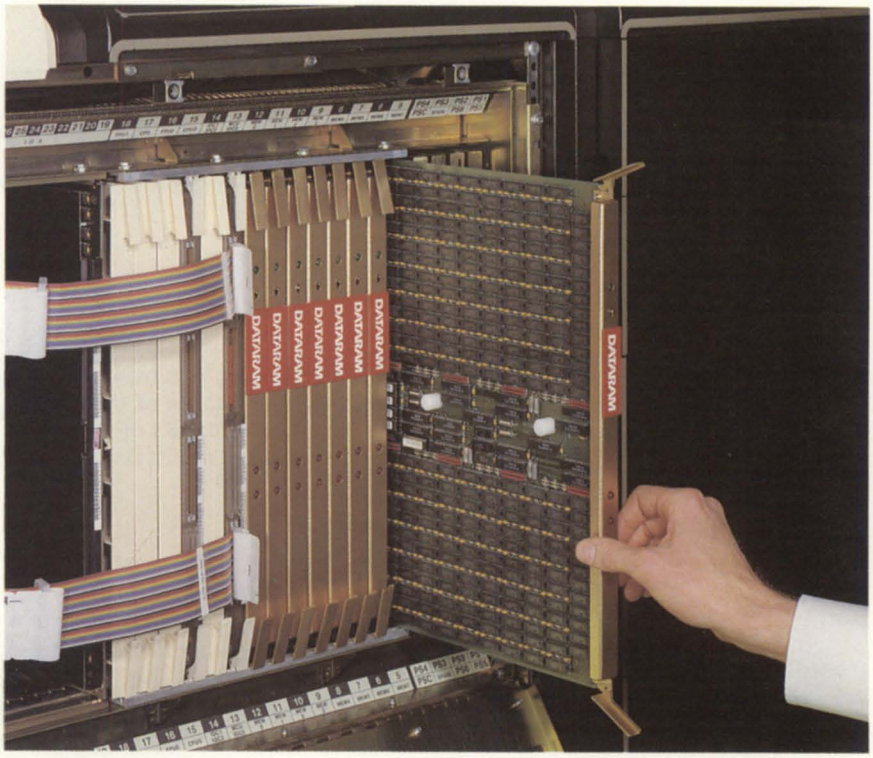

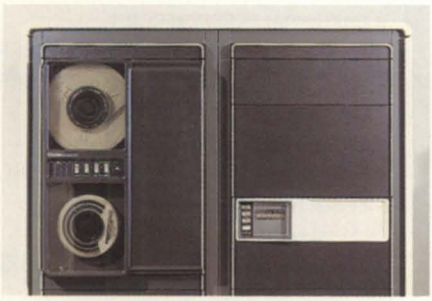

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Secondary school

SYNOPSIS

Combatting program inefficiency is a task for the tireless. Here, Jim Siegman strikes again at the class of programs that have the biggest impact on system throughput—report programs.

Last month, in the first battle of a war against sloppy programming, I presented a secondary lookup routine designed to make report programs more efficient. The improved routine is problematic under two conditions—when it does too much work, and when it's simply not efficient enough. To solve the first problem, I refer you to the March issue. To overcome any remaining inefficiency, read on.

If the secondary record does not exist, and none of the previous routines handled a case in which no record was found, this could cause incorrect or undesirable output. Two other possible causes of inefficiency are 1) sporadically arranged secondary records or 2) a very limited number of secondary records. In all cases, we can improve the routine to achieve a better throughput.

First, let's fix the routine to handle missing records. We could detect them by checking the file status of the secondary file. However, if we needed a record that was still loaded (except for the key), we would have no way of finding the key to which it once belonged. What we really want to do is preserve the key that goes with the data, in the event that the new key doesn't have a record. We can achieve this with the following changes to the detail processing paragraph and lookup paragraphs:

```
PROCESS-DETAIL-NEXT.
   PERFORM READ-NEXT-DETAIL.
   IF ARO-DETAIL-STATUS NOT = I-O-OK
   GOTO PROCESS-DETAIL-FINAL-TOTAL.

IF FIRST-RECORD-FLAG = "Y"
   MOVE LOW-VALUES TO PREV-SALESREP
   PERFORM GET-SALESREP-RECORD
   MOVE "N" TO FIRST-RECORD-FLAG
   GO TO PROCESS-CUSTOMER-PRE-BREAK.
```

. . .

```
   LOOKUP-SALESREP-RECORD.
   IF ARO-SALESREP NOT = SLM-SALESREP
         PERFORM GET-SALESREP-RECORD.

   GET-SALESREP-RECORD.
   MOVE ARO-SALESREP TO SLM-SALESREP.
PERFORM READ-SALESREP-RECORD.
IF SLM-FILE-STATUS = I-O-OK
   MOVE SLM-SALESREP TO PREV-SALESREP
ELSE
   MOVE PREV-SALESREP TO SLM-SALESREP.
```

This fix determines whether or not a lookup was successful. Since the PREV salesperson field will only be updated with a successfully retrieved record, the only time this routine fails is if LOW-VALUES is a valid salesperson key. That's never happened in any application system I've seen, even if we include lookups to any file and not just a salesperson master file. The way to implement the failed lookup detection in the detail processing is demonstrated here:

```
PERFORM LOOKUP-SALESREP-RECORD.
IF ARO-SALESREP = PREV-SALESREP
```

```
    MOVE SLM-SALESREP-NAME TO
        PRT-SALESREP-NAME
ELSE
    MOVE "Salesperson not found" TO
        PRT-SALESREP-NAME.
```

A dearth of secondary records

Now consider the situation in which a limited number of secondary records exist, and none are needed for consecutive detail records. In one application I saw, for example, there were 20 labor operations in a factory. Three were common to nearly every product, and three or four more were present in about half the products. The remaining labor stations were used infrequently, in up to 10 percent of the records.

The solution was to build an array in memory of the last 10 records retrieved. If the program had to go to the file, the last record went on the top of the heap and bumped everything else ahead. Now and then, one of the three common operations would get bumped, but it was promptly reloaded in the next operation.

The batch program went through the entire product data base and recalculated the cost of manufacture of each product. Since this application was meant to replace a manual system, the existing product line was being built one custom product at a time, on an as-needed basis over a number of months. Each product that costed out with a significant difference from the manual called for corrections to the manual, the automated procedure, or both. Since the labor factors were also being fine-tuned throughout this period, the batch program was run often—sometimes daily. As the file grew, so did the runtime of the recost program, a report that basically updated the detail file.

When we first implemented the secondary lookups to the standard labor cost file (the assembly line had 17 records), we were hitting the file three to five times for each detail record. The technique introduced above didn't help at all—the reduction in file I/O was virtually nil, and we added *more* processing, with the previous key checks and updates, to boot. The improved method actually made the program less efficient. But when we added the array in memory and stored the data fields needed from the 10 previous records, disk file I/O was cut nearly in half.

The number of accesses to the standard labor cost file was reduced from an approximate value of over 10,000 reads to less than 200 for the final run. The 40 percent reduction in file I/O resulted in a runtime reduction of 20 to 30 percent. That's about one fourth of the elapsed time.

You may ask why we went to so much trouble to build a file for only 17 labor operations? Well, that number eventually increased to 100 as more labor operations were added in the plant. Also, there were manufacturing operations in several other cities which, because of differing labor costs, would allow the final number of records to be as high as 300 or more. At these locations, we adjusted the size of the array from 10 to 20 or more if performance started dropping off.

The characteristics of the data were such that even though the number of labor standard figures increased to a few hundred, rarely more than 10 to 20 would be needed for each piece of the file, since processing was done in product code sequence. Once the array was loaded, it could be used for quite a while before needing replacement by a new set of standards.

Stay alert and stay tuned

The "improved" lookup with previous key check is suitable for general use, and it is the routine I nearly always implement in my code. Stay alert for the times it may not be the best solution. Normally, such a situation is easy to spot, since the most frequent occurrence is with level break routine lookups. There are other times, however, that are not so obvious.

The same techniques apply to a variety of different languages—only the code differs in most cases. And though I have listed a number of different ways to retrieve secondary records, there are even more methods that can be tailored to the eccentricities of any particular application.

That's it for this month. I hope that everyone found something useful. I'll be looking at more efficiency-promoting techniques in the future. Δ

Jim Siegman is a contributing editor to ***Focus*** *and treasurer of the Chicago Area Data General Users Group. Send comments or questions to him c/o Datamark Corp., 3700 W. Devon, Suite E, Lincolnwood, IL 60659; 708/673-1700.*

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Style watch

SYNOPSIS

Multiple columns and text break options, improved handling of tables, and underline capability (gasp!) mark new release of desktop publishing software for CEO users.

by Joe Cannata
Special to Focus

The folks over at Intercon Associates in Rochester, New York, have been busy working on rev 2.20 of their highly successful desktop publishing product, Office/Publisher. Running integrated with CEO, their package allows users to create print quality output with CEO documents as the text source. Available since last December, the latest revision attempts to fulfill a number of customer requests, and to support new devices.

User level changes

First up is the copymark <BIN n>, which selects the desired bin for different page sizes within a document. The "n" represents the printer paper tray number. In the case of a manual paper feeding printer, an "M" is used instead of the "n." The command must be entered on a separate line at the top of the page requiring non-default paper feed.

In response to heavy demand for multiple columns, mostly voiced by customers who publish newsletters, Intercon raised the Office/Publisher limit from two to four columns. In previous revisions, the software always balanced the text between the two columns; this is now optional, and the old <Nn> copymark format was changed to accommodate the expanded offering. Besides having to set the number of columns (1-4), "b" must be set to either "Y" for column text balancing or "N" for no balancing. The "Y" and "N" must be in upper case.

Users can also select where to break column text. The new <BRK> copymark stops the multi-column format wherever the copymark is entered and turns off column balancing for the remaining page segment. The new copymark can thus eliminate strange-looking column text, where the leading is visibly different in the columns.

Intercon has done some extensive work to enhance the usage of tables. In the past, when a table went beyond a page break, the continuing page contained only the table data without descriptions. Using the new <TTC> text copymark, it is now possible to specify a table title continuation string. The "text" typed immediately after the copymark will be inserted as a table title at the top of each new page onto which the table overflows. This copymark must be entered on a separate line prior to the table.

Another change in table handling involves the use of indents. Formerly, any indent in a table translated into a vertical line, if the indent corresponded with a format ruler tab stop. You could not intentionally indent text without causing a problem. This can now be overcome by using a second format ruler. The additional ruler must contain the regular table tab stops, and the new tab stops for the desired indentation positions. This second format ruler can appear anywhere after the Start Table copymark,

Figure 1: User style sheet specifications

Style name: DEFAULT.STL

Modifiable	
User level:	2
Font name:	S
Point size:	10.00
Line leading (points):	12.00
Physical page size:	Standard letter (8.5 x 11 in.)
Page orientation:	Portrait
Top margin (picas):	7
Bottom margin (picas):	8
Left margin (picas):	8
Right margin (picas):	6
Header margin (picas):	4
Footer margin (picas):	3
Header overlap in margin (picas):	2
Footer overlap in margin (picas):	2
Header location:	V
Page number vertical location:	B
Page number horizontal location:	V
Graphic location:	C
Graphic print mode:	On
Logical page verso-recto mode:	On
Line justification mode:	Justified
Maximum successive punctuation:	3
Hyphenation mode:	On
Hyphenation order:	Dictionary first
Minimum characters before break:	2
Minimum characters after break:	2
Number of columns:	1
Column balancing:	On
Minimum orphan lines on a page:	2
Minimum widow lines on a page:	2
Minimum single lines at end of page:	3
Minimum single lines at top of page:	3
Change bar location:	R
Change bar offset (picas):	1
Change bar width (points):	3
Table title continuation literal:	" (continued)"
Leader pattern:	" . "
Leader pattern space width (1/1000 em):	200
Underline mode:	C
Not modifiable	
Maximum number of headers:	10
Maximum number of footers:	10
Gutter between text columns (picas):	2
Gutter between table columns (picas):	1

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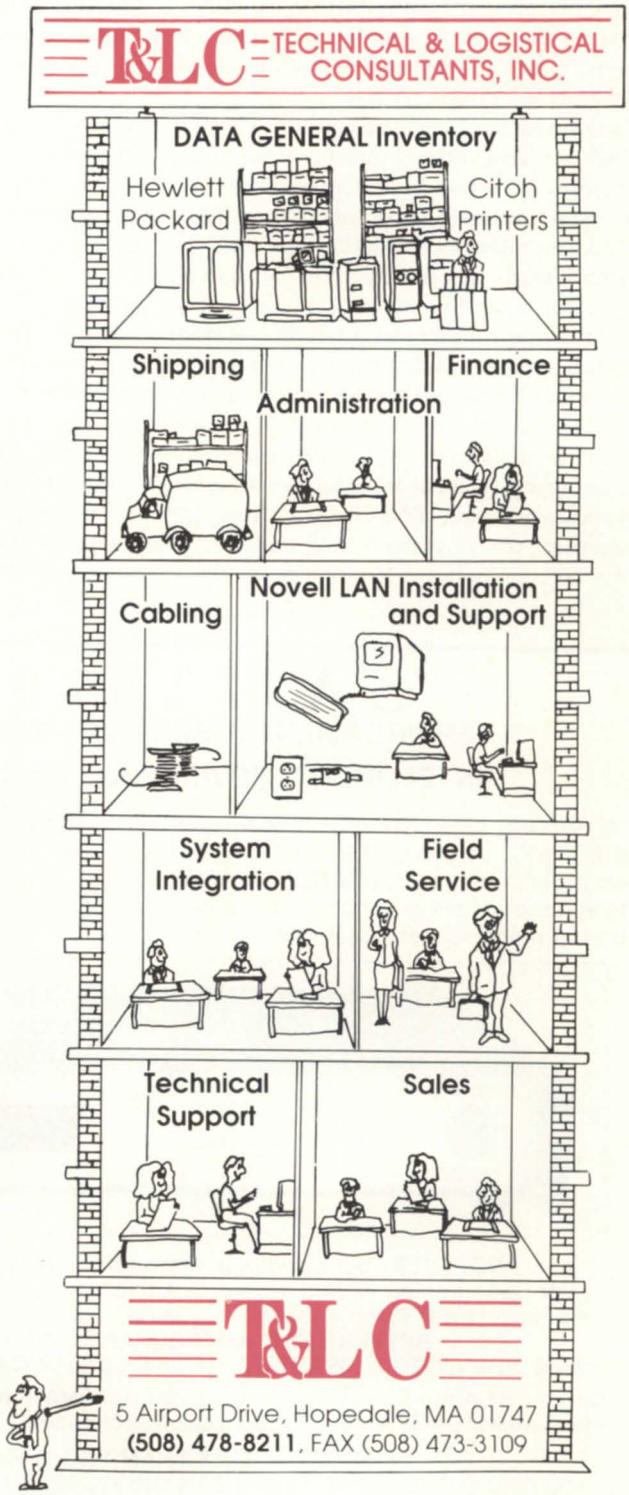

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but it must *precede* the text to be indented.

Another major change to Office/Publisher tables appears in the use of leadering. An example of leadering would be the dot fill in a table of contents. A new table-type copymark <TL> sets this. By default, the dot is the leadering character, but the <LPccc> copymark allows for a user-selected fill pattern. If you wish to prevent leadering for a specific row, the <LN> copymark can be placed on the same line as the table entry to be inhibited. In leadered tables, the text will be bottom aligned, as opposed to top alignment in the other table types.

Underlining has long been considered a no-no in the publishing industry, and Office/Publisher was created with good rules of publishing in mind. Underlining was not allowed. Italics were the appropriate substitute. In rev 2.20, however, due to extensive user demand, underlining is now available. The <Um> copymark starts this process. The "m" can either be "C" for a continuance underline (including all characters and spaces) or "N" for a non-continuance underline (skipping spaces). This copymark must be used in pairs, one to start and one to stop the underlining. It can also be used to create horizontal lines. The string <UC><EM10><UC> produces a 10 pica underline.

A further enhancement includes a page number option, for page number placement at the top or the bottom of the page. The copymark now reads <PNL>hv. The "h" is "L" (left), "R" (right), "C" (center), or "V" (verso-recto), and the "v" is either "T" for top or "B" for bottom. No change in the placement of the copymark is needed.

The other new user feature is that Interfont characters such as superscript, subscript, and special characters like the happy face can now be created with available typefaces. Boldface, for example, requires entering the copymark, and then setting the (+) TEXT ATTRIBUTE to the entire copymark.

Style and the system manager

Style sheets have always been tied to the user's Office/Publisher profile. New stylesheets required adjustments to the profile by the system manager. Now, through the use of the <STYLE?> copymark, users can select different stylesheets on their own, without requiring any intervention by the system manager. All that is required is a valid stylesheet name (provided to the user by the system manager), inserted in place of the "n" in the copymark. The copymark must be placed at the top of the first page of the document.

Various stylesheets can be viewed and listed with a new utility, available on the Utilities Menu. Thus, the Office/Publisher Utilities Menu now has 12 options, with the stylesheet view or print being the addition. Minor changes have been made to the utilities. The printer Definition Utility has been reformatted somewhat, and is now more user-friendly. The Font Categories Editor is also a little easier to use.

An interesting program included with 2.20 in :PUBLISHER is PRINT_CEO_CMD.PR. This does exactly what it says—it prints

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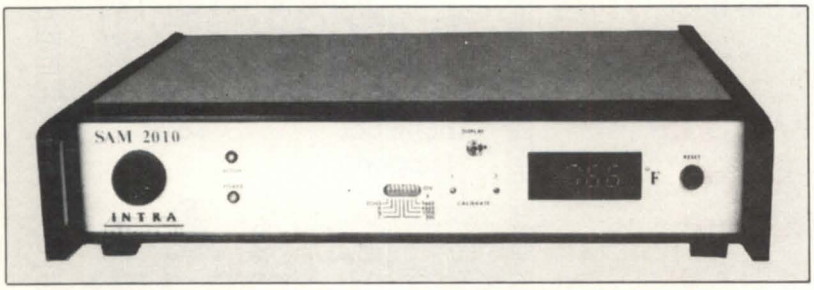

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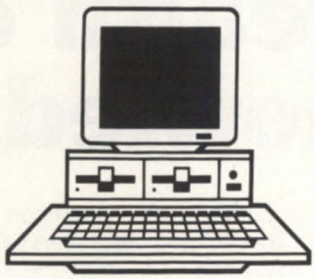

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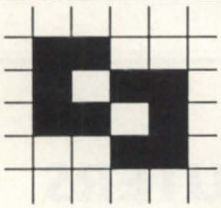
the user command file, command by command. This has long been a request of CEO users, and those with Office/Publisher will not have to wait any longer. The program is invoked with the macro PRINT_CEO_CMD.CLI, and takes a username as an argument or a /ALL on the macro name. A sample output is listed below:

```
Command name: F1
Command description: EXIT CEO
Command definition starts from (1. Activity where invoked, 2. Main Menu) 2
Command: {CANCEL/EXIT}Y {NEW LINE} {CANCEL/EXIT}Y {NEW LINE}

Command name: F2
Command description: GO TO INBOX
Command definition starts from (1. Activity where invoked, 2. Main Menu) 2
Command: {NEW LINE} {NEW LINE}1 {NEW LINE}

Command name: F5
Command description: Office/Publisher copymark
Command definition starts from (1. Activity where invoked, 2. Main Menu) 1
Command:
    {INSERT} {TEXT ATTRIBUTE}/f p-n {TEXT ATTRIBUTE}D {NEW LINE}
{EXECUTE} {<-} {<-} {<-} {<-} {<-} {<-}

Command name: F6
Command description: Open copymark
Command definition starts from (1. Activity where invoked, 2. Main Menu) 1
Command:
    {INSERT} {TEXT ATTRIBUTE}/x {TEXT ATTRIBUTE}x {NEW LINE}
{EXECUTE} {<-} {<-} {<-} {ERASE EOL} {INSERT}

Command name: O/P UTILITY
Command description: Office/Publisher utility menu
Command definition starts from (1. Activity where invoked, 2. Main Menu) 2
Command:
    {INTERRUPT}6{NEWLINE}2 {NEW LINE}PUBLISHER.UTILS {NEW LINE}
{EXECUTE}

Command name: PUBLISH
Command description: Publish current document
Command definition starts from (1. Activity where invoked, 2. Main Menu) 2
Command:
    {INTERRUPT}7 {NEW LINE}
```

The changes in this revision are well documented in a new system management manual, and addenda of a reference card and the user's guide. With the introduction of 2.20, Office /Publisher is now a very stable and mature product. It may be some time before any more major enhancements come along. In the meantime, the latest additions will be put to good use. Δ

Joe Cannata is a training specialist with Data General Educational Services. He may be reached at 7927 Jones Branch Drive, Suite 200, McLean, VA 22102; 703/827-9690.



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Circle 45 on reader service card.

Bits and bytes from the bulletin board

Straight dope on QPRINTs and CEO

From: Ron Parks

I was told by the CEO people that you cannot do QPRINT and CEO print on the same con port. I have a laser printer that I send documents to that I'd also like to send CEO documents to. I can't get the CEO documents to go.

The CEO people tell me that I have to assign another con port, and call it a plot queue, to make the documents come out on the same laser printer. Does anyone have any ideas?

From: Randy Berndt

We had two 4558s hooked up to the same XLPT (printer, not plot) queue, and we did normal QPRINTs and CEO intermixed with no problems. We defined the printers in CEO as queues (you have to include the console number, but CEO ignores it if you set the printer up as a queue). When CEO Formatter finished, it handed the job off to EXEC.

Another trick for forms control: Generate a bunch of printers (one for each form in portrait and landscape) and then specify a non-standard form for those with forms, and no forms for the ones that use blank paper (even landscape). CEO hands the job to EXEC with /FORMS=, landscape jobs come out right, and everything is automatic.

From: Tom Gurak

We do CEO prints, QPRINT/BINARYs outside of CEO as well as ordinary QPRINTs to CEO printers without any problems. We even use CEO's cleanup files.

Apocalypse now

From: Dave Garcia

Does anyone know of a patch that will change the date and time from standard DG format to, let's say Digital? (i.e., 25-jan-1990 11:51:00:00.) I want to patch the CLI so that upon system boot it will ask for the date and time in the following manner: DD-MM-YYYY HH-MM-SS, just like when you boot up VAXes. In the event my AOS machine lasts this long, I'd like to be able to set the date for the year 2000.

From: Walter Mosscrop

Dave, I think that AOS/VS can already handle dates well into the next century. I'm sure that DG will have a patch for correcting the entry problem by the year 2000, assuming they last the decade.

We had a version of RT-11 a few years ago that caused the year 1984 to be shown as year 00—apparently, someone at DEC never thought the operating system would be in use that long. Δ

The NADGUG/RDS electronic bulletin board is available to all NADGUG members. The phone number is 415/499-7628. There are no fees for use other than the telephone charges.

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Circle 54 on reader service card.

Aviion, Eclipse support Portable Netware

Boston—Netware for Aviion Systems, the industry's first RISC-based products to support Novell's Portable Netware, were announced by Data General at Networld '90. DG also announced that Oracle Corporation's relational data base management system will support Netware on Aviion systems.

The announcements came with DG's introduction of three new products in its Distributed Applications Architecture (DAA) Open LAN product line: a Software Developers' Kit (SDK) for Aviion PC LANs; Netware for Eclipse MV systems; and Native Netware on DG Dasher 386 workstations.

Both Aviion and Eclipse MV servers can now support Native Netware clients on Macintosh, MS-DOS, Microsoft Windows/386 and OS/2 workstations. As a multiprocessing system, Aviion servers can provide network file, print, and data sharing capabilities while simultaneously executing other network services, and Aviion and Netware applications.

The Software Developers' Kit (SDK) for Aviion PC LANs offers VARs, system integrators, and third party developers the tools to develop client/server applications for multi-vendor and Novell LAN environments. The kit includes Netwise RPC (remote procedure call) Tool, RPC Network Library, RPC extension programs, and a source level debugger.

DG also plans an SDK for LAN Manager that it will introduce later this year. The forthcoming kit will enable developers to write one application for multiple types of PC LANs, DG says, thereby reducing development costs.

Native Netware for the Dasher 386 provides a server platform that takes advantage of Novell's security, reliability, and network management features.

The new DAA products are available from DG 90 days after receipt of order. Netware for the Eclipse MV will not be available until the second half of 1990. Cost of software licenses depends on configuration, with Netware for Aviions at $6,550 for a 1-64 user system on an AV/4000, and Aviion PC LAN's Software Development Kit at $9,935 for a 1-4 user system.

Data General Corp., 3400 Computer Drive, Westboro, MA 01580; 508/898-4083. Δ

Circle 71 on reader service card

New DG terminals provide improved Unix compatibility, DEC terminal emulation

Westboro—Data General announced new D216+, D412+, and D462+ terminals with improved screen compatibility between AOS/VS and Unix application environments.

ICobol and BBasic applications can now be ported to the Aviion platform without having to re-write code or make changes to screen-handling commands. Programmable function keys on the D412+ and D462+ allow for automation of frequently used functions. All models come with an IBM PC AT-compatible, 101-key keyboard and can run from multi-user PCs.

The terminals, which work with host systems ranging from MVs to Aviions to VAXes, also include new DEC terminal emulation capabilities enabling a single display terminal to be used in multiple host environments.

DG's new models feature a 14-inch, flat-faced screen that displays 24 lines (user selectable to 25 lines), with 132 column, row-by-row screen compression and offers a 70 Hz screen refresh rate. An optional anti-glare, anti-static mesh screen is also available.

Bar code terminals (DG models 5232 and 5233) based on the D216+ and D412+ are also available. Each model combines bar code electronics with a wand or handheld laser gun scanner. When enabled, the bar coding terminals auto-discriminate widely used bar code formats such as UPC, EAN, LOGMARS, Interleaved 2-of-5, Codabar, and 128.

Prices for the D216+, D412+, and D462+ are $445, $545, and $995, respectively. Bar code terminal model 5232 costs $1,195 and model 5233 is $1,295.

Data General Corp., 3400 Computer Drive, Westboro, MA 01580; 508/898-4074. Δ

Circle 72 on reader service card.

MV as electronic messenger

Brooklyn, NY—Complink, Ltd. introduced Office Access software for Data General MVs. The software provides electronic messaging services to CEO users as well as users of other word processing and data processing applications.

It sends faxes, telex messages, cablegrams, telegrams and priority mail, as well as off-network electronic mail to systems such as IBM DISOSS and PROFS, S/34, 36 or 38 mail systems, DOS-compatible PCs and LANs, Wang Office and DEC's All-in-One.

An administrator's section in Office Access accommodates "profiling" of system communications, and message dispositions. Single messages can be sent to a number of users by "just marking them off and letting the software do the rest," Complink says. Lotus files and other transactional information can also be sent and integrated into existing applications with the new product.

Complink, Ltd., 1419 Avenue J, Brooklyn, NY 11230; 718/338-9646. Δ

Circle 69 on reader service card

Digital Dynamics announces D:drive rev 1.3

Ann Arbor—D:drive, a PC to MV software LAN package, is available in a new version (revision 1.3) that includes expanded support of character developments, file locking, and new commands that enable the running of any program within D:drive.

Through a collaboration with Compuview, Digital Dynamics includes a complementary demo of Vedit Plus, a PC text editor, with each demo and full version of D:drive.

Digital Dynamics, Inc., 3055 Plymouth Rd., Ann Arbor, MI; 313/995-2400. Δ

Circle 76 on reader service card.

DG/UX 4.2 supports OSF/Motif and Aviion graphics library

Westboro—DG/UX 4.2, the latest release of DG's native Unix operating environment, includes new SNA (systems network architecture) software packages to improve IBM connectivity, and also support for the OSF/Motif user interface and DG/AVlib, a graphics library for Aviion systems.

Running with OSF/Motif is Looking Glass, an icon-and-mouse driven graphical user interface from Visix Software, Inc. that gives the Aviion the "look-and-feel" of desktop PCs. The graphics library contains a set of high performance 2D and 3D subroutines and a series of commands for development of graphics applications on DG's latest machine.

The new IBM connectivity package allows DG/UX to support Application Program Interface for Logical Unit (APILU) types 0, 1, 2, 3, and 6.2. Programs written on Aviion systems can thus exchange data with programs that adhere to these protocol standards.

Additional IBM connectivity packages that DG previously bundled together are now available as separate components. These include Synchronous Data Link Control (SDLC), a communications package that connects Aviion systems with computers using the SDLC line protocol in IBM SNA environments; SNA, which provides the communications transport facility to connect Aviion systems to an IBM SNA network; as well as SNA/RJE (systems network architecture/remote job entry) and SNA/3270, which allow emulation of IBM 3776 Model 3 SNA workstations and peripherals, IBM 3270 terminals, and IBM 3286 and 3289 printers on Aviion systems.

DG/UX 4.2 licenses start at $500.

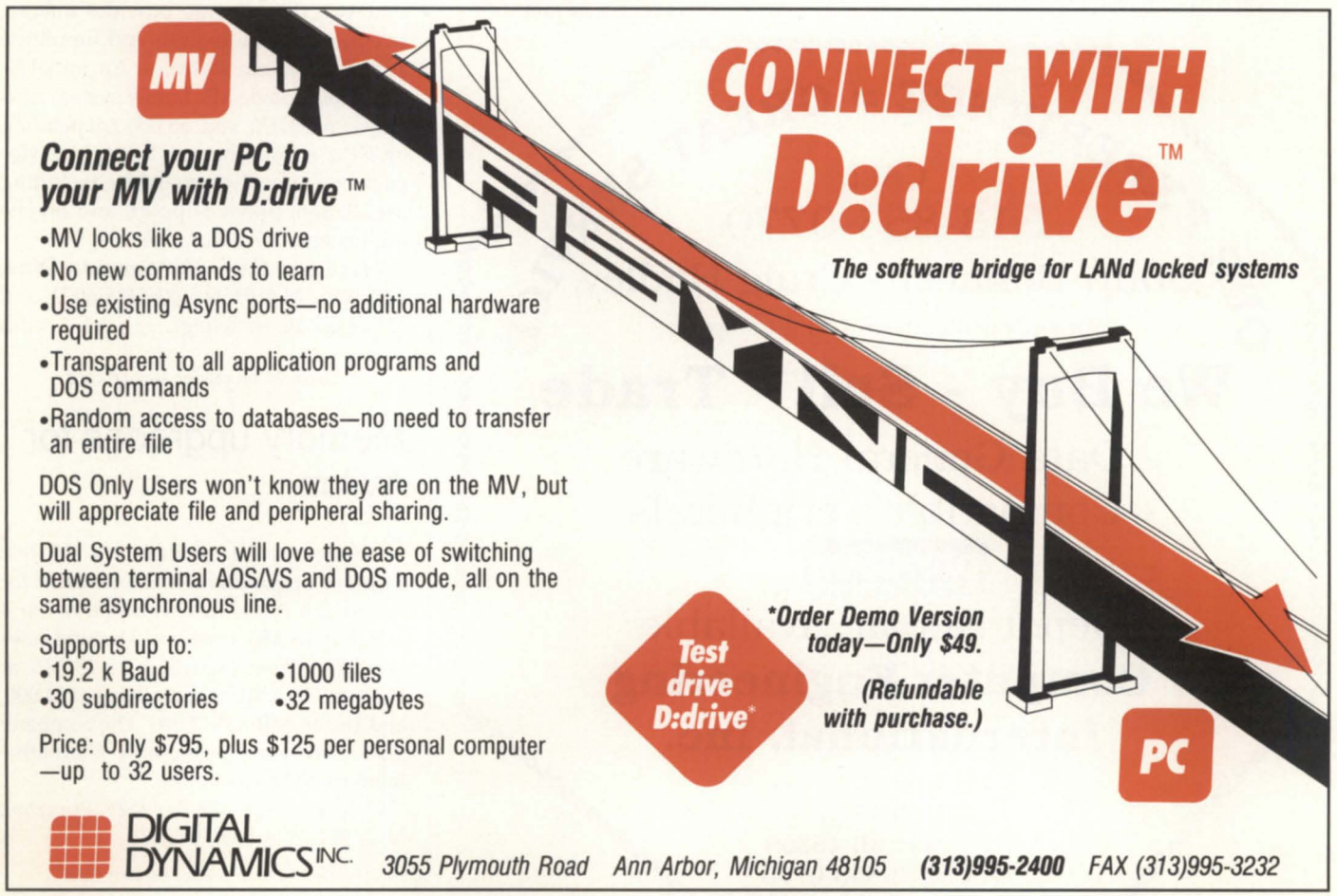
Data General Corp., 3400 Computer Drive, Westboro, MA 01580; 508/898-4072. Δ

Circle 73 on reader service card

CY-8200 backup system features LCD transfer info

Newport News, VA—Contemporary Cybernetics announced a new 8 mm high capacity backup subsystem, the CY-8200, a helical scan tape drive based on the Exabyte EXB 8200.

A two-line, 40 column LCD status display on the CY-8200 shows transfer rate (up to 15 MB per minute, depending on how fast data is delivered), command



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under execution, unused tape in megabytes, and the ECC rate indicating backup integrity. The subsystem itself provides a formatted capacity of just over 2.3 GB per tape, and is available in tabletop or 19 inch rack mounting models. A direct interface to Pertec standard 9-track tape controllers is also available. Prices start at $4,000 and range to $20,000.

Contemporary Cybernetics Group, 11830 Canon Blvd., Newport News, VA 23606; 804/873-0900. Δ

Circle 70 on reader service card

VSPAC/One performance software available for MVs

Westboro—DG's new VSPAC/One software provides Eclipse MV system managers with access to a range of performance data on a single CPU.

Incorporating the same methodology as DG's Atlanta based Systems Evaluation and Performance Analysis Center (SEPAC), the software provides interactive performance analysis and simplified access to system statistics. An initial license for a single MV family system runs between $3,000 and $8,000 (depending on CPU class). Through SEPAC, service packages are also available, including installation, phone support, and on-site implementation assistance.

Data General Corp., 3400 Computer Drive, Westboro, MA 01580; 404/448-6072, ext. 2171 (SEPAC marketing). Δ

Circle 74 on reader service card

Memory upgrades for Aviion

Princeton, NJ—Dataram's DR-880 memory upgrades are now available for the Aviion 300 series workstations in 4 MB and 16 MB versions. The upgrades provide system expansion to 28 MB or 112 MB. The 4 MB module starts at $2,000, and the 16 MB at $12,000. The company says that theirs "is the only alternative memory to DG's offering."

Dataram Corp., P.O. Box 7528, Princeton, NJ 08543-7528; 609/799-0071. Δ

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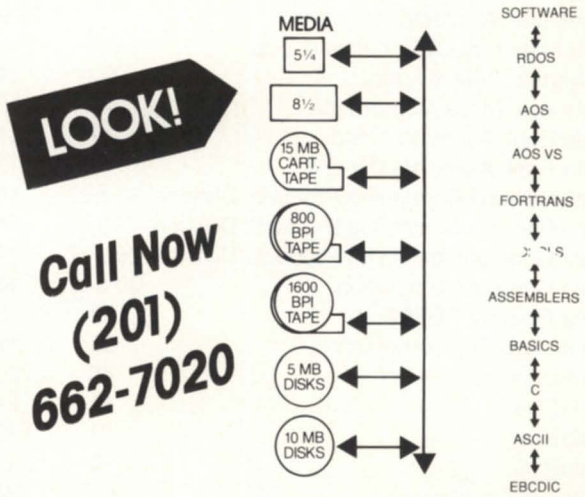

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Data General quarterly reports, always a popular topic, showed a loss of $20.5 million (69 cents/share) for the first quarter ending December 30, 1989. For its first quarter last year, the company reported a loss of $19.5 million.

Revenues for the first quarter were $290.7 million, compared with revenues of $308.6 million for the first quarter last year. Operating loss for the quarter was $18.4 million, compared with an operating loss of $17.5 million for the first quarter last year.

With revenues down and losses up, does this mean that Data General is in for another bleak year of plant closings and layoffs? Probably not. President and CEO **Ronald L. Skates** said the drastic cost reductions are working; showing up as a nearly $10 million reduction in operating expenses, compared to the first quarter of 1989. The company is also pleased by response to the Aviion line of open systems.

"We remain cautious for the near-term; we expect that demand will continue to be erratic. Longer-term, however, we are confident that we have taken the right steps to generate growth and become profitable," said Skates.

■

In late January, three Data General vice presidents resigned from the company. Former Senior VP for Communications Systems **Colin Crook** signed on as chairman of the corporate technology committee of Citicorp, the banking and financial services company.

Two high-level executives on the international front resigned, leaving Executive Vice President **Herb Richman** to oversee international operations. **Wayne Fitzsimmons**, a DG veteran of 18 years, most recently as VP of Americas and Far East, joined **Banyon International**. As VP international at Banyon, Fitzsimmons will oversee marketing, support, and sales channels.

Dave Lyons, former VP & GM, International Sales and Service, resigned to pursue the proverbial "other interests."

■

DG hired three new vice presidents in February. **David Ruberg,** formerly of **Tie/Communications**, is VP of Telecommunications. Ruberg's primary responsibility is to ensure the success of Data General's joint venture with **Nippon Telegraph & Telephone.** Ruberg dealt extensively with NTT while at Tie/Communications.

Tom Palka is the new VP/US Sales. Palka is formerly of **Prime Computers**, where he was VP North American Sales & Corporate Offices. He will report to DG VP North American Sales **Angelo Guadagno**. Reporting to Palka will be **Brian Bilder**, formerly of **Apollo**, who is the new VP/Western Operations.

At press time, DG was poised to make further announcements regarding corporate structure.

■

Brock Control Systems, Inc., of Atlanta, Georgia, signed an independent software vendor (ISV) agreement with DG to offer its sales automation software on DG's Aviion family of Unix systems.

■

Modem maker **U.S. Robotics** acquired in February 100 percent of the stock of **Communications Research Group (CRG)**, a software developer and maker of Blast communications products. The purchase will allow U.S. Robotics to offer integrated hardware and software communications systems. Blast has an amassed customer base of over 50,000 installations.

■

Technicraft Automation Group of Richmond, Virginia, granted exclusive Canadian license for its Distributors Business Management System (DBMS), software for wholesale distributors, to **Equisys Systems, Inc.**, a Toronto-based DG value-added reseller.

■

Adagen Ada design software is now available on Aviion computer systems, following DG's signing of an independent software vendor agreement with **Mark V Systems Limited**. Adagen is a software development environment that automates and integrates the analysis, design, and maintenance of large Ada projects. Ada is the programming language mandated for use by the Department of Defense and defense contractors.

■

Keeping track of blood supplies can be a messy job, but software from **Hemocare, Inc.**, a Data General VAR, makes it easier. The Hemocare blood bank automation system was recently acquired by 10 hospitals in the U.S. and Canada. The system, which is based on MV family and Dasher 386 computers, manages the voluminous amount of information on patients and blood donors that must be assembled to ensure a safe blood supply.

■

B.J. Inc. was advised by **The Coca-Cola Company** that B.J. Inc's logo "is very similar to the Arden Square Device used in connection with our product COCA-COLA," and that it believes that the logo might "cause those who view it to believe that **Brian Johnson** Inc. is somehow connected with or related to The Coca-Cola Company, which, as you know, is not the case."

Included in the evidence from The Coca-Cola Company was a photocopy of a letter on B.J. Inc. stationary addressed to **Mr. Steve Mintz** of **Data Bank Associates.** Data Bank Associates markets the ARC program for AOS/VS. B.J. Inc.'s :SYSMGR Division markets a competing product called :WFFCA.

When asked for comment, Johnson said he will probably remove the swirling ribbon from the logo. He noted that several years ago, when The Coca-Cola Company announced New Coke, he sent the company a letter of protest on B.J. Inc. stationary. At that time, The Coca-Cola Company made no mention of the logo, but did send him a coupon for New Coke. Δ

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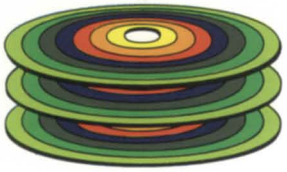

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