

June 1989

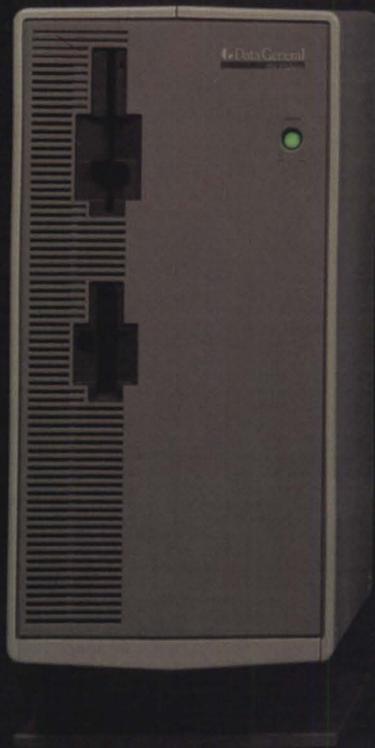
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The Magazine of the North American Data General Users Group



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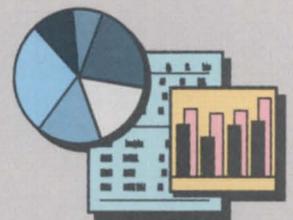


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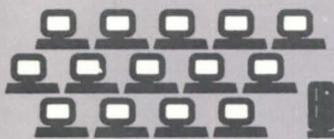
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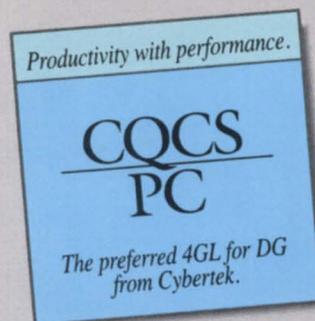
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PUBLICATIONS

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Your vote counts

Start watching your mailbox for two very important items that should reach you soon. One of them is the registration kit for the 1989 NADGUG conference in New Orleans, September 18-22. Engrave those dates in your memory and guard them jealously—you don't want to schedule anything else that might keep you from attending what will probably be quite a celebration. (The conference plans are shaping up very nicely, and it's beginning to look like Data General may indeed give users some reasons to celebrate.)

The other item to watch for is NADGUG's annual "user concerns survey." The background to this survey goes back several years, to a time when our discussions with Data General were sometimes a bit strained. I think it was during Rene Dominguez' term as NADGUG president, during a meeting with some of DG's top management. One of the NADGUG officers began to talk about problems users had been having with field service, and it seemed like the point just wasn't getting across. Finally, Ed de Castro, DG's president, put it bluntly: he said if we were just going to give them anecdotes, they wouldn't know whether to take it seriously or not. If we could give them some solid numbers they'd know what to do.

Rene took Ed at his word, and the first user concerns survey was born. Incidentally, most of the top concerns from that first survey dropped off the list completely within a year or so. We take that as evidence that the survey has really worked. We gave them solid data about the issues that bothered us most as DG users, and DG management took effective measures to resolve them.

This year's survey is similar in format to what we've done for the last few years.

It provides lots of blank lines for you to fill with a list of the issues and concerns that are at the front of your mind. The idea is that the usual multiple choice format might have channeled your responses, possibly causing us to overlook important concerns. The free form style for the user concerns survey encourages you to list the items that are important to you.

After you make your list of concerns, there are spaces for you to assign priority ratings to each concern. Your priority ratings will help give us a general idea of the relative importance of each of the concerns the survey uncovers.

The NADGUG staff will compile all the results, and then the NADGUG officers will carry them to our next meeting with DG's management sometime this summer.

In my opinion, this process is one of the most important benefits NADGUG has to offer its members. That's not taking anything away from our annual conferences or *Focus*. We talk a lot about how valuable it is to be able to take the problems you have directly to somebody who can do something about them. Our user concerns survey is a perfect example of how that works. I hope you will take the time to participate, because this is one election where your vote really counts.

I'd like to use the rest of my space this month to give you a little more information about next September's conference. By now you probably know that it's in New Orleans, and that the conference theme is "Changing the Challenge," a reference to the subtle shift in what it takes to be a successful manager of the DP function. With all the turmoil that's so evident as the industry lurches toward standards in dozens of areas, this promises to be an extremely valuable conference, professionally speaking.

But let's not overlook the celebration aspect, either. New Orleans is a great place for having fun, and our conference planners have taken a lot of pains to make sure we enjoy ourselves while we're there. If you like riverboats, jazz, good food, and good company, then you have all the more reason to make plans for attending. Δ

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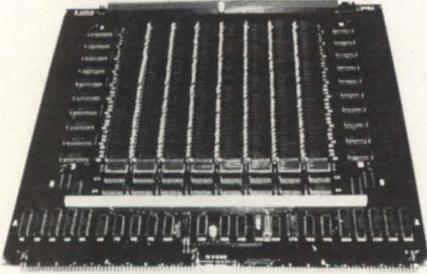
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EDITOR'S NOTE

Under the cover

Doing the cover story for this month's issue of *Focus* was a lot of fun. Service is a topic that comes up again and again in our editorial planning sessions—often enough that we make it the cover story about once a year. Although the topic remains the same, the coverage changes a lot from year to year.

For instance, consider the user survey. Data General Service does its own research on customer satisfaction using a questionnaire that is fairly standard throughout the industry. Their research shows a fairly dramatic improvement in customer ratings over the last few years, and they appear to score at least as well, and in many cases better, than their competitors with other major vendors. However, I've always had a few lingering doubts about their survey techniques. For one thing, the surveys aren't done anonymously. If your FE knows you were scheduled to get a survey, he's likely to give you a call just to see how things are going and to remind you to be sure to complete the survey. And if you give a low score, you're likely to get a call from the branch manager to get more information about the problem.

I'm not criticizing that approach. It makes good sense from a service point of view to follow up on problems and see if they can be settled before they get too serious. However, it would also tend to nudge users toward slightly more favorable evaluations. You have to be a little skeptical when the average satisfaction level on a 10 point scale is higher than 9.

We decided to do a little research of our own to see how our results would compare to DG's. We also wanted to see how third party service organizations were doing in the DG community. The techniques we used would fall far short of being "scientific," because we didn't do any pre-screening of the questions, or any formal statistical analysis of the responses. Nonetheless, we got enough responses to make us feel that the results should be fairly representative of NADGUG members. Our conclusions appear in the article on page 19.



One thing we decided *not* to do this time around was a vendor list. After trying a number of different ways in the past, we finally concluded that there was simply no way to guarantee that we were including every company that offers maintenance or support services to the DG community in our list. Invariably we would leave somebody out, and then spend months correcting the oversight. If anybody out there misses the vendor list, please let us know—if enough people want it to come back, we may give it another try some other year.

This month's cover was especially fun. I had proposed the idea of a pert young carhop to illustrate computer service a year ago, but the rest of the staff (all women) thought it was offensively sexist, so we didn't use it. This year the rest of the staff came up with the idea themselves—and thought it was cute and perky. I think there's something approaching a Universal Truth here, but I'll let you draw your own conclusions.

In any case, I have to admit that I hovered more than usual while Ann Soto proceeded with the artwork. Soon her office was papered with cutouts from the *Sports Illustrated* swimsuit issue, and she even brought in a library book filled with old Varga airbrush illustrations from *Playboy*. (Footnote: in one of his earlier illustrations, Varga was in such a hurry that he drew six fingers on one of the young lady's hands. Nobody noticed.)

As the image began to appear on paper, I started calling the artwork "Donna," and the staff began to tease me about the number of trips I was making to check on her progress. My excuse sounded feeble even to me: an editor is *expected* to be personally involved with his work. Δ

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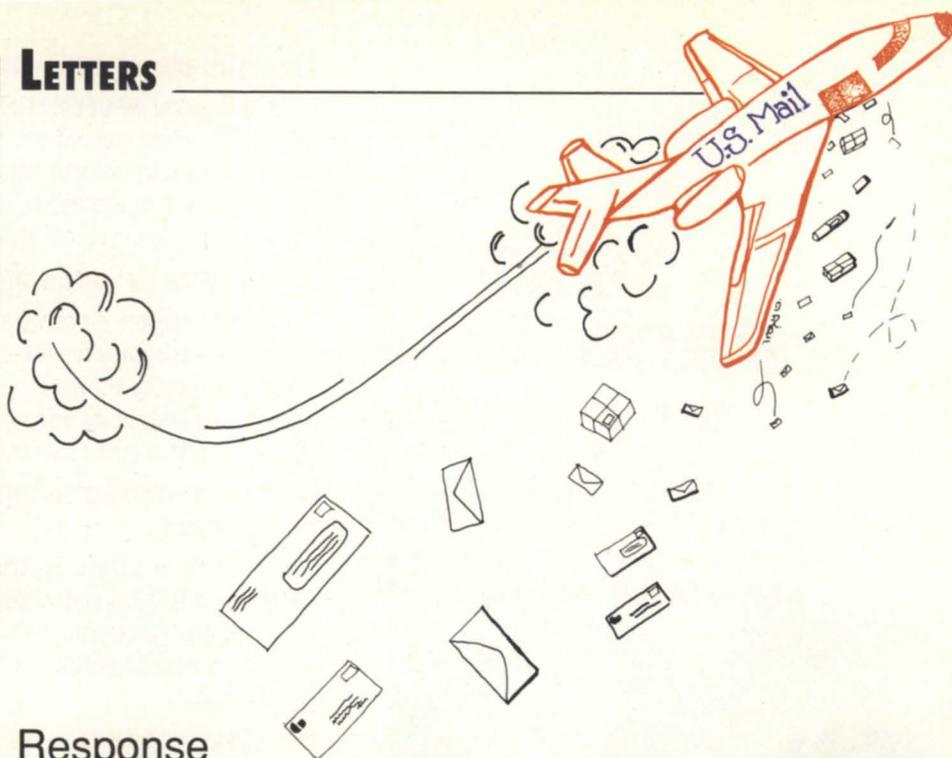
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LETTERS



Response

In response to Sue Dintelman's letter in the May issue of *Focus* regarding my dismissal of disk optimization packages as "anxiety-ware," I have a few comments to make.

First of all, I've never disputed that there are some cases where AOS/VS disk optimization packages can yield significant, long-term improvement. However, it's my contention that the cases are few and far between, and involve situations of atypical usage (i.e., not general purpose mixed time-sharing and batch systems).

As to Sue's contention that I used to believe in disk optimization according to my Feb, '87, *Focus* column, my reading of that same column is somewhat different. I spoke of how to detect fragmentation; I never indicated that de-fragmenting would have significant benefits. In fact, I

cited the danger involved if de-fragmenting did have a short-term significant benefit.

Both in my columns and in my seminars on system performance, I have always cited fragmentation as a classic example of the "Is it True? Does It Matter?" trap. Lot's of things are true, but few matter (e.g., lower numbered IAC ports get better service, but the difference is in the range of small fractions of a millisecond).

I agree with Sue that the ultimate test of whether disk optimization works for your system is to try it. My main complaint is that so far, all the success stories are anecdotal.

Regards,
B.J.
B.J. Inc.

Response time

You struck a responsive chord with your "inherently boring subject" of response time in your April article (System Manager's Log, by Brian Johnson). In our day to day efforts we see over and over the requirement that "response time shall be three seconds." But I have never seen anyone put in writing as clear a definition as your paragraphs on :RESPONSE_TIME. I hope every system manager copied your article, implemented your :PRIORITIES:RX, and asked their boss for a raise. It was reassuring to note that your

prescription for process priorities is very close to our actual procedures.

If other professionals would volunteer their remedies on other boring subjects, perhaps more of the DG community could discover how to operate at a profit. The result would be more companies buying more DG products and better business for all of us who serve that market.

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In Indiana and Texas

Two new RIGs get going

The **Data General Users of Indiana (DGUI)** held their second meeting on March 22 at the Meridian Mark Conference Center in Indianapolis. Twenty-five DG users from the Indianapolis area attended the meeting, which was their first as a recognized regional interest group.

The operation of the RIG was officially turned over to **Nancy Miller**, chairperson of the steering committee. Miller will be in charge of dues and financial planning, **Don Haycox**—newsletter and facilities, **Annette Kaub**—membership and programs, and **Arden Grubb**—by-laws and networking.

Tracy Clifford and **Robin Bain**, of the Indianapolis DG office, did a good job of organizing the group and recruiting enthusiastic users. **Ed Anania**, of Data General, reminded the group that the local DG office will continue to offer its support.

I attended the meeting to make a presentation on NADGUG membership benefits, and to explain how NADGUG interfaces with local users groups and Data General. After giving suggestions on starting a successful RIG, I described the many benefits of NADGUG membership.

Following the business meeting, there were informative sessions on two topics. The subject of one of the sessions was PC*I. **Greg Bogan**, a Data General systems engineer, demonstrated how PC*I

can provide a local area network for personal computer users to share files and printers with Data General minicomputers. In the other session, **Glen Simmons**, manager of data center services for BMG Music, discussed communications with DG systems. As an extra bonus, DG representatives held a drawing for two sets of tickets to see the Indiana Pacers.

This meeting marked a great beginning for the Data General Users of Indiana—future gatherings are being planned. For more information, contact one of the following people: Nancy Miller of CIC Enterprises Inc., 317/253-1711; Don Haycox of Wood-Mizer, Inc., 317/271-1542; Annette Kaub of Compusystems, Inc. at 317/573-2980; or Arden Grubb of Batesville Tool & Die, Inc. at 812/934-4953.

Another recently recognized RIG is in the Central Texas area. The officers of the new users group held a planning session on April 7. Members of the group will be conducting a phone survey to ask local DG users what kinds of activities they would like the group to sponsor. (They are also taking suggestions for an official name.) For details about future meetings and topics, contact **Mike Leathers** of Snowbird Systems, 512/835-0143; **Cindy Muerer** of Hillhouse Associates, 512/343-5555; or **Sydney Bond** of Association Insurance, 512/345-7500.

The **Metropolitan New York RIG** has scheduled its next quarterly meeting for Tuesday, June 20, from 10 a.m. to 12:30 p.m. at the Data General Saddlebrook, N.J., offices (Park 80 West, Plaza One). Contact **Stephen Kern** at 201/327-6300 (ext. 368), if you plan to attend.

The **Carolinas Regional Interest Group (CARORIG)** joined Data General and the **Southwest Area Regional Interest Group (SEARIG)** on April 27 in sponsoring a booth at the Data Processing Managers Association (DPMA) Region 8 Conference. The conference was held at the North Raleigh Hilton and Convention Center in Raleigh, North Carolina. DG users in the Carolinas should contact **Steve Pounds** of Security Forces, 704/334-4751, for more information about the groups' activities.

The April meeting of the **Pittsburgh Area Data General Users Group (PADGUG)** was held in Data General offices at 200 Fleet St. **Kathy Kardos** spoke about new products from Data General and **Anne Valentino** gave an overview of **Mid-Atlantic Data Service**. The next meeting will be held on June 14. In addition to a speaker from Data General, **Mark Taylor** of **Data Assurance** will discuss disaster recovery. PADGUG encourages members to attend and increase their chances of winning a free admission to

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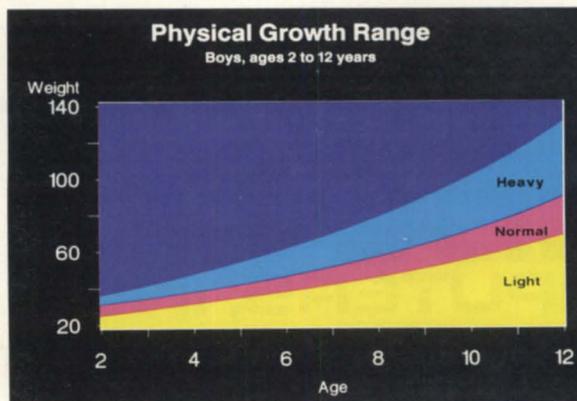
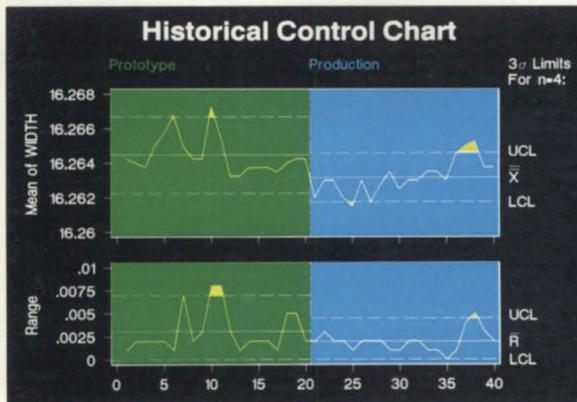
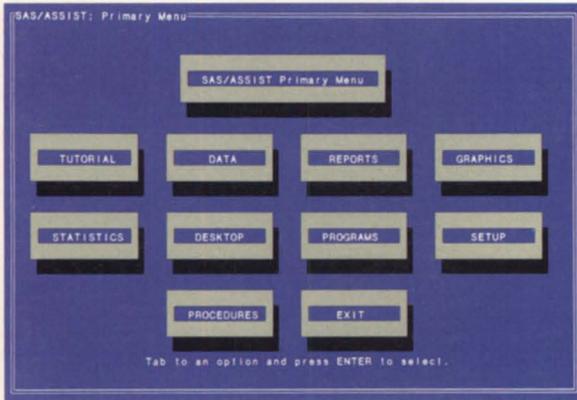
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the NADGUG conference in September! Contact **Ken Krugh** with **LMV Leasing**, 412/826-8200, with any questions concerning the Pittsburgh group.



And for those of you who speak Japanese and like to travel . . . **Nippon Data General Users Group (NDGUG)** will hold its ninth annual conference June 22-23 at the Hotel Century Hyatt in Tokyo. Scheduled events include keynote addresses, case studies by users, exhibitions, and a reception.

Keynote addresses will be given by **Prof. Ikujiro Nonaka** of **Hitotsubashi University**, and **Tom West** of **Data General**. Prof. Nonaka will speak on creating and managing information. West will discuss Data General's marketing and product strategies. Scheduled presentations include the subjects "neuro computer," visualization, strategic information systems, and graphics. More than six hundred attendees are expected.

If you are interested in attending the conference or would like more information on NDGUG, contact the NDGUG staff, c/o Nippon Data General Corp, 4-3-13 Toranomon, Minato-ku, Tokyo 105 Japan.

The Conference fee is Y5000. Advance registration required. Interpretation from Japanese to English is not included.



The speakers bureau project is under way and we need your help! A year ago the RIG/SIG committee developed a list of speakers who are available for meetings of RIGs and SIGs. It soon became apparent that while this was a valuable resource, it could be made even better and more useful to user groups. The committee decided to elaborate on the original idea and turn the speaker list into a full-grown speakers bureau.

The most logical place to look for names is the NADGUG membership itself. With over 2,500 members to extract from, the

Cathlene Gentry is the RIG/SIG coordinator for NADGUG. She may be reached at Focus magazine, 4807 Spicewood Springs Rd., Suite 3150, Austin, TX, 78759; 1-800/877-4787, (1-800/USR-GRUP).

committee expects to establish a speakers bureau of the most knowledgeable Data General users around. Expertise should vary greatly as well as geographic availability.

A questionnaire soliciting volunteers for the speakers bureau will be included in next month's *Focus*. Please take the time to complete the questionnaire and mail it back to us with the information requested.

This information will be used for the sole purpose of contacting prospective speakers.

The speakers bureau will be organized by geographic location and by subject. Each listing will provide information about the speaker including availability to travel, required number of attendees at presentations, and whether or not a fee is charged. Δ

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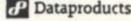
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UNIX

Making the rounds

Aviion systems get jump on competition

by Robin Perry
Focus staff

When members of Hounix, a group of professionals from the Houston area who use Unix, were told, "the future of computing is before you... and it's sitting on that table right over there," their collective reaction appeared to be one of skepticism. Not being familiar with, or necessarily fans of, Data General, the Texans might have been wondering if this was another tall tale.

But before the April meeting was over, the members had received convincing testimony and a hands-on demonstration

of the "fastest desktop server in the industry," according to Mike Fowler, manager of system software product marketing for Data General. Based on the powerful 88000 RISC chip from Motorola, the high-speed workstations that bring the

power of a 32-bit computer system to the desktop are making their debut before audiences from coast to coast.

The workstation, with 4 MB of memory, optical mouse, PC/AT keyboard, DG/UX 4.1 (Data General's version of Unix) operating system, and 20-inch flicker free monitor, will cost around \$7,450. All this power is housed in a 16- x 16-inch wide and 2-1/2-inch tall "footprint," that doesn't even get hot.

The new machines, dubbed the AXS 300 series, were unveiled in March and

are becoming familiar to the Data General community; now they are being introduced to the rest of the computer world. "There has been a lot of interest, especially in the local users groups," said Fowler, who has been traveling the country touting the Aviion systems. "Some of the people have not been able to keep abreast of the technology."

Mike Lewis, a sales representative for DG Houston, also reported a favorable reaction. "It was one of the first times I've seen people get that excited since the DG/One (laptop computer). People just can't believe it when you have that kind of power for that kind of price."

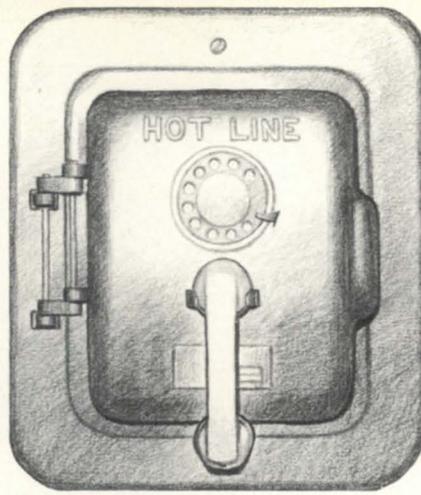
"It was one of the first times I've seen people get that excited since the DG/One"

Lewis was also happy that DG products are reaching a new audience, like that at the Hounix meeting. "None of these people knew DG. That new focus is exactly where we want to be," he said. He described Unix and industry standards as "a

national push. We've got a good jump on the competition now."

While prototype systems are being paraded before the public, a number of the machines are already in the hands of software developers. "Anybody can make good chips, but at the end of the day, the guy with the most software applications wins," said Fowler. "I expect we will ship the units and software in volume at the end of the summer. Some of the porting efforts are going amazingly quickly." Δ

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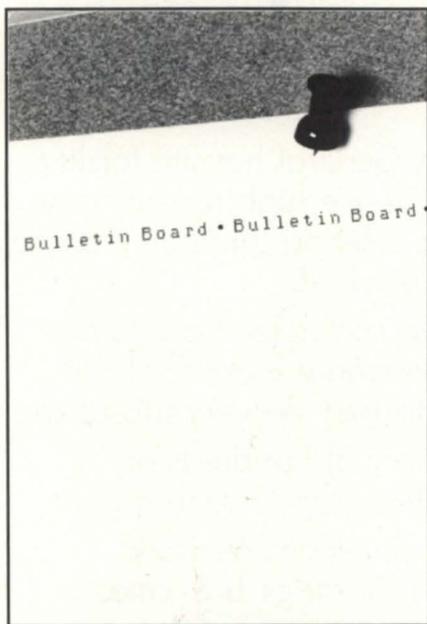
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Bits and bytes from the bulletin board



Logon/logoff in progress

From: Mark Sufke

Help! I occasionally find myself in the following situation: someone complains of a hung terminal. Doing a console status command from OP displays the dreaded logon/logoff in progress. I try to disable the console and exec tells me there is no such device. Trying to enable gives me an "already enabled" message. How do I clear this message, short of terminating exec? I am running 7.03 on an MV/2000 (but I have seen this happen on other systems as well). Any help or background on this would be greatly appreciated.

From: Kevin Danzig

I am not sure of 7.03. Do you have a cleardevice/rxon @con<whatever> that will free up the con line so exec can either

enable or disable? Short of that is to type ^Q on the console a few times to unhang it and then let exec enable/disable.

From: Jeff Campbell

From the master console, do a cleardevice/rxon @conxx. That should clear it up.

AT&T network and laserjet

From: Mike Shumway

We just signed the bottom line for a large ISN network. We were lucky enough to demo a small ISN to work out the EIAHOST problems, etc. But, AT&T was able to send a logoff string down the line on a hard(switch) disconnect. I think we sent a CMD-BRK, CTRL-D, CTRL-D, which logged off all the CEO users. We are mostly a CEO shop. What other types of pitfalls can we expect? I hear that the IBM printers don't work very well, but not a lot of information on the DG equipment. Can you help?

From: Rob Mougey

Don't despair, the ISN is really a rather stable machine. When we first purchased our ISN, the software did not support the ability to send control sequences, hence our need to use IAC-8s on the DG to ensure that the users logged off the MV.

If you have several laser printers, I would suggest disconnecting the permanent circuits prior to powering off your MV. If you don't do this, the printers will sometimes display "LINE ERROR" and you have to go through the process of resetting the printer and the circuit, and restarting the printer. I would recommend that you *do not* use the flow control parameters (ie, NONE vs. XON). They seem to cause more problems than they fix. We have four fiber concentrators and one fiber link to a System 75 with an ADU card. We have about 320 endpoints. One problem from the administrative side is that we

have no way to record how often users receive a "BUSY" when accessing one of the machines (DG and Prime). There are no useful reporting features (i.e., number of busy signals, traffic load, etc.), but we have learned to live with it. We did not want to part with the bucks required to purchase Starkeeper, AT&T's "reporting" software. We may be installing a Starlan card in the future.

Anyway, you should be happy to hear that the system has been running for 14 months without a serious failure. We did have to take the system down for 30 minutes to replace a defective AIM-8, and it was down for an hour for a software upgrade. It is very reliable.

VS 7.6X and CEO

From: Margrit Eade

For various reasons we are still on AOS/VS 7.57. Have other CEO users had any problems with CEO printers (we have HP Laserjets) on VS 7.6x? We're running 2.26 of CEO.

From: Rob Mougey

We are running 7.64 and 3.02. Maybe we are just lucky, but we have had no problems at all with our printers and the new XLPT. If you have more than 15 printers, be forewarned that DG provides no way to check which printer is running from which XLPT process. Our users have noticed a delay in processing print requests, but I think that is due more to an overloaded system than the new XLPT.

PC access via MV

From: Walter Moss crop

We have a packaged system that runs on a PC with an optical disk drive and we would like for any terminal on our MV host system to be able to run the retrieval software (not just issue MS-DOS commands).

Does anyone know of a package that

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would allow a terminal on an MV to emulate the keyboard/monitor on a PC? We don't want the PC to act as the terminal; instead, we need to remotely access the PC through the MV. We only need text displays (no graphics).

The closest that we have seen so far is a program called Close-Up, which allows one PC to remotely access/control another. Unfortunately, it only runs on PCs.

Does either DG PC*I or RDS PC/VS (in particular, REX) support this type of access? Can it be done?

From: Doug Kaye

PC/VS allows MS-DOS commands to be issued from MV terminals, but this is only in a pseudo-batch mode. There are no facilities for running interactive programs.

Another idea (I don't know how feasible) might be to redirect your PC's console to a COM port, then connect that to your MV via an IAC port. From there, you could run DG/GATE (or something simpler) to access this via a terminal. This assumes that your application's console can be redirected.

From: Jeffrey Wu

The only thing I can think of might be to use the TELNET application service of TCP/IP. This would be expensive, however, because you would have to purchase two TCP/IP protocol stacks (assuming that you already have an installed network).

Why DG?

From: Mark Weber

Is there anyone out there who likes *anything* about DG? Sounds like a lot of masochists out there. If you hate it so much, why bother?

From: Doug Kaye

DG makes some of the best hardware in the business. Good architecture and solid engineering. Pretty damn reliable, too. AOS/VS is a well-designed OS, too. The problems are in the implementation and shoddy quality control.

From: Richard Hankins

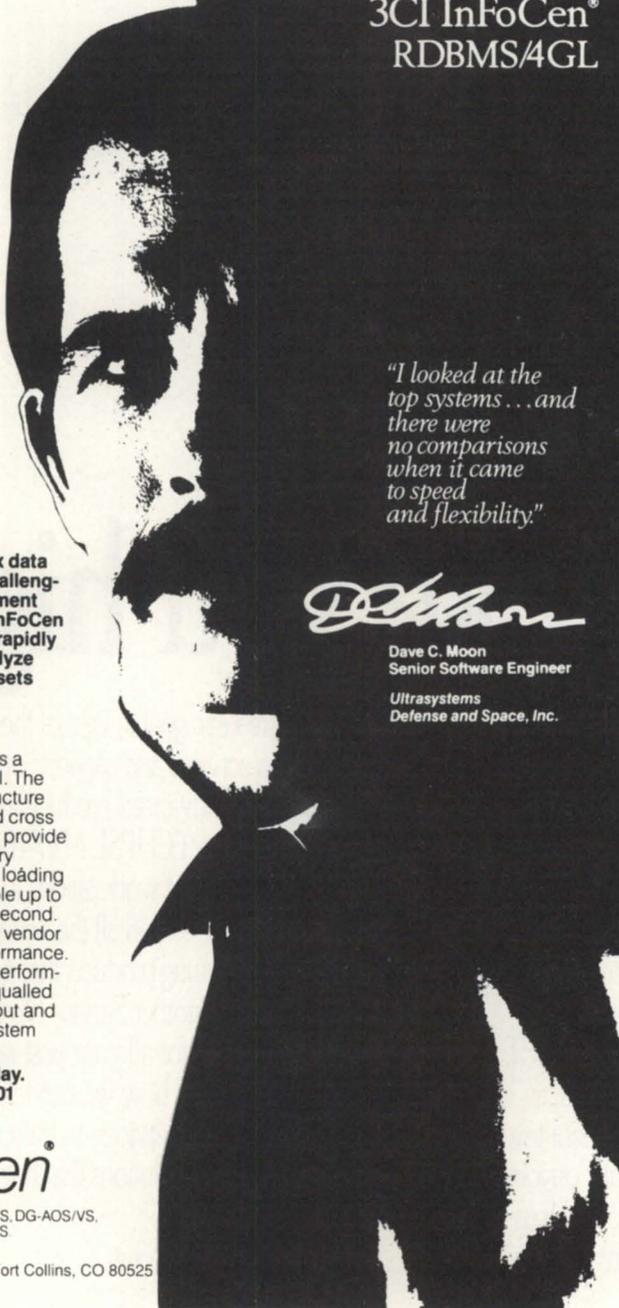
DG has the best hardware and the most flexible OS on the market. But, unless you are truthful about problems, then there is no reason for DG to improve in the areas that need to be improved. Do I complain? You bet. Would I change to IBM, DEC, or others? No way.

From: Tim Boyer

Look at it positively. If all we're doing is petty nitpicking, it means that there's nothing major that we have to gripe about. And if we're doing it on this board, it means that we're trying to work the problems out among ourselves, rather than chucking it all and changing vendors. Think of it as therapy for computer nerds.

One of my problems is communicating with my spouse. If I go home and say that sales were up 20 percent, she understands that. If I say that TELNETD is aborting when you execute an ANYPID from TCON, she gets this glazed look over her eyes. So who do I turn to for commiseration? Hello, RDS!

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Disk-to-disk move

From: Margrit Eade

I have found that moving data from one disk to another using the MOVE command takes twice as long as dumping the data to tape and restoring it. Am I missing something, or does DG not have a disk-to-disk utility (like FDR in IBMland)? Not crucial to me, I'm just curious. By the way, I have old ARGUS DPJ disks, and am using a MTD 6250-bpi tape drive with DBRLOAD/DBRDUMP.

From: Tim Boyer

Are you specifying /BUFF=32768 on the MOVE?

From: Margrit Eade

I have tried the MOVE command with all different buffer sizes, with and without a /L= switch, in batch, and direct. The fastest time I could get for moving all the data on one disk (516,152 blocks, the DPJ disk was 76 percent full) to another disk on another controller, was 4 hours, 17 minutes.

From: Michael Meissner

I believe that the real answer is all of the dump/load programs are multitasked, so you have next filenames, read, and write all going on in parallel, while poor old MOVE is implemented sequentially.

From: Mark Weber

I am sure the difference is multitasking and 16-bit vs. 32-bit process.

From: Margrit Eade

Thanks, that makes sense. I guess there is no need for a fast disk-to-disk utility.

MVs running DG/UX

From: Glenn Diehl

My original question had to do with poor performance on the MV/8000 (or MVs in general) when running DG/UX. Your reply mentioned the fact that MVs grow the stack backwards compared to other machines. So, my second question: aside from the variable argument passing difficulties, is there any other performance impact resulting from this "backward" stack growth? Again, I was told that DG/UX is slow on MVs because the MV is Unix-hostile. I still haven't seen a good explanation of why this is so . . . granted, there are difficulties in porting generic Unix code, but unless the kernel and utility programs were all compiled

with "commonformat," I don't see why Unix should be any slower on an MV than any other comparable machine. Thanks again for your input.

From: Michael Meissner

Well, the libraries and kernel have to support both commonformat and non-commonformat, so there is some overhead there. I suspect the real reason may

be hardware—many Unix programs are either call-intensive or register-intensive, and the MVs CALL instructions are none too fast. Likewise, only having four registers means that you spend a lot of time reloading registers. Finally, on the older machines, I think any OS has to clear the PTE and flush the cache each time a new program is run (by OS I meant both DG/UX and AOS/VS). Δ

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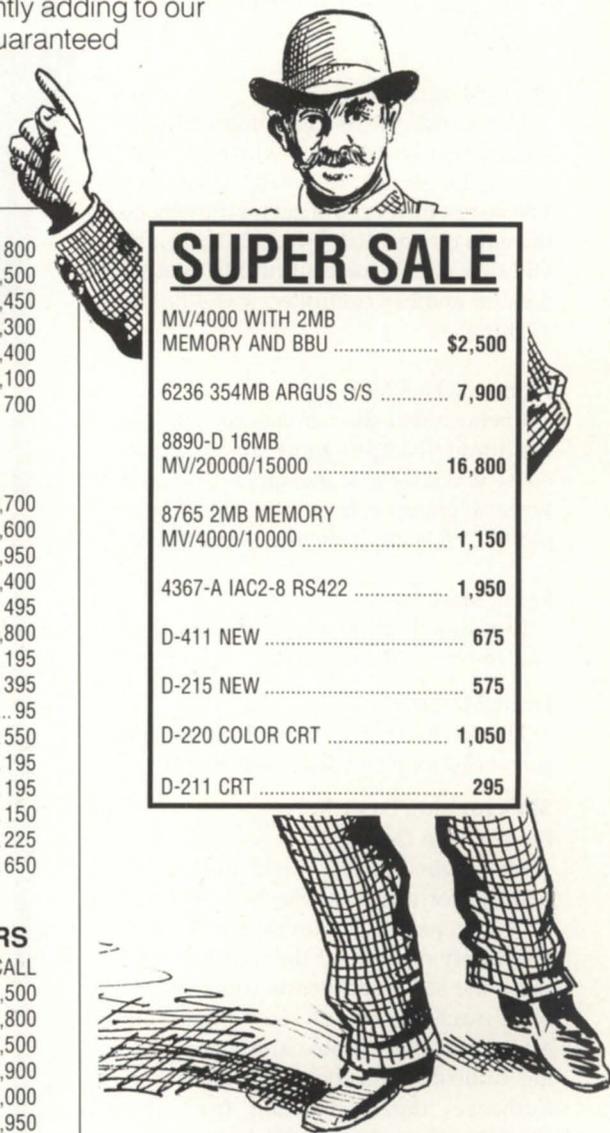
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The results of a survey of NADGUG members show that almost 90 percent of those who responded are pleased with the quality of their maintenance and repair service. (See complete survey results on page 20.) Of course, there's always room for improvement, and members had many suggestions for how their service could be improved.

The first part of the survey was designed to find out who is fixing computers. Of the total responses, 72 percent said they use Data General service exclusively and 18 percent said they use a third-party maintenance (TPM) company. The remaining 10 percent use a combination of Data General, third-party, or in-house services. Almost all are on a maintenance contract.

The reasons given for using one type of service over the other were varied. In general, the choice seems to be made based on factors of cost, perceived reliability, and flexibility rather than the competence of a field engineer. Field engineers, in general, were rated highly, and described as helpful, friendly, knowledgeable, reliable, and concerned about customer needs.

How DG rated

Response time is an important issue to many users. Over ninety percent of all users said that technicians appear on site in a timely manner after trouble is reported. Eighty-seven percent said that

repairs are normally made in the amount of time promised. "DG service has always been 'Johnny-on-the-spot' when we had a problem. I can't imagine how it could be improved," said one user. Another user of DG service reported that "DG came out to fix a down system at 3 a.m."

The major complaint about DG could

be summed up in one word: money. A few of the typical comments were: "The service is great, but the price is too high," "Data General service is very expensive," "It could be made less expensive," "It's a bit pricey," "I dislike the price," "The cost is high," "It's expensive," "I don't like the price," . . . and so on.

Less often, the following complaints about DG service were listed: not enough replacement parts in stock in the local offices, lack of options on how service is purchased, problems with billing, unwillingness to cover non-DG equipment, and FEs that are too overloaded with work to perform preventive maintenance.

"When I went to a five-year agreement, the billings got even more confusing. We were *supposed* to get only one bill a year," one user said. Another user suggested making maintenance costs cheaper as a system ages. "Once the infant mortality period has passed, it is rare that any boards fail," he said. One user proposed a combination time and materials/insurance policy for costs that exceed a yearly limit.

However, many appeared to be fiercely loyal, like the user who said, "I have very good rapport with my DG service people. I think they're the best in the business and wouldn't change even if it was cheaper." And this comment from Mississippi: "In our part of the country, one would be a first order fool to go with service other than the vendor."

Third-party maintenance

It came as no surprise that flexibility, options, and low cost were the key factors that users listed in their decisions to use third-party maintenance. "The repair people let me make some repairs myself,

See you in court

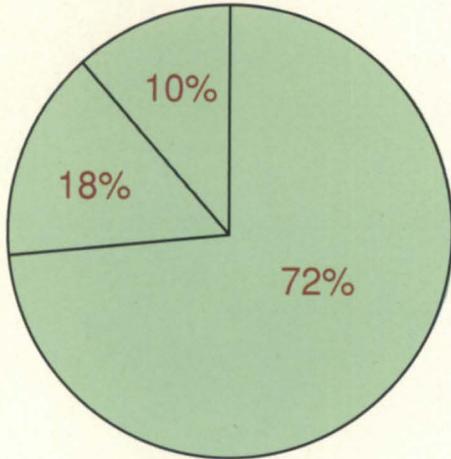
No feature on repair and maintenance of Data General equipment would be complete without mentioning outstanding litigation that could force Data General to change its policies.

Grumman Systems Support Corp. and Data General are in a legal battle over Data General's tying of certain software, services, and supplies to maintenance agreements. In a suit filed by Data General, a federal judge in Boston granted a preliminary injunction against Grumman, preventing it from using Adex, a diagnostic software tool. Grumman has developed its own diagnostic software, and is pursuing a suit against Data General on the grounds that Data General's policies "preclude Grumman and other third party maintainers from competing against DG in the maintenance of their computers." Computer Products & Repair, Inc., of California, has also brought action against Data General.

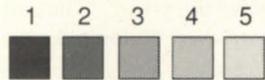
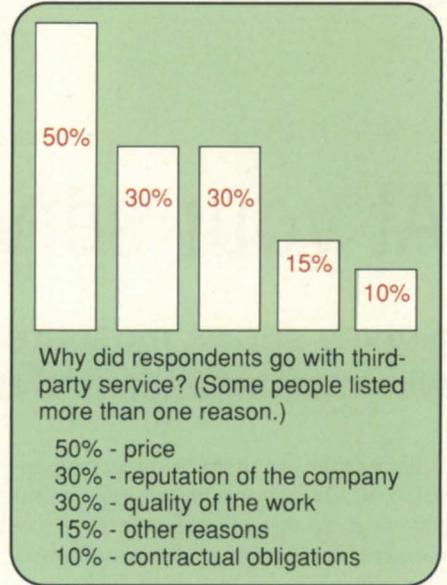
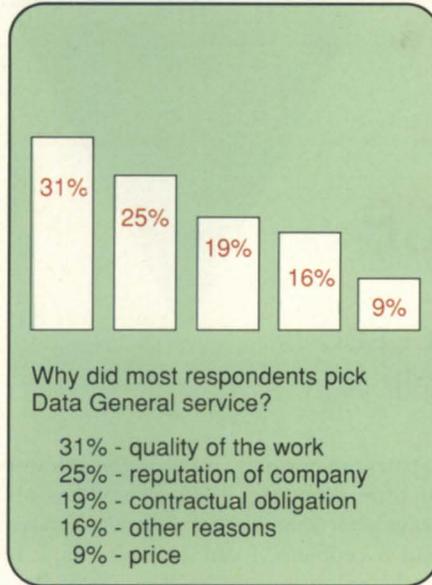
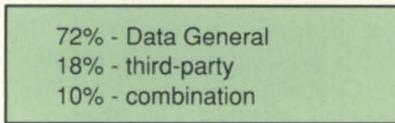
Data General has responded that the lawsuits are "without merit and will be vigorously defended."

(For details, see February and March issues of *Focus*)

SURVEY RESULTS



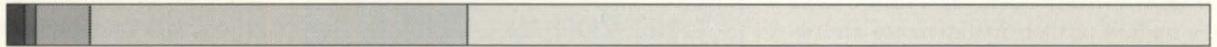
Who provides maintenance and repair service for your computer system?



Key: on a scale of 1 to 5, please rate the following statements as they apply to your experience. (A rating of 1 means "never" or "below average" and a rating of 5 is "always" or "excellent.")

1) Does a technician appear at your site in a timely manner after trouble is reported?

1.5% .5% 4.5% 32.5% 61%



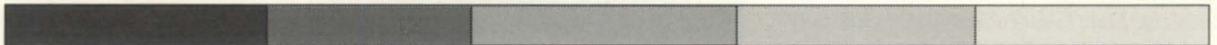
2) Are repairs completed in the amount of time promised?

1% 3% 9% 45.5% 41.5%



3) If a repair cannot be made quickly, does the maintenance company provide back-up equipment?

22.5% 16.5% 22% 20% 19%



4) Do your service technicians perform preventive maintenance on your computer system?

10.5% 8% 13.5% 24% 44%



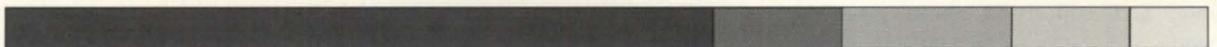
5) Could past system breakdowns have been prevented through maintenance?

41.5% 33.5% 15% 6% 4%



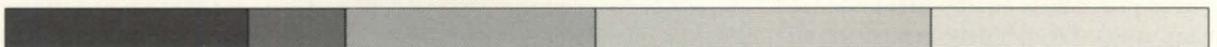
6) Do you ever use depot repair?

59% 11% 14% 9.5% 6.5%



7) If you used depot repair, how would you rate the service?

20.5% 8% 20.5% 28% 23%



8) Overall, are you satisfied with your maintenance and repair program?

5.5% 5% 44% 45.5%



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before the read of the other buffer is done, there will be few problems associated with this technique.

Please notice the proviso "if it can be guaranteed." Failure to guarantee that this will happen can cause some problems with data handling. (Imagine what would happen if the buffer that is being processed is grabbed and new data is written into it before the processing of the

buffer is complete.) If this cannot be guaranteed, then some form of signalling between the two tasks, or a locking mechanism for the buffers, must be implemented to prevent any confusion between the two tasks.

Double buffering is usually implemented when the time to process one portion of the activity is significantly less than the other portion. One example of

double-buffering is the UART within most terminals and many terminal controllers. The UART (universal asynchronous receiver/transmitter) is an integrated circuit (See Figure 1) that converts the serial bit stream coming along the communications cable into a parallel byte for use by the local device (and vice versa). If we assume that the baud rate is 9,600, then we can say that at full tilt, a device (CPU or terminal) must remove a character from the parallel buffer about every millisecond. Without double-buffering, the CPU would have to read every bit of the incoming character, which would be approximately 10 times as often.

In this example, double-buffering is a solution that is well-suited to the problem. It relieves the burden of reading each individual bit and is an inexpensive solution. Also, we know that the CPU can read the buffer quickly enough to not cause overflow of the incoming buffer (except under extreme abnormalities).

Multiple buffers

If some of the above conditions cannot be guaranteed, then it is up to us to provide a solution. If we follow the progression from one to two buffers, then it is obvious that the next solution is with more buffers. Multi-buffering, at the cost of added programming complexity and memory usage, permits a solution to many more problems than the previous methods. The added programming complexity is not severe at all—in fact, it is nearly trivial. The memory usage requirement is virtually not a physical issue (pun intended), even when we throw in the added wish that the data be treated as little as possible.

Queuing, buffers, and buffer headers

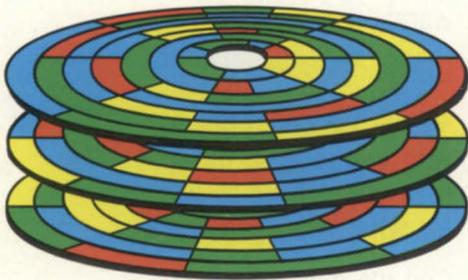
Creating a number of buffers is simple. You can define them as arrays, blocks, or some other construct (the term from your favorite language goes here), or alternatively you can let the buffer space be created at run time by requesting the memory space from AOS/VS (this concept will be discussed in another article).

Queuing the data is not a practical idea, even though it would be easy to implement. The reason for saying "nay" is that it could potentially lead to a performance issue, depending upon how many times the data is manipulated, and also upon

REORGANIZE DISKS IN PLACE,

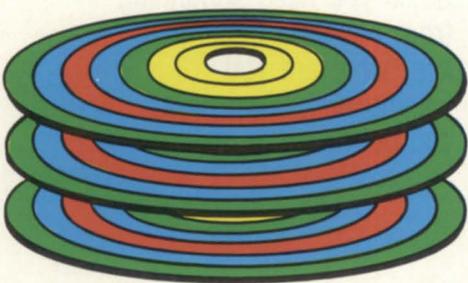
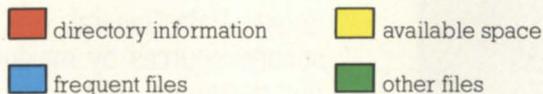
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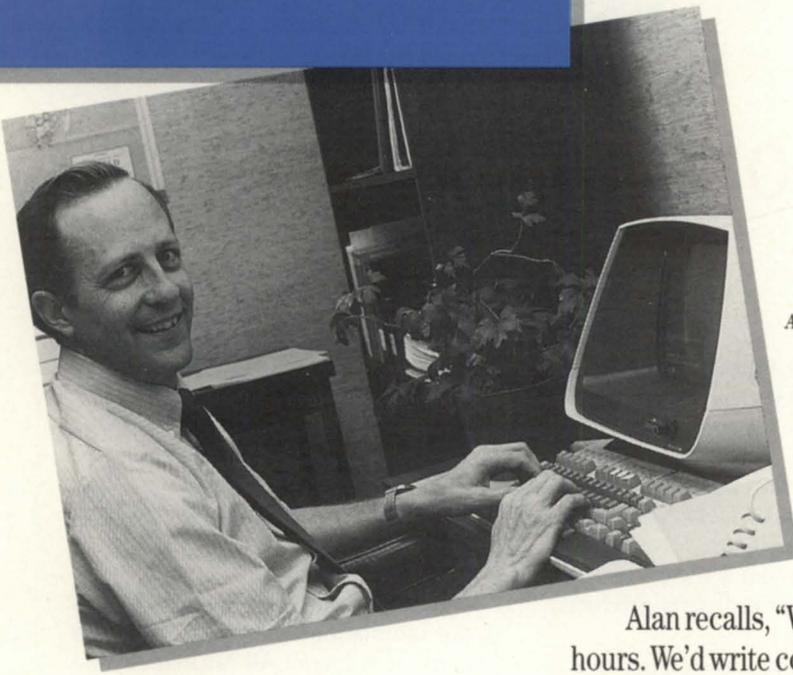
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Alan Ashton, in the early days of WordPerfect, working at a Data General terminal.

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Alan recalls, "We worked long hours. We'd write code until two or three in the morning, or as long as one of us could stay awake."

And while they developed the program by night, they tested it by day on the city staff. The clean screen, speller interface, and other features are a direct result of listening to what the secretaries wanted.

Data General, naturally, is one of our strongest platforms. And we continue to listen to DG users. We now work with CEO, and we have developed other tools such as M-Edit, a macro editor, and P-Edit, a program editor. These smaller scale editors tiptoe around heavy DG programs for quicker, lighter editing.

In addition to WordPerfect, WordPerfect Library also originated on the Data General and introduced our electronic mail and calendaring programs.

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"We aimed high from the beginning," Bruce explains, "and we kept our standards high all along."

WordPerfect Corporation's relationship with Data General goes back to the very first keystroke.

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When it rains, it pours

Policy turnabout results in coverage of non-DG peripherals

A storm was building outside as Focus began this interview with Mike Grossman, DG's Field Engineering marketing manager, Norm Hodge, director for FE marketing and sales support, and Steve Carter, public relations manager for DG Service. Just as Hodge began talking about coverage of non-DG peripherals, a siren sounded—the weather radio was advising listeners of a severe thunderstorm. It seemed an appropriate setting considering the subject matter.

Focus: We recently surveyed user group members and found that about 72 percent of them were using DG maintenance. Are you satisfied with that kind of market penetration?

Hodge: Anything less than 100 percent wouldn't satisfy anybody in our business. Of course it's not realistic to expect 100 percent because users have a lot of alternatives.

Focus: In our survey, a large majority of those who used DG service said they were satisfied. However, they listed several "needs improvement" areas, especially price. How does this compare with your own research?

Hodge: I'm pleased to see that so many people are satisfied with our service. We've spent a lot of effort to get to that point. Your results are probably showing similar things to our research, although it's partly a semantics issue what you mean by "service." Of course price is always the toughest issue. For a full service, broad based computer company like ours, price is clearly one of the main things customers are sensitive to. When you're talking about price, you're also talking about value that customers perceive, and we try to show that we're worth what we charge for the service. We've also got programs in place that can mitigate the price issue somewhat. One of them is our

long-term contract, for a three-year or five-year commitment with an associated discount program.

Focus: Another area our survey turned up was a perceived lack of flexibility in covering third-party hardware. I've heard that's changing. What is the current policy with respect to third-party products?

Hodge: For a number of years we've been maintaining some non-Data General peripherals, but that capability was relatively limited. Over the last year we've worked to build a very broad capability doing service on non-Data General peripherals that are attached to our Data General customers' systems. By the time you publish this article we will have announced that we're supporting a substantial number of non-DG peripherals. Right now our capability approaches nearly 100 products and we'll build to over 200 very quickly. This doesn't mean going out with a bag of parts and trying to figure out how to fix something if it fails. I mean that we'll deliver service of the same quality that we now deliver for DG products. We don't want to risk all the work we've done to build up our reputation for customer satisfaction just to cover a printer we didn't make.

Focus: I know you haven't made the announcement yet, but could you say in general terms what non-DG peripherals you will be accepting under maintenance contracts?

Hodge: We'll be covering a lot of things . . . disk drives and printers with names like Fujitsu, Printronix, Diablo, NEC, Control Data, Datasouth, Epson, Hewlett-Packard, Okidata, Cypher . . . and we'll also do IBM PCs that are connected to DG systems, and virtually any number of modems and other devices. Our customers have demanded it and it's time for us

to step up and deliver it.

Focus: Our survey also found a number of respondents complaining about billing and contract administration. What have you been doing to resolve problems like that?

Carter: We made some major changes in our international contract software in January of this year. All calculations are now being done at the model level rather than the total contract level. That yields a much more accurate billing. Now there are concise explanations, in layman's terms rather than model numbers or odd abbreviations. People used to be billed, then credited at a later date, but now credits automatically occur as soon as they're issued. We also include a summary statement at the beginning of the invoice now, so people don't have to go through dozens of line items to check their billing. The invoices are shorter in length, much easier to understand and deal with, and they don't include the errors or questions that sometimes occurred in the past. The data for all this comes directly from the central dispatch system, so the data is entered automatically from the field. That has speeded up the whole process. If I can throw some numbers at you, our contract accuracy, which we have measured for years, had been at 82 percent. In February, after the first month of implementation of the new software, it had shot up to 92 percent, and it's still going up. We're shooting for 100 percent.

Focus: Over time, the FEs probably do a lot more to shape users' attitudes toward DG than anything you can do with the sales force or advertising. How do you go about assuring that service personnel will show DG in a positive light?

Hodge: There's no doubt that would be a challenge for somebody first starting

in the service business. We've been in the business for a long time, and we've consistently increased our customer satisfaction. One of the ways you do that is by having your engineers trained properly, not only in terms of fixing the equipment but also making sure that they deal properly with the customer and project a professional image.

Carter: Our educational group recently introduced a program that we call "Top Gun." It's a week-long intensive course aimed at putting field engineers into real life situations at our Woodstock training center and having them not only address system level troubleshooting (as opposed to per-product) but also emphasizing how to communicate better with customers so they understand what's happening and what the plan of support is. That was introduced back in November, and ultimately the whole field force will be going through some form of Top Gun training.

Focus: During the belt tightening of the past few years, there have been a number of plant closings and layoffs at DG. How did all of this affect service?

Hodge: In the move that we made from Massachusetts out to the Colorado product repair center, we did find some difficulties, mostly with parts availability. We learned a lot from that experience and I think I can assure you that during the adjustments that are being made these days we've learned how to handle that. We've taken some measures to assure that there's extra inventory available and also a hotline for very quick expediting.

Focus: What is field engineering doing to get ready for the new Avion systems?

Hodge: From a service point of view, it's not anything that's substantially different. There are changes any time you introduce a leading edge product, but we've done that a number of times. I think we've got a breadth of programs that will be necessary for that marketplace, and indeed, the new compatible products program to service non-Data General hardware will be an important differentiator for us in that marketplace.

Focus: Over the past 10 years we've seen a steady increase in the proportion

of DG's total revenues that come from DG Service. I think it's now around 30 percent. Why has service been growing faster than other revenues?

Hodge: The quarter just ended was the first time that service revenues were actually a little less than in the previous quarter. It was \$109.7 million, compared to \$115.5 million for the same quarter a

year ago. You're really seeing a leveling out of service revenues. That's good news or bad news, depending on whether you're DG or a user. In part, it's an issue of price/performance, which is good news for the customer. Systems are much more reliable and much less expensive to repair. Therefore you'll continue to see pressure on the service revenue side of the business. △

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Then the salesman dropped a little bombshell. "And by the way," he said, "your warranty isn't valid unless we provide all the maintenance on the vehicle."

My hand froze, the pen tip inches away from the dotted line. "You mean I can't take the car to Hans, my own mechanic? He's been taking care of my cars for 20 years."

"Well, he can't take care of this one."

"But Hans is a genius . . . a wizard," I said. "He can make an eight-cylinder engine purr like a Singer sewing machine . . . he's the best."

"But he doesn't work for us . . . so you can't use him. And he can't buy replacement parts, either."

I set the pen down. I was in pain. It was a fine machine . . . I really wanted the car. But I was looking to buy a car from them, not a service contract. There was no reason I shouldn't be able to buy one without the other. With deep regrets I walked out of the dealership and climbed back into my old familiar car . . .

Freedom of choice

Competition from independents has improved service for all

by David McMonigle • Special to Focus

The scenario described to the left is being played out across the country in another arena . . . the arena of computer sales and service. With the emergence of qualified independent service organizations (ISOs), those who purchase systems from hardware manufacturers were offered a choice: to rely on the manufacturer for support of its products, or to explore options to find the best service at the best cost.

Over the past several years, users have increasingly chosen independent service organizations. In the past, maintenance contracts provided by manufacturers were looked on as a necessary evil. They were the only insurance against the possibility of problems with the hardware. In effect, manufacturers had customers over a barrel. They were the only game in town and they made all the rules. The customers were often forced into a "fix it at any cost" mentality because they wanted to avoid the larger evil of prolonged and deadly downtime.

The need for ISOs was created by a perceived lack of post-sales support from the original manufacturer. The growth of the industry since that time can be attributed to the economy and efficiency offered by these specialized firms. As competition came into the market, service contracts became less of a necessary evil

and more of what they claimed to be—a service. Like all competition, this new expansion led to industry-wide improvements. In order to compete, these ISOs had to be able to provide superior service at a better price.

Consumers have discovered a wealth of benefits in working with qualified ISOs. Reduced cost heads the list of direct benefits, along with single-source service for hardware from a variety of manufacturers. Top ISOs have also demonstrated the ability to adapt to a customer's needs and to develop close working relationships.

One of the biggest advantages offered by ISOs has been the ability to support equipment from a variety of manufacturers. The days of having a system where all hardware and peripherals were manufactured by one company are gone. Various companies have excelled in the development of specific subsystems. Customers can select the best CPUs, disk drives, laser printers, scanners, modems, and terminals from different manufacturers to create a complete system that best suits their own needs. In addition, ISOs have been able to offer their customers unbiased hardware and software evaluations, thus aiding them in the expensive and important task of developing the system.

The success of ISOs has forced hardware manufacturers to look more closely

at their own service. They have been forced to compete, and the competition has led to improvements in their own service. Their prices, once artificially inflated by monopoly, have lowered. They have developed more reliable hardware to create more cost-effective service contracts for their clients. They have even admitted to the effectiveness of conglomerate systems by recently offering to service a limited amount of equipment manufactured by outside firms.

The result has been better service for customers... no matter which way they choose. The permanent presence of independent support creates an industry-wide higher level of service in terms of support, pricing, and uptime. And that is the way it should be with free competition in the marketplace.

Recently, however, there has been a disturbing turn of events. Manufacturers have begun to seek new ways of competing with ISOs, rather than relying on improvement of their own service. Spare parts have become scarce for competitors in the service industry while they are readily available to government, educational, and other end users.

Diagnostic software has become a bargaining chip in the quest for clients, and the focus of a legal tug-of-war between manufacturers and ISOs. The first step was making diagnostic software unavailable to ISOs and then selling clients on the idea that without the diagnostics, nobody could adequately service the equipment. This led to the development of independent diagnostic software that met or exceeded the capabilities of the manufacturers' own tapes. Once this happened, manufacturers responded by tying microcode needed to run "smart" disk drives in with the purchase of diagnostic software.

Some call this "playing hardball" and others call it coercion. Whatever you call it, the end result is that when competition is taken out of the marketplace and into the courts, it limits the consumer's freedom of choice. No matter which side of the fence you stand on... that is ultimately a mistake. Δ

David McMonigle, a former MIS director for one of California's largest retail sales firms, is currently a partner in a marketing and communications firm specializing in the service and technical industries.

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Host busters

You gotta think like 'em to stop 'em

by Michael E. Marotta
Special to Focus

Every system manager is responsible for computer security. Requirements for security can range from seeing to it that the Halon system works, to assuring that you do not run out of greenbar stock. The central issues of security involve just one thing: preventing unauthorized access.

You do not want your shipping clerk issuing payroll checks. You do not want your competitors to know the discounts you give to preferred clients. You do not want your system resources dedicated to helping someone you never met earn a master's degree. You do not want your system to crash, and you do not want to lose data.

System security is the key to system integrity.

One ring to rule them all

Data General employs a security schema based on concentric rings. The stronger your privileges, the closer you are to the middle. The center-most ring is dedicated to the operating system. If you have access to the AOS/VS internals, you can control the entire system.

The easiest way to gain a key to open the inner circle is to know the system manager's password. This can be achieved with a password grabber program. The program can be written in any language. The grabber program displays the system log-on request. When you key in your username and password, the program returns an error message and passes control of the terminal back to AOS/VS. You assume that you keyed your password wrong, log in again, and proceed as normal. However, the grabber program has written the log-on sequence to a file that can be viewed later by its author.

The grabber program requires getting to the manager's terminal, of course. This can be done before or after work, at break time, or on lunch hours. The manager can be induced to log in on another terminal, then be distracted, giving someone time to allocate unauthorized privileges.

These techniques work at all levels. There are eight rings. If users are relegated to an outer circle, they can move to one of the inner circles by finding someone with more power and usurping some of that power.

"Help, I'm a user"

There are other ways to fake out a system manager. It has happened that a manager will get a phone call from someone claiming to be a client with a problem. The system manager quit last week and the client needs to know the password. A user was just promoted to system manager and needs more access. A field engineer is helping a client of yours restore a crashed system. The possible ploys are endless.

Be aware that it is possible for you to discover that while you thought you were the system manager, you are actually a user. The inner rings are really controlled by someone else. It is possible for a vendor to have more access to your system than you do. This is especially true when you buy a "total solution" package. Since you have no control over who is employed or fired by a vendor, you have no control over who knows how to access your computer. One Data General OEM supported over a dozen clients and had the same username and password on each system.



Anyone who discovered the password for their own system would know how to get into several others.

Large organizations are easily lulled by their own security. The assumption that the guard at the desk can protect you is tenuous at best. Once an intruder gets past the guard, he can go anywhere. In a company with a heavy division between labor and management, a three-piece suit is a passport to go anywhere and do anything. In some companies, a white hard hat and a three-piece suit lets the intruder display signs of great status. Low-level management types will fawn and scrape while answering questions about your computer system.

Trial and error

There are many reasons why violations of system security are carried out by adolescent males. With no immediate responsibilities beyond school and homework (both of which can be ignored), the teenage hacker has the time to try and try again when attempting to access a computer.

Guessing passwords is actually pretty easy. On any system that serves many people, there will always be at least one person whose password is the same as his username. This is a result of laziness or cyberphobia. Once you have a list of users (or directories) it doesn't take long to find an easy route.

Occasionally, accounts are created for departments, projects, and people who never use them. The default parameters are often that the password is identical to the username. Set up once, accessed once, and abandoned, these log-on codes are just waiting for someone to discover them.

One step away from the password that is the same as the username is the password that is based on the username. You can find some Robert B. Jones or Roberta B. Jackson whose password is BOB, BOBBY, BOBBIE, RBJ, and so on. Names of pets, children, and towns are somewhat better as passwords, though not by much. It is possible to write an autologger program that gets its passwords from a dictionary. Word processors come with spelling checkers that include as many as 100,000 words.

A good password includes more than uppercase letters. On the other hand, if you force your users to keep track of passwords like 8*Hk@1, you only encourage

them to write these down and post them near their terminals. A median path is to use combinations that are easy to remember, like ImaKG1.

Cloak and cipher

Encryption is the best method for protecting data. The National Bureau of Standards supports the Data Encryption Algorithm (DEA) that uses a 56-bit, user-

selectable key. There are many other encryption algorithms available.

The RSA algorithm developed by Rivest, Shamir, and Adelman of MIT is regarded as the best. This is a public key system. Encryption keys are known to many. Anyone who knows the encryption key can send a secret message. Only the person who has the deciphering key can retrieve the message. The RSA algo-



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rithm relies on the fact that two 100-digit prime numbers can be multiplied to produce a 200-digit key. Discovering the original prime numbers is currently beyond the limits of mainstream computing, but it can be done.

Researchers at Los Alamos and other places have dedicated their Cray supercomputers to discovering new ways to factor large numbers. When the RSA al-

gorithm was introduced, the estimated time for a successful brute force attack was measured in centuries. Today it is measured in months.

Also, keep in mind that using a cipher will slow down data processing since information must pass through a complex program. The benefit is that there is no better way to protect data. Even the simplest code or cipher will thwart all but

the most sophisticated intruder. The most sophisticated methods will even keep the best code breakers busy for about a year.

Step 1: Mount tape

It is possible to prepare a tape or diskette that looks like it came from a vendor. A new release or bug fix can really be a set of instructions to do anything someone else wants to accomplish.

Before you install new software, make sure that you have a purchase order or some other supporting document. Make sure that the package really looks like one from your vendor. Check the postal cancellation. Read the shipping label and the invoice or packing slip.

Reach out and touch someone

Your system's modem is an open door. Given the above considerations, there is virtually no way to have a perfectly secure system. Any computer connected to the phone lines is part of a global telecommunications network. If you do not need to have your modem turned on, then turn it off.

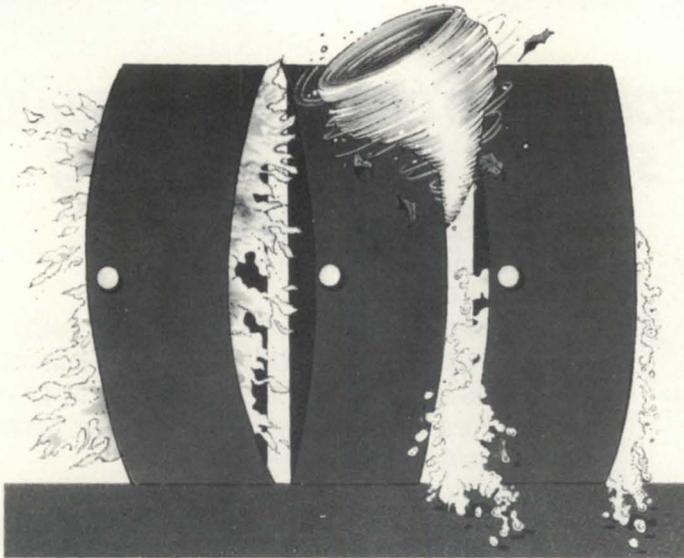
On the other hand, by isolating your system, you deny resources to your users. Sales people on the road, managers at conferences, and users in the field all need access to your system. Providing for them also means providing for just about anyone with a modem. The solution comes from understanding what makes a hacker tick.

Generally speaking, most hackers are interested in gaining knowledge about computers. While there have been instances of hackers damaging data and crashing systems, these are far, far less common than the automobile accidents we take for an acceptable risk. Also, there are thousands of computer bulletin boards in America and millions of people who enjoy them. While not as intensely dedicated to getting into your computer, these people have a more than casual interest in data and the machines that process it.

If your system has dial-up access, you can avoid a lot of headaches by being friendly. Establishing your own bulletin board system is a way to sidetrack the casual visitor into an area that can be profitable for your organization. You can tout your newest products and services or brag about community awards.

If you have some special reason for hiding from the world, you can always

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set up a dummy system that is easy to access from the front-end bulletin board. Files named PAYROLL and INVENTORY can contain dummy data. (Real payroll and inventory files should have other names, anyway.) If some person intent on harming your system gets in, there is little real damage that can be done.

The phone lines are not your only weakness. Tempest methods involve using variants of common television technology to pick up signals emitted by your computer or its terminals. Lining all your equipment with lead foil is a hassle. It is not necessary for all but the most sensitive sites. It is, however, a way to ensure that no one can gain information from your computer.

The exponential growth of fiber optic cable has not completely replaced copper wire. It is still possible to tap a communication line by placing a magnetic pick-up over the cable. Some sophistication is required here and chances are slim that if you make widgets, some other widget company is going to go through all this trouble. Nonetheless, there are many companies that sell break out boxes. These can be used to show data going to and coming from your computer. Again, this route involves the inherent nature of copper wire.

More sophisticated techniques are needed to tap fiber optic cable, but they exist. In fact, fiber optic cable has its own weaknesses. It is possible to bring a communications network to a grinding halt simply by crimping the cable. Fiber optic cable is also susceptible to changes in temperature. Pouring liquid nitrogen over the line can cripple communications. By the time you get ready to solve the problem, it has literally evaporated and communications are back to normal—less the critical time you were without a computer.

Day of the tiger

If you want to know if your system is secure, assemble a tiger team. Chances are that your own programmers know quite a lot about the chinks in your armor. Programmers love this kind of challenge, and it is in the interest of your

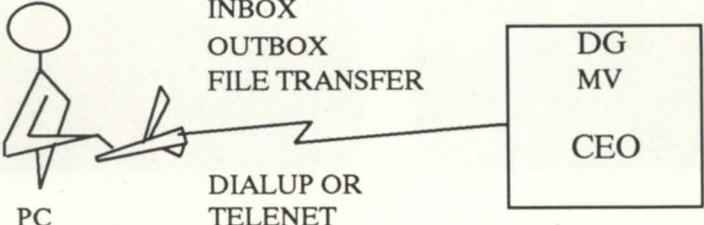
Michael E. Marotta is a technical writer with a decade of experience on Data General and other equipment. He works in manufacturing and business environments.

people to ensure that only they have the keys to the kingdom.

You can find dozens of books about computer security in a library. *Out of the Inner Circle* by Bill "the Cracker" Landreth (Microsoft Books, 1985) is the story of one hacker. *The Computer Underground* by M. Harry (Loompanics, 1985) offers other information on how systems are compromised.

It is important to maintain the integrity of your computer system. Getting bogged down in paranoia is counter-productive. Just because you do not invite strangers into your home does not mean that you shoot strangers who stop to admire your front yard. Communication is inherent in computing. The goal of security is to prevent damage to your organization—nothing more and nothing less. Δ

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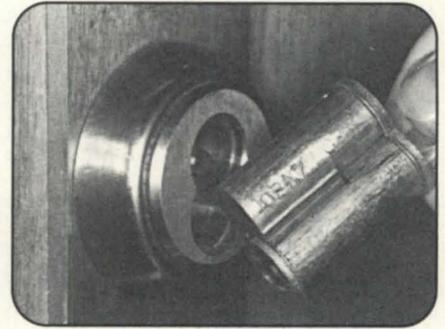
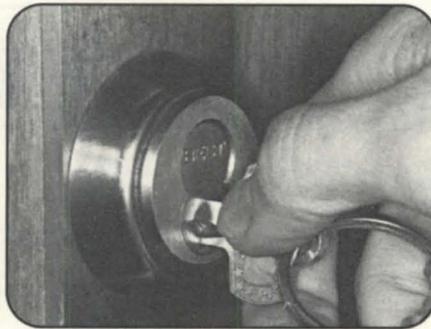
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Circle 72 on reader service card.

Security in the small data center



by John Coan • Special to Focus

(Part 1 of 2)

Password protection, access control lists, and all the software security in the world cannot protect your system if your computer room itself is vulnerable to physical threats such as fire, unauthorized intrusion, or water.

Managers of large mainframe data centers have traditionally protected their multi-million dollar systems against physical threats with extensive and expensive security devices. Smaller computer centers, on the other hand, tend to be under protected. Fortunately, there are a number of practical, medium cost measures for protecting an area against physical threats such as vandalism, fire, flood, loss of cooling, and theft.

Controlling physical access to your equipment and the information it holds is at least as important as good software security. Although logical security threats like the Arpanet worm have received much public attention, physical threats can easily override any logical protection scheme you may devise.

For example, in an AOS/VS shop, if a system's master console is accessible to passersby (certainly not recommended), the system manager may choose to run the LOCK_CLI.PR program to disable the master CLI from performing certain ac-

tions. This program disables superprocess and superuser and a number of other commands, resulting in a fairly innocuous CLI. However, it does not disable the CONTROL command, or else the common CONTROL @EXEC MOUNTED command an operator uses would not work. So what happens when someone types CONTROL @EXEC HALT? This command terminates the EXEC process and all user processes. In addition, an exposed master console gives access to the break key, making it possible to get to the SCP and issue HALT and RESET commands.

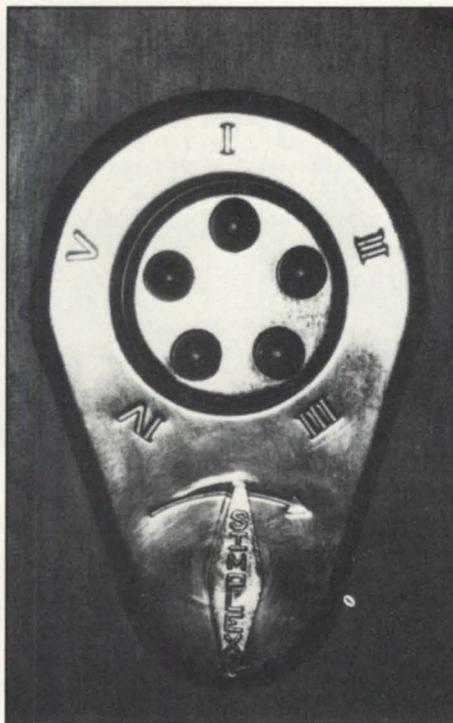
If the same passerby has access to the computer itself, he can push the reset button, or even cut power and reboot from his own systape, which gives him a regular PID 2. Even if he doesn't know enough to boot a system, just the act of cutting power disrupts your business and would probably be quite costly in downtime alone.

The recommendations listed below deal with physical security only. In order to be effective they must be implemented as a part of a comprehensive overall security strategy, including software security, good human resources management, and well thought out operating procedures.

Don't wait for the coffee maker to trip a circuit (and melt down your system) before implementing some of these practical suggestions

Recommendation 1: Lock up your computer, its master console, magnetic media, and disk and tape drives.

Your computer room should be a separate enclosed area with a good lock on the door. The lock should not be keyed to your building's master key system. Better yet is a simple push button combination lock in addition to a keyed lock. One model, the Simplex, (pictured at right) has five buttons arranged in a circle. Any combination of button pushes, in order, can be quickly set as a combination for this lock. The buttons can also be set to be pushed at the same time. Thus, out of those five buttons you get 1,089 possible combinations. The Simplex lock has the added advantage of not requiring electricity, which makes installation easier and cheaper. This lock, and others of its type, are widely available in computer supply catalogs for about \$130, and offer a convenient way of securing your computer room during working hours. They are not sufficient by themselves, however. After hours or on weekends a keyed



lock should also be used.

Everyone is familiar with the traditional key entry lock, sold at all hardware stores (Yale, Schlage, etc.), and probably found on your front door. These locks are quite common and keys are easily duplicated. For your computer room, you should consider a high security lock. These locks are harder to defeat, and key blanks are less readily available for them. Examples of high security locks include the Medeco and Best brands. The Best lock (pictured on page 32) has an additional unique feature—its pin tumbler cylinder core can be changed in about ten seconds without removing the lock from the door. This permits rekeying the lock quickly when the need arises.

Recommendation 2: Lock up auxiliary areas.

Your computer probably gets its electric power from a power distribution panel in a utility closet down the hall. So what happens when a fellow employee's office coffee maker trips the cir-

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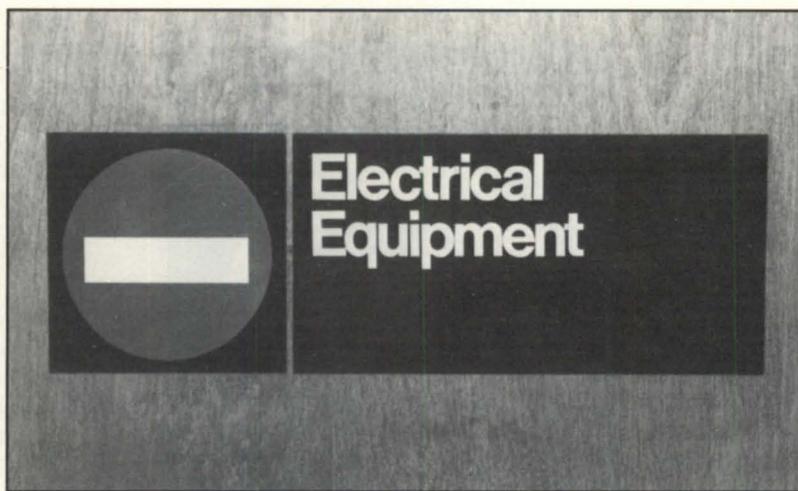
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covered!

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cuit breaker and he tries to reset it? Your computer probably runs on a different circuit than the coffee maker, but inside that electrical panel all the circuit breakers look similar. When your colleague finds himself in this twisty maze of little passages, all alike, does he take the time to read the circuit labels or does he just go down the line, flipping each in turn until he finds the coffee maker?

Computers don't like power interruptions, which is what you will get in this instance. Keep your utility closet locked up and label your computer's electrical circuits with dire warnings not to cut power without checking with you first.

Your data communication wiring probably goes through a utility closet, too. Switched dial-up lines may be connected



to the phone company network here via a terminal block. Leased lines and certain telephone company datacom equipment may also reside herein. A careless tug on a cable disrupts your network, or worse yet, an evil corporate spy taps into your private business.

If your computer room air conditioner

has a fan and evaporator unit outside the building, your cooling system is vulnerable. If the air conditioner is installed in compliance with the National Electrical Code there will be a nearby power disconnect switch in a steel box. Most of these switches have a place to put a padlock. Get a good one, for some day a well meaning (or not so well meaning) person may simply cut off your air conditioning. Better yet, when

planning your installation, try to locate auxiliary air conditioning equipment in a controlled area, such as on a rooftop or within a fenced area.

Recommendation 3: Get status monitoring equipment for unattended operation.

Does your computer run 24 hours a

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MV20000 Model 1 16MB, FPU	SAVE \$	4463-ZT USAM-4	475
MV20000 Model 2 16MB, FPU	SAVE \$	4380 ISC-2 (Synch)	950
MV20000 Model 1 to Model 2 upgrade	SAVE \$	4372-B TCB-16	500
MV15000 Model 20 8MB	SAVE \$	4371-C TCB-8 for expansion	455
MV15000 Model 8 to Model 20 upgrade	SAVE \$	4370-A IAC-16 RS422, 20MA	2,600
MV15000 Model 10 to Model 20 upgrade	SAVE \$	4368 IAC-16 RS232, 20MA	3,800
MV10000 4MB Meter high cabinet	\$28,000	4367 IAC-8 RS232, 20MA Modem Cnt	2,100
MV8000-II 6MB Meter high cabinet	7,800	1625 Power Conditioner 5KVA	950
MV8000 Model 9300	1,750			
MV7800 4MB 16 slot chassis	8,800	Disk Storage Units:		
MV4000 2MB	2,800	6061 192MB Disk subsystem	\$ 1,500
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Desktop 10 Floppy, 15MB disk	875	6336 71 MB MV2000/MV1400	1,500
Desktop 20 Floppy, 15MB disk	1,295	6363 160MB MV2000/MV1400	2,500
Desktop 30 Floppy, 15MB disk	1,495			
S-120 256K 16 slot	550			
S-280 BMC 2MB	7,500			
Processor Options			Terminals:		
8997 Expansion chassis MV15, 20	\$7,000	6053 D2 Monitor with keyboard	\$ 100
8819 Second IOC for MV10000	5,500	6108 D200 Monitor with keyboard	125
8762 Expansion chassis MV10,8,4,S280	4,500	6130 D400 Monitor with keyboard	250
8761 Floating point unit MV4000	1,500	6166-X D410 Monitor with keyboard	400
8749 Battery backup for MV10000	3,200	6169-X D211 Monitor with keyboard	325
8746-B Battery backup for 8762		6391-X D214 Monitor with keyboard (new)	500
EXP Chassis	1,800	6392-X D215 Monitor with keyboard (new)	550
			6393-X D411 Monitor with keyboard	600
			6394-X D461 Monitor with keyboard (new)	700
			Note: Add \$45.00 per unit for Amber Screen.		
			6284 D220 Color Monitor w/keyboard	700
			Tapes:		
			6021 800 BPI new style	\$ 600
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			6026 800/1600 BPI Brown, FCC compliant	3,000
			6125 1600 BPI Streamer, FCC compliant	500
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day, seven days a week? If so, do you have operators on duty at all times? If you answered yes to the first question and no to the second, you probably need to install an alarm system that protects against unforeseen emergencies such as a burst water pipe, loss of cooling, or extended power interruptions.

If such an alarm is to do any good, it must include some provision for notify-

ing the security guard or yourself when it activates. Tape dialers are a common method of communicating an alarm, and are relatively inexpensive. Once the initial purchase is made, there are no recurring expenses except a phone line, and you may be able to use an existing telephone or modem line for this. A step up from the tape dialer is the digital alarm communicator, which is gaining

widespread acceptance. Audible alarms such as bells and sirens may also suffice, but depend on someone being within hearing distance at the time of activation.

Two options are available: computer supply catalogs list packaged devices that can be customized for burglary, high water, temperature, and electric power. Typically, these devices dial up to four pre-programmed numbers when a condition exceeding specified limits is detected. They may also have a feature that allows you to dial in to the unit and get a report of conditions. You can even dial in and listen to the sounds in your computer room. These typically sell for about \$700 including an assortment of remote sensing modules. Shipping and installation are extra.

A second option is to purchase a custom-designed security system from a professional dealer. The advantage here is your ability to precisely tailor the system for your particular needs. Price will probably exceed \$2,000 but may be worthwhile, especially if the equipment you are protecting has a relatively high value. As you go further up in price scale you may want to consider having an alarm company monitor your security system with a leased or dedicated dial-up line. This would involve a monthly charge, but may be the only option if your local police or fire department discourages programming your automatic dialer to call them directly.

In all cases, the monitoring system you get should have a battery backup—preferably the nickel cadmium or lead acid with gelled electrolyte type. An additional, nice-to-have feature of an alarm system is self-monitoring circuits that sound a local alarm when detecting that the monitoring system itself has malfunctioned.

These are just a few of the precautions you can take to limit your exposure to catastrophic events. Most are relatively inexpensive, and have the potential to save you big bucks.

(Next month: Fire extinguishers and automatic fire suppression.) Δ

John Coan is an information systems manager at the State of North Carolina Department of Insurance.

AOS/VS: WORRIED ABOUT SECURITY?

Try a Demo of: GUARDIAN

©DataLynx, Inc. GUARDIAN PROFILE EDITOR User name: DL.Husing

1-Password:		24-Encrypt password:	Y
2-Profile expire: 12-Jul-89	3-Password life: 90	25-Superuser:	N
4-Initial program: :GUARD_USR.PR		26-Superprocess:	N
5-Initial IPC file:		27-Use IPC:	N
6-Initial directory:		28-Use console:	Y
7-Default user priority: 2	8-Max. queue priority: 1	29-Use batch:	Y
-----Extended Options-----			
101-Initial user program:	:CLI.PR	103-End time: 12:00	104-Days: 1-5
102-Primary start time:	07:30	106-End time: 17:00	107-Days: 1-5
105-Secondary start time:	13:00	109-Mins. after window to logoff:	0
108-Use time windows in batch:	N	111-Force new password selection:	N
110-User group number:	0	113-User choose own password:	Y
112-Use GET_PASSWORD macro:	N	115-Number failed logins allowed:	0
114-Maximum concurrent logins:	0		
116-Consoles not allowed:			
117-Other host ID#'s:			
42-Comments:			
Edit which field?			
"Help line"...			

1. AUTOMATIC PASSWORD CONTROL

GUARDIAN allows management to set a time limit on every user's password life. At each log-in this limit is checked. If it has expired, the user is notified of the need to change passwords within 7 days. If they do not, the profile is disabled.

2. EASY-TO-REMEMBER PASSWORD PHRASES

As users often forget random character passwords, GUARDIAN can create 250,000 5-7 letter English password phrases. New password phrases can be automatically assigned to users, or they can be given the option of creating their own.

3. SET 61 USER PRIVILEGES WITH JUST ONE SCREEN & WINDOW

GUARDIAN replaces PREDITOR with one profile editor screen. 61 privileges can be set by changing single menu items or using any existing profile as a template. XODIAC support field specifies the processors to be updated if a profile is changed.

4. CONTROLLING ACCESS BY TIME OR GROUPS

GUARDIAN can limit a user's access to specific hours and consoles, and/or assign them to 1 of 100 groups whose access and number of concurrent users can each be controlled.

5. MANAGEMENT REPORTS

GUARDIAN uses a log file to track unauthorized access attempts. Management reports show who has expired passwords or profiles, "super" class privileges, "obvious" passwords, and who has not used the system for a user-defined period of time.

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Circle 25 on reader service card.

A complete listing of the NADGUG software library

All NADGUG members interested in receiving the NADGUG software collection should send a 1,200-foot tape to:

Randy Berndt
American Urological Association
6750 West Loop South, #900
Bellaire, Texas 77401

MV/2000 and MV/1400 users should send one tape cartridge. Software contributions should be sent to the same address. Be sure to include your membership number. (Special thanks to Kevin Danzig for help with preparing the MV/2000 cartridges.)

People with AOS/VS rev 6 should send a 2,400-foot tape and specifically request DUMP_II instead of the usual compressed version. The decompression program is rev 7 specific.

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.

Big Brother

Automatic log-off program written in Fortran 77. Donated by the U.S. Forest Service. 181 blocks.

B.J.'s BBS contributions

This addition to the library consists of 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. 5,749 blocks.

CRTEDIT

This is the old RDOS screen editor ported over to VS. 51 blocks.

DBCHECK

This program checks the open status of an INFOS file and examines the check-pointing status of a file. 230 blocks.

DUMpload

DUMpload is a Macintosh program to dump and load AOS/VS-compatible dumps on a Macintosh. 140 blocks.

ERP

A process-termination program developed by NASA and modified by Manville. In Fortran 77. 338 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. 459 blocks.

FTNCVT

This is a Fortran 5 to Fortran 77 translator. 287 blocks.

Games

Games is a collection from various places. A new version of Conquest has been added as of April '89. 19,516 blocks.

Glossary

Glossary is a program from John Grant that builds a list of words used in a document and shows where they are used. 416 blocks.

IMSLUTIL

This is a collection of CLI macros, Cobol routines, and assembly routines callable from Cobol. By IMSL of Houston. 6,154 blocks.

JAG_UTIL

JAG_UTIL consists of several programs: Filecount, Userspace, Scan, and Laminate. 1,501 blocks.

Kermit

Kermit is a file-transfer protocol developed at Columbia University. Uses 9,328 blocks.

Logout

Another auto log-out system. 246 blocks.

Look

Look is used to view text files. It allows you to move forward and backward in a file. This program was donated by Data General. 438 blocks.

Macros

This is a collection of macros from various sources. 452 blocks.

MENUDIR

This is an initial user menu that can chain to other applications. It features a password-control system. From the Fed SIG. 492 blocks.

Misc Kerm

An expanded version of AOS Kerm,

this now includes other versions of Kermit including DG/One Kermit. 6,298 blocks.

QHelp

QHelp is a tree-structured help facility. 2,277 blocks.

SKLSCRN

This is the Cobol standard entry screen featured in George Burns' article that appeared in the April 1988 issue of *Focus*. 385 blocks.

Softtrans

This is a file-transfer protocol written in Fortran 77. It's used to communicate with proprietary PC communications packages. 496 blocks.

SWITCHES

SWITCHES is the GET.SWITCHES routine from John Grant's column in *Focus*. 1,297 blocks.

TEX 2.25

TEX (Terminal Emulator with Xmodem) is a terminal-emulation program written by David Down. He has recently revised the TEX software to include a command language. TEX is being distributed as shareware. At the end of 30 days, either remove it from your system or send the author a \$45 fee. 495 blocks.

VT100KER

VT100KER is the VT100 emulator from John Grant. 1,135 blocks.

Xfer

Xfer is a tape-conversion utility. 653 blocks.

New listings

RDOS Kermit

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

Black Jack

Kim Medlin of Data General presented this at the Las Vegas conference. 15,079 blocks.

Notify and Prior

Two contributions from Concept Automation. Notify tells you when a process has terminated. Prior lists the priorities of processes. 273 blocks.

Spell

Can check the spelling of a word or spell-check a document. Submitted by Richard Kouzes. 5,163 blocks. Δ



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Hardware, hard choices

Your decision can limit or expand your options

by Brad M. Friedlander
Special to Focus

(The following is a continuation of an article describing many of the choices that today's workstation users face. Part one, "Testing the waters: new products, new choices, new terminology confront workstation users," appeared in the May 1989 issue of Focus.)

The user is faced with three choices that, taken together, define the hardware platform. These choices are between: 1) micro channel architecture and other architectures; 2) Intel's 8086, 80286, and 80386 processors; and 3) IBM and some other vendor.

MCA or other architectures

For the architectures, the choice is among the ways the computer system handles the input/output (I/O). The options are:

- IBM's 16-bit MCA
- IBM's 32-bit MCA
- The earlier IBM PC/AT bus structure
- Extended industry standard architecture (EISA), the new bus recently announced by Compaq, Tandy, Zenith, NEC, and several other clone makers that is PC/AT compatible
- Other proprietary bus structures

Even with the IBM PC families, these architectures have considerable differences. One difference is in the add-on boards, or feature cards, that are incompatible between IBM's 16- and 32-bit data buses, as well as between IBM's and other vendors' 32-bit buses. All the IBM 16-bit AT buses and clones are physically the same. However, the MCA 16-bit, the MCA 32-bit, and other 32-bit proprietary buses, are all different and require unique feature cards. In addition, the I/O band-

Figure 1: PC choices and their attributes

Microcomputer	Operating system	Processor chip	Bus architecture
PS/2 Model 25 30	PC-DOS	8086	PC-XT
30 286	PC-DOS IBM's OS/2 (SE or EE)	80286	PC-AT
50 60	PC-DOS IBM's OS/2 (SE or EE)	80286	16-bit MCA
70 80	PC-DOS IBM's OS/2 (SE or EE)	80386	32-bit MCA
PC-AT compatibles	MS-DOS MS-OS/2	80286 or 80386	PC-AT
PS/2 clones	MS-DOS IBM's OS/2 (SE or EE) MS-OS/2	80286 or 80386	MCA
Future Non-IBM PCs	MS-DOS MS-OS/2	80386 or 80486	EISA (1 year away)

Source: Arthur D. Little, Inc.

widths vary and prohibit some high-speed applications on lower-end models. Finally, the architectures have different methods for supporting data contention (when two or more cards on the CPU want access to data or processing simultaneously).

Hardware compatibility becomes an issue with non-IBM 80386s too. While major companies such as Zenith and

Compaq have also extended their 80386 systems' data buses to 32 bits, these are compatible neither with each other nor with MCA.

Not even IBM can be positive that the MCA approach will eventually win broadest acceptance. IBM's recent announcement of the PS/2 30 286 (80286-based) computer shows that customer demand exists for the older AT bus. So

far, nearly all 32-bit boards are used for memory, which is usually specific to each vendor and therefore does not cause a major problem. Users simply go to that vendor to buy the memory they need.

These differences affect users as well as hardware and software vendors. The lack of interchangeability among I/O boards presents both financial and managerial concerns.

The user will need multiple boards in a mixed PC environment and must support these. Similarly, having different I/O drivers for peripherals requires either internal programming or, more likely, support from the hardware or software vendor, often for printers or other peripherals no longer sold.

Users can avoid these problems by limiting themselves to a single computing environment. However, this limit is often impractical because various end users within organizations have different PC needs. Faced with a multiple environment, the user must stockpile boards and increase staff to deal with the increased demand for compatible hardware drivers.

For the hardware vendor, the key question is whether to support different architectures and operating systems or to sidestep the issue by going into a niche market. The narrower market is likely to limit the vendor's growth potential. On the other hand, supporting multiple bus structures and both OS/2 and non-OS/2 environments may require producing multiple versions of I/O ROM on feature cards, which would be costly.

For both systems and applications software vendors, the choice is also between a niche strategy and one of supporting mixed environments. Here the decision has less to do with what form the products will take, and more to do with how many versions the vendors will support, and how much of the PC market they will target.

Intel 8086 or Intel 80x86 processor

Beyond the choice of operating system or bus architecture, the chips around which the PCs are built are crucial to software compatibility. Each Intel chip—8086, 80286, and 80386—has peculiarities that affect its performance with software written for the others.

Neither Intel nor IBM anticipated the great acceptance of 8086-based comput-

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ers. Thus, the 80286 design, closely following the 8086, did not incorporate a seamless way of running programs for the 8086. The chip boots up in its "real" mode, which will run 8086 programs. Users can switch once, and only once, to the "protected" mode and run a program written for the 80286. Switching back to the real mode requires rebooting. The protected mode supports the organizational and hierarchical capabilities of OS/2.

Remaining committed to 8086-based MS-DOS systems can lock a user out of ever switching to OS/2 without disposing of all those PCs. Conversely, acquiring the high end of PS/2 now can make the user dependent on the availability of software yet to be announced and can entail both obvious and hidden costs.

Intel, however, realizing this problem and reacting to the demands of such customers as IBM, has designed certain compatibilities with the 8086 into the 80386 chip. The 80386 accommodates all three architectures. It can run 8086 real mode and 80286 protected mode programs. In addition, it has an 8086 virtual mode that allows 8086 applications to run in a protected mode.

To both complicate and complete the picture, OS/2 written for the 80286 contains a combined hardware/software fix, called the Compatibility Box. This fix allows users to run MS-DOS programs in the 80286's protected mode. To do this, the protected mode system goes to the keyboard controller, initiates a reboot process, and runs the real-mode program under control of the box. It then returns control to the protected mode. OS/2 keeps track of both environments to allow a clean transition in both directions.

The 80286 chip was not designed to work in this manner. While this seems a convoluted and even technologically risky fix, it does allow the 80286 to handle a wide variety of programs without the time and data loss of shutting down the system to reenter the real mode. The box will serve an important purpose for companies with a large investment in 8086 software until OS/2 takes full advantage of the 80386. The versions of OS/2 to be released in late 1989 and beyond should make the 80386 computers, including PS/2s, more attractive. They should also allow users to run 8086 programs without using the 80286 solution to the mode

transition problem.

For the user, the first question is whether to go strictly with the protected mode and wait for OS/2 programs written for it, or to stay with current programs and rely on the Compatibility Box. For most, the option of waiting is not realistic. Because 8086 systems cannot run OS/2 and many users will want that capability, they are stuck with a decision

between 80286 and 80386 equipment, knowing that the former has only a subset of the real capabilities to be realized by later OS/2 versions running on the 80386 in the uncertain future.

For many hardware vendors, the chip differences have no major implications. Clone makers, however, have to decide whether they will develop and support an installed base of 80286 programs. Al-

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ternatively, they can concentrate on products that operate without the box. Each chip instruction set from the 8086 through the 80386 is richer, offering the software vendor greater flexibility; but the lack of compatibility with earlier versions requires decisions about which products to write and support.

Different models of IBM's PS/2

It does not simplify the choice that the PS/2 line is not monolithic—that various models are incompatible with each other. This is so because IBM is trying to cover a variety of bases. Fundamentally, the bottom two PS/2 computers, models 25 and 30, are not OS/2 machines and never will be. While IBM stopped producing the XTs and ATs, it did incorporate their capabilities and architectures into the new product line, albeit with some significant differences.

The 25 and 30 are based on the same 8086 chip, run XT-compatible software, and have an enhanced MCGA graphics display. The next higher system, the model 30 286, uses the 80286 chip and runs AT-compatible software, has the more pleasing appearance of the VGA display, and supports OS/2. The middle models, 50 and 60 of the line in their various configurations, use the AT's 80286 chip. Models 70 and 80 and future models will use the 80386 (and 80486 as it becomes available).

Even in the PS/2 line, the various data buses are not compatible in all products. Models 25 and 30 use an XT-compatible bus, accepting all boards for it. Model 30 286 uses an AT-compatible bus. However, the 50 and 60 use a 16-bit MCA, and the higher models use a 32-bit MCA. Peripherals requiring the full 32-bit bus will not plug into the 16-bit MCA, and models 25 and 30 cannot use boards from higher models.

So far, IBM has done a superb marketing job of convincing people that OS/2 is somehow inexorably connected with PS/2. While the names are similar and the products compatible, there is no requisite connection. IBM's position is that PS/2 and its MCA are critical to the efficiency of OS/2. Other vendors pointedly disagree, or they would not be selling alternative products.

Tandy and the newcomer Dell, among others, are already selling PS/2 clones. Several others, including Kaypro, Zenith,

and Compaq, have announced their forthcoming products in the area—although whether they will actually produce clones with the MCA in light of the recently announced EISA remains to be seen. PS/2 clones from foreign firms are already appearing.

Choice of vendors

For the present, users face the decision of buying a PS/2 from IBM, an AT-compatible, or a PS/2 clone from another vendor. For the user, this is one decision that has subjective considerations. Many are more comfortable with IBM as the vendor. Historically, IBM has meant less risk. For large, multiple location users, this can mean better support and services. On the other hand, in many cases a vendor that is well represented locally may be able to give superior support. Furthermore, its prices for similar products are likely to be lower than IBM's.

In addition, as a traditional mainframe vendor, IBM views PCs as an extension of that environment, with benefits in simply connecting to the host processor as a dumb terminal or local processor. Other vendors tend to focus on the PC as a tool, both by itself and in networks. They can be more innovative in some ways because they give greater consideration to how PCs work alone or in work groups of varying sizes.

The decision for users can often be based more on vendor considerations than on which type of hardware would best suit their needs. If the customer chooses IBM, that means a commitment to PS/2. Going with another vendor can mean either an AT or a PS/2 clone, a course that can provide more options in many cases. Figure 1 (page 39) provides a breakdown of PC choices and their relevant attributes. Δ

Excerpted with permission from PS/2 and OS/2 in Practice: User Decisions and Vendor Dilemmas, published by Arthur D. Little Decision Resources. The author, a member of Arthur D. Little's Information and Telecommunications Systems Section and a past president of NADGUG, specializes in mixed-vendor multiple-host networks, intelligent workstations, capacity planning, and performance analysis. He can be reached at Arthur D. Little, Acorn Park, Cambridge, MA 02140, 617/864-5770.

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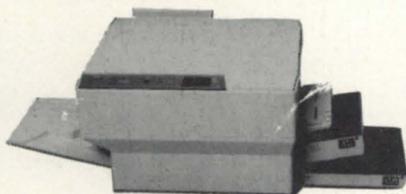
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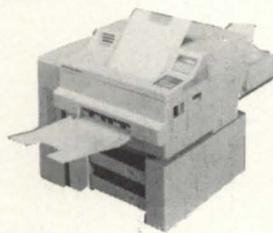
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Weeding out noise, part II

Traditional solutions to noisy data transfers

by Rainer McCown
Special to Focus

(In the second part of a three-part article on data transfer, the author describes how communication protocols help prevent problems caused by noise on the line. The first part, "Weeding out noise: Snap-crackle-pop makes trouble for data transmission," appeared in the April 1989 issue of Focus.)

ASCII transfer

Forms of data transfer that are not included under protocol transfers (described below) are lumped into the category of ASCII transfers. The connection between a DG mini and a terminal or personal computer is uncontrolled. The appearance of extraneous characters on the screen is a good indication of potential data transfer problems. These problems are affected by transmission distance, data rate, and the electrical interface used.

The first uses of ASCII were to drive

teletype machines via a current loop interface. Noise is less of a problem with a current loop interface because a lot of energy (current) is passed down the wires, which tends to swamp out the noise signal. The move to RS-232 signals (which transmit data at a higher rate because they put less energy through the wire) has increased noise susceptibility problems. The latest standard, RS-422, increases noise immunity by sending both a positive and negative signal (differential drive). This cancels noise signals that are imposed onto both signal wires, and attenuates by half signals that are on one wire.

Except for parity, there is no mechanical way to detect, much less correct, transmission errors. Visually, the operator will notice, and thus ignore, extraneous characters. While the operator can ignore extra characters on the screen when data is

ASCII and you shall receive

ASCII (American Standard Codes for Information Interchange) was developed in the 70s by AT&T for its second-generation teletype machines. This code was a substantial improvement over the communication codes previously used. Control characters were added, upper and lower case characters were included without shifting in and out between code sets, and many special characters were added.

The code was an 11-bit code that was designed to drive a mechanical teletype. Each character began with a start bit, which in the mechanical teletype started an electric motor used to decode the following bits. Seven bits of data were followed by a parity bit (usually odd to guarantee at least one

bit was in the character code) and two stop bits. The stop bits were required to allow the motor time to stop and get ready for another start signal.

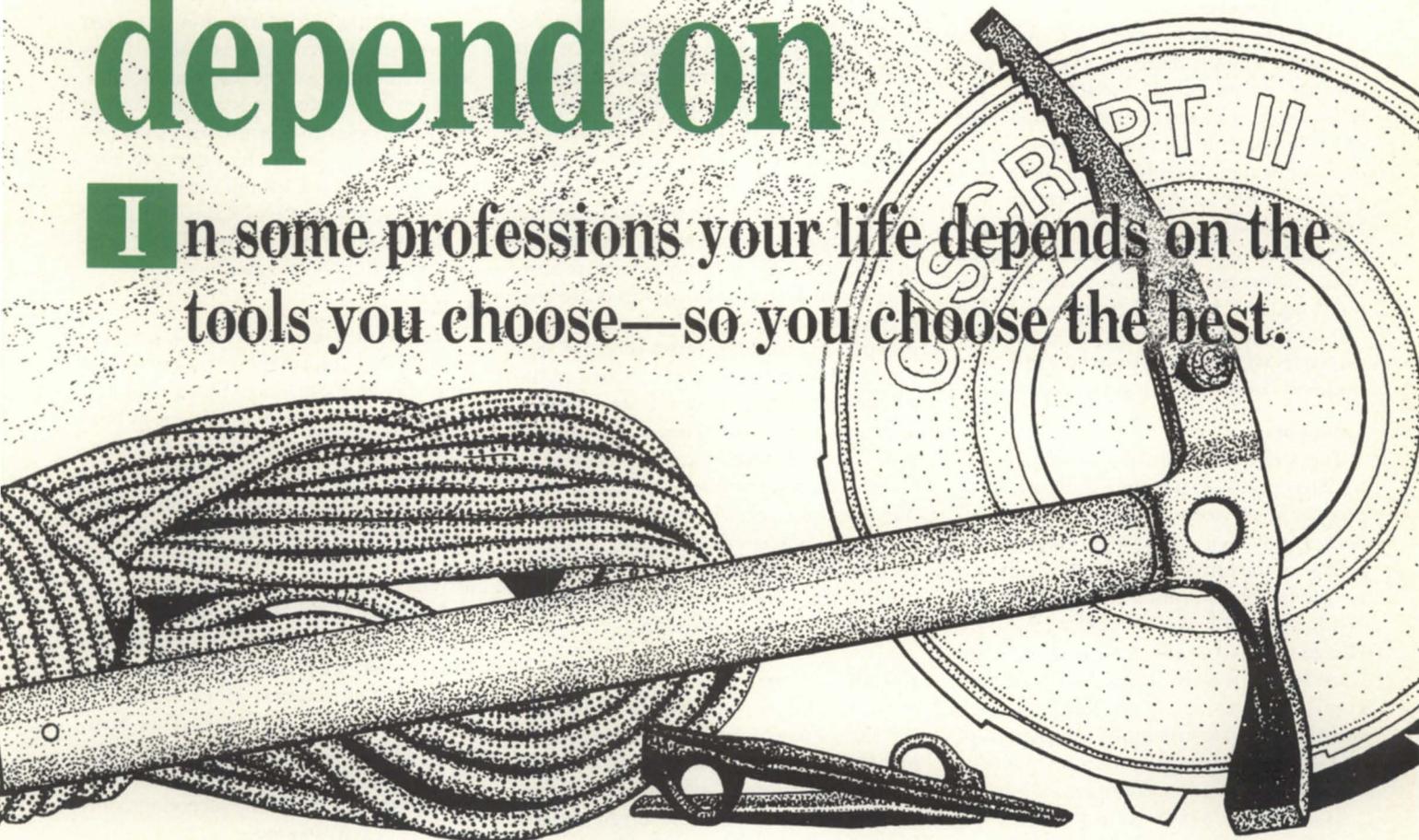
Because of the mechanical motion of the carriage, the carriage return and line feed operations were separated, with the carriage return being sent first. The speed of the returning carriage was fast enough to return within two character times (CR plus LF). This meant that no fill characters were required at the end of a line, as with previous machines.

The teletype was introduced just as the first minicomputers were being developed, and this combination solidified the ASCII character set standard.

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being transferred to another computer, any noise on the line could cause serious problems. To prevent problems during data transfer between computers, communication protocols were devised.

Protocol transfers

Since the increased popularity of 8-bit, no parity, signals, there has been no error checking of individual characters sent between host computers and terminals (or PCs). In current technology, error checking is done mainly on blocks of characters. Although strictly speaking a protocol is any previously agreed to form of communication, I will refer to a protocol as a block of characters that is acknowledged by the receiving end. I will describe some of the features, and limitations, of two popular protocols with a key to understanding the trade-offs in protocol design or selection.

Xmodem

The Xmodem protocol was an early file transfer protocol developed when most programmers were hackers (long before hackers got a bad name) who created programs for the fun of it. Xmodem was popularized by the communication package PC TALK. PC TALK was created by Andrew Fluegelman, who also invented the free-ware (or shareware) concept. These programs became successful because they were first, they were simple, and they were free. I will describe how a protocol works using Xmodem as an example.

The object of a protocol is to ensure the exact movement of a file of data between two computers. The data, in Xmodem, is broken into blocks of 128 characters each. Each block begins with a start character, followed by some identification data (which is the block number and 1's complement of the block number); then comes the data (128 8-bit bytes), ending with the error checking code. The original Xmodem used the least significant byte of the sum of all of the bytes in the block. This simple error detection technique is called checksum.

Subsequently, some people with a mathematical bent improved on the error code by changing it to a 16-bit CRC (cyclical redundancy check). This increased the total block length by 1 byte, and increased the probability that all errors would be detected.

If errors are random in effect and uniform in distribution, the error detection improvement should be easy to calculate.

A 1-byte error code would give a false indication once in 256 times (.39 percent error rate, or 99.61 percent accuracy), while the 2-byte CRC error rate is once in 65,536 times (.0015 percent error rate or 99.9985 percent accuracy). Calculating the actual error rate is not this straightforward because the distribution of errors is not uniform. Because any error is rare and both schemes will detect any 1-bit error, the error detection problem occurs only on multibit errors. However, the most likely error value is either zero or 255 (all ones). A checksum has more trouble detecting these particular error values, which tends to make the CRC technique more robust. The above accuracy calculations are correct for the case where the signal is clear, except for a sudden burst of noise that totally obscures several characters in the middle of a block of data. Unfortunately, although noise often comes in bursts, it also comes in more than one burst. If a block of data is retransmitted many times due to error detection, the detected errors manifest themselves in retries. A direct correlation can be made between the number of retries and the slim chance that a bad block got through.

Kermit

The Kermit protocol takes its name from the little green frog muppet created by Jim Henson. (I am particularly attached to the animal motif as demonstrated by our Rhinoceros logo, the origin of the Rhintek company name.) The Kermit protocol was developed, and is controlled, by Columbia University. It is not in the public domain. Rather, Columbia University distributes it without charge (except for a media charge) and prevents anyone else from charging for copies of Kermit (again except for a small distribution charge). This means that private companies cannot make money selling and supporting Kermit products. Therefore, many versions of Kermit exist and can be downloaded from a bulletin board or obtained from friends. It is also available from the NADGUG software library. The protocol has been incorporated into many commercial communication packages (at no extra charge) and Kermit support is usually available from these manufacturers as part of their package support.

Kermit was developed on mainframes and minicomputers at a time when the byte was standardized at 8 bits, but com-

munications were set to 7 bits plus parity. A technique was developed to convert the 8 bits into two 7-bit bytes using special block header information to indicate where this was done. When the Kermit communication protocol is started, a lot of environmental information is passed between the two computers. This includes information about the file (name, size, date, etc.), revision levels and features of the two copies of Kermit, and information about the computers that are running the software. Kermit often includes data compression capabilities and many of the latest Kermits include sliding window (full duplex) capabilities.

Full duplex

Full duplex operation of a protocol implies that information can be sent in both directions at once. Since it is rare that actual data needs to be sent in both directions, the data sent back is the acknowledgement that the block of data was received. In Xmodem, after each block of data is sent, the sender waits for the reply from the receiver that the data arrived correctly.

A 1-byte acknowledgement of either ACK (acknowledgement) or NAK (negative acknowledgement) is expected by the sender before the next block is sent (or the current block is resent). This turnaround time can be long, especially if the information is sent over a public network or satellite link, or if the receiving computer is heavily loaded.

The full duplex alternative is to number each block and also number the corresponding acknowledgement. Then, by sending the next several blocks before the first block is acknowledged, the line turnaround delay can be avoided. There is a window of opportunity during which to receive the acknowledgement that limits the number of outstanding blocks to a fixed number, such as 16 or 32. As acknowledgements are received, the outstanding block window slides forward with the block numbers, which explains the term "sliding windows." Δ

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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 can be reached at P.O. Box 220, Columbia, MD 21045; 301/730-2575.*

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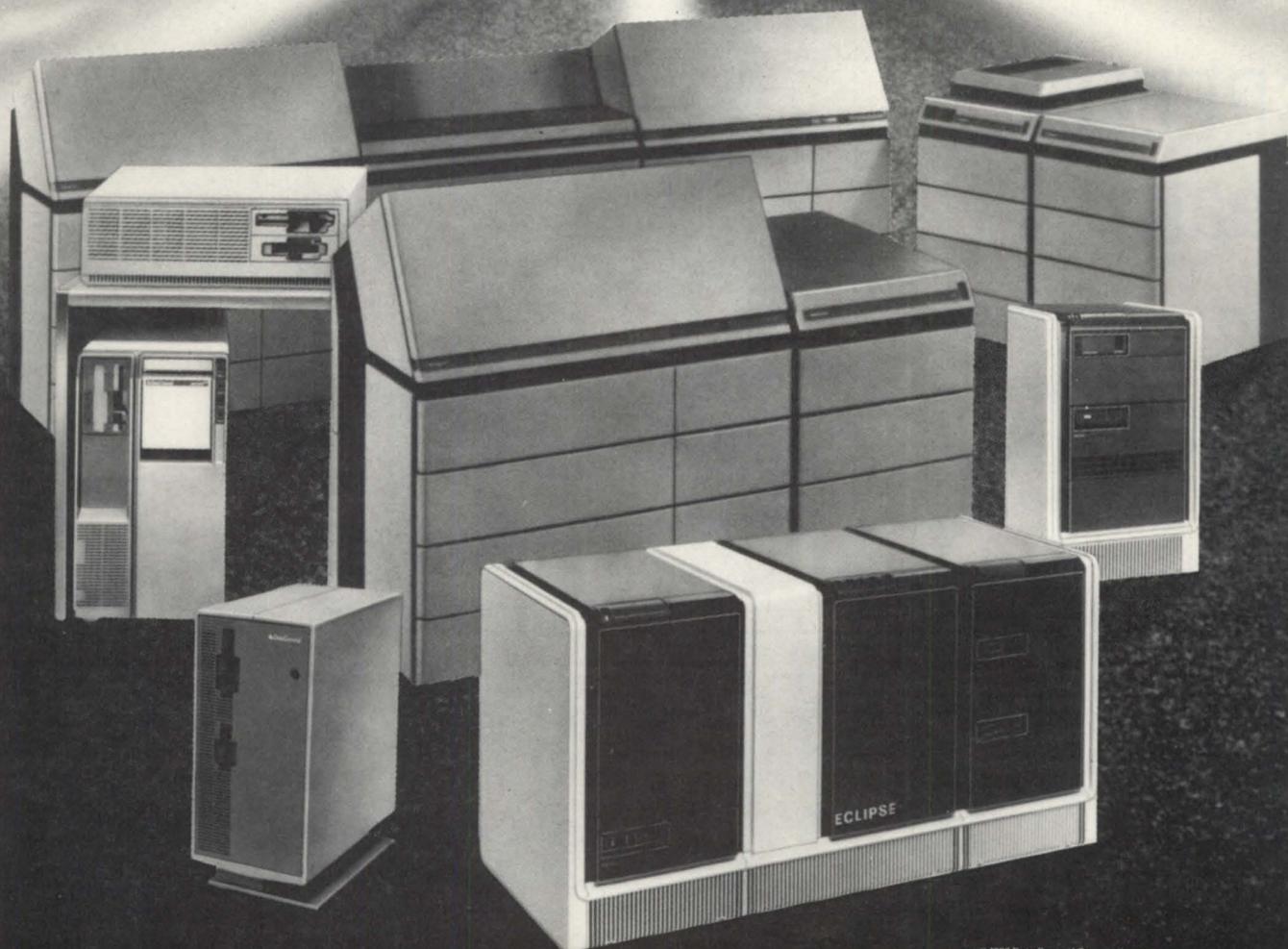


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SPEED freak

Cosmic macros await

One of the most common omissions cited when critiquing the CLI is the lack of any general string handling operators. I've never found this to be much of a problem because, like most old-time DG users, I'm a SPEED Freak.

Let me make a suggestion; when you start packing for your vacation this summer, why not slide a SPEED manual under that stack of Fruit of the Looms in your suitcase?

In order to illustrate how useful CLI macros can become when a small dose of SPEED is added, I'll give you a couple of examples from our system. The first is an incredibly useful enhancement to the tried and true ?.CLI macro, and the second is a less obvious, but cosmically useful macro called RELINK.CLI.

Figure 1: ?.CLI

```

0001: COMMENT Display current processes.
0002: COMMENT
0003: COMMENT Usage: ?[/switches] {string}
0004: COMMENT
0005: COMMENT Any switches applicable to the WHO command may be used.
0006: COMMENT
0007: COMMENT If the optional string is supplied then only usernames,
0008: COMMENT process names, or program pathnames containing the string
0009: COMMENT are displayed.
0010: COMMENT
0011:
0012: [!EQUAL,%1%,]
0013:
0014: COMMENT Simple ? command.
0015:
0016: [!EQUAL,[!SYSTEM],AOS]
0017: WHO/2=IGNORE%//% <,1,2,3,4,5,6><0,1,2,3,4,5,6,7,8,9>
0018: [!ELSE]
0019: WHO/2=IGNORE%//% [!PIDS]
0020: [!END]
0021:
0022: [!ELSE]
0023:
0024: COMMENT Complex ? command.
0025:
0026: DELETE/2=IGNORE/V ?.[!PID].WHO.TMP
0027: [!EQUAL,[!SYSTEM],AOS]
0028: WHO/2=IGNORE%\%/L=?.[!PID].WHO.TMP <,1,2,3><0,1,2,3,4,5,6,7,8,9>
0029: WHO/2=IGNORE%\%/L=?.[!PID].WHO.TMP <4,5,6><0,1,2,3,4,5,6,7,8,9>
0030: [!ELSE]
0031: WHO/2=IGNORE%\%/L=?.[!PID].WHO.TMP [!PIDS]
0032: [!END]
0033:
0034: COMMENT Put the SPEED commands in a file so they can be fed to SPEED
0035: COMMENT with a /I switch and thereby not show up on the screen as
0036: COMMENT they would if XEQ/M SPEED were used.
0037: DELETE/2=IGNORE/V ?.[!PID].SPEED.TMP
0038: CREATE/M ?.[!PID].SPEED.TMP
0039: <@S~%1%~;0L1PW1L>
0040: #K
0041: FUH
0042: )
0043: X SPEED/I=?.[!PID].SPEED.TMP ?.[!PID].WHO.TMP
0044:
0045: COMMENT Display the final results.
0046: TYPE ?.[!PID].WHO.TMP
0047:
0048: COMMENT Tidy up around here.
0049: DELETE ?.[!PID].<SPEED,WHO>.TMP
0050: [!END]

```

Figure 2: RELINK.CLI

```

0001: [!EQUAL,%/||%,]
0002:
0003: [!EQUAL,%3%,]
0004:
0005: WRITE
0006: WRITE Usage: %\%[!ASC 333]/N[!ASC 335] template old-string new-string
0007: WRITE
0008: WRITE Example: %\% # :UDD: :DISK2:UDD:

```

```

0009: WRITE
0010: WRITE If /N is used then any changes are just reported instead of made.
0011:
0012: WRITE
0013:
0014: [!ELSE]
0015:
0016: COMMENT Create a file listing the links and their resolutions.
0017: DELETE/2=IGNORE/V ?%\%.[!PID].LINKS.TMP
0018: FILESTATUS/L=?%\%.[!PID].LINKS.TMP/LINKNAME/NHEADER/TYPE=LNK %1%
0019:
0020: [!UEQ,[!SIZE ?%\%.[!PID].LINKS.TMP],0]
0021:
0022: WRITE No links match %1%.
0023:
0024: [!ELSE]
0025:
0026: COMMENT Create a SPEED command file to convert any lines
0027: COMMENT containing a match on old-string to commands which
0028: COMMENT call me with /! and the old and new strings.
0029: DELETE/2=IGNORE/V ?%\%.[!PID].SPEED.TMP
0030: CREATE/DATASENSITIVE/M/TYPE=TXT ?%\%.[!PID].SPEED.TMP
0031: 10IQJ
0032: <@C~
0033: ~ ~;>
0034: <@C~ - -:-1M>
0035: <@C~-%2%-~%3%-;0L@I-%%\%N%/II -0L1PW1L>
0036: #K
0037: FUH
0038: )
0039: XEQ SPEED/I=?%\%.[!PID].SPEED.TMP ?%\%.[!PID].LINKS.TMP
0040: [!UEQ,[!SIZE ?%\%.[!PID].LINKS.TMP],0]
0041: WRITE Sorry - no link resolutions matching %1% were found.
0042: [!ELSE]
0043: [!NEQUAL,%/N%,]
0044: WRITE Here are the changes I would make:
0045: WRITE
0046: [!END]
0047: [?%\%.[!PID].LINKS.TMP]
0048: WRITE
0049: [!END]
0050:
0051: [!END]
0052:
0053: COMMENT Tidy up around here.
0054: DELETE/2=IGNORE ?%\%.[!PID].<LINKS,SPEED>.TMP
0055:
0056: [!END]
0057:
0058: [!ELSE]
0059:
0060: COMMENT Pass II comes here with link name and resolution.
0061:
0062: [!EQUAL,%/N%,]
0063: DELETE %1%
0064: CREATE/LINK %1% %2%
0065: FILESTATUS/ASSORTMENT/NHEADER %1%
0066: [!ELSE]
0067: WRITE,,%1%,,LNK,,%2%
0068: [!END]
0069:
0070: [!END]

```

?:CLI

Several people have called now to request a copy of my fancy ??.CLI macro, so I'm going to publish it here. It's small enough that you can easily key it in. The listing is shown in Figure 1.

The advantage of this macro is that you can request a list of only those PIDs whose WHO output contains a specific string (e.g., a username, process name, or program pathname).

The format of the command is:

) ?[/switches] [optional-string]

Here's a blow-by-blow of how the macro works.

If no string is supplied, the macro simply does a WHO command for all possible PIDs. In the case of AOS, it tries PIDs 1 through 69 by brute force. In the case of AOS/VS, it uses the [!PIDS] pseudo-op to examine only those PIDs actually in existence.

If a string is supplied, then the WHO output is diverted to a temporary disk file and SPEED is used to capture all lines containing the string and discard the rest. Any lines left are then displayed.

I realize that SPEED is an anachronism for most AOS/VS users, but it's definitely worth learning if you want to be able to get around CLI's lack of string processing in order to write fancy macros. In the case of this macro, the SPEED commands are relatively simple.

XEQ SPEED filename causes SPEED to open filename and read its contents into a buffer in memory until either: a) end-of-file, b) a form feed, or c) the buffer is full (about 20 KB). It also creates filename .TM as a temporary output file.

SPEED specifies a loop with <commands>. The commands within the angle brackets are executed until a command is found that indicates the loop is to be exited. The command "@S~%1%~;" tells SPEED to search forward through the file being edited for any occurrence of "%1%," and to exit the loop if no match is found (";" means exit if the previous command failed). The "%1%" is actually replaced with the first argument's value by the CLI as part of the CREATE/M command that creates the SPEED command file. If a match is found, the ";" does not cause an exit, and the remaining commands in the loop are executed. In this case, the commands are "0L" to return to the beginning of the line containing the match,

"IPW" to write the line to the output file without a form feed, and "1L" to position to the next line. After the loop is exited, "0J" positions the buffer pointer to the beginning of the buffer, "#K" kills (i.e., erases) the current buffer, and "FU" copies the remainder of the input file to the output file (none in our case), deletes the input file, and renames the temporary output filename to the input filename ("FU" stands for file update). Finally, the "H" command says go home, which means to terminate SPEED.

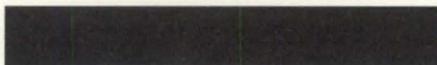
:RELINK.CLI

Have you ever found yourself in a position where you move a directory subtree from one disk unit to another, and then you have to change a bunch of links to point to the new disk unit? What's really needed in this case is a way to rename the resolution part of a collection of link files.

We ran into this problem enough times that I finally broke down and wrote a macro to do it. The macro command for-



*What's really
needed
in this case is
a way to rename
the resolution part
of a collection
of link files*



mat looks like this:

) RELINK template old-string new-string

This macro finds all the links that match the template, then it examines the resolution of the link for old-string. For each match it finds, it generates a command to delete the old link and create a new one whose resolution has old-string replaced with new-string. Here's an example:

) FILESTATUTUS/TYPE=LNK +

Directory :D23:UDD:D.BJ:FOCUS

```
FOO      LNK :D23:UDD:BETTY:FOO
THISISALONGLINKNAME
        LNK :D23:UDD:BOOP:LADEEDA
ZIP      LNK :D23:UDD:FRED:ZIP
```

) RELINK + :D23: :D22:

```
=FOO     LNK :D22:UDD:BETTY:FOO
=THISISALONGLINKNAME
        LNK :D22:UDD:BOOP:LADEEDA
=ZIP     LNK :D22:UDD:FRED:ZIP
```

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The macro listing is shown in Figure 2. The CLI part is fairly straightforward, but here's a blow-by-blow on the SPEED macro:

The input to SPEED is the output of the FILESTATUS command on line 18. Using the links shown above, it would look like:

```
=FOO :D23:UDD:BETTY:FOO
=THISISALONGLINKNAME
:D23:UDD:BOOP:LADEEDA
=ZIP :D23:UDD:FRED:ZIP
```

The "10I0J" commands insert a NEW LINE before the first line and then jump (back) to line zero. The first loop joins any line that CLI had to split in two because the link name was longer than 16 characters. The second loop changes all multiple spaces to single spaces to free up space for the insertions to come. The final loop does the scary stuff; it searches for a line containing the old-string and changes it to the new-string ("@C~%2%~%3%~;"). The macro name

with /II (and /N, if supplied) is inserted at the front of the line ("@I~%\%%/N%/II ~"), the line is written to the output file without a form feed ("0L1PW"), and the search for the next match continues with the next line ("1L"). When the search for old-string fails, the entire buffer is clobbered ("#K"), the file is updated ("FU"), and SPEED goes home to daddy ("H").

:SUMMARY

If you're not up to keying the macros in from the figures, you can download them from the :SYSMGR BBS as items AOSVS16:MACROS:WHOS and AOSVS-16:MACROS:RELINK.

In the meantime, dust off that SPEED manual and start playing around with it.

By the way, the line numbers were added to the macro listings with yet another CLI macro that used (what else?) SPEED!

:BACKUP_PROBLEMS

Along with AOS/VS 7.64 came yet another new DUMP/LOAD (also called

DUMP_II/LOAD_II) with a fresh batch of quirks compared to its predecessors. To add insult to injury, somebody back at DG decided to muck about with CLI's DUMP/LOAD/MOVE commands and screwed up the way that they handle links.

I haven't had time to research the new problems fully at this point, but I can tell you some of the symptoms.

LOAD_II/DUMP_II seems to be a little unclear on the concept of how the /RECENT switch is supposed to work. I've noticed several times now that doing a LOAD_II/RECENT multiple times causes the same collection of files to get reloaded each time. How could those files be more recent than the copies just loaded?

LOAD_II also seems to have a bit of a problem with labeled tape dumps created with DUMP_II. We inevitably get a message from LOAD_II when starting to read the dump set that the tape we've mounted is not the first tape of the dump tape set; but then the load proceeds normally. If we attempt to load the dump

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tape set using 7.60's LOAD_II, we get an abort due to an invalid labeled tape sequence number. Ditto for CLI's LOAD command.

CLI's LOAD/MOVE commands (they share much of their internal logic) seem to be determined to access the resolution of any link that they come across, even if they're only trying to just LOAD or MOVE the link entry itself. Why this should be the case escapes me. I suspect that somebody just forgot to set bit zero of AC1 on an ?FSTAT command somewhere.

:AUTOBAUD

After going crazy trying to call into a dial-in modem on a port with the new /AUTOBAUD characteristic, I finally figured out the problem. The new autobaud feature requires that the three NEW LINES or CARRIAGE RETURNs used to determine the baud rate have their parity bit turned on (i.e., 7-bit characters with MARK parity), apparently regardless of the current /CHARLEN= and /PARITY=

*Apparently
something in PMGR
or the IAC
forces the parity bit
to MARK when
no parity
is specified*

settings on the port. This probably stems from the fact that most DG terminals (my D400, for instance) won't work if you set their parity switches to NONE; you have to use MARK. Apparently something in PMGR or the IAC forces the parity bit to MARK when no parity is specified.

Unfortunately, in order for my terminal emulator program to do XMODEM or YMODEM transfers, the PC's COM port has to be configured for 8-bit characters with no (i.e., SPACE) parity, which makes dialing into ports with /AUTOBAUD nearly impossible. Δ

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Under the ethernet

ITCs bring DG terminal connection to the state of the art

Last month we studied the new ITC-128 and ITC-64 controllers from Data General that allow terminals to be connected to MV family computers over an ethernet LAN. Having discussed the protocols used on these controllers (the XNS protocols), let us continue by examining the performance of these devices and of the LAN itself.

“In this worst-case scenario a single keystroke has been responsible for four frames, and 256 bytes of ethernet traffic”

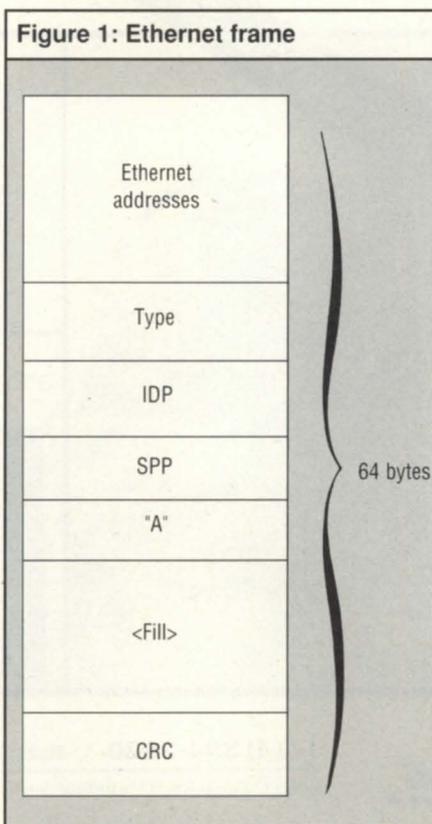
Performance

What are the realities of the ethernet traffic generated as a result of this service? First, let's consider simple typing. Assume that an application such as CEO has issued a ?READ system call to read data from the user's keyboard.

You type an "A" at your keyboard. That character leaves your terminal via the asynch port and is transmitted to the local Termserver. Inside the Termserver that single

byte is encapsulated in the various levels of software (Figure 1) and ultimately results in a minimum-length ethernet frame. This is a 64-byte packet on the LAN.

At the other end, the ITC receives this packet, and returns an acknowledgement (ACK) packet—another 64 bytes. This contains no user data, but is part of the SPP protocol. Now, like an IAC, the ITC generates an echo of the "A" that you typed and transmits this character back to the Termserver in a third 64-byte ethernet packet. The Termserver sends the echoed "A" to your screen and transmits an ACK of its own back to the ITC. In this worst-case scenario a single keystroke has been responsible for four frames, and 256 bytes of ethernet traffic.



Don't panic

Before you throw up your hands in horror, I've got to tell you that this is no big deal. First of all, the delay at the terminal is barely perceptible.

Second, you've got to put this into the perspective of ethernet's 10 million bps bandwidth. That's 1,000 times the speed of a 9,600 baud connection. But didn't we

THE WORKSTATION

just figure that we generated 256 bytes to transmit and echo a single character? Isn't that 128 times what it would take to simply send this character directly? By that benchmark, an ethernet is only eight times as fast as a single 9,600 baud line.

But suppose you ask the CLI to TYPE a large file. Now the ITC receives data from AOS/VS and is able to place as many as 546 bytes in each packet. These packets are transmitted to the Termserver at ethernet speeds, where the Termserver is able to parcel them out to your terminal's screen at slower asynch speeds. There's only a single ACK transmitted by the Termserver to the ITC-128 for the entire 512 bytes.

If users at every terminal were typing files simultaneously, the ethernet could handle approximately 2,000 users. In reality, we have seen as many as 7,000 terminals on a single ethernet. And at that site, the typical ethernet load was between 17 percent and 20 percent. By the way, consider how many MVs you'd have to have on one ethernet to sustain 2,000 ter-

minals typing files at 9600 baud.

"Active Users?"

The specifications for the ITC-128 refer to "128 sessions, 64 concurrent." What exactly does that mean?

This is Data General's way of helping you configure your system. An ITC-128 has roughly four times the performance of an IAC-16. Those of you with IAC-16s know that you can't get all 16 users running at 9,600 baud, since the maximum throughput of an IAC is less than 4,000 characters per second, due to the limited processing power of the on-board 16-bit microEclipse processor. An ITC-128, on the other hand, has a throughput greater than 16,000 characters per second. In other words, if you had 64 active users, you'd get at least the same performance out of an ITC-128 as you'd get if you put those 64 users on four IAC-16s. If your terminal usage is light, you should feel comfortable configuring 128 users per ITC-128. In fact, if your usage is so light that you can get users to log off to free up ITC-128

ports, you can even get more users per controller. It is possible, by the way, to configure Termserver and ITC ports for automatic disconnect after periods of inactivity.

PCs and the ITCs

You might wonder why I've devoted so much time and space in "The Workstation" to the connection of terminals. First of all, this involves a local area network, which is a subject dear to my heart, but in addition, the ITC and LTC controllers offer an outstanding configuration for terminal emulation with a PC workstation.

Most emulators simply emulate an asynch terminal. In this case, data leaves the PC's serial port just like it would leave a Data General terminal. From there it can go into a Termserver and from there to the ITC.

But a PC can be connected directly to the ethernet whereas a terminal cannot. In fact, this may already be the case; your PC workstations may already be part of a LAN supporting DG/PC*I, PC/VS, or

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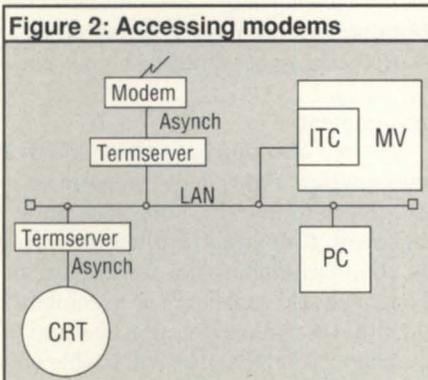
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Novell's Netware. If you are using PC /VS or Netware, the Popterm/410 emulator can communicate directly with the ITC over the ethernet LAN. Let's look at Figure 2.

Rational Data Systems, (the developers of Popterm) has licensed the Termserver protocols from the Bridge Communications Division of 3Com (the manufacturer of the Termserver). Within Popterm is a complete implementation of 3Com's VTP, and XNS's Courier, SPP, and IDP protocols. It's basically a combined one-port Termserver and emulator all within the PC.

There are some marvelous advantages to using the ITC directly for terminal emulation:



There is no need for a second PC controller or asynch cable. The same cable that is used for other LAN traffic (PC/VS and/or Netware) can be used for emulation. In many other cases today, customers are forced to run asynch cabling for emulation in addition to the ethernet used for higher-level PC integration functions.

Improved performance. Since the data from the ITC to the PC is never in asynch form, you can achieve performance superior to a 9,600 baud connection. Whereas an emulator on an AT-class machine typically runs at an effective rate of 7,000 baud or so, Popterm is noticeably faster

Doug Kaye is a partner in Rational Data Systems. He can be reached at 5725 Paradise Drive, Corte Madera, CA 94925; 415/924-0840. This article is excerpted from the "1989 Rational Data Systems Report on PC Integration" to be published later this year. For a free copy, contact RDS at 150 S. Los Robles Ave., Pasadena, CA 91101; 818/568-9991. Copyright 1989, Rational Data Systems.

than a 9,600 baud terminal.

Lower overhead than virtual terminal. An alternative to this is presented by DG/PC*I's emulators. Under AOS/VS these are very slow and present considerable overhead. DG recommends this emulation only for occasional use. Under AOS/VS II, the virtual console capability has been moved into the kernel of the operating system itself. While this is substan-

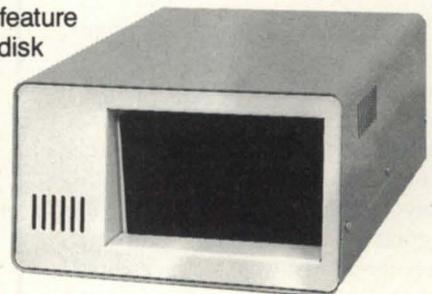
tially better than the previous version, no use is made of the intelligent processors such as IACs or ITCs. Performance of a virtual terminal cannot realistically equal that of a "normal" terminal device.

In summary, the ITC controllers bring Data General up to the current state-of-the-art in terminal interconnection, and should provide a sound basis for similar strategies into the 1990s. Δ

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The only constant is change

When buying custom software, be sure your rights to modify it are included in the package

By Richard D. Marks
Special to Focus

Sometimes a firm's data processing needs cannot be met by off-the-shelf software. So, the firm hires a computer programmer to develop software tailored to its business. After investing thousands of dollars developing software, more than one firm has been surprised to discover that it does not own the software, or even the rights to maintain or improve it.

Computer programs are considered literary works for the purposes of copyright law, and are thus protected in the same way as books or magazine articles. Absent a contract, the developer of a commissioned software program is the author and copyrighted owner. If you buy software from its author, all you own is a copy of the copyright program. You have no right to create a sequel or, possibly, to allow anyone other than the author to fix the program if it stops working properly.

The owner of a copy of a copyrighted work can do little more than use the work in its original form. This restriction might not bother the book buyer who purchases a book only for the purpose of reading it. Computer programs, however, are different. They are not meant to be stagnant and used as is; rather, they are routinely maintained and periodically modified. New versions correct the problems discovered in the old versions and provide enhanced features to meet growing business demands. Only the copyright owner is entitled to make these corrections and enhancements (called derivative works) to the software program.

It is important for any business that commissions the development of special software to obtain, by written agreement, certain rights in the software program. If you cannot fix the bugs that almost al-

ways develop in software, modify the software to meet your changing needs, or upgrade the software for compatibility with new computer equipment, the purchase may soon be of little value in the ever-changing computer world.

There are three ways you can obtain the rights to modify the software: 1) enter a work-for-hire agreement with the program writer; 2) purchase the necessary copy-

If you cannot modify the software to meet your changing needs, the purchase may soon be of little value in the ever-changing computer world.

right rights via an assignment of copyright; or 3) obtain a license for the necessary use rights.

Work for hire

A work-for-hire is a relationship created via a document entered between the party commissioning a work—in this case, a computer program—and the person or people who are writing the work. By virtue of this contract, the party commissioning the work is considered the author for

copyright purposes. That is, the commissioning party owns the copyright, even though the other party actually wrote the program. The contract creating the work-for-hire relationship is best entered at the beginning of the project, before work is started. It must be signed by both parties.

Assignment

You can also purchase all or some of the copyright rights in the program via a document technically known as an assignment. (Copyright is often described as a bundle of rights, any of which can be bought or sold separately or in combination.) But a caution: you must be sure to purchase the rights that will enable you to maintain the software properly. You must also be sure to follow certain formalities prescribed in the Copyright Act so that the assignment is enforceable.

Assignments can be tricky. In a recent case, a company contracted for copyright ownership in software developed by an independent contractor. The purchase proved to be of little value. The company obtained ownership of the object code of the program, but not of the source code. The distinction is important.

Source code is written on paper and deciphered by a programmer—it is human-readable. It is developed in the first instance by a computer programmer, and is what is needed to change, correct, or enhance the computer program. Object code is machine-readable; it is generated by the computer from source code and operates the computer. Modifying the object code is extremely difficult, if not impossible, for the average programmer. Thus, it is important to obtain copyright rights in the *source code*.

Licensing

A programmer/author may be reluc-

tant to enter a work-for-hire relationship or to sell the copyright to a program (even a specially commissioned one) because such programs often contain previously developed programs and subroutines of the programmer. The programmer wants to retain ownership in those preexisting materials, which are used over and over again in projects for a variety of clients. Fortunately, total copyright ownership often is not necessary because important equivalent rights can be obtained in a properly drafted licensing agreement.

The licensing agreement should contain provisions that entitle you to maintain and modify the software program. Such an agreement typically covers the right to maintain and enhance the software. This may be done in-house, by a staff programmer, or by a third-party software maintenance and programming house. The right to maintain the software entitles you to correct bugs that crop up during use. The right to enhance entitles you or your third-party programmer to modify the software to accommodate business or technological changes, and to add features to the program.

Because the computer programmer might have certain proprietary interests in the software, you (and any third-party programmer or firm you hire) might be required to maintain the software in a confidential status. Consequently, the licensing agreement may contain confidentiality or trade secret provisions, including the mandatory use of a confidential agreement for all who work on or have access to the source code.

A computer program is an ever-changing literary work. This requires that a contract for any software development project clearly allocate the copyright rights for use of the software. The right to modify a computer program is a valuable right that enhances the value of the computer program itself. A firm that hires a programmer or a programming company to develop software should make sure that it acquires all of the ownership or licensing rights necessary to permit full use of the software in the years ahead. Δ

Richard D. Marks is a partner at Dow, Lohnes & Albertson, a Washington, D.C.-based law firm. He specializes in computer, telecommunications, and media law.

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Generation GAP

4GLs offer savings in programming time—but at what cost?

Do you use a fourth-generation language? If the answer is yes, have you discovered that your new MV/15000 mod 20 with 32 MB can only support 25 users before it grinds to a screeching halt?

I have heard rumors in both the DEC and DG environments about what happens to your powerful mini or supermini when it is infected by a 4GL package. Since the horror stories ranged from "terrible" response (5 to 10 seconds), to "not bad today" (only five minutes from username/password to the next screen), I decided to learn more about this problem.

Fourth-GL data base designers subscribe to a technique known as third normal form, which, roughly translated, means that no information is duplicated in the system. In other words, every piece of information is recorded only once. Having spent most of my life programming in ICobol with ISAM, or AOS/VS Cobol with Infos II, I tried to relate this technique to the structures with which I am familiar. The magnitude of the problem was overwhelming.

The technique can be described in this way: everything on the system is on a list. The terminology may change from system to system; what one system calls a list another may call a file, element, schema, record, or frame. (As an ICobol programmer, I would call it a file with one or more keys.) Some lists contain data and others contain pointers. For example, you may have a customer list that contains the following data: account number, name, billing address, and phone number. You may have another list containing the order number, order date, and status. In a traditional ISAM system these two lists might correspond to the customer master and order header files.

In the traditional ISAM structure, you would store the customer number in the header file. That way you could retrieve the customer name and address by cross-referencing the master file. In a 4GL system, you would not put the customer number in the header file. Instead, you

would create a link list that pointed to both the master and the header files. (In ISAM terminology, that means a third file with at least two keys: one built of order numbers and one built of customer numbers.)

Does this method have a great affect on system performance? Not with a small system or a simple application. But one of the most frequently cited benchmarks for a 4GL is the number of transactions per second it can crank out. Suppose you wanted to find out how many open orders you had for a given customer. You would have to scan the link list for that customer. Each time an entry was found you would have to randomly retrieve the order information and master list information. (In ISAM terms, you would read a primary file and access two secondary files.)

Suppose you also wanted to include the salesperson's name on the report? There would be another link list of customers and salespeople. Once the customer was found, you would be able to retrieve the seller's name. The traditional approach would be to copy the salesperson's number into the header list. Thus, five logical accesses are needed by the 4GL to do what three can do in an ISAM system. Other ordinary requests that take only a few steps in an ISAM system could involve over a dozen index structures in a 4GL.

Let's sit back and reflect

I am reluctant to embrace a new technique that is supposed to overwhelm the industry (remember PL/I and AP/L?).

ICobol programmers have, in moderation, been practicing something like this programming technique for nearly 15 years. It doesn't make a lot of sense to blindly copy every bit of information needed for an application module into the master file for that portion of the system. On the other hand, the new technique is overkill. By not duplicating any information, anywhere, you require a lot more resources for the same function.

GOTO: a similar story
 The last time the programming industry had a battle of this magnitude on its hands was over the concept of structured programming. True

purists would rather write several extra pages of Cobol code and add three layers of nesting between the MAIN-LOGIC section and processing loop, than add a single GOTO statement to their programs. Anti-structured folks would have IF statements with 20 or 30 nested branches, depending on an incredible variety of flags, instead of having a PERFORM. Most seasoned programmers have seen examples of both extremes. The first is very organized but performs poorly on a virtual memory-based machine. The second can perform like a speed demon on MV systems, but is nearly impossible to maintain.

My opinion? I prefer sacrificing some performance for the advantage of having

organized programs. On the other hand, there are some circumstances where a purist style structure is simply quite cumbersome. In this case, I pop in a carefully documented GOTO and don't worry about it.

To sum up, I urge you to do things in moderation. The underlying theory of 4GL and many of the techniques that arise from it can be helpful and make for efficient system designs.

Why 4GL?
 The answers to this vary widely. Fourth-GLs are great prototyping tools. The users can get the look and feel of an application as early as a few days into

the project. By getting together with users early in the development process, most fatal mistakes will be weeded out before final implementation. Also, users will be

more receptive to automation or upgrades if they help implement them.

The other big advantage is in the area of non-procedural programming. In other words, you can tell the system which data to store and which data to print, and it does the rest. End-users can say, "I want a report showing this information, sorted by that, and selected from records that fit these criteria." They don't have to write the code to do it—they just say what they want. The savings in programming and turnaround time from user request to implementation can be cut drastically. However, to get that flexibility, you have to sacrifice great quantities of system resources. Δ

Jim Siegman is a contributing editor to Focus, chair of the NADGUG Audit Committee, 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; 312/673-1700.

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One good buffer leads to another

With this advice, you'll soon be multi-buffering

In my last article I described how to use some of the features of multitasking to implement timed-out activities. This month, I would like to add a few more concepts to our repertoire and soon demonstrate how they can be used to accomplish multi-buffering.

Single buffering

In many programs, a data buffer is allocated, and subsequently read into. When the processing of the data that has been read is complete, more data is read in, and the process loops until there is no more data to read in. This is traditionally called single-buffering, because there is only one buffer in use. To shorten the discussion on the pros and cons of this technique, let me just say that it is easy to program.

Double buffering

A common extension to this is to use a second buffer. Double buffering allows for one of the buffers to be used as an input buffer. When the read is complete, the buffer is passed on to another function for processing, and the second buffer is taken so that while the first buffer is being processed, the second buffer can be read into.

The primary advantage of this technique is that if some form of parallel processing is available (it is with AOS/VIS), then the elapsed time for the program to run can be reduced, because some processing can be done on the first buffer while the next set of data is being read in by the peripherals. If it can be guaranteed that the processing of the second buffer is complete

Figure 1: UART diagram

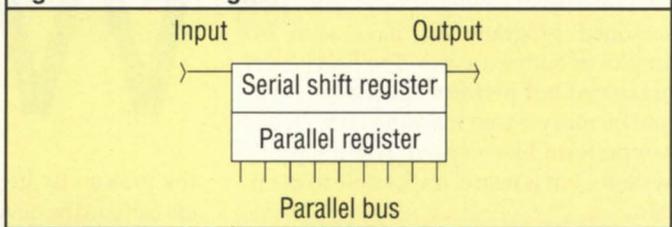


Figure 2: Queued buffer headers

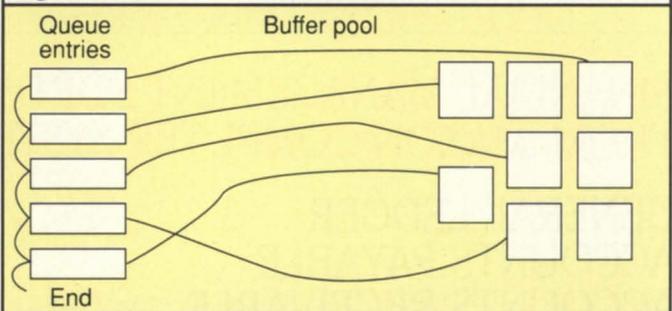
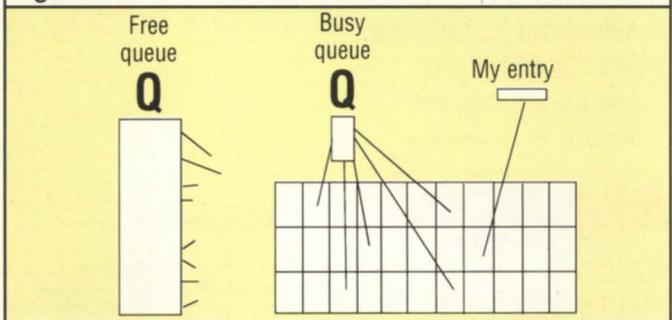


Figure 3: Buffer descriptor

Next entry pointer
Previous entry pointer
Buffer address
Buffer length
Sequence number
Status

Figure 4: The works in action



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following their direction," said one user.

Others appreciate the willingness of third-party companies to cover non-DG equipment, or to do favors like install cables or convert data. Others liked the benefits of dealing with a small company, and freedom of choice in purchasing peripherals. Fifty percent of the users of third-party maintenance cited price as a major factor in their decision.

The results for the section on third-party maintenance are not intended to apply in all cases to all third-party maintenance companies. Obviously, a comment applies to only one user's particular service provider, and not all TPMs. TPMs represented in the survey include Grumman Systems Support, Computer Engineering Associates Inc., Computer Repair Inc., Computer Products and Repair Inc., Delta Computec, Computer Maintenance Alternatives, CMG Computer Services, Hanson Data Systems Inc., STS Systems, Interscience, Security Computer Inc., Data Consultants, NPA Systems Inc., and Logical Solutions.

Common shortcomings

Two shortcomings that were mentioned in some cases by both users of third-party and Data General service were response time and parts availability. The poor response time was due, at least in one case, to a third-party company not having enough technicians. One user of Data General service at a remote site complained that she sometimes has to wait over 24 hours for an FE to arrive. Since users of both DG and TPMs sometimes mentioned that their service companies appear short on inventory, we wondered who is holding all the parts. Then we read a survey from a user at the U.S. Forest Service who said, "We have a cache of DG parts which we can use to begin repairs." Of course, stockpiling parts seems an unrealistic solution for most customers.

Depot repair

The third category of repair service queried on the survey was depot repair, a high-growth area in the computer

maintenance field. Seventy-five percent of the respondents have never used depot repair. Those that have used it gave mixed reviews, although over half rated it favorably.

About the survey

The survey was inserted in NADGUG members' April issues of *Focus*. As an experiment, we gave users the option of mailing their responses or sending them via our fax machine. Consequently, our fax machine was very busy the first two weeks of April! Questions were devised by *Focus* staff, with input from members of the Editorial Advisory Board.

The results are presented confidentially, although we asked users to give their names and telephone numbers for verification purposes (and to make sure a single vendor did not stuff the proverbial ballot box.) We believe the survey gives an accurate reflection of the opinions of NADGUG members, but not necessarily the opinions of all Data General users. △

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how much data is involved. Unnecessary data movement from one location to another chews up yet a few more cycles that could have been devoted to EMPIRE.PR or other games in rings four through seven.

Queuing can be of significant value, however, if instead of moving the data between functions (read "tasks"), we maintain short entries that describe the buffers and their contents, as can be seen in Figure 2. Figure 3 describes a typical entry for a buffer header. The first two items in the header are to make the queuing easy to manage, the third item is what lets this scheme work, while the rest of the entries could be application dependant. (Since all of the buffers were probably created of equal size, the length is that of the usable contents within the buffer.)

Hint: while the buffers are being created or allocated from memory, create a buffer header at the same time that points to the new buffer, and enqueue it to the "free queue." (This is the most logical time to do it, since the address of the buffer is in hand.) The program initialization would also allocate the queue descriptors that point to the head and tail of the required queues.

Figure 4 shows a typical organization of the queues and buffers in action. Any buffers that are not being worked on, or are waiting to be serviced, have their headers on the free queue. If a task or function is to receive data, a header is dequeued from the free queue, and that buffer is protected from being modified by any other task. Of course, any entity that has dequeued an element from any queue should never forget the address of the header, nor write over the pointer to the actual buffer, as the act of disassociating the two would make the buffer irretrievable. When the incoming data has filled the buffer, timed-out, or reached a terminator, the receiving task would enqueue the header onto the "busy queue," or some other appropriate area.

Obviously, if the entity that handles the actual data is ready, it would dequeue

a buffer header from the busy queue, work on it and then enqueue the same header onto the free queue, indicating that the buffer is now available for use. Note: the program might have any number of queues for specific causes, and the headers may be moved from one queue to working storage, then to another queue, etc. (When all processing of the buffer that is pointed to by the header is com-

plete, the header should eventually return to the free queue.)

Wrap-up (for now)

The ground work has now been covered, and I am running out of room, so next month I will take the inter-task messaging that was explained in the May issue, and present a sample program that shows these techniques in action. Δ

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The last hurrah

You'll still have him on tape

This will be my last regularly scheduled article for *Focus*. Quite simply, I have run out of ideas (and subroutines). When I started three years ago, it was easy to write the articles because, over the last 10 years of working with AOS and AOS/VS, I had written many subroutines to hook into AOS/VS to do all of the interesting things I needed in my programs. However, I have no more subroutines to write about and I no longer have the time to investigate a new feature just so I will have new material for an article. This is rather evident if you look at the subject matter of several of the articles in the last six months: you know I'm scraping the bottom of the barrel when I start talking about CLI macros!

Figure 1 is a brief summary of all of the articles I have written, along with the names of the subroutines. Many of the routines are just packaging around the system calls, but in a way that hides as much of the gory details from the user as possible.

Only the minimum amount of information is required in the calling sequence. In most of the articles, I tried to describe a situation that poses a problem, and then I provide a solution to that problem. Tools are useless unless you have a reason to use them and know how to use them.

I am going to dump all of the articles on a tape and send them to the NADGUG software library. The article files are in Data General WordPerfect 4.05 format and include source code for all of the subroutines except GET_SWITCHES, which was too large to be published (but is available as a separate item from the library).

Several people have asked me for reprints of old issues, so this is a good way to make the set of articles available to all. The names of the files correspond to the year and month of the *Focus* issue in which they were printed. However the titles of the articles often differ because the editor (sometimes) dreamed up a better title: my favorite is "How to make files disappear" (April 89).

I have never made apologies for writing non-portable code. My programs exploit as many of the features of AOS/VS as they can. Although my applications are [diamond-] studded with many of these subroutines, I guess my all-time favorite and most useful subroutine is GET_SWITCHES (*Focus*, Sept.-Nov. 1986). Consider an application that is written in portable generic code and that poses a seemingly endless series of questions to select filenames and options. Now consider the same application that allows filenames to be specified as arguments or switches and

that uses switches to set the options, allowing it to be encapsulated with different option combinations in various macros. Which one would you rather use? If your application isn't using GET_SWITCHES, you may be doing yourself and your users a great disfavor.

My second most used routine is GET_FREE_F77_CHANNEL.

Figure 1: Articles and subroutines

1986	
Jul	YES, CLI, HANG, GET_PROGRAM_NAME, CLI_PROGRAM
Aug	Functions to convert DG binary to VAX binary
Sep-Nov	GET_SWITCHES
1987	
Jan	Fun macros for your system
Feb	GET_REVISION, GET_FREE_F77_CHANNEL
Mar	REWIND_TAPE, RING_IS_IN
Apr	BATCH_MODE
May	WAIT_FOR_CA_INTERRUPT, WAIT_FOR_CAZ_INTERRUPT
Jun	EBCDIC_TO_ASCII
Jul	GET_DIRECTORY, SET_DIRECTORY
Aug	LISTERR
Sep	Using LFE to create libraries
Oct-Nov	SPEED vs SED
1988	
Jan-Apr	Assembly language primer (parts 1-4)
May	READ_FILE.CLI
Jun	Assembly language primer (part 5)
Jul	short-cut macros
Aug	START_PROGRAM
Sep	CHECK_OBITUARY, TERMINATE
Oct	GET_NEXT_FILENAME
Nov	my working environment
Dec	workspace (multiple disks)
1989	
Jan	odds & ends
Feb-Mar	WAIT_FOR_IPC, SEND_IPC, FILE_MISSING
Apr	NEXT_TAPE_FILE
May	pseudo-instantiation in FORTRAN

I can't tell you how useful this subroutine is and how it improves the readability and maintainability of Fortran programs. (Don't sneer, all of you C programmers—unreadable code transcends the boundaries of language syntax. I've seen a lot of unreadable code in many languages, including C). Consider the typical code fragments from a large Fortran application shown in Figure 2. This is the way most people write their code: there is no formal or logical method of assigning channels (logical unit numbers) and the entire application is hard-coded with literals (numbers). The reason the numbers are random is that they are selected as the program is patched and modified and extended, and the author can't remember what channel numbers he is using elsewhere in the program: "I'm probably not using a weird number like 39 anywhere else, so I'll just use that."

I had a better solution: I always defined the channel numbers as constants (PARAMETERS) in a single INCLUDE file for each program:

```
integer index_file,scratch,database
parameter (index_file=20,scratch=21,database=22)
```

which allowed me to code symbolically:

```
read(index_file, ...
rewind(database)
write (scratch, ...
```

Figure 2: Typical unreadable, unmaintainable Fortran code

```
open(24,...)
read(26,...)
open(23,...)
close(24)
backspace(58)
rewind(23)
open(3,...)
```

It also meant that I only had to look in a single file to see which channel numbers were being used, so I could assign another number for a new file.

All this changed when I wrote the original GET_FREE_F77_CHANNEL (*Focus*, Feb. 1987): it dramatically changed my programming style. The only permanently defined channels in my programs are the preconnects:

```
integer screen, keyboard,listfile
parameter (screen=10,keyboard=11, listfile=12)
```

All new programs since then have used GET_FREE_F77_CHANNEL to pick a free channel. I don't care what the channel number is and I don't have to keep track of it. If I require a channel for a new file, I just call GET_FREE_F77_CHANNEL. Consider how many times you have written a subroutine that

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AOS[/VS] TRICKS

Figure 3: GET_FREE_F77_CHANNEL (Version 2)

```

subroutine get_free_f77_channel(ichan)
  implicit none
c>>>constants
  integer min_chan,max_chan
  parameter ( min_chan=0,max_chan=255 )
c>>>variables
c->subroutine arguments
  integer ichan
c->local (stack)
  integer ier
  logical open
c->local (non-stack)
  logical*1 locked(min_chan:max_chan)
  data locked/256*.false./
  save locked
c>>>begin
c-> scan channel table from high to low since it is more likely
      that a free channel will be found at the top end
  do ichan=max_chan,min_chan,-1
  inquire(unit=ichan,opened=open,iostat=ier)
  if(ier.eq.0.and..not.open) then
    if(.not.locked(ichan)) then
      locked(ichan)=.true.
      return !got one!
    end if
  end if
  end do
  stop 'Panic: no free F77 channels!'
c>>>entry
  entry lock_f77_channel(ichan)
  if(ichan.ge.min_chan.and.ichan.le.max_chan) then
    locked(ichan)=.true.
  end if
  return
c>>>entry
  entry unlock_f77_channel(ichan)
  if(ichan.ge.min_chan.and.ichan.le.max_chan) then
    close(ichan) !make sure
    locked(ichan)=.false.
  end if
  return
end

```

opens a file, performs a file operation, and then closes the file. The calling sequence might look like:

```
call PROCESSFILE(ichannel,filename)
```

Obviously "filename" should be supplied as an argument to make the subroutine more useful in different applications. You also know why "ichannel" (F77 channel number to use) is included: because if it was hard-coded inside, then the subroutine wouldn't work inside another program that was already using that channel. Right? Well that's tacky, isn't it? Now you can simply call it with the filename:

```
call PROCESSFILE(filename)
```

and inside, GET_FREE_F77_CHANNEL will find a free channel, use it, close it, and return with no muss, no fuss, and nothing to keep track of:

```

subroutine PROCESSFILE(filename)
  character*(*) filename
  call GET_FREE_F77_CHANNEL(ichan)
  open(ichan,...)
  read(ichan,...)
  ...
  close(ichan)
  return
end

```

Although many file operations can be packaged in a single subroutine, some will require access to the channel number

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across various subroutines. In that case, you can either put the channel number in COMMON or pass it around as a subroutine argument. Of course, you will give the variables suitably mnemonic names, won't you? It is still 100 percent better than the code shown in Figure 2.

There was one situation that caused a problem or two. I couldn't always just pick *any* free channel because, although it might be free when I picked it, some library software might have reserved it for its own use, causing it to bomb later. A good example is the UNIRAS graphics software, which reserves channels 20-33 and 85-99 (on VAX/VMS anyway). So I added two new entry points to GET_FREE_F77_CHANNEL (LOCK_F77_CHANNEL and UNLOCK_F77_CHANNEL), added a table to remember the status of each channel, and . . . version 2 was born (Figure 3). Now all I do is lock channels 20-33 and 85-99 at the start of the application, and then use GET_FREE_F77_CHANNEL as required. When I close a channel, I also call UNLOCK_F77_CHANNEL to clear the "locked" status:

```
do i=20,33
  call LOCK_F77_CHANNEL(i)
end do
do i=85,99
  call LOCK_F77_CHANNEL(i)
end do
```

```
...
call GET_FREE_F77_CHANNEL(index)
open(index, ...)
read(index, ...)
...
close(index)
call UNLOCK_F77_CHANNEL(index)
...
```

Everybody, and I mean *everybody*, should be using this subroutine: you will never go back! If you're thinking, "I don't want to get dependent on some strange, obscure code that I don't understand, and that won't work on another system," don't worry. It is easy to understand, easy to use, and entirely portable. You can make it your own, and take it with you everywhere you go. GET_FREE_F77_CHANNEL scans channels [0,255] that are valid for Data General F77. On another system, like VAX/VMS, only channels [0,99] are allowed, but the routine will still work, because the error return on channels 100-255 will be ignored.

One of the most satisfactory pieces of coding I have done with this routine involves an application that processes files recursively (much like F77 processes INCLUDE files). The main subroutine (PROCESSFILE) is shown in Figure 4.

If you wrote PROCESSFILE without GET_FREE_F77_CHANNEL, you would have to supply and maintain an external (perhaps in COMMON) table of channel numbers for the subroutine

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**Figure 4: Recursion is easy
with GET_FREE_F77_CHANNEL**

```

subroutine PROCESSFILE(filename)
character*256 filename,new_filename
character*10 keyword
call GET_FREE_F77_CHANNEL(ichan)
open(ichan,file=filename,...)
1 read(ichan,'(a)',end=999) buffer
... parse for 'keyword' & 'new_filename'
if(keyword.eq'INCLUDE') then
call PROCESSFILE(new_filename)
else
...
end if
go to 1
999 close(ichan)
call UNLOCK_F77_CHANNEL(ichan)
return
end
    
```

to use. Your code would be considerably tackier than shown in Figure 4. Of course, we are lucky that DG's F77 uses the stack for local variables and generates re-entrant code so that you can do such recursion. I recently spent a day or so struggling with VAX/VMS Fortran so I could do the same thing. The compiler forbids a subroutine to call itself, but I fooled it as follows:

```

subroutine PROCESSFILE(filename)
...
if(keyword.eq'INCLUDE') then
call RECURSIVE_PROCESSFILE(filename)
end if
...
end
subroutine RECURSIVE_PROCESSFILE(filename)
character*(*) filename
call PROCESSFILE(filename)
return
end
    
```

That defeated the compiler, but I still had to write my own PUSH and POP package to manage all of the so-called "local" variables on my own stack. It's easy (now that I know how to do it!).

Well that's it for now and maybe for some time. If I come up with something else that just begs to be printed, I'll show up again in this magazine. Δ

John A. Grant is a geophysicist with the Geological Survey of Canada. He is also system manager, chief cook, and bottle washer for the Exploration Geophysics Subdivision's MV/4000. He may be contacted at 601 Booth St, Room 591, Ottawa, Ontario, K1A 0E8: 613/992-1082.

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Analysis tools

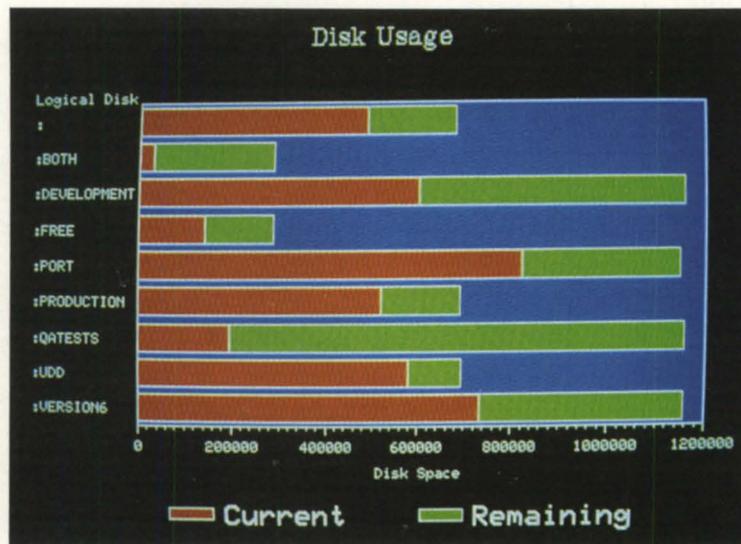
SMAT analyzes user profiles, system log information, and disk space usage

by David Bultman
Special to Focus

There are many system management tools available for the AOS/VS system manager. They are available from a variety of independent software vendors, as well as from Data General, which includes many tools with AOS/VS to help the system run more efficiently. However, these tools do not always meet the precise needs of the system manager.

Our system manager at SAS Institute in Cary, NC, needed to tighten security on our Data General MV system. Some special privileges, such as super-user and superprocess, had been handed out too freely. Determining which users had special privileges became quite tedious, because Data General's profile editor, Preditor, examines only one user ID at a time.

We decided to write a program that would read all the user profiles and store pertinent information into a SAS data set. Then we wrote another program that queried this data set and reported which users had special privileges. This simple program slowly developed into something we call SMAT (the System Manager Analysis Tool). Among other things,



On-screen graphic representation of the user profile directory

SMAT analyzes user profiles, system log information, and disk space usage.

Profile file

Obviously, a program to analyze user profiles can be written in any language; all you need to know is where and in what format the information is stored. Each user on an AOS/VS multiuser environment has a user profile file. The UPF-type file is in the UPD directory and contains information about the user and profile. Created with Preditor, the AOS/VS privilege editor, this file contains information such as the location of the user's

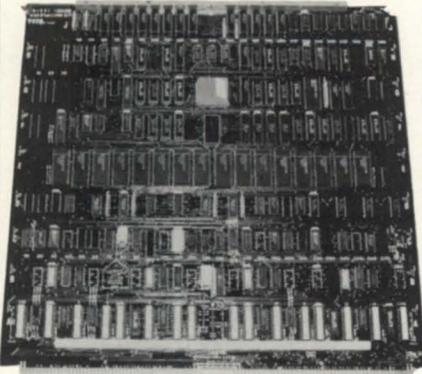
initial IPC file, the user's initial start program, and other user specific information. SMAT collects the data in each of the user profiles, storing the information into a disk file in the form of a SAS data set. Subsequently, the data set is queried to obtain any sort of report requested from the system manager.

Even if you do not use the SAS system of integrated software, it is easy to use any programming language to build such a facility provided you know the contents of the UPD file. See Figure 1 (Page 72) for a few of the more important elements of the user profile.

System log

Another concern of the AOS/VS system manager is managing the system log. AOS/VS provides SYSLOG, the system log function, which records information for later playback with AOS/VS's REPORT program. While on, the system log file automatically records user account-related information gathered by EXEC and AOS/VS, Xodiac network informa-

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MANAGEMENT

Figure 1: UPF-type files

These are some of the user privileges maintained in the UPF-type files in the UPD directory. Word numbers are zero-relative starting from the beginning of the file. Bits are numbered as follows:

WORD

| 15| 14| 13| 12| 11| 10| 9| 8| 7| 6| 5| 4| 3| 2| 1| 0|

Change Working Set Limit, word 73 bit 14: Allows the user to run programs that change the default working set limit.

Change Address Space Type, word 73 bit 13: Allows the user to run 16-bit programs in addition to 32-bit programs.

Change Working Set Limit, word 73 bit 12: Allows the user to run programs that change the system default working set limit.

Superprocess, word 73 bit 10: Allows a process to issue process control commands against any process.

System Manager Privilege, word 73 bit 9: Allows the user to initialize and release job processors (relevant only with more than one processor), to create and delete process classes and logical processors, and to change the locality of other users' processes.

Use IPC, word 73 bit 8: Allows the user to use InterProcess Communication system calls.

Access Devices, word 73 bit 7: Allows the user to bypass AOS/VS and access devices directly, via privileged hardware I/O instructions.

Change Username, word 73 bit 6: Allows the user to assume another username.

Create Without Block, word 73 bit 5: Do not block the creating (father) process when it executes a son process.

Change Priority, word 73 bit 3: Allows the user to change his/her process priority.

Superuser, word 73 bit 2: Allows a user process to bypass all file and directory ACLs; also allows a user process to run Predator.

Change Type, word 73 bit 1: Allows the user to run swappable, resident, or preemptible.

Unlimited Sons, word 73 bit 0: Allows the user to create an unlimited number of son processes.

Change Password, word 79 bit 5: Allows the user to change his/her password.

Access Remote Resource, word 79 bit 4: Allows a remote user to access files and devices like tapes and printers.

Virtual Console Privilege, word 79 bit 3: Allows the user to log on from a virtual console.

Use Modem Privilege, word 79 bit 2: Allows the user to log on via a modem.

Use Batch Privilege, word 79 bit 1: Allows the user to submit batch jobs via CLI QBATCH or QSUBMIT.

Use Console Privilege, word 79 bit 0: Allows the user to log onto a console under EXEC.

Last Login Time Seconds, word 80: The user's last login time, seconds.

Last Login Time Minutes, word 81: The user's last login time, minutes.

Last Login Time Hour, word 82: The user's last login time, hours.

Last Login Day, word 83: The user's last login date, day.

Last Login Month, word 84: The user's last login date, month.

Last Login Year, word 85: The user's last login date, year.

tion gathered by networking software and AOS/VS, software, soft and hard errors gathered by AOS/VS, and the SCP operating system.

Additional information can be written to the system log file in two ways. First, with the CLI command LOGEVENT, any superuser on the system can write messages into SYSLOG. Secondly, you can write to the SYSLOG file with the assembly language system call ?LOGEV, described in the AOS/VS programmer's manual. The syslog file is located in ":", (colon) and is called SYSLOG.

Some of the information stored in the SYSLOG file includes the time when SYSLOG was started and stopped, the time each individual process terminated, what time each user connected, how many pages they printed, and what privileges they have.

Data General's REPORT interprets the SYSLOG file and produces reports with the SYSLOG information. We used to use REPORT, but decided there would be an advantage in having a REPORT-type fa-

cility under the SMAT umbrella. This would save the system manager from learning another program or having to remember several different user interfaces. The user interface for this part of SMAT is identical to that of the user profiles. The tool is completely menu driven; the system manager can simply press the appropriate function key to retrieve information from AOS/VS and analyze the collected data. The information is summarized in report form or graphical form.

Disk space usage

One of the graphical aspects of SMAT is the way it displays the disk space usage. Data General's hard disk drives are genned into the system as Logical Disk Units or LDUs. LDUs reside in ":" (colon) and look like files with a type equal to LDU. User Directories reside in ":UDD" and are Control Point Directories. This information can be collected with some fairly easy CLI macros into a flat file. Instead, we elected to incorporate this into SMAT. SMAT collects the disk drive in-

formation into a SAS data set and runs SAS/GRAPH software on the data set to display the information.

Every system manager's needs are different, and you may not need a graph to display current disk usage. We wrote SMAT as a solution to remedy some problems. Among other things, SMAT helps us to analyze user profiles, system log information, and disk space usage. Although you can do many things with other tools, some cannot be done except with a moderate amount of programming. (For instance, collecting and displaying the information in the user profile directory and graphing the information as shown in the photo on page 71.)

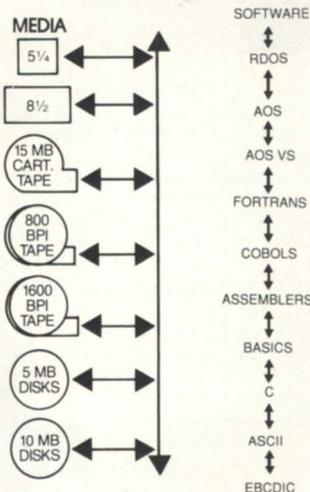
We found it helps to have our system management tools integrated under one umbrella. It reduces our system manager learning curve and the need to remember several different user interfaces. Δ

David Bultman is a systems developer at SAS Institute Inc., in Cary, North Carolina.

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Since lately it seems that each issue has brought news of a change in the corporate structure at Data General, *Focus* editors decided to publish an organizational chart. (A case in point: we had to make a last-minute revision to this chart when the resignation of a vice president was announced.) This chart shows the new reporting structure and all the officers of the company. The changes have been made in order to "strengthen Data General as it pursues its strategy to be a force in the proprietary, industry-standard, and communications markets," according to Data General.

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The latest products for DG systems

DG's new products allow easy access

Westboro—Data General Corporation made a series of announcements recently that underscore the company's strategy of allowing customers to connect, interoperate, distribute, and manage applications and files in a multi-vendor, multi-LAN environment. Designed as part of Data General's distributed applications architecture (DAA), the announcements are listed below.

Enhancements to the Data General Personal Computer*Integration (PC*I) communications platform and PC Workstation Services (PCWS).

Included is the introduction of CEO Connection/LAN, a new software package that enables PC users to take advantage of both PC applications and Data General CEO office automation capabilities over a DG/PC*I LAN. Data General also introduced server and workstation

packages for DG/PC*I that reduce prices and make ordering easier.

PCWS, CEO Connection/LAN, and CEO Connection, DG's asynchronous-based connectivity product, give users three ways to integrate PCs and add office automation. The CEO Connection/LAN provides an integrated environment in which IBM-compatible PC users can transfer files and initiate virtual terminal emulation over a DG/PC*I LAN. It is connected to the MV family server running CEO or CEO Light software.

The PCWS software package provides a multitasking windowing environment that offers cooperative processing between a PC and CEO host, including electronic mail and filing.

Other new DG/PC*I features increase performance and integrate IBM PS/2 models 50, 60, 70, and 80 into DG/PC*I networks. "The enhancements to DG/PC*I have improved network level throughput by up to 150 percent," said Joe Forgione, director of Distributed Systems and Communications.

•An ethernet and ethernet-StarLAN/IEEE 802.3 bridging unit.

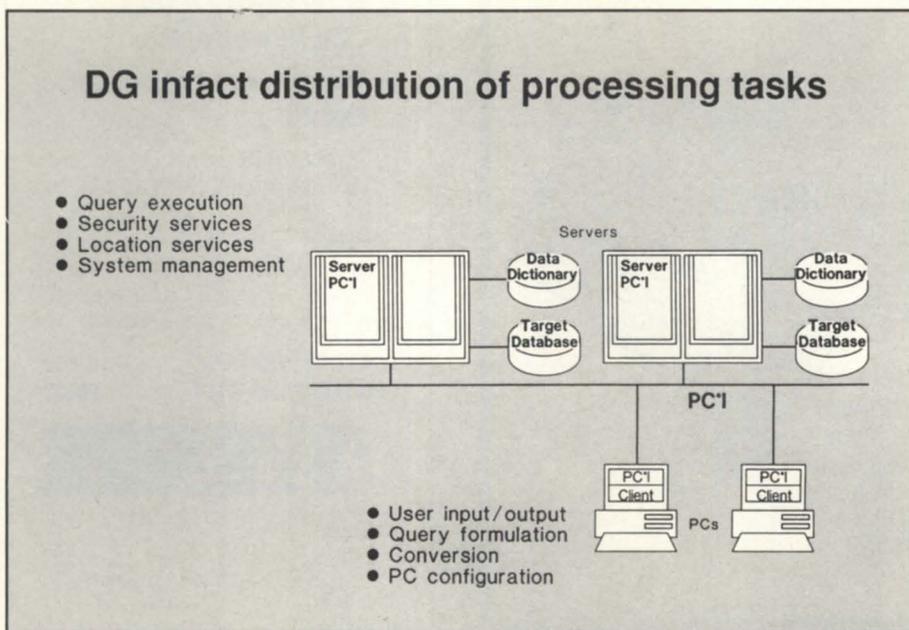
The ethernet/IEEE 802.3 and the ethernet/StarLAN 802.3 bridging units support the IEEE 802.1(D) "Mac Bridge" standard. DGC 802.3 Mac bridges connect networks directly together to form one logical network, allowing users serviced by separate networks to share information and resources. The bridges limit the amount of inter-network traffic, reducing overhead and improving performance. The bridges are enhanced through a 12.5 MHz Motorola 68000 microprocessor with one MB of memory. Applications with substantial cross-network communications requirements, such as large networks with hundreds of users, are all easily serviced by the bridges.

•DG/Infact, an information access software package that allows a PC user to easily access a variety of data bases.

DG/Infact allows an IBM-compatible PC user to query a data base residing on an MV family server—without having to know its physical location, structure, or query language. DG/Infact distributes processing tasks between PCs and MV family servers. It downloads the results of queries and converts them to popular PC application formats. The product is a result of a cooperative development agreement between Data General and Network Innovations, recently acquired by Apple Computer.

•TCP/IP support for the Dasher/386 Unix-based personal computer.

TCP/IP, the industry-standard communications protocol that enables the configuration of distributed systems in multi-vendor environments, is now supported by DG's 386/IX operating system. TCP/IP allows the Dasher/386 to share information with Data General products running under the AOS/V5 and DG/UX operating systems; products from DEC,



Sun Microsystems, Apollo, and Unisys; and other vendors who support the TCP/IP standard.

The announcements "effectively position Data General in a world of customers who increasingly look to distributed solutions . . . What Data General brings to these customers is a range of offerings which implement industry standards and integrate server, microcomputer, and mainframe networked systems," said Forgiione.

Data General, 3400 Computer Dr., Westboro, MA 01580; 508/898-4051. Δ

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DG adds Dasher/386-25 to Unix family

Westboro—Data General has announced the Dasher/386-25 personal computer, an addition to its industry-standard Dasher/386 Unix family that incor-

porates a 25 MHz Intel 80386 microprocessor. The multiuser system provides source code compatibility for SVID-compliant applications with Data General's new family of 88000-based systems.

"The Dasher 386-25 is faster and more powerful than the entry-level Dasher/386, providing minicomputer performance and functionality for the price of a personal computer," said Herb Osher, division director of product marketing.

The Dasher/386-25 Unix system is IBM PC-AT compatible and uses the 386/ix Unix V.3 operating system and VP/ix DOS-under-Unix product set. It includes a 64 KB memory cache, up to 12 MB of system memory in 4 MB increments, and up to 644 MB of internal disk storage. Intelligent 8- and 16-line serial controllers are provided, allowing up to 50 asynchronous serial connections for terminals, modems, or printers. The system is also available with amber or color VGA industry-standard PC graphics terminals.

High-capacity peripherals offered on the Dasher/386-25 Unix system include a

10 MB SCSI tape drive with optional error checking and correction that is media compatible with the 88000 family of systems.

The Dasher/386-25 Unix system with 4 MB of memory, 159 MB of disk storage, 150 MB cartridge tape drive, 8-line intelligent multiport serial PCB, and a 386/ix runtime operating system license is priced at \$15,480.

Data General, 3400 Computer Dr., Westboro, MA 01580; 508/898-4051. Δ

Circle 84 on reader service card

Cognos announces two new products

Ottawa, Ontario—Cognos Incorporated recently announced two additional products for users of Data General Eclipse MV mid-range systems: the 20/20 Database Connection to Cognos Inc.'s Powerhouse fourth-generation language (4GL) application development environment, and a new version of the Powerhouse PC

All Texas Data General users are invited to participate in NADGUG's newest regional interest group — the Central Texas Data General Users Group. Find out for yourself the advantages of belonging to a local users group. You'll meet a network of people with whom you can exchange information, advice and concerns about using your Data General computer. You'll be able to attend meetings concerning DG specific subjects and take part in periodic workshops.

The Central Texas Data General Regional Interest Group is currently planning upcoming meetings. Officers are contacting current members and other DG users in the area to find out what concerns and interests should be discussed at future meetings. Details for upcoming activities will be announced soon. If you would like to add your thoughts to the planning, or would like more information, contact one of the following officers, Mike Leathers **512/835-0143**, Cindy Muerer **512/343-5555**, or Sydney Bond, **512/345-7500**.

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Circle 68 on reader service card.

that supports local area networks and provides host communications for the Data General environment.

The 20/20 Database Connection is now available through a technology partnership with Access Technology, Inc., and provides a seamless bridge between 20/20 (an integrated spreadsheet package for multiuser computers), and Powerhouse 4GL. The 20/20 Database Connection allows Data General users to quickly and easily retrieve information from a Powerhouse application and directly import it into a 20/20 spreadsheet for analysis and reporting.

The new version of Powerhouse PC provides source file and data file transfer between PCs and mid-range computers. Powerhouse PC currently runs on networks supporting OS/2 LAN Manager from Microsoft and MS-DOS-based PC LANs from Novell, 3COM, Ungermann-Bass, Banyan, and the IBM Token-Ring-based products. Powerhouse PC also supports PC*I architecture and Data General's Personal Computing Integration suite of products.

Cognos Inc. also announced Version 5.05 of the Powerhouse 4GL for Data General's Eclipse MV family. The new version provides DG/SQL users with an estimated 20 percent performance increase over Powerhouse 5.00. It also provides enhanced connectivity through integration with Powerhouse PC, full support for the file system of Data General's ICobol language, and improved integration with DG's office automation software, CEO.

Cognos Incorporated, 3755 Riverside Dr., Ottawa, Ontario, K1G 3Z4; 613/738-1440. Δ
Circle 80 on reader service card

Data Bank Associates releases Turbotran for Desktops

Germantown, MD—Data Bank Associates' Turbotran Xmodem/Ymodem file transfer protocol is now available for DG Desktop and 16-bit Eclipse users. Although DBA's 16-bit version will operate only in an AOS environment, it will support multiple file transfers, Ymodem, as well as Xmodem, and speeds up to 9,600 baud without noticeable degradation.

DBA's connectivity of AOS and AOS

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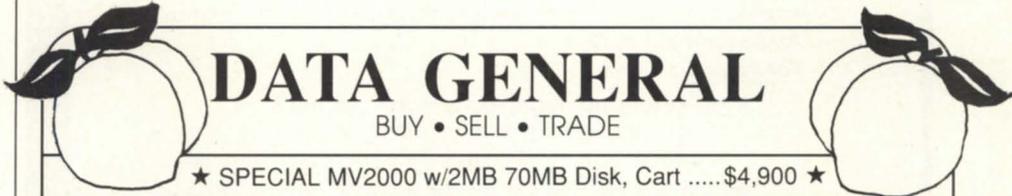
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Dasher D410	325
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4342 AT116	390
4206 MCA	450

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B1000 Data Products	4,500
6194 TP2 Enhanced	950

CONTROLLERS:

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Circle 15 on reader service card.

/VS systems through TurboTran provides a low-cost alternative to organizations that are converting from a 16-bit system to MVs. Similarly, it represents a low-cost means of converting to PC or LAN environments. TurboTran includes special procedures for moving files to the MS-DOS system through DG file templates. (Persoft's Smarterm 400 is required on the PC or LAN.)

TurboTran works with Smarterm 400, Softerm II, PC-Talk, Procomm, ASCII Express, Versaterm, Front End, and any PC communication software that supports the PC standard of Xmodem protocol. Since TurboTran works with any PC package, it is not necessary to purchase additional software for each microcomputer.

TurboTran features include: creation of a permanent trail file, switches to allow

changing to subsequent programs, batch mode for remote retrieval, and automatic truncation of pad characters. When used with Smarterm 400, a simple command on the DG will transfer one or more files automatically.

DBA offers a free trial period during which users may try the product for 30 days with no obligation. TurboTran includes CRC error checking, is fully integrated with CEO, has PC support utilities, includes one-year software subscription and telephone support, and is available for all AOS and AOS/VS systems at \$225 per DG CPU.

Data Bank Associates, Inc., 20010 Century Blvd., Suite 104, Germantown, MD 20874; 301/540-5562. Δ

Circle 81 on reader service card

ANNOUNCING REV 2.00!

We've done it again! Following hot on the heels of our other bestseller, *THE ULTIMATE*, we are pleased to announce the release of *The ULT Routines Library rev 2.00*.

Now containing over 200 assembler routines the *Ult Library* is a must for all **VS Cobol** installations. Combining the speed of Assembler, simplicity of use itself, and plain readability (e.g: CALL ULT.GET.USERNAME, CALL ULT.PULL.DOWN.MENU, CALL ULT.SEND.IPC.MESSAGE) the Library provides all the system calls that will ever be needed in a commercial environment . . . and then adds to this an unparalleled array of features which enable the system designer to specify the most complex systems hand in hand with smooth and highly sophisticated user interfaces, in the knowledge that the programmers will actually relish the chance to use some ULT routines

For instance:

- PC like user interfaces, e.g. pull down menus & windowing, without having to worry about terminal types and building of escape sequences. Just call our routines.
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- And lots more

For more details urgently contact:

North America – DataLynx Inc.
6659 Convoy Court, San Diego, CA 92111 (USA)
Tel: (619) 560-8112

Australia & New Zealand – Mini Computer Systems Pty Ltd.
411 Hawthorn Road, South Caulfield, Victoria 3162 (Australia)
Tel: (03) 528 2711

Otherwise – Le Software Man Ltd.
PO Box 545, London N7 8DF (England) Tel: + 44-1-809-2762

Circle 26 on reader service card.

SCIP announces XTCB distribution box

Beverly Hills, CA—System Controllers and Interface Products (SCIP) has released a new IAC-16 compatible TCB dubbed the XTCB, a form and fit DG TCB (16 channels) that converts the RS-422/20mA IAC-16 outputs into 16 channels of RS-232.

Use can now be made of unused and surplus Data General 5360A, 4368A, and 4370A IAC-16 models by substituting a SCIP XTCB in place of the standard DG TCB/16. Inside the XTCB, circuits convert the signals from the dual 50 connectors to RS-232 signals, and output them via 16 DB25p connectors. The internal and external cabling are standard DG or SCIP.

The XTCB is 100 percent compatible with the Data General, with the exception of the signal conversion. The XTCB /16 is priced at \$675.

SCIP, 449 S. Beverly Dr., #201, Beverly Hills, CA 90212; 213/282-8700. Δ

Circle 86 on reader service card

Compiler creates DG-compatible programs

Louisville, KY—The SMI ICobol Compiler from Software Management is an independent compiler that creates DG compatible object programs (.DD and .PD files) from Cobol source programs. ICobol programmers in any interactive Cobol runtime environment, running under

any operating system, can use it to compile and execute programs completely within the runtime system.

The multiuser compiler, written in ICobol, can execute on any or all terminals on a system. Extra features include: screen enhancements to take advantage of underline and reverse video attributes, and procedure division enhancements, such as an ENDIF verb. Other ICobol productivity tools include a word processor and spreadsheet.

Software Management, 1101 Embassy Square Blvd., Louisville, KY 40299: 502/499-6557. Δ

Circle 88 on reader service card

Portable FAX/modem fits in pocket

Northport, NY—Touchbase Systems, Inc., has released the Worldport 2496, a 9,600 bps facsimile (FAX) modem and full-featured 2,400 bps data modem in a single package. The unit is designed for PC-compatible portable and laptop computers, but can also be used with desktop computers.

The Worldport 2496 has two standard RJ11 telephone jacks for direct connection, and a unique interface for acoustic coupler action. This allows the unit to be used in many situations where direct connection to a phone line is not possible, such as phone booths, hotel rooms, and digital PBX systems. Other key features for portability include a self-contained battery, light weight, and compact size (4.81" x 2.75" x 1").

The unit can automatically detect and route an incoming FAX or data call. Proprietary software allows unattended background operation for sending or receiving FAX transmissions, sending group broadcasts, and integrating full data communications features for the data modem section. The Worldport 2496 is priced at \$699.

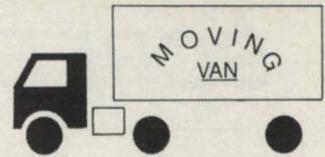
Touchbase Systems, Inc., 160 Laurel Ave., Northport, NY 11768; 516/261-0423. Δ

Circle 90 on reader service card

SYSTAT, Inc. available on DG minicomputers

Evanston, IL—SYSTAT, Inc., has announced that both SYSTAT Version 4.0 and the new SYSGRAPH software packages are available for Data General minicomputers.

New SIGs on the block!



Special interest groups bring together DG users who share interests in common products, technologies, or applications. SIGs communicate through meetings at NADGUG conferences, newsletters, and periodic workshops.

NADGUG welcomes two new SIGs — SMBasic and CQCS. SMBasic is organized for DG shops using SMBasic to share information and ideas on the best use of this computer language. The CQCS SIG is organized to make the most efficient use of the fourth generation language, CQCS, on Data General machines. Membership in one of these groups places your name on the mailing list, enables you to attend meetings, and introduces you to a network of users who are available to share concerns about SMBasic or CQCS issues.

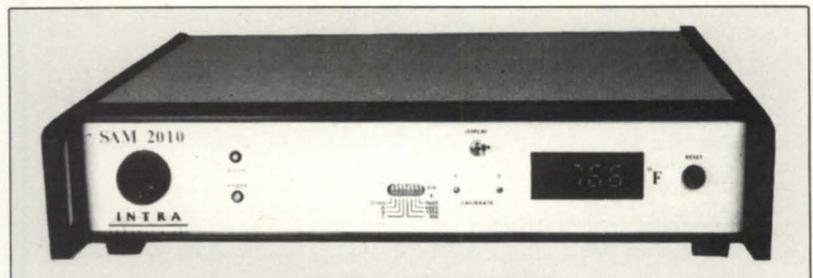
Special interest groups connect users who are concerned about the same things. SMBasic enthusiasts should contact Ken Smith, McGean-Rohco, Inc. 1250 Terminal Tower, 50 Public Square, Cleveland OH 44113; 216/621-6425.

CQCS advocates can receive information from Ray Walther, AIM Management Group, Inc., 11 Greenway Plaza, Suite 1919, Houston TX 77046; 713/626-1919.

Circle 61 on reader service card.

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New features include:

- View screens of programs running on other terminals
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- Remote termination with orderly shutdown
- WP Library and CEO interfaces
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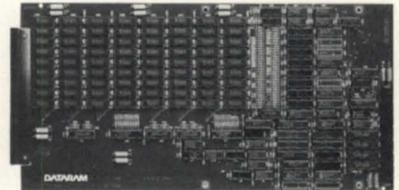
SYSTAT Version 4.0 is a comprehensive statistical and data management package. The command-driven system offers univariate and multivariate statistics, cluster analysis, factor analysis, multi-dimensional scaling, nonlinear estimation, and time-series analysis. A macro facility allows users to design their own front-ends and menus for frequently executed or complex programs. SYSTAT Version 4.0 provides spreadsheet-style data entry and editing, and a text editor for output and batch files.

SYSGRAPH produces high resolution statistical and scientific graphs. Users may draw maps, two- and three-dimensional graphs, and several kinds of scientific plots.

SYSTAT, Inc., 1800 Sherman Ave., Evanston, IL 60201; 312/864-5670. Δ

Circle 89 on reader service card

DR-1420 offers more memory for MV/1400s and MV/2000s



Princeton, NJ—Users of Data General's MV/1400 and MV/2000 series can boost memory capacity up to 12 MB, improve response time, and run more applications with the new DR-1420 memory module from Dataram Corporation.

Dataram's DR-1420 module is available in both 8 MB and 4 MB capacities for convenient upgrading, and it uses 1 MB DIP DRAMs. Both capacities are fully compatible with DG's MV/1400 DC and MV/2000 DC processors as well as the DS/7500 Workstation.

Dataram's board offers easy installation, without hardware or software changes, and requires no maintenance. It comes with Dataram's Lifetime Warranty and is supported by the company's Ex-

press Spares program.

Dataram Corporation, P.O. Box 7528, Princeton, NJ 08543-7528; 1-800/822-0071 or 609/799-0071 (in New Jersey). Δ

Circle 85 on reader service card

MV/1000 DC is lowest priced member of MV family computers

Westboro—Data General has introduced the Eclipse MV/1000 DC, the lowest-priced, 32-bit computer system ever offered by the company. It reduces by up to 34 percent the cost of entry into MV family computing.

With DG's Personal Computer*Integration (PC*I) proprietary LAN software, the MV/1000 DC can be configured as a low-end file server in a LAN-server environment. Operating systems for the MV/1000 include AOS/VS, AOS/VS II and DG/UX. DG/RDOS is available for customers wishing to upgrade from Desktop Generation products to 32-

bit systems.

On a single printed circuit board, the MV/1000 DC features a CMOS gate-array, 32-bit CPU, a floating point unit, and 4 MB of memory. The board also features Winchester disk, floppy diskette, and cartridge tape interfaces, two RS-232 modem control ports, eight RS-232/RS-422 selectable ports, and a parallel printer port.

The price for an MV/1000 DC system with 4 MB of memory, 38-MB Winchester disk drive, and 737-KB diskette is \$8,150. The MV/1000 is available 30 days after receipt of order.

Data General, 3400 Computer Dr., Westboro, MA 01580; 508/898-4051. Δ

Circle 83 on reader service card

SAS announces new releases for DG

Cary, NC—With performance improvements, two additional products, and several new features, Release 5.18 of the SAS

System is now available for AOS/VS operating systems.

The two new products are SAS/QC and SAS/IML software. SAS/QC, a statistical quality control tool, provides users with a way to analyze variations in mass-produced items. SAS/IML software is an interactive matrix programming language for sophisticated data analysis and manipulation. Formulas used by programmers, statisticians, mathematicians and researchers can be transcribed directly from matrix algebra notation to SAS/IML statements.

Release 5.18 also features device drivers for Adobe System Inc.'s Postscript printers, type fonts from Bitstream Inc., and the SAS host-to-host link, which allows communication with a SAS session on a personal computer.

The SAS system under AOS/VS is an integrated software system for data management, analysis, and presentation.

SAS Institute, Inc., SAS Circle, Box 8000, Cary, NC 27512-8000; 919/467-8000. Δ

Circle 87 on reader service card

REEL 9-TRACK GENIUS

Talk to the 9-track tape experts at Overland Data about connecting your PC to the mini/mainframe world. We'll help you decide what you need—before you buy.

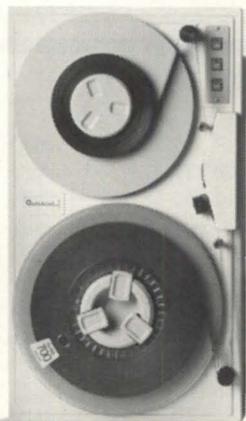
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ON-LINE HELP *Who to call for answers about NADGUG and FOCUS*

NADGUG's electronic bulletin boards

(300 or 1200 baud modem)
 Rational Data Systems415/924-3652
 OIS (to get an OIS ID and password, contact a DG field engineering telemarketing representative)800/325-3065
 In Massachusetts800/952-4300
 In Canada416/823-7830

NADGUG membership, address changes

Suzanne Himes.....800/877-4787
 (Outside the U.S.)512/345-5316

Information on RIGs or SIGs

Cathlene Gentry800/877-4787
 (Outside the U.S.)512/345-5316

Editorial questions, comments, article suggestions

Greg Farman or Robin Perry
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|--|---|

Let the North American Data General Users Group (NADGUG) connect you with other Data General users who have a similar special interest and who want to share information, ideas, problems, and solutions. No matter what the special interest is behind the group — equipment, systems or application software, major language, operating system, industry type — the reason is the same: to work together to exchange ideas on how to get the best performance out of your DG system.

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, Cathlene Gentry, at 800-USR-GRUP for further information.

Data General reported a revenue increase of \$34.1 million, for a total of \$342.7 million, for the second fiscal quarter. Net gain for the period ending March 5 was \$7 million, compared to a \$19.5 million loss in the first quarter. Overall, however, revenue is down from the same period of a year ago, when second quarter earnings were reported at \$19.9 million.

The modest profit for the quarter apparently was a pleasant surprise for industry analysts who had expected a loss. Data General stock posted a one and three quarters point increase on the day the financial statements were announced.

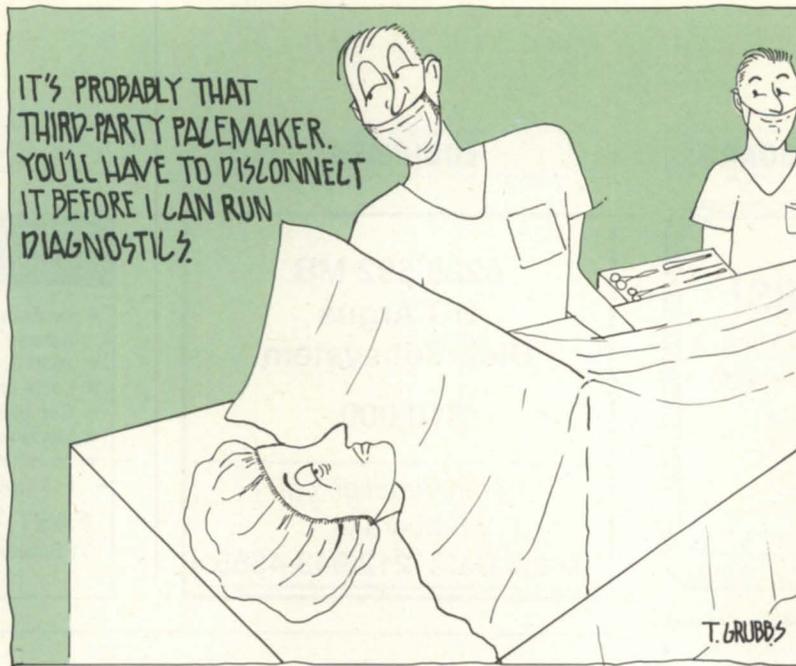
The newly announced MV/1000 DC is essentially a re-designed MV/1400. One of the engineering challenges for the job was to fit it into a package that looks like a PC.

An estimated \$100 savings per board was realized by maintaining the system board at six layers, although there was a potential for as many as eight layers.

The announcement of the MV/1000 DC is accompanied by an aggressive program to encourage replacement of older 16-bit systems. The program includes free software license upgrades, and discounts on AOS and AOS/VS courses.

Data General's group manager of software, **Chris Stone**, was named executive director of the newly formed Object Management Group. The international organization is devoted to making computer systems and software from different manufacturers work and communicate together efficiently. The group is made up of 10 leading companies including American Airlines and Hewlett-Packard.

Jet-setter. The Aviiion AVX 300 (a.k.a. the Maverick) made a guest appearance



at the April meeting of **Hounix**, an association of Unix users from the Houston area. The prototype took the southern detour after making an appearance at the Comdex show in Chicago. It was supposed to arrive on a Monday so local technicians could tune it up for the Tuesday evening meeting. However, it was held up by the shipping company and did not arrive until Tuesday afternoon. DG Houston representatives worked expeditiously to get the machine to the meeting on time, and had only a few minutes to hook it up, wipe off the fingerprints, and start the graphics programs. It all went off without a hitch.

The same machine has traveled to shows all over the country, and to Canada and Europe with no problems, said **Mike Fowler**, manager of system software product marketing for Data General.

Employees of the **Special Systems Group** in Southboro coordinated the design of a sensitive materials tracking device for the United States government. The new system, named **Starbase**, tracks the transportation of sensitive materials within the United States to make sure that they have not gone off-course, been stolen, or hijacked. The operator of the system will have access to maps that track a truck's position to within 100 yards at all times. It takes in account all aspects of travel, including the terrain, elevation,

road changes, and weather conditions. A Starbase operator can view eight touch-sensitive display monitors at one time. Activity is monitored on an MV/20000 processor.

The Starbase was ordered by **Sandia National Laboratories** in Albuquerque, New Mexico. Employees there are responsible for national security programs in defense and energy, with primary emphasis on nuclear weapon research and development.

Viking Software Services of Tulsa, OK, has signed an independent software vendor agreement with **Data General**. Viking offers a high-speed data entry package that can be used in state/local governments and federal departments.

To CIR, with love. **Citicorp Information Resources (CIR)** as been accepted into the **Data General** Authorized System Distribution (ASD) Program. ASD is a cooperative marketing program provided for DG value-added resellers (VARs) who meet a specified set of business, marketing, and sales criteria.

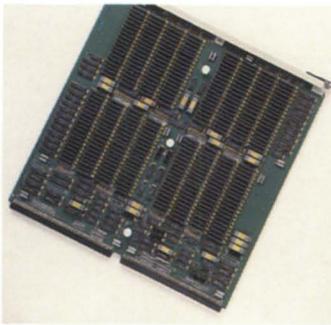
Stephen Baxter, a 16-year veteran of Unisys Corp., was named vice president of marketing following the April resignation of **Ward MacKenzie**. Baxter was most recently vice president of product marketing for Unisys' U.S. Information Systems Groups.

MacKenzie, who is credited with building DG's Value-Added Reseller (VAR) channels, had been with the company since 1987. He will continue to work with DG as a consultant.

For a complete picture of the new faces and changes in Data General's corporate organization, see the chart on page 74. Δ

Memory Boards for MV/15000, MV/20000 Computers

Dataram DR-1520 memory comes in 8, 16 or 32MB board capacities. The add-in memory uses 1Mb RAM technology to upgrade processor performance, and does not affect DG service arrangements. Boards are user installable, have Enable/Disable switch and LED indicators.

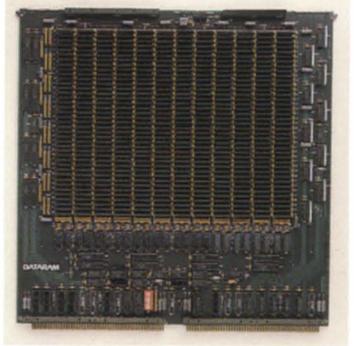


Dataram Corp. Phone 1-800-822-0071 (NJ 609-799-0071).

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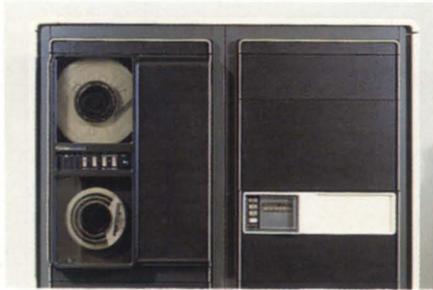
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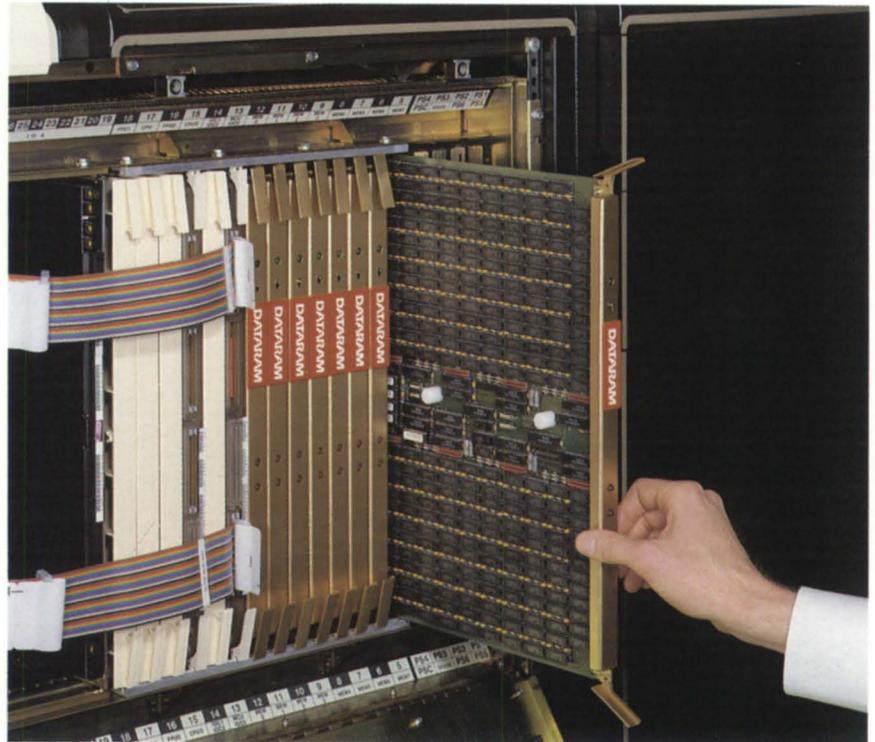
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Main Memory Upgrade for MV/4000 and MV/10000

DR-280 series memory offers a choice of 2, 4 or 8 MB of main memory per board. The DR-280 operates with highest reliability DRAM technology and can be installed in minutes — without hardware or software changes. **Dataram Corp. Phone 1-800-822-0071 (NJ 609-799-0071).**

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Up to 16MB Extra Main Memory for MV/2500 Series

Dataram's DR-2500 memory boards, available in 8MB and 16MB capacities to improve processor speed and power, are fully compatible with hardware and software for DG's MV/2500. The plug-in memory needs no maintenance, has a lifetime warranty, and is available on a 30-day trial basis. **Dataram Corp. Phone 1-800-822-0071 (NJ 609-799-0071).**

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