

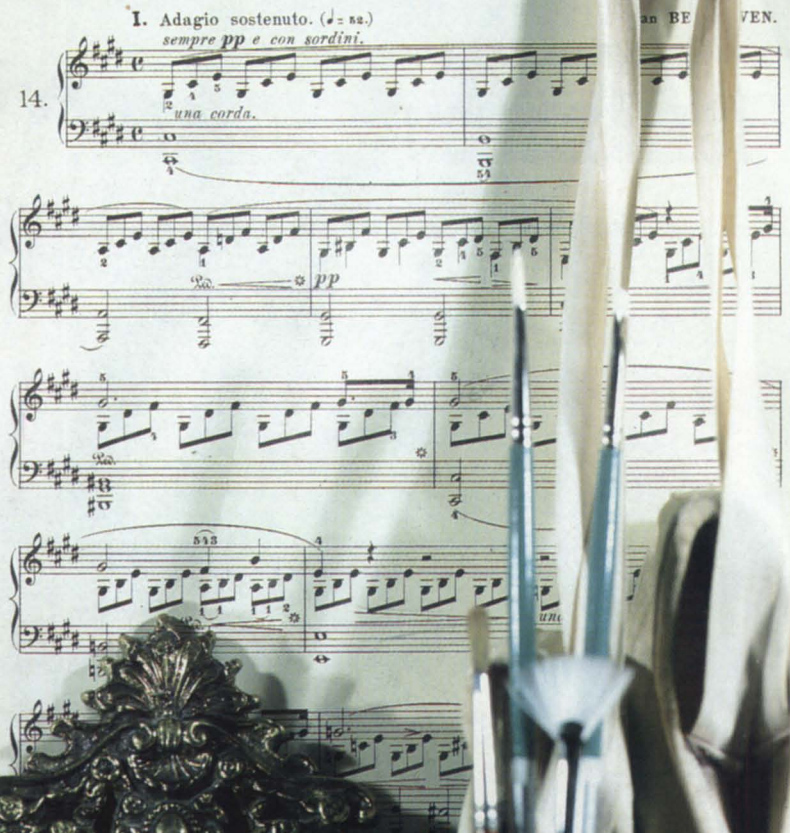
FOCUS

The Magazine of the North American
Data General Users Group

November 1986



Donata quasi Fantasia
(MOONLIGHT)
Op. 27, No. 2
To Countess JULIA GUICCIARDI.
Abbreviations: M. T. signifies Main Theme; S. T., Sub-Theme; Cl. T., Closing 1
group; R., Return; Tr., Transition; Md. T., Mid-Theme; Ep., Episode.



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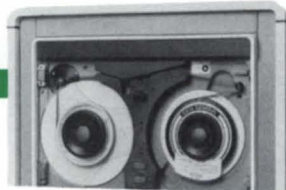
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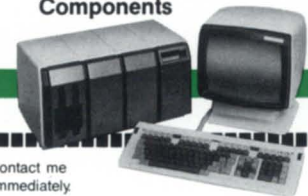
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This month's special concerns the part Data General plays in the arts and humanities. The photo above, courtesy of the Library of Congress, shows their magnetic tape archives.

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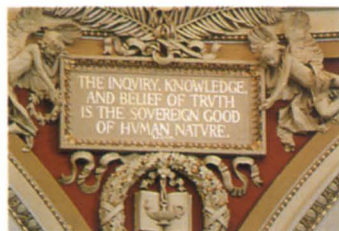
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About this month's cover: We give special thanks to the staff at the Paramount Theatre, Austin, Texas, for the use of their program; the Austin History Center, Austin, Texas, Public Library, for the historical photos in the antique frame as well as throughout the cover articles; and especially Mr. Denton of Ginny's Copying Service Inc., Austin, Texas, for his help in the photo reproduction of the artwork. The photo inside the terminal is courtesy of the Library of Congress.

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ment and school accounts.

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government and school accounts. And, if you purchase *WordPerfect*, *MathPlan*, and *WordPerfect Library* at the same time, you can save 10% on the total price.

WordPerfect version 4.1 for the Data General One has been renamed *WordPerfect 4.1 for 3 1/2" Media*.

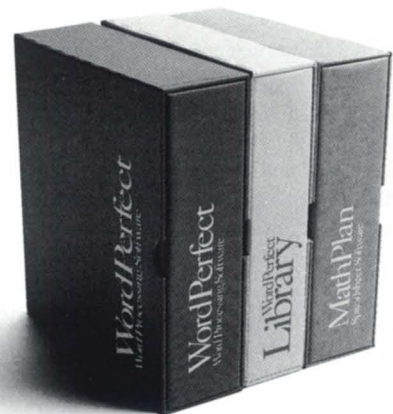
The program runs on the Data General One, the Data General Dasher One, and the IBM PC

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The new AOS/VS library addresses the specific needs of DG system users and is *substantially* different from the PC version, in both price and features. *WordPerfect Library* for the DG includes electronic mail, a calendar and scheduler, a phone message system, and a shell menu which allows easy access to different programs.

The entire library is written in assembly language, providing substantial performance improvements over similar programs offered by the hardware manufacturer.

Check out the price

The price for *WordPerfect Library* is \$2,000 for the MV/2000DC and the MV/4000DC, \$4,000 for the MV/4000-MV/8000, \$5,000 for the MV/10000, and \$6,500 for the MV/20000. Discounts are available for subsequent licenses, and for govern-

ment and school accounts.

MathPlan® 2.11 and Trendview™

But the library isn't the only new item on the shelf. *WordPerfect's* spreadsheet software, *MathPlan*, has now been enhanced considerably, and will integrate with *Trendview*, Data General's graphics package. With *MathPlan 2.11*, *Trendview*, and the appropriate terminal, you can create pie charts, color and shaded graphs, etc.

Pricing for version 2.11 is \$1,200 for the MV/2000DC and MV/4000DC, \$2,000 for the MV/4000-MV/8000, \$3,000 for the MV/10000, and \$4,000 for the MV/20000.

WordPerfect news

The price for *WordPerfect* on AOS/VS systems has been adjusted slightly: \$2,000 for MV/2000DC and MV/4000DC, \$4,000 for MV/4000-MV/8000, \$5,000 for MV/10000, and \$6,500 for MV/20000.

Discounts are available for subsequent licenses, and for

The finer things

This month's special on the humanities presented an interesting challenge to the staff. The topic appealed to us, but as the deadline approached, we found only a few installations using DG computers in the arts and humanities. Yet we knew the DG user community was filled with creative types. Where were they?

The idea for the special goes back to November of 1985, when Data General introduced the MV/20000 and MV/2000 at a press conference in New York. It was a unique choice of settings: the auction gallery at Christie's, a firm known worldwide for its auctions of fine works of art and expensive collectibles. The new hardware got most of the attention, but there was an interesting footnote: Christie's had placed a first-day order for three MV/20000s.

Back in the office, we began reflecting on the many NADGUG members we had met over the past several years whose private pursuits included music, dance, the fine arts, history, and so on. We decided to find out more about how DG systems are being used to support "the finer things"—people's creative and reflective pursuits.

Easier said than done. We had to work harder to get our interviews, and in the end, we simply didn't find as many DG systems and users doing work in the arts and humanities as we would have liked. Nonetheless, what we found was interesting on at least two counts. The applications themselves piqued our curiosity, but probably more importantly, they pointed out the strengths of DG systems—as well as areas in which new tools will have to be developed before DG can play a bigger role in the field.

The users we talked to were unanimous in reporting that DG provides an excellent combination of price and performance, good service, and solid tools for managing and analyzing data. So why was it hard to find people doing humanities projects on DG systems? Apparently, it's partly a matter of opportunity. Specialists in the humanities tend to use whatever systems have been available to them—which most often means IBM or DEC. However, there also appears to be a lack of specialized hardware and software to perform specialized tasks—such as interfacing to an MIDI (Musical Instrument Digital Interface) sequencer.

A familiar tyranny of numbers applies here. Product developers dream of hitting the

home run—they measure their chances and direct their resources toward the largest installed bases. The result is that users of IBM or DEC machines have had the benefit of the efforts of more developers, and have usually enjoyed a wider selection of specialized products.

At least that's the conventional wisdom. Current economic conditions would support a different strategy, however. The continuing malaise in the computer industry has dampened the enthusiasm of venture capitalists for computer-related projects, thus making it harder for developers to bring products to the mass markets. Developing products for special needs within the DG community should be correspondingly more attractive. Smart developers with limited resources will improve their chances by identifying a need in a limited area, developing a quality product, and then, after gaining a foothold, extending the product into new areas.

There is no shortage of smart, creative people in the DG community, and there will never be a better time for them to turn their energies toward developing tools for people with special needs—artists and scholars, for example. Since Data General has targeted schools and universities as one of the vertical markets to get special attention during the next few years, there is also the potential for a special partnership between DG and developers of products for this market.

In any case, we have a strong suspicion that there is more to tell about DG users and the humanities than we were able to uncover for this month's special. If you can provide any hints on who to talk to and where to look, we'd love to start work on the sequel. Δ
—G.F.

Errata

The caption on page 10 of the October issue incorrectly identified Charlene Kirian. She is the chairwoman of *OASIS*, the Office Automation Special Interest Subcommittee.

In Richard's Ernst's article "Interchangeable Parts" for the October special, an error occurred on page 14: "file maintenance system" should have been "flexible manufacturing schedule."

An errant dollar sign in John Grant's October column (page 34) might have confused some readers. We are blaming "?\$GTMES" on a combination of modem communications and editorial fallibility.

FOCUS

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A generation ahead in RIG support

by Paul Duck
Special to Focus

I would like to share an experience that is an example of how a Regional Interest Group *should* be dealt with by Data General.

As well as being the chairman of the RIG/SIG committee for NADGUG, I am the president of the Ohio MV Users Group. Thus I can identify with the miscellaneous problems that crop up in the course of leading a RIG or a SIG.

The topic for the September meeting of the Ohio MV Users Group was data communications. Two speakers were scheduled: representatives from a major PBX manufacturer and a major data communications products manufacturer. The gentleman from the communications products company was calling me regularly waiting for an opportunity to speak at a meeting. I arranged two months ahead of time for his company to give a presentation.

Two months passed, and it was the day before the meeting. I called all of the scheduled speakers to verify the time, place, etc. But when I called the representative from the communications products company, I was told he was no longer with the company.

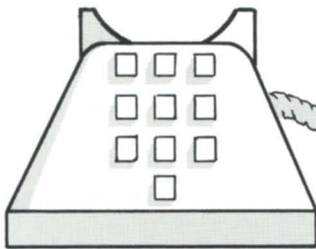
Keep in mind that this happened the day before the meeting. Normally this would be enough to make a RIG president slash his wrists, but in my particular case, I wasn't panic-stricken. Why? Well it's not *just* that I have nerves of steel and ice water in my veins (though of course these qualities are necessary in our line of work).

The real reason I was able to stay reasonably calm was because in Cleveland we can turn to Data General, or more specifically, to Mark Palmer, DG's branch sales manager. Mark's reaction when I called was, "What can we do to help?" He had Pete Dupon, Area 4's communications specialist, fly in from Detroit and give a presentation on Data General communications products. The meet-

ing was a tremendous success thanks to a great deal of cooperation from the local Data General office.

There are a tremendous number of success stories to be told about people and organizations that have done something extraordinary for a RIG or SIG. If you know of someone who should be recognized for their efforts on behalf of a Regional Interest Group, please let us know! We often deal with negative issues, but there are many, many good things to be said, and the RIG/SIG Committee would like to provide recognition for people who deserve it. Δ

If you have an interest in taking a leadership role in your local Data General community by starting a local Regional Interest Group or a Special Interest Group, take the first step by calling either Paul Duck at 216/892-3070, or Barbara Hoogasian at Data General, 617/870-7830.



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- (300 or 1200 baud modem)
- Rational Data Systems **415/924-3652**
- OIS (to get an OIS ID and password, contact a DG field engineering telemarketing representative) **800/325-3065**
- In Massachusetts **800/952-4300**
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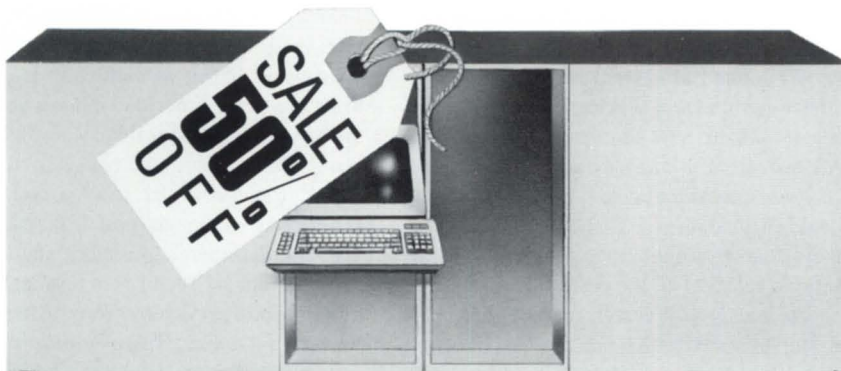
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Do it yourself

Buying a few extra terminals can save a lot on maintenance

by Kirk Honold
Special to Focus

Sage Foods, a distributor of food products to the airlines industry, has seen its sales expand from \$65 million in 1981 to \$110 million in 1986. Over the same period, the employee base has grown from 85 to more than 200.

Our DP staff has grown just as quickly, moving from two MIS consultants to an in-house MIS department with five full-time employees.

In 1981 we had a one-half meg Eclipse C/150 with 10 terminals and eight printers. We are still a small shop, but we now have a 10 MB MV/8000 and a 12 MB MV/10000 supporting more than 100 terminals and more than 40 printers at 10 locations throughout the country.

Back in 1981, we had on-site terminal maintenance from Data General for all of our Dasher D3 terminals. We paid approximately \$30 each, totaling \$300 a month or \$3,600 annually. The employees accepted the new computer slowly at first, but after a few successes, the demand for terminals grew: by the end of 1982, we had 24 terminals and eight printers hung onto a 1 MB Eclipse C/150. Our maintenance cost for the terminals also grew, from \$300 a month to \$720 a month—prompting us to review alternatives for maintaining our terminals.

In our initial study, we defined some simple requirements. First, we could not afford to have a terminal down for more than 24 hours. On the average, most employees were using their terminals approximately 50 percent of the time, so if a terminal went down, employees could share a terminal for the 24-hour period.

Secondly, we wanted to be sure that if we chose to go with a third-party on-site maintenance, the service company would be available at all of our locations throughout the country.

Lastly, the expenses for repairs should not exceed the cost of the on-site maintenance contract we had at that time. Basically, we

wanted to find a way of keeping terminal maintenance costs down, especially since we expected our demand for terminals to triple within the next few years.

We looked at several alternatives. The first was to have a service company do the repairs on-site on a time and material (T & M) contract. This method didn't meet our time requirements since most service companies couldn't guarantee a 24-hour turnaround—they usually assign low priority to T & M service calls. Also, the cost of travel for the engineer and repair costs were quite high. For example, our Atlanta branch was hit by lightning last year, blowing out three of our D200 terminals. Since insurance would cover the cost of repairs, we called the local Data General Service to repair the units. The DG engineer came out to the branch office and

locations. Also, the savings for us would have been minimal.

The last alternative we looked at (and finally selected) was self-maintenance. The term "self-maintenance" really doesn't reflect what we do, in that we didn't hire an engineer to do the repairs, nor do we have anyone in the company to do them. Basically, all we did was purchase spare units—usually used terminals from wholesalers at a low cost (the last D200 units we bought cost \$300 each). We keep them available to replace any terminal that goes down. The broken terminal is then sent to a local service company. After repairs we return it to our "spare" stock. The average charges for repairing the terminals have been between \$50 and \$100, plus freight (UPS Next Day Air), which is between zero and \$80. The ones with no freight cost are the 30 or so local terminals.

Figure 1: On-site Maintenance versus Self-Maintenance Costs

Assumptions:

Monthly On-site Maintenance Charge: \$25 per terminal
Charges for repairs and freight: \$180 per incident
Repair incident to terminal ratio: 2% or 1 for 50 per month
Cost of spare terminal: \$500 each
Terminals to spare ratio: 1 for 8

Accumulated Cost by Month:

Months	25 terminals		50 terminals		100 terminals	
	on-site	T&M	on-site	T&M	on-site	T&M
1	625	1,500*	1,250	3,180*	2,500	6,360*
2	1,250	1,680	2,500	3,360	5,000	7,720
3	1,875	1,680	3,750	3,540	7,500	8,080
4	2,500	1,860	5,000	3,720	10,000	8,440
5	3,125	1,860	6,250	3,900	12,500	8,800
6	3,750	2,040	7,500	4,080	15,000	9,160
7	4,375	2,040	8,750	4,260	17,500	9,520
8	5,000	2,220	10,000	4,440	20,000	9,880
9	5,625	2,220	11,250	4,620	22,500	10,240
10	6,250	2,400	12,500	4,800	25,000	10,600
11	6,875	2,400	13,750	4,980	27,500	10,960
12	7,500	2,580	15,000	5,160	30,000	11,320
Net Savings:	4,920		9,840		18,680	

*Includes cost of spare terminals

replaced the single board on each of the damaged terminals. The total charge for this was \$2,700.

Another alternative was to find a third-party service company that would take the terminals on an on-site terminal maintenance contract at a lower cost than Data General. We found several service companies that serviced DG terminals at a lower cost, but they didn't have service locations in all of our 10

By now, you're probably wondering where the "savings" is in self-maintenance. It's simple. It's in the numbers. As I stated earlier, we have more than 100 terminals company-wide, and on an average, we have two terminals a month go down. Looking over our repair log for the last 12 months, we had 20 units that needed repairs. So, taking the worst case scenario, this is how it works out.

First, let's assume an average of \$25 a

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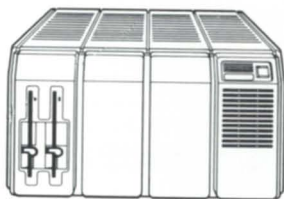
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month for an on-site terminal maintenance contract from Data General. Taking my 100 terminals times the \$25, my cost would then be \$2,500 a month, or \$30,000 annually.

Now, using our "self-maintenance" approach, we had to initially lay out \$500 each for six "spare" units, for a total of \$3,000. Taking the average number of terminals going down for the last year (two per month), and using the worst case for repairs and freight charges (\$180 per incident), the first month cost would be \$3,360. Add charges of \$360 per month for the next 11 months, for a first-year total of \$7,320—a net savings of \$22,680. Our actual expenditures for terminal maintenance, including repairs and freight charges, for the last 12 months was \$1,546 (the "spares" were bought three years ago).

Figure 1 shows how the cost of self-maintenance would compare with on-site maintenance contract charges for different

numbers of terminals.

Based on the total number of terminals you have, and how many "spare" terminals you need to purchase, the savings will vary, but in almost all cases, savings can be made by going to a "self-maintenance" approach.

To evaluate self-maintenance for your own site, you should review your incident reports for the last 12 months and compute what you could have saved.

$$\text{Savings} = ((\text{NT} * \text{MC}) * 12) - ((\text{SP} * (\text{NT} / \text{SR})) + ((\text{NI} * \text{CI}) * 12))$$

Where:

- NT = Total number of terminals
- MC = Monthly charge per terminal for on-site maintenance
- SP = Cost of a spare terminal
- SR = Spare-to-terminal ratio
- NI = Number of incidents per month
- CI = Cost per incident (repair and freight, if any)

Our actual expenditure for terminal maintenance for the last 12 months was \$1,546

The decision to go this route had to be planned carefully. We had to find a reliable local service company. In addition, we had to have the support of our management and users, as well as the manpower to monitor the program. It's not for everyone, and it could be a problem for some. But if you're trying to cut costs, this is an alternative.

Today, with the lower cost of buying terminals, whether new or used, the initial outlay for "spare" units is minimal compared to the savings that you'll have over the next year and beyond. And just think of all the other equipment you could buy with your savings. Δ

Kirk Honold has served in a variety of functions for NADGUG. Contact him at Sage Foods, Inc., 999 E. Touhy Ave., Des Plaines, IL 60018; 312/827-0066.

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Recipe for a help desk



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250	CEO users	Several	Backup personnel
2	CEO specialists	450-500	User inquiries per month
2	Telephone lines	1	Hot line to Customer Support Center
Direct	Access to all systems	Full	Management support
Full	CEO manager privileges	Abundant	Patience, understanding
Unlimited	OP privileges (SuperUser access: optional)	1	Bottle of aspirin (optional)
Additional	Extended hours procedure		(Serves 250)

Put the two CEO specialists in a corner of the world by themselves (they don't need any more distractions), and place a telephone on each of their desks. Mix with the patience and understanding required to deal with the user inquiries that will sometimes try their

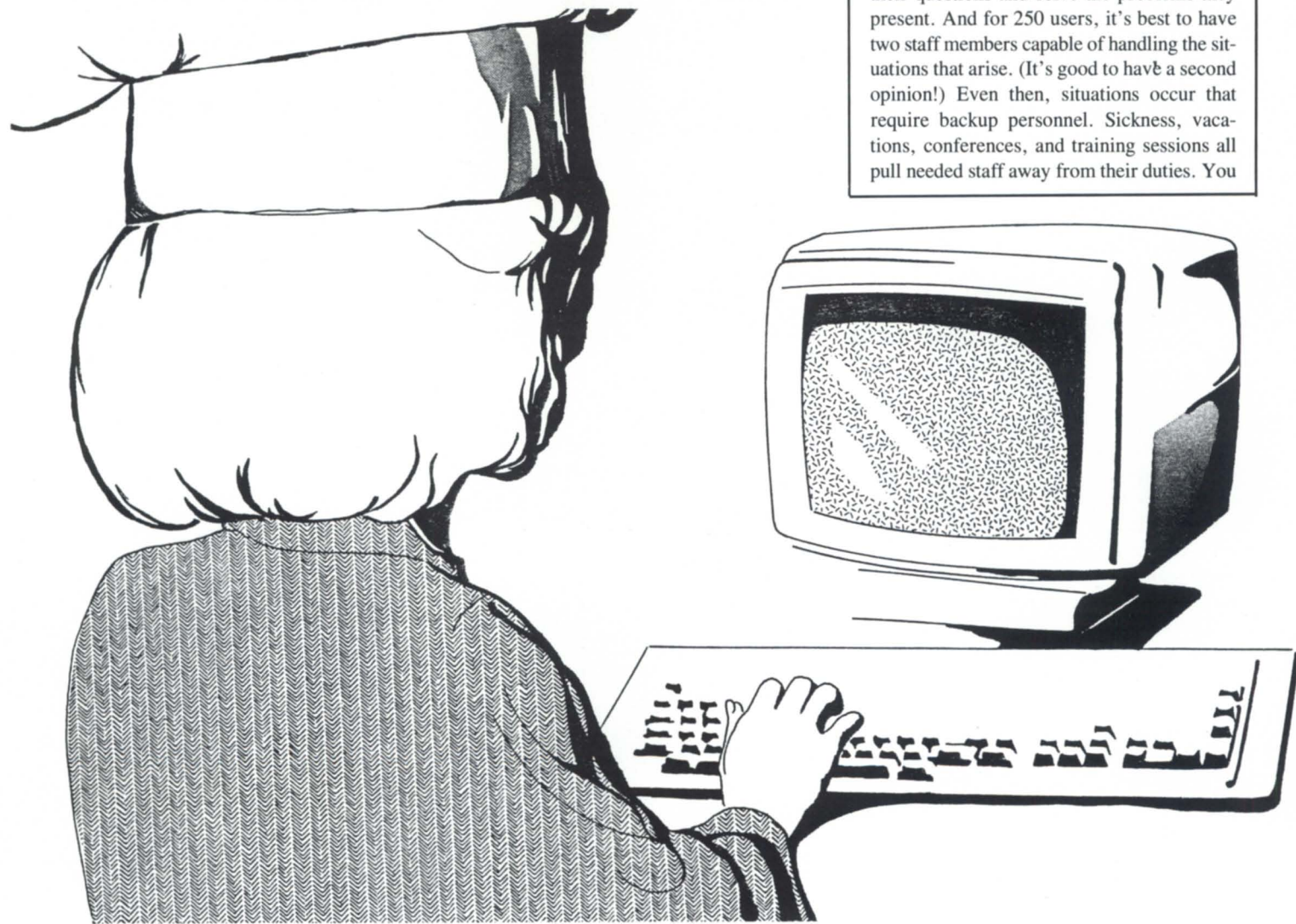
limitations. Add the rest of the ingredients gradually, but continuously. Take the aspirin as needed. Place in an MIS or Information Center for best results, and knead with compassion and support. Evaluate their effectiveness periodically, and shift responsibilities if needed.

by Charlene A. Kirian
Contributing Editor

I know this "recipe" sounds a little farfetched, but I'm trying to make a point. Before you dismiss me as a kitchen crackpot, let me expand on a few of the instructions.

An appropriately managed help desk requires expert knowledge of the products it supports. Of course, it takes time to acquire that knowledge, but the staff managing this resource should be the most knowledgeable people at their installation. If they're not, credibility can be lost forever.

Users depend on the help desk to answer their questions and solve the problems they present. And for 250 users, it's best to have two staff members capable of handling the situations that arise. (It's good to have a second opinion!) Even then, situations occur that require backup personnel. Sickness, vacations, conferences, and training sessions all pull needed staff away from their duties. You



Whether it means staff must carry a beeper around after normal work hours, or someone must be on-site for those before-and after-hours people, a procedure must be established

need to always have someone trained to step in during an emergency.

At times, however, even the most knowledgeable person needs to rely on someone else. That's where the Customer Support Center comes in. They have the expertise and resources to get you the answers. It's not always what you want to hear—so tell them! You have the option of not accepting an answer they give you. If you don't like it, they are required to escalate the problem to a higher level.

It's necessary for the help desk to have access to all systems. Some installations even opt to equip the help desk with terminals for each system. If that is inconceivable in your environment, have a simple macro designed to get you from one system to another if they are networked. It will save a lot of time.

CEO manager privileges within CEO are a must. This is where all definitions of printers, user profiles, and the user directory are kept. To effectively control what exists, these privileges should only be given to one source—the help desk. It may take two people to handle all the functions available, but with more staff having those privileges, management can be a nightmare. Even with these functions available, there are other things that require AOS/VS control. With "change username" and "OP" privileges in CLI, the help desk can also check most CEO system problems or concerns.

It's been a big debate in our CEO workshops whether or not a CEO manager should have superuser privileges. The concerns are with system security. With superuser, a user can violate any and all security. A simple command or key error could delete the entire system. Another concern is with the management of files in the data base. With more than one user having the super privileges, data base files can become a nightmare.

However, without superuser privileges, a CEO manager must take several extra steps to accomplish even simple tasks. For example, to replace a calendar or reminder file in another user's account, the manager needs to become CEO_MGR, change directories to :CEO_FILES:CEO_CALENDARS, move the owner's calendar to a SAVE directory for backup purposes, become OP, change direc-

tories to :CEO_FILES:CEO_CALENDARS again, delete the old calendar, copy

from a blank calendar, and change the access control lists (ACL) for that particular user.



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*It's been a big debate
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Superuser privileges bypass all these extra steps. CEO managers can't even look up one of their users' passwords without superuser privileges or without bothering one of the technical staff for the information.

This has to be a management decision within your own installation, however. If you can't get special privileges, you'll have to learn to work your way around the obstacles using other avenues. Whatever the decision, DG needs to look at the way CEO manager privileges are addressed in CEO. If more could be done within CEO, then this would not be an issue.

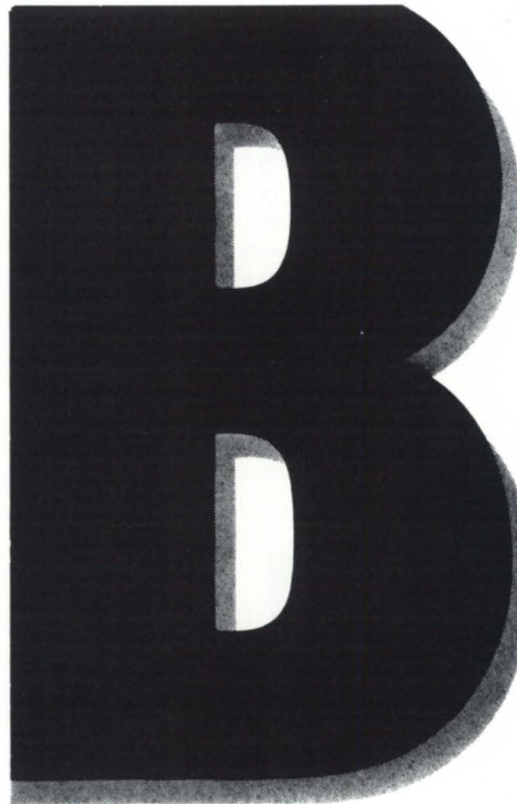
In regard to after-hours coverage, how long are you responsible for users' concerns—just for the hours that you are on duty? What about those die-hards that come in before dawn and don't leave until late at night? How do you offer them support? Or do you? The answer has to be yes—they require support, too. But how it's accomplished varies from company to company. Whether it means staff must carry a beeper around after normal work hours, or someone must be on-site for those before- and after-hours people, a procedure must be established so users will know what to expect.

Above all, you must have management support to accomplish your efforts. Management must always be involved with what steps are being taken, what problems arise, and how they must be handled. If they're not, the whole situation can backfire on you, and you may never be able to recover. They are an integral part of the team that will be there to buffer any major concerns that could develop internally or even with Data General.

Help desk personnel are a rare breed. They're the staff that must interface with angry or distraught users. They're the ones who take the bruises when a document is lost. They're also the ones who are commonly blamed when a software bug is found. Users expect the help desk to resolve any situation

they encounter. Lend a sympathetic ear to help desk personnel. They, too, have to need some-

one they can complain to. And keep a bottle of aspirin handy. . . . Δ



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Charlene A. Kirian is OA training specialist for the on-line Computer Library Center, Inc., 6565 Frantz Road, Dublin, OH 43017; 614/764-6435. She also serves as president of NADGUG's OASIS Office Automation Special Interest Subcommittee.

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Sharp start for LA EDGE, other new RIGs and SIGs

Approximately 80 DG users in the Los Angeles area, who call themselves the LA EDGE, got off to a sharp start on September 15 at their first RIG meeting, according to the chapter president, Carolyn Naber, of Creative Data Concepts. The name, which stands for Los Angeles End-Users of Data General Equipment, was conceived by board member Steen Brydum because, "We didn't want anything ending in GUG," says Naber.

The meeting was held at the Brookside Country Club. Football fans may be interested to know that it's located next to the Rose Bowl. Members were treated to a good California white wine and refreshments, as well as a presentation on "Hooking up your PC to your MV" given by Doug Kaye of Rational Data Systems. Although the wine flasks were emptied by 10 pm, a few of the die-hards milled around until later.

The paperwork is already underway for the group's official recognition by NADGUG and should be completed by the next meeting.

For more information write LA EDGE, P.O. Box 50107, Pasadena, CA 91105; or call Carolyn Naber at Creative Data Concepts, 818/244-4634.

Other RIGs and SIGs are springing up around the country following Conference 86. The following new groups have been keeping the NADGUG staff informed of their start-up activities.

- In Dallas, Texas, two different groups of users found they both were working toward the same goal: a regional group to serve the North Texas area. They got together for an organizational meeting, and are now planning to hold regular meetings the second Wednesday of each month. For more information, contact Marco Fehlbaum, Federal National Mortgage Association (Fannie Mae), 13455 Noel Road, Dallas, TX 75240; 214/770-7555.

- Another RIG is forming in Seattle,

Washington. For more information, contact Helen Von Erichsen, c/o Boeing Commercial Airplane Company, P.O. Box 3707, MS 4706, Seattle, WA 98124; 206/655-1566.

- A special interest group for Federal government installations held its organizational meeting at Conference 86, and is now planning follow-up mailings and a newsletter. For more information, contact Milo Naranjo, Director, Division of Information Resources, Department of Labor - OIG, Room 55504, 200 Constitution Ave NW, Washington, DC 20210; 202/523-2813.

The Metropolitan New York RIG has scheduled its next quarterly meeting, to be held at Data General's office in Saddlebrook, NJ (Park 80 West, Plaza One), on Tuesday, December 16. The meeting will be from 9:00 am to 12:00 pm, on the topic, "Auditing and the Computer." If you are planning to attend, or would like more information, contact Stephen Kern at 201/327-6300, ext. 368.

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Registration fee includes snacks and lunch during the two-day workshop, plus reception Thursday night. Attendees should make own arrangements for staying at the Old Mill Inn, Bernardsville, NJ; 201/221-1100. "Beneficial Group" room rate is \$72/single. For more information, call Charlene Kirian, OASIS President, at 614/764-6435.

Conference 86 attendance tops expectations

When the dust had settled and the numbers had been tallied, Conference 86 proved to be the biggest NADGUG annual meeting ever—by a wide margin.

Of course there are many different ways to compare this year's attendance with 1985's. No matter how you figure it, though, there was an increase of at least 12 percent in the number of people attending the conference sessions, and an overall increase of 18 percent.

Strictly speaking, the attendance figures aren't really comparable. The 1985 conference, which was held in Boston, drew many one-day attendees from Data General and other companies located in the area. Conference 86, with its Disney World setting, drew a larger number of spouses and families.

Perhaps the best measure is the total for full conference attendees, which showed an increase of 16 percent. That rate is consistent with the attendance growth over the past few years, but somewhat behind the overall growth in NADGUG membership. As planning for next year's conference gets under way, the meetings committee will have to be prepared for at least that rate of increase.

Conference 86 Event Totals	1986	1985
Full conference		
regular attendees	464	400
executive board	29	20
speakers	45	42
Total full conference:	538	462

One-day attendance		
Tuesday	17	33
Wednesday	7	27
Thursday	1	4
speakers—Tues.	5	13
speakers—Wed.	5	7
speakers—Thurs.	4	7
Total one-day attendees	39	91

Adult social functions	60	30
Exhibitor social functions	39	16
Booth personnel (non-DG)	100	57

Total attendance: 776 656

OASIS schedules third CEO workshop

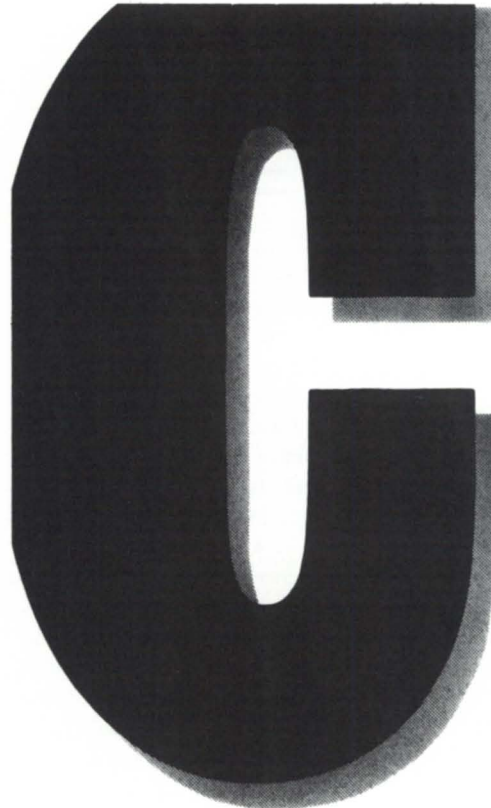
Following impressive successes for its first two CEO workshops, the Office Automation

Special Interest Subcommittee is scheduling a third, this time at the offices of Beneficial Data Processing Corporation in Peapack, New Jersey, December 4 and 5. This time the format will be expanded to fill two days of meetings and cover a wider range of topics.

Topics now planned for the CEO workshop include:

- Getting help from DG's Atlanta Customer Support Center
- Documentation of CEO and other DG products
- A preview of CEO rev 3.0
- A demonstration and overview of the 20/20 spreadsheet from Access Technology

(continued on page 59)



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If all of DG's utilities used a common routine or system call, users would have a common interface they could rely on to report switch errors

Minimally unique switches/Part = 3

Analyzing CLI switches with a single subroutine call

by John A. Grant
Contributing Editor

(Editor's note: the previous two articles in this three-part series presented techniques for designing interactive programs, with special attention to CLI arguments and switches. In this final installment, the author presents a foolproof method of analyzing CLI switches in a single subroutine call.)

/3/A/Why?

It is very important to write application programs and utilities so that their switches and arguments are processed exactly as the CLI does, i.e., with error detection and minimally unique usage permitted. Users have every right to expect a consistent interface, whether they are using the CLI, AOS{/VS} utility programs, third-party software or in-house application programs. Novice users don't understand why they can use minimally unique switches on the CLI but not on a pro-

gram (DG software developers take note!). Unfortunately, once a user has been frustrated by a utility that ignores switch errors, he or she will adopt a policy of always using full switch names for all programs, and possibly even CLI commands. Without knowing which products check for invalid or minimally unique switches, this is perhaps the only alternative.

Let me illustrate with a few examples using some of Data General's own utilities. While the operation of the programs is satisfactory, their handling of switches and arguments could be improved. If they all used a common routine or system call, users would have a common interface that they could rely on to report switch errors. All of the commands shown in Figure 1 contain errors.

As you can see, most of the errors are ignored, and those that are detected are reported with inaccurate error messages. None of these errors should be ignored—and all of them should cause the program to terminate with a more appropriate error message, as indicated in Figure 2.

Note that I am referring primarily to syntax errors in switches, not context errors (such as using DISPLAY/IGNORE on a disk file). Consider the last case: SED/NOFORMFEED.

It is important for this invalid switch to be recognized and reported immediately, followed by program termination. At the moment, SED ignores it, leaving the user to wonder why it still contains form-feeds after editing. This is simply not acceptable for such a utility.

But designing programs to behave as they should isn't a trivial matter. Before I present my current method of analyzing switches and arguments, I'll review some initial attempts so you can better understand what the final solution required.

/3/B/Switches/Early days

The AOS{/VS} ?GTMES system call is the only access to the CLI command line (initial IPC message). It has several modes of operation, and can retrieve and count arguments, as well as test for switches and their values. Although it can test for all single-character switches (i.e., /S/X/L) in a single call, it cannot detect longer switch names at the same time. Knowing what to look for, it can check for the presence of a switch such as /ABC. However, since a separate call to ?GTMES is required for each switch, it cannot detect switch names that are invalid or not minimally unique.

Figure 1:

CLI Command	Error Message	Result
X LABEL	"no such argument"	program aborts
X LABEL @MTBO	"no such argument"	program aborts
X LABEL/XXX @MTBO X	"no such argument"	program aborts
X LABEL/OWNER @MTBO X	none	program continues
X LABEL/UVL @MTBO XYZ	none	program continues
X DISPLAY/FIRST	none	program continues
X DISPLAY/FIRST=XYZ	none	program stops quietly
X DISPLAY/I	"invalid switch /I"	program aborts
X SED/XXX	none	program continues
X SED/NO	none	program continues
X SED/NOFORMFEED	none	program continues

Figure 2:

CLI Command	Error Message
X LABEL	"argument 1 must be the tape name"
X LABEL @MTBO	"argument 2 must be the volume id"
X LABEL/XXX @MTBO X	"unknown switch /XXX, choices are ..."
X LABEL/OWNER @MTBO X	"switch /OWNER requires a value"
X LABEL/UVL @MTBO XYZ	"switch /UVL requires a value"
X DISPLAY/FIRST	"switch /FIRST requires a numeric value"
X DISPLAY/FIRST=XYZ	"switch /FIRST requires a numeric value"
X DISPLAY/I	"switch /I not unique, choices are ..."
X SED/XXX	"unknown switch /XXX, choices are ..."
X SED/NO	"switch /NO not unique, choices are ..."
X SED/NOFORMFEED	"unknown switch /NOFORMFEED, choices ..."

Furthermore, while single-character switches may be adequate for some programs, their use hardly qualifies the program as "user-friendly." The single characters may provide no clues at all about their meanings. For example, if you use /S for a "save" option, then you are forced to use another letter for a "sort" option. A better solution would be to use /SAVE and /SORT.

Fortran 5 has a high-level implementation of some of the basic functions of ?GTMES (COMINIT, COMARG, COMTERM), but it is awkward to use and mirrors all of the disadvantages of ?GTMES. I wrote my own Fortran 5 routines:

```
integer argname(16), name(16), number, i, ier
logical SWITCH, debug
integer NSWITCH, ASWITCH, length, l_name
real RSWITCH, scale
```

```
call GETARG(i,number,argname,ier) ;get
  argument 'i'
if(ier.eq.27) . . . ;eof='no argument'
debug= SWITCH ("debug",i) ;/debug
length=NSWITCH("length",i) ;/length=5
scale= RSWITCH("scale",i) ;/scale=2.54
l_name=ASWITCH("input",i,name)
;/input=xyz
```

Briefly, GETARG retrieves CLI argument "i" as a character string and/or a number; "i" has no sequential access restrictions. SWITCH, NSWITCH, RSWITCH, and ASWITCH check for the presence of the switch name on argument "i," returning logical, integer, floating point, or character values respectively. Further details aren't important; you can probably figure them out by looking at the examples. By the way, I didn't know it at the time, but there is a Unix GETARG routine that is similar to my GETARG (small world).

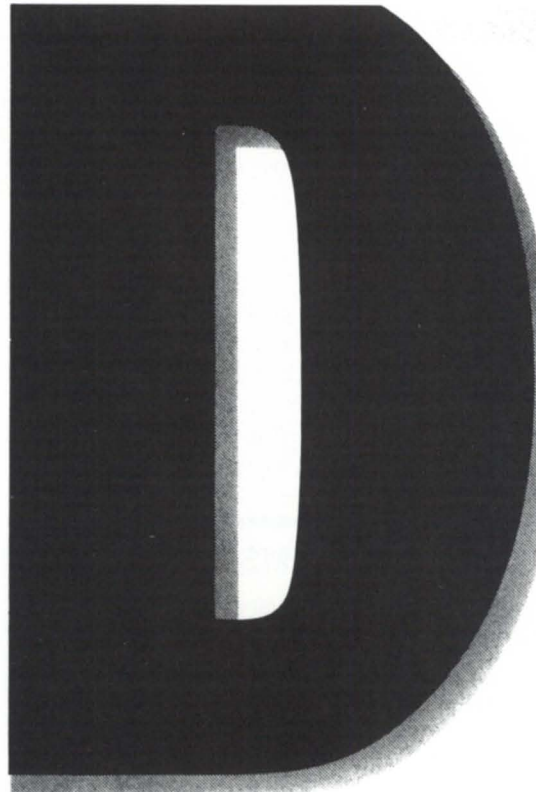
These routines worked well enough, but they couldn't detect invalid or misspelled switches, and I couldn't use minimally unique switches with them. In addition, I would have had to write additional code to check the validity of the switch in the context of its use. (In the example above, perhaps /LENGTH without a value is invalid, but in another program the value may be optional.)

/3/C.1/GET_SWITCHES/Design requirements

I decided I had to come up with a solution that would completely eliminate the limitations of ?GTMES and my previous attempts. In

other words, I wanted a solution that would be able:

- to detect the presence of an invalid switch



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*It is impossible to construct
a single table that
can contain CHARACTER, LOGICAL,
INTEGER, and REAL variables*

name

- to recognize minimally unique switch names and detect the presence of a switch name that isn't minimally unique
- to detect an invalid use of a switch (missing value, wrong type of value)
- to detect errors in the programmer's calling sequence
- to report all of the above errors internally without returning error codes to the programmer
- to provide help or hints to the user by listing the possible switch names and usage in the event an invalid or non-unique switch name is detected.

To meet these requirements, there was one overall design requirement: all of the switches for a given argument must be analyzed as a group, and the lookup algorithm must be driven by the switches that are *present* rather

than by the switches that are *defined*. This requires a single subroutine, to which a table of valid switches is presented.

Each switch in the table requires three pieces of information: the keyword or switch name, the switch type (a code), and the variable in which the result is to be returned. These three items are sufficient to allow the routine to detect and report all syntax errors. It is then left to the programmer to check for context errors upon a successful return from the routine.

/3/C.2/GET_SWITCHES/Oranges and apples in the same table

It would be nice to be able to code the routine so that each of the three tables is passed as a single subroutine argument. However, there are several difficulties which become apparent when trying to represent this infor-

mation in table format. While it is possible to use a CHARACTER array to hold the list of valid switch names and switch type codes, it is impossible to construct a single table which can contain CHARACTER, LOGICAL, INTEGER, and REAL variables. The table could contain the addresses (pointers) of these variables, however, F5 does not have WORDADDR and BYTEADDR functions like F77. Even F77 does not support such "pointers" in subroutine calling sequences (the functions are only used for filling packets for the ISYS system call function). Finally, arrays also require DATA or assignment statements to define their contents. I wanted to keep the calling sequence simple, compact, and easy to code; the use of WORDADDR, BYTEADDR, DATA, or assignment statements only adds clutter to the calling sequence.

The next best way to present this table of information to the subroutine is to write the subroutine so that it accepts a variable number of arguments. In this way, the "table" is built on the stack by the compiler when it generates the calling sequence for the subroutine. It isn't possible to write such a routine in Fortran because all subroutine arguments must be declared in the SUBROUTINE statement. However, it can be done with a little knowledge of the runtime stack environment and a few assembler routines.

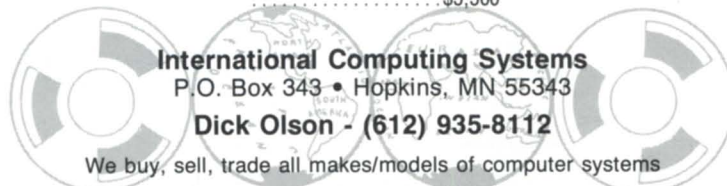
/3/C.3/GET_SWITCHES/Final design

I finally came up with a routine called GET_SWITCHES. The calling sequence has four mandatory subroutine arguments:

- arg 1: CLI argument to be analyzed
- arg 2: returned numeric value of the CLI argument, -1 if not numeric
- arg 3: returned character value of the CLI argument (program name if arg 1 is "0")
- arg 4: returned status code (-1 if CLI argument is not present, otherwise 0) followed by an optional number of subroutine argument triplets
- arg 5: returned switch result (logical, integer, real or character variable, depending on switch type)
- arg 6: the switch name
- arg 7: switch type: 0=logical, 1=integer, 2=real, 3=character

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GET_SWITCHES
*has a simple calling sequence
 and handles every possible switch and
 argument setup*

GET_SWITCHES combines the functions of retrieving a CLI argument and checking the switches on that argument. Each CLI argument is analyzed entirely by a single call to GET_SWITCHES. If GET_SWITCHES is called with only four subroutine arguments, then the CLI argument is retrieved and any switches present are considered invalid. Otherwise, the switches are compared to the "table" of switches presented as subroutine arguments (5,6,7), (8,9,10), (11,12,13), etc. Note that the use of switches is not restricted to just the program name; you can use switches on any CLI argument.

The third argument of each triplet of subroutine arguments for each switch serves two functions: it identifies the type of VARIABLE in which the switch result is to be returned, and it defines the valid FORMAT for that switch name. A positive switch type indicates that the value is mandatory; a negative code indicates that the switch value is optional.

Switch type=0 (logical)
 —internal error if the switch has a value
 —returns .FALSE. if switch is not present
 —returns .TRUE. if switch is present

Switch type=1 (integer) and 2 (real)
 —internal error if switch has no value//
 —internal error if switch value is non-numeric
 —returns -1 or -1.0 if switch is not present
 —returns number if switch is present

Switch type=3 (character)
 —internal error if switch has no value
 —returns "<377>" if switch is not present
 —returns character string if switch is present

Switch type= -1 (integer) and -2 (real)
 —internal error if switch value is non-numeric
 —returns -1 or -1.0 if switch is not present
 —returns -2 or -2.0 if switch is present but has no value
 —returns number if switch is present and has a value

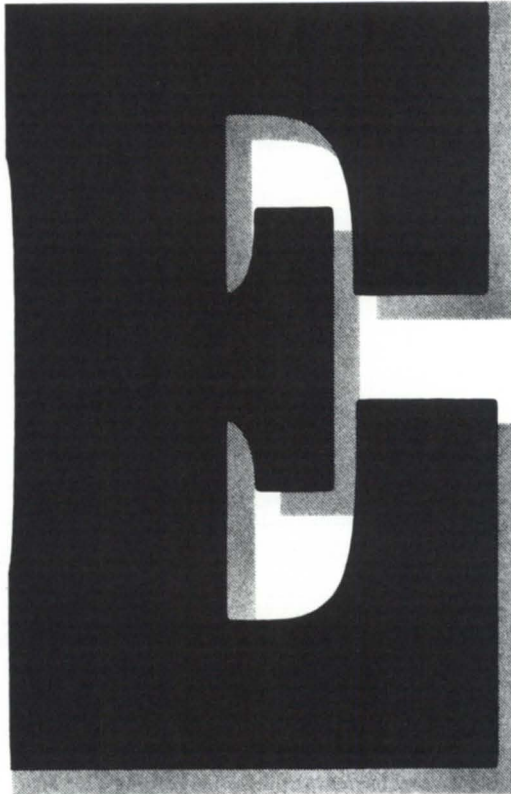
Switch type=-3 (character)
 —returns "<377>" if switch is not present
 —returns "<0>" if switch is present but has no value
 —returns string if switch is present and has a value.

In addition, GET_SWITCHES reports an

error if the programmer has coded an incorrect number of subroutine arguments (not 4+3n) in the calling sequence, or if an invalid

switch type is encountered in the argument list.

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I use GET__SWITCHES in hundreds of application programs, and it works like a charm

value of each switch to be specified as a range of values (i.e., [1,32767]) or as a list of possible values (i.e., 800, 1600, or ADM) so that GET__SWITCHES could also check the validity of the switch value. However, this would require a more complex calling sequence and state table.

The bottom line: GET__SWITCHES has a simple calling sequence and handles every possible switch and argument setup I could imagine. It almost eliminates the need for preparing user-level documentation for a program's valid switch options, because the program can be "interrogated" by executing it with a "garbage" switch. GET__SWITCHES will tell you it is invalid and list all of the valid switch names and their syntactical usage.

1/3/C.4/GET__SWITCHES/Coding tricks

Only the first four subroutine arguments are declared in GET__SWITCHES. However, the total number of arguments in the calling sequence can be $4 + 3n$, where n is the

number of valid switches (n may be 0). It is sufficient to know how many arguments were coded in the call to GET__SWITCHES. Then the arguments can be retrieved and returned using assembler routines. GET__SWITCHES detects invalid calling sequences by ensuring that the argument count is at least 4 and that the number of additional arguments is either 0 or a multiple of 3.

In Fortran 5, the number of arguments can be determined from the difference between the stack and frame pointers because a word address is pushed on the stack for each argument coded in the subroutine call.

Fortran 77 uses the AOS/VS External Calling Sequence (VS/ECS); an address (byte address for CHARACTER entities, word address for others) is pushed on the stack for each argument coded. The presence on the stack of additional arguments for the length of CHARACTER variables, and dummy arguments for some of the non-character vari-

ables, further complicate matters.

One location on the stack also contains the number of arguments PUSHed (M), which is not the same as the number of arguments coded. However, since the calling sequence for GET__SWITCHES *always* has a non-CHARACTER entity as the last argument and a CHARACTER entity as the second to last argument, the number of coded arguments is $(M+1)/2$ (think about it!).

The "dope vectors" pushed on the stack for the CHARACTER variables cause more problems. If you write a routine in Fortran 77 that declares fewer than the actual number of arguments in the calling sequence, and some of the declared arguments are CHARACTER, the program will get lost and crash and burn immediately upon entering the subroutine. The only solution was to write in assembler. I originally wrote GET__SWITCHES in Fortran 5 and 16-bit assembler. Since I had no experience with 32-bit

Figure 3:

```
-----+-----
program DISPLAY

c->>variables
c->stuff for argument 0
character*32 arg0
character*32 fn_list
character*4 density
logical all_files,append,byte,convert,decimal
logical hexadecimal,ignore,stop_at_eot,listuda
logical list,show_numeric,show_text,uppercase
integer ifirst,last,increment,iwidth,blocksize

c->arguments 1 & 2
character*32 arg1,arg2

c->miscellaneous
integer idummy,ier,dflag
logical copy_mode,hardcopy

c->>constants
c->types of switches for get_switches
integer sw_logical,sw_integer,sw_name
parameter (sw_logical= 0) !/xxx
parameter (sw_integer= 1) !/xxx=n
parameter (sw_name= 3) !/xxx=yyy

c->>begin
c->read global switches to set options
call get_switches(0,idummy,arg0,ier, !minimal
# all_files, "all", sw_logical, !/al
# append, "append", sw_logical, !/ap
# byte, "byte", sw_logical, !/b
# convert, "convert", sw_logical, !/c
# decimal, "decimal", sw_logical, !/d
# ifirst, "first", sw_integer, !/f=n
# hexadecimal, "hexadecimal", sw_logical, !/h
# ignore, "ignore", sw_logical, !/ig
# increment, "increment", sw_integer, !/in=n
# stop_at_eot, "physical_eot", sw_logical, !/ip
# fn_list, "l", -sw_name, !/l(=xxx)
# last, "last", sw_integer, !/la=n
# listuda, "listuda", sw_logical, !/li
# list, "nolist", sw_logical, !/no
# show_numeric, "numericonly", sw_logical, !/nu
# blocksize, "oblocksize", sw_integer, !/ob=n
# density, "odensity", sw_name, !/od=adu
# show_text, "textonly", sw_logical, !/t
# uppercase, "uppercase", sw_logical, !/u
# iwidth, "width", sw_integer) !/w=n
```

```
c->adjust logic as required
list=.not.list
stop_at_eot=.not.stop_at_eot

if(show_text.and.show_numeric) then
stop "can't use both /TEXTONLY & NUMERICONLY"
else if(show_text) then
show_numeric=.false. !no numeric
else if(show_numeric) then
show_text=.false. !no text
else
show_text=.true. !show both text
show_numeric=.true. ! and numeric
end if

c..set default values for switches with optional values
if(ifirst.eq.-1) ifirst=0
if(last .eq.-1) last=32767
if(increment.eq.-1) increment=1
if(iwidth.eq.-1) iwidth=16

c..set flag for ?open packet
if(density(1:1).eq."<377>") then
dflag=0
else if(density(1:3).eq."800") then
dflag=?opdl
else if(density(1:4).eq."1600") then
dflag=?opdm
else if(density(1:3).eq."ADM") then
dflag=?opam
else
stop "/ODENSITY must be 800, 1600 or ADM"
end if

c..set listfile
if(fn_list(1:1).eq."<377>") then
hardcopy=.false. !no /L switch
else
hardcopy=.true.
if(fn_list(1:1).eq."<0>") then
open(l,file="@list",...) !just /L
else
open(l,file=fn_list,...) !/L=filename
end if
end if

c->get argument 1 (no switches)
call get_switches(1,idummy,arg1,ier)
if(ier.eq.-1)stop "Arg 1 must be name of file to DISPLAY"

c->get argument 2 (optional, no switches)
call get_switches(2,idummy,arg2,ier)
copy_mode=ier.ne.-1 !.TRUE. if arg 2
...
```

(continued on page 50)



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B32 Tours North America!

A 32-bit BBASIC from New Zealand proves faster than the domestic product

by George Henne
Contributing Editor

In the July issue of *Focus*, I wrote about my first impressions of B32, a product I had received by mail. It was a 32-bit version of Business BASIC that claimed greater speed and functionality than Data General's BBASIC. As you may recall, I tested it at the time and found it quite interesting. However, there were a few problems.

About a month later, I had a call from the people at B32 telling me the problems had been fixed, and asking if I would be interested in having Murray Haszard, the author, drop by for a few days. I said yes, and Murray made MICOM the first stop of a six-city tour of North America.

August 23-28: Toronto

B32 loaded onto our system with no trouble. They had changed the internal format of the code since we last tested it, so we had to LOAD, LIST, ENTER, and SAVE our programs again under the new rev. (This process is the same as what you may already have done to go from BBASIC rev 3.00 to 4.00 or 4.10.) This is the first test of compatibility: if there are any syntactical differences, they should show up here.

About 99 percent of the programs converted with no problem. For the most part, the ones that didn't contained STMB statements. Some of the STMBs are designed for a 16-bit world: to make them work under B32, they must be replaced by the new STMEs that are supplied.

We then started running some performance benchmarks. In the process, we uncovered some minor problems. This didn't surprise us: BBASIC is a tremendously complex product, and rewriting the whole thing is a huge job.

What did surprise us was this: Murray was able to fix each problem in about 20 minutes!

Another problem was that one of our CPUs was not up to the current revision of microcode.

The results of our tests are in Table 1. The tests were run using a product of ours called ForthWriter, a report generating tool. We timed its results on a typical job: select and sort, then print. The test represents a reasonable mix of CPU and disk activity.

	B32	B32/HS	BB4.10
Sort Phase	78	68	105
Print Phase	114	108	208
Total	192	176	313

Tests were run on 2 MB MV/4000 with a 354 MB disk. Jobs running were the only jobs on the system. Tests were run at MICOM.

There are two ways to run B32: regular and high speed mode. Regular mode works just like regular BBASIC. High speed mode does its own record blocking and unblocking, bypassing the AOS/VS Agent.

The results were good: 63 percent faster in regular mode, 78 percent faster in high speed mode. However, Murray felt the performance could have been faster yet. Looking at the jobs more closely, there was a 93 percent improvement in the Print routine, while only a 54 percent improvement in sorting. This was easily explained: B32 is only able to improve the performance of the KADD statement by about 10 percent, a major part of the Sort routine.

As Murray left, we were continuing our tests by bringing up some of our customers' live systems under B32.

August 28-September 2: Piqua, Ohio

Our first tests proved beyond a doubt that B32 was much faster if it was running all by itself. But we still needed to know how it would run on a system with lots of terminals.

Richard Koenig of Plantrol Systems and one of his customers, QualityForms, set up a test. The system was a 4 megabyte MV/4000 with two 354 MB disks, 29 terminals, and four printers. This certainly was a heavily loaded system, but it has always worked OK due to BBASIC's efficient use of memory.

We were concerned about whether B32 would need more memory. Regular BBASIC is restricted to 16 shared and 16 unshared pages per user, due to the 16-bit addressing. Programs under B32 are immediately 50 percent larger, and the B32 interpreter is much bigger as well.

We needn't have worried. In the test, all parts of the system ran substantially faster. Quotes that had taken 8 seconds to generate ran in 3 seconds. An update went from 30 minutes down to 10. Terminals could have their baud rates turned up to 19.2 KB without appearing to stall. Overall, the user felt the system was twice as fast.

Why didn't the machine run out of memory, even though B32 is larger? One very good reason might be that regular BBASIC really doesn't fit into 16K either. A lot of it has to sit in overlays which are called in as needed. B32, with its larger addressing, needs no overlays. As a result, a large amount of overhead is eliminated.

One of the user's concerns was due to problems he has had with flaky power. When he was running RDOS, everything got written to the disk immediately, minimizing data loss in the event of a power failure. With AOS/VS, nothing gets written until the memory is needed for something else, or the file is closed by all users. This could be hours. Could anything be done about this with B32?

Murray thought about this one for a little bit. After playing with the code for a bit, he announced a new switch that could be specified on starting B32: \$FLUSH, which forces data to be written out to the disk as soon as possible. Of course, the data also remains in the buffer, available as part of the LRU chain.

We asked if this wouldn't slow down the system. Actually, it didn't. The explanation is that all those records would have been written out anyway, sooner or later, so there really wasn't any increase in disk I/O. The 354 MB controller apparently puts READs at a higher priority than WRITEs, so there really isn't a measurable difference in a live production environment.

It should be noted that this feature minimizes the potential damage from a power

*The most significant result is that B32
was faster in every single test.
It is also clear that high
speed mode results in
worthwhile speed improvements*

failure, but doesn't eliminate it. Some sort of battery backup or UPS solution is still strongly recommended.

September 3-6: Roanoke, Virginia

In Roanoke, Murray visited Mark Strickland of Evans Paints. One of the key tests at Mark's site was B32's support of foreign terminals. Of course, only BBASIC offers this feature—no magic way to run other DG products on foreign terminals has been found. The terminals worked OK, I gather, and a couple of minor problems in B32 were found and fixed.

September 7-9: Atlanta, Georgia

Commercial Data Systems Corporation was interested in B32 for more than just speed. One of the products they sell is Dimension, a BBASIC applications generator. As with many of these products, they are up against the constraints of the language, operating system, and hardware.

What interested them was the increased program size possible. While normal BBASIC has a limit of about 26K, B32 increases the

maximum program size to a mind boggling 512K. While I question the sanity of any BASIC programmer who would write a program that big, almost every BBASIC programmer I know has at some point run into the current limit on size.

They were able to move Dimension over to B32 quite easily, and the results were what they had hoped for. Once again, a couple of new problems were found and fixed while Murray was there.

It should be mentioned that the types of problems being found and fixed in B32 were of the variety that occur when a programmer misuses BBASIC, and BBASIC lets him or her get away with it.

September 10-12: Baton Rouge, Louisiana

Protective Casualty is a major user of BBASIC. They have two MV/8000s: one with four 602 megabyte drives, the other with one. A total of 82 terminals and nine printers are scattered across the two systems. As you can imagine, they are always on the lookout for ways to increase the performance of their systems.

Lamar Bevil of Protective Casualty put B32 through its most extensive performance test yet. He also chose a different approach. It wasn't possible for him to convert the whole system, nor could he get it dedicated to just running the tests. Therefore, he devised a way of doing the tests while his regular applications were running.

The results appear in Table 2. His method was to create both a BBASIC and B32 version of each test, and start them at the same time on two different terminals. The times taken were actual elapsed time, and were highly dependent on what else was happening on the system.

Since they were running simultaneously, both jobs were subject to the same conditions on the system. However, the job that finished last had an advantage in that it didn't have to contend with the job that finished first. All the tests really show is that there was a significant speed improvement under a variety of conditions—they don't show how big that difference was.

The most significant result is that B32 was faster in every single test. It is also clear that high speed mode results in worthwhile speed improvements. Please note: using high speed mode might require some slight changes to your code—checking for EOF is no longer allowed. In most cases, this should not create a problem: a lot of the EOF checks in your code might be left over from the RDOS days, when your files couldn't grow the same way.

September 13: London, England

After his successful tour, Murray left to go back to visit his customers in England. It seems pretty clear that B32 is a viable product that meets its claims. We plan to continue our testing, and see no reason currently why we shouldn't recommend it. Δ

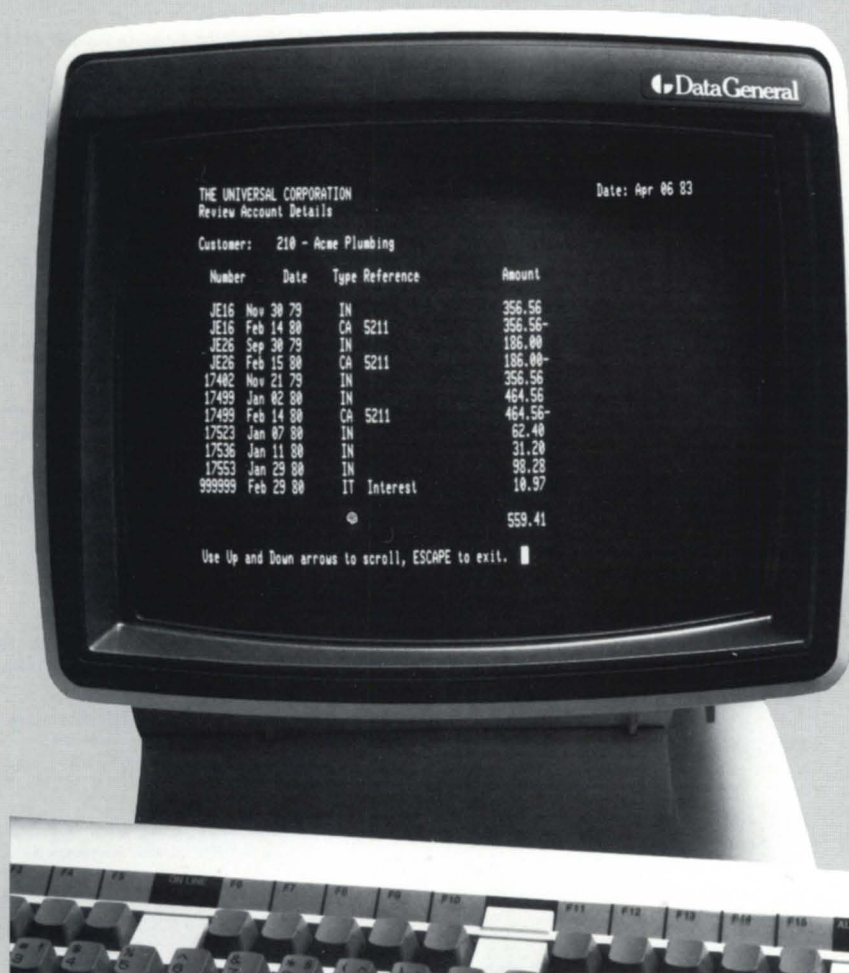
TABLE 2

	<u>B32</u>	<u>BB4.10</u>
1. arithmetic: generate 500 primes	556	991
2. 10000 sequential WRITEs of 100 bytes	90	103
3. 10000 sequential READs of 100 bytes	37	42
4. same as 3, but high speed mode	17	56
5. 10000 WRITEs extended Random file	66	157
6. same as 5, but high speed mode	76	168
7. 10000 random READs on Random file	33	87
8. same as 7, but high speed mode	31	79
9. 10000 OPEN/WRITE/CLOSE, Random file	5791	8220
10. same as 9, but high speed mode	4402	5450
11. 10000 OPEN/READ/CLOSE, Random file	1949	2789
12. same as 11, but high speed mode	2343	4277
13. 10000 OPEN/KADD/CLOSE	6377	7274
14. same as 13, but high speed mode	5092	5857
15. 10000 OPEN/KFIND/KNEXT/CLOSE	10267	13510
16. same as 15, but high speed mode	4477	5166
17. 10000 KNEXT	28	36
18. same as 17, but high speed mode	33	39

Tests were run on a 6 MB MV/8000 with four 602 meg disks, 49 terminals, and nine printers. B32 job and BBASIC 4.10 job were started simultaneously on separate terminals on a fully loaded system. Elapsed times are shown. Results are courtesy of Lamar Bevil, Protective Casualty, Baton Rouge, LA.

As vice president of Micom Computer Systems, George Henne has worked with Business BASIC users for nearly a decade. Send questions or comments to him at 575 Madison Ave., suite 1006, New York, NY 10022; 416/445-4823.

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- 37. **AOS/VS System Managers' Panel 2—Chairs:** David Novy, 3M/Brian Johnson, BJ Inc.
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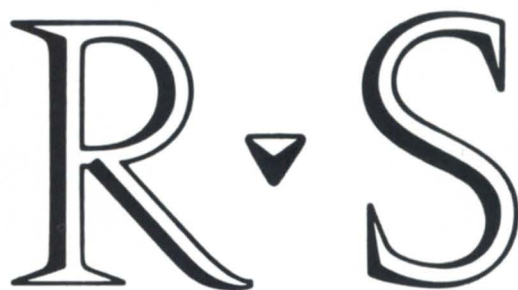
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A portrait of DG's role in the arts and humanities

by Dan Littman
Special to Focus

Artists and intellectuals have been slow to recognize how computers can help them in their work, but many have begun using the machines to push back old limits. In some cases computers relieve creative minds of drudge work; in other cases, computers do things that simply couldn't be done before.

Computers are helping artists design and engineer sculptures, helping composers and musicians write symphonies and perform music, simplifying stage and costume design

for the theatre. Social scientists are able to back up theories with more than sound reasoning when they can quickly turn ten million or a hundred million bits of data into a statistical base. Linguists can follow the evolution of language geographically and historically; art historians can watch the unfolding of a new style or school with a precision inconceivable 20 years ago.

Most of the arts and humanities work that leans heavily on computers is taking place at

universities, where comparatively large budgets provide intellectuals with access to large, sophisticated computers.

So far, Data General is playing less of a role than it might.

To speak with intellectuals about their work with computers not only reveals how non-experts think about the machines, but also suggests areas where DG might find a niche.

A few small schools rely on DG computers as their main systems. At those schools,



some fascinating historical and social science projects are taking advantage of their systems' word processing and data handling capacity. At other schools, including some of the nation's most renowned—the University of Pennsylvania, Brown University, the University of Michigan, the University of Wisconsin, and Harvard University, for instance—DG systems are installed in engineering departments and medical schools, but haven't made their way into the humanities.

DEC and IBM have come to dominate mainframe computing in the arts and social sciences, and IBM and Apple have almost exclusive control of the desktop computer market on college campuses.

According to Russell Pinkston, a composer and music professor at Columbia University who works with computers, there is "nothing about the architecture that would proscribe DG. It's an historical thing. . . (Composers) started using IBM mainframes, and then 10 years ago many people switched to DEC."

Theodore Hirschberg, director of the Center for Greater Philadelphia and a former Penn history department faculty member, puts it more bluntly: "It's an accident of hardware if someone is using DG. . . . It (hardware) is all so generic."

Scholars and artists are turning more and more to computers for help with their work. In the process, many are gaining recognition for their technical contributions. Nancy Ide is now on the computer science faculty at Vassar College, but she is also president of the Association for Computing in the Humanities and a member of the Modern Language Association, the nation's principal organization of scholars of U.S. and European literature. Robert Oakman, an MLA member on the computer science faculty at the University of South Carolina, also has written about English letters and about computer analysis of literature.

Researchers at Roger Williams College, a small liberal arts school in Bristol, Rhode



Historic American Buildings Survey photo by Jack E. Baucher.

Island, rely heavily on a 10 MB MV/10000. Their machine operates on AOS/VS with three Argus 354 drives and two controllers; it handles 135 terminals (D460s and D210s) through two IOCs and eight IACs, allowing almost every faculty member a terminal in his or her own office. The system also supports two 600 line per minute printers and 10 HP LaserJet printers.

As for software, "We originally just loaded what all the colleges have," says Harold "Skip" Pomeroy, head of Roger Williams College computer center. The college has installed WordPerfect for word processing, SPSS and SAS for statistical analysis, and Powerhouse and Informex for data base management. The system also has several software development packages, CEO for the school's administration, and "gobs of engineering software."

Faculty members are taking advantage of the DG system for several interesting projects. Anthony Agostinelli is a historian and jazz buff who teaches a class in jazz history. His biggest project right now is to put together a comprehensive jazz discography. With Pomeroy's help he developed a simple program that can manipulate thousands of artists' names and song and album titles by name, number, dates, and other important variables. The program is mostly a time-saver for Agostinelli—"It's a heck of a lot easier than having to type up three separate lists,"—although the data base has a potential use for tracking obscure artists' careers and following the evolution of combos, styles, record labels, and so on.

Agostinelli has other plans for the future. "I hope we eventually use the DG to interface with minicomputers we have on campus, so that eventually we could do music-writing. . . . The technology is already there," he says. "We can use computer keyboards and MIDI sequencers (Musical Instrument Digital Interface) with a synthesizer keyboard to do editing and transcribing."

But, Agostinelli says, the technology isn't enough to get started. "We could use a program called BLAST to go from a Mac or an IBM PC into the DG. . . but I don't know if it would work for a music program. Our school's DG's storage capacity would be fantastic compared to a 256 KB desktop mini. . . but I haven't seen (the necessary software) for the DG unit yet."

Agostinelli's data base is only one of several that uses Roger Williams College's DG mainframe. Dr. Charles Watson is compiling all the information he can about blacks living in Bristol County, Massachusetts, from about 1770 to about 1880. Watson estimates that Bristol County, which contains Taunton, Fall River, and New Bedford, three of Massachusetts' larger and older towns, was home to between 2,000 and 3,000 blacks throughout most of that time. Using U.S. Census data, vital statistics registries, Seaman's Protection Papers (a form of identification for sailors), and Overseers of the Poor records, Watson's work will eventually help people to track down ancestors or historical figures. "On the DG. . . (I'll) be able to pull out different lists—all (Bristol County blacks) born in Virginia, for example."

Other researchers have done similar studies of blacks in other Massachusetts counties, Watson says, and he envisions a data base that will allow researchers to draw far-reaching conclusions about black society in the United States.

Watson chose to manage the data with Informex because "Pomeroy just suggested it. I'm not familiar with computers, and Pomeroy says Informex (is a good package)



Historic American Buildings Survey photo by Jack E. Baucher.

for a relational data base." Pomeroy also plans to teach Watson how to use Informex on an IBM PC.

Mike Swanson, in Roger Williams' Department of American Studies and Historic Preservation, is compiling a massive data base, although he has almost no background in computers. With help from students in his U.S. architectural history classes, Swanson is analyzing and indexing the Historic American Building Survey, a collection of more than 50,000 photographs of buildings that the National Parks Service has compiled since the

1930s. It is housed, virtually unindexed, in the Library of Congress.

Swanson and his students work with a microfiche collection (published by the microform publisher Chadwick and Healey), studying each photograph for about 50 different architectural features—"Such things as the

shape of the roof, or window patterns. . . or questions of chimney placement. And of course location and date," Swanson says.

"What this will allow people to do . . . is a lot of fairly clever statistical analysis, in terms of distribution. . . to follow the innovation of an architectural feature from its introduction in the U.S."

For example, Swanson says, "The earliest Colonial windows were 4 very small panes by 4 panes (in each sash), so 16 over 16. (Then they) moved to nine over nine, but bigger panes of glass weren't available every-

Support for a ministry

In rural Texas, far from the cold analysis taking place on college campuses, a Data General MV/8000 has found a home promoting Christianity. Last Days Ministries, based on a ranch near Lindale, Texas, 60 miles east of Dallas, depends on its computer to maintain a mailing list of half a million, put out *Last Days* and *Americans Against Abortion* magazines, handle the ministry's finances, and administer a staff of 150.

The MV/8000 with 8 MB of memory is hooked up to two Fujitsu 277 MB CDC drives, 20 D200, and 30 D210 monitors. A Phoenix Communications Interface feeds the in-house Mergenthaler typesetter.

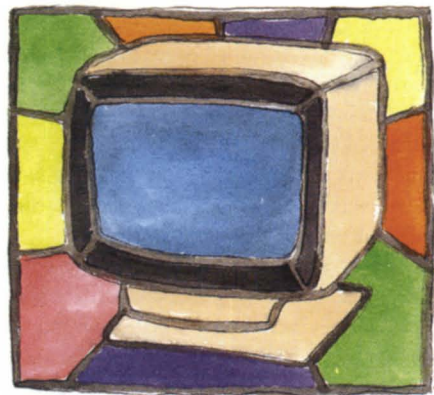
According to Tim Serbin, assistant to the ministry's chief computer engineer, Last Days Ministries moved into computers slowly. The ministry started back in 1977 in Southern California, when Keith Green, the founder, became a Christian. "He was a musician and he started singing songs about the Lord."

Green began feeding and sheltering street people with the money he made performing. "The ministry eventually grew to about seven houses," Serbin said, and as Green travelled giving concerts across the country, "people would ask him to keep them in touch."

It wasn't long before Green had to com-

puterize his mailing list, starting on a PC. Four years ago, after the move to Texas, Green was killed in a plane crash. The ministry continued to grow, however, and its computer needs grew with it.

After using a Qantel, which Serbin found unsatisfactory because they weren't able to



expand it as their needs grew, the ministry went to DG's C/150, and then added a C/350. "There were no problems with shifting machines," Serbin says, but they had become locked into using two separate computers. They soon replaced the C/150 with a second C/350, but, "As the word processing grew

we were just coming to a crawl because word processing uses so much RAM. So we got an MV/4000."

With IACs, the MV/4000's speed met their needs, but, "We still had two separate computers, so we had to transfer information between (them)—100 or 150 files at a time. We always wanted one computer to handle everything."

In June the ministry finally installed the MV/8000, and, says Serbin, "We're gonna stick with it for a while. It's a really good machine," although he'd like to move up from 8 MB to 12 MB RAM.

The magazines and the ministry's thousands of personal letters are produced with WordPerfect, rev 4.05; WordPerfect's MathPlan handles internal details such as monitoring food and other supplies. To maintain its massive mailing lists, the ministry has written its own software using 32-bit COBOL and INFOS II.

Serbin says the ministry does its own servicing and doesn't bother with a service contract. "We'll track the problem down to the part and just order the part." So far, they've had little problem with DG equipment. "The hardware is excellent. For the price it's just the best you can get." **Δ**



Historic American Buildings Survey photo by Jack E. Baucher.

where at the same time.”

This kind of analysis will reveal more than simple architectural history, because building styles depend on such variables as what materials can be manufactured in or transported to an area, how wealthy the inhabitants are, and their ethnic or cultural background.

Swanson began the project on a home computer, but moved to the school's DG system "about a year ago." Pomeroy set Swanson up on SPSS knowing that the data base would eventually hold several million facts. Swanson says the system has been easy to learn. He says Pomeroy picked SPSS "because SPSS is the one we happened to have on our machine." When he hit a minor software snag soon after moving to the DG, Pomeroy "fixed it for me. It (the computer) is a black box to me . . . although I'm becoming a computer nut.

"You have something you want to do, and you learn as much as you need to know (on the computer) to do it. And then you think of something else you want to do and you learn more about the computer to do that, too."

Swanson says it may not be long before computers do the analysis as well as data handling. "The Library of Congress is putting (the photos) on video disk, which puts them into digitized form." The technology isn't very good yet, he says, but suggests that when photo digitization matures, photo analysis software won't be far behind. "It's fantastic. You hardly have to touch anything anymore. I'm not sure that's so good from a pedagogical point of view: If the computer does the looking, then the kids won't have to."

Pomeroy says DG's service to Roger Williams College has been "excellent on hardware. Software has been, well, sort of up and down, inconsistent." To manage more and larger data bases, Roger Williams will probably add 4 MB and another drive, Pomeroy says. "And we may add another small CPU so people can do development work."

Across the continent, another small

liberal arts school is running research and academic computing on a Data General system. Christian-oriented Point Loma Nazarene College in San Diego has an MV/10000 devoted entirely to the faculty, while the school's administrative computing runs on a competitor's machine. The DG mainframe has a 592 MB drive and a 354 MB drive, and operates on AOS/VS. It supports 75 D211 terminals, one line-printer and six NEC Spinwriters, three modems, and a card reader for grading standardized tests.

The chairman of the Department of History and Political Science, Jim Jackson, Jr., is putting the DG system to work on a study of late nineteenth century labor migration patterns in Germany's Ruhr River Valley. This area was one of the earliest to be industrialized, and displaced country people began flooding into factory towns. Jackson is using SPSSX, an updated version of SPSS, to analyze what he calls an "enormous amount of data. The Germans were very efficient at keeping information—on census data, tax information, residency registration."

The major questions in his research are, "Are migrants dislocated, uprooted, without ties? Are they disturbed psychologically and therefore disturbing all of society and prey to revolution?" He says this position was first advanced by German sociologists in the late nineteenth century, such as Max Weber, and later "widely disseminated by American students of the German school."

Weber and his colleagues, without computers, had no way to gather and analyze hard data, so they based their theories on reason and speculation. But, says Jackson, "What is emerging from my work is not so gloomy a picture. Migrants didn't behave as dislocated individuals. They may have moved a lot in their teens and early twenties, but they found networks of stability. . . (and) most of their lives they didn't move."

Jackson has a strong background in computers, having taught himself SPSS on a card-

based Cyber CDC in graduate school at the University of Minnesota. He later used U.C. San Diego's Burroughs system before Point Loma installed its DG system three years ago. "File handling on the DG is very user-friendly, and I appreciate that very much," he says. His computations are so huge that at times they have tied up the entire CPU and won him informal "awards" from his colleagues. He likes to submit jobs in batch mode, "so I don't interfere with people working in an interactive mode. And that's fine; it hardly delays me at all."

Point Loma's coordinator for academic computing, Marilyn Allen, says, "We've found the hardware to be very good," and service "has been as good as you can expect," but she has one serious software complaint. "We are using old revs of everything. With the updates of CEO we haven't been able to use the Spinwriters. When CEO 2 came out it didn't support the printers, so we couldn't update to AOS/VS 5, so we couldn't update our programming languages. . . . There was a lot of dissatisfaction because a lot of people had bought Spinwriters."

In years to come, computers will most likely become easier to use, and capable of handling ever more sophisticated and creative applications. As they come to require less of users, intellectuals and artists will undoubtedly find new and creative ways of using them.

Perhaps that trend will begin to widen the gap that now seems to be narrowing between computer experts and computer users.

Data General, though widely praised by the technically knowledgeable for the quality and price of its hardware, will have to compete on very different grounds in the arts and humanities community. Like any other company that hopes to capture a share of that growing market, DG will have to develop and package new solutions to a unique—and very interesting—set of needs. Δ

Dan Littman is a free-lance writer.



Congress' information connection

Upgraded computer system channels data through the Library of Congress

by Andrea Beebe
Special to Focus

Ideally, members of the U.S. Congress base their legislative decisions on informed opinions. Data General machines at the Library of Congress in Washington, D.C. help provide the information for those opinions.

"We're responsible to Congress to answer requests (from legislators), since we are an arm of Congress," says William McAfee, senior systems analyst at the Library. "This means that all the House and Senate offices are allowed to call us for information, so we process from 400 to 600 thousand requests a year."

To organize and control the flood of information flowing through the Library, McAfee wrote an Inquiry Status and Information System (ISIS) in November 1976. Now running on an MV/10000, ISIS receives a request, decides which department of the Library

should handle it, and ships the request to that department. ISIS also keeps a record of the time and materials required of the person who fills the request.

Data General equipment is also used to monitor the progress of materials through the copyrighting process. All materials being copyrighted in the United States—600 to 700 thousand items annually—must be registered through the Library of Congress.

The Library has been using DG equipment for eight years. Staffers chose Data General because of the company's reputation and the software available (IDEA and INFOS, specifically). Putting information on DG minicomputers also enables information to be stored independently from the mainframe, thus restricting access and improving security.

In August 1985 the Library entered a three-year contract to upgrade its Eclipse equipment to five MV/10000s. "We currently have four C/330s and two C/350s," McAfee says. "We're in the transition right now. What we're going to end up with is three MV/10000s, two C/350s, and eventually all /10000s and no C/350s."

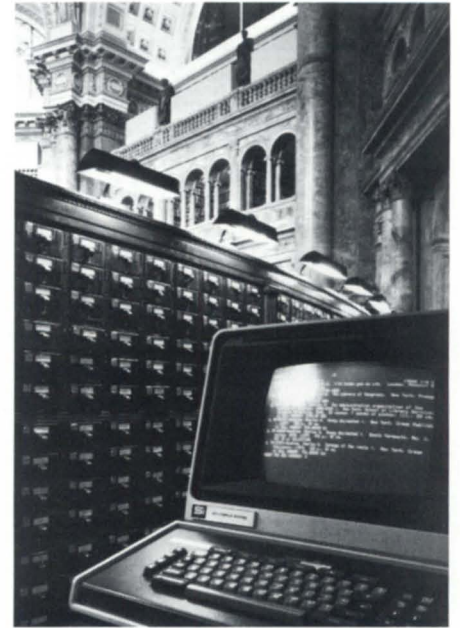


Photo courtesy of the Library of Congress, Washington, D.C.

"C/350s are all right. The problem is, from a systems programming standpoint, we're maintaining two different operating systems, an AOS and AOS/VS operating system," he says, adding that the two systems create quite a workload. He believes the Library's programmers could easily fit more applications onto the C/350s, but management and procedural constraints prevented them from doing so.

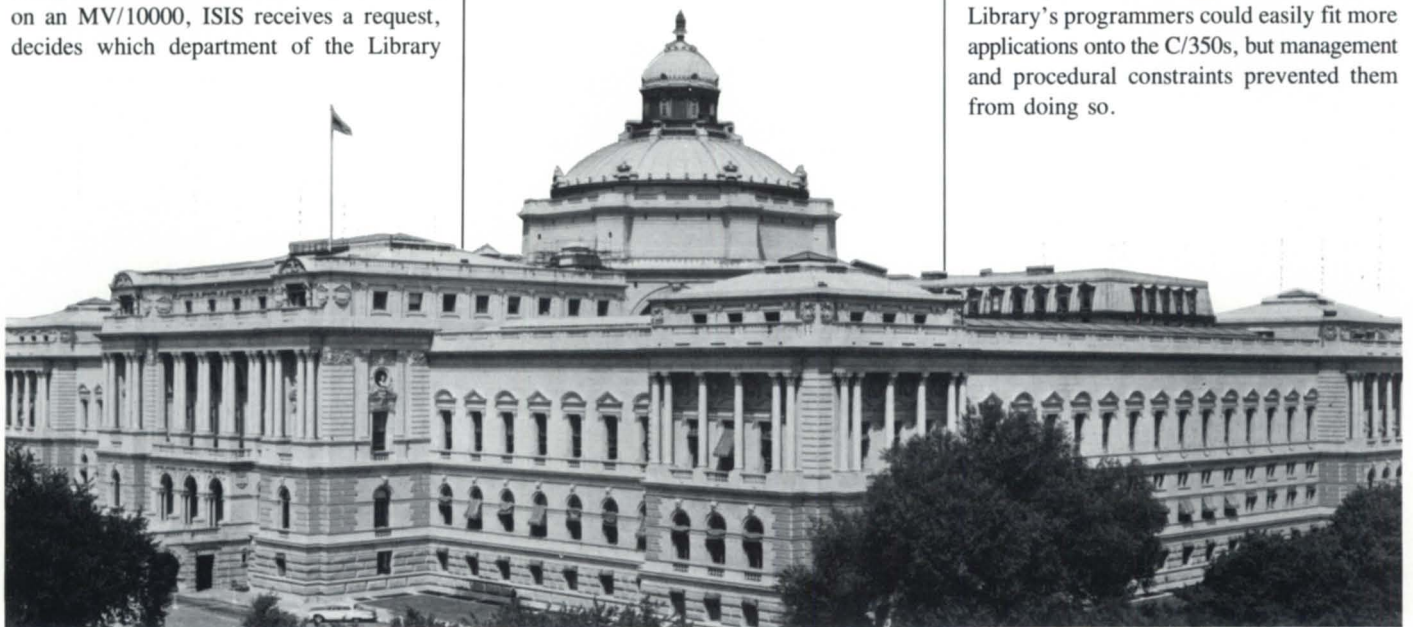


Photo courtesy of the Library of Congress, Washington, D.C.



The Library's hardware upgrade also involves switching from removable 192 MB disks to 592 MB fixed platter disks. This upgrade is expected to alleviate what Library systems analysts agree is one of the biggest problems with their system—opportunity for operator error. "The 192s are fine if you keep them on the same drive that they're read and written on, but you can run into problems when you move them from drive to drive," McAfee says. One problem occurs when disks go out of tolerance. Others occur when operators make backup errors, or drop the packs.

"We'll have four (592s) on one MV. We'll still be copying disk A to disk B," McAfee says, "but we'll be able to put in more protection at the operator level, and there'll be no picking up of packs and putting them into drives."

"We're one of the few users in the country running IDEA," McAfee says, estimating that the Library's 110 terminals running IDEA applications make it the largest site running IDEA in the nation.

During the upgrade, Library systems analysts ran into problems with IDEA, a

powerful screen handler marketed by Data General. They had been using a five-year-old rev of IDEA, and it didn't work properly on the MV/10000s. But they worked around the problem by reformatting the disks from 16-bit to 16-bit emulation, then restoring the information to the disk.

But when the MV-compatible version of IDEA arrived, Library employees found another problem. "We do logging coming out of IDEA, which means for every update made to the data base we make transaction records for it," McAfee says. "Mainly, it was losing track of the transaction records. But we put a patch in to keep track of them, rather than have the records lost in never-never land."

The Library staff is also planning to upgrade its software, and is considering replacing IDEA with a more modern language—perhaps a relational data base that runs under Unix 5. "The feeling is that you've got to get into an application package where if you decide your hardware—for whatever reason—isn't meeting your requirements, you can pick your package up and, with minor

changes, put it on another computer," McAfee says. "Right now, IDEA is not that portable."

Another software addition is the linked system project. The Library already has networking with X.25 and Telenet; soon, an Ethernet connection on the three MV/10000s will allow them to talk to each other, and a network system Hyperbus will allow the MVs to talk to the IBM mainframe.

Another application of the MVs will help protect original materials by storing optical forms of the materials. An input scanning system controls a 68000 processor capable of optical scanning in three modes: single sheet, gear, and microfiche. The scanned material goes on to a magnetic disk, where it is reviewed to ensure it was properly scanned. Once reviewed, the material is written onto the optical disk in permanent mode. When the optical disk is full, the material is transferred into a "jukebox," which contains 100 4-gigabyte disks.

"We're scanning quite a bit of information, but we're nowhere near filling that thing up," says McAfee. An index of the information is stored and linked with a system that allows users to search for and pull up articles in optical form. Thus, people requesting to see an article can read the optical versions instead of handling original materials. "The technology was really supposed to substitute for, let's say, picking up a magazine by the throat," he says.

Another application, yet to be completed, is a computer network that will permit researchers to access certain libraries across the nation. The linked disk system allows a user to enter an information request in a library's system. The request passes through the Library of Congress and shoots out to the other libraries. Computers at each library then search for the information requested; if found, the information comes back via Telenet through the Library of Congress hub, and then is sent back to the person who requested it.

Roland Nelson, senior systems analyst, says this linked disk project uses the DG system as a front-end. One library—at Washington State—is already connected to the Library of Congress. Libraries in New York and Chicago are among those to be included in this long-term project. △

Andrea Beebe is a free-lance writer who will be entering a Master's program in Library and Information Science next year.

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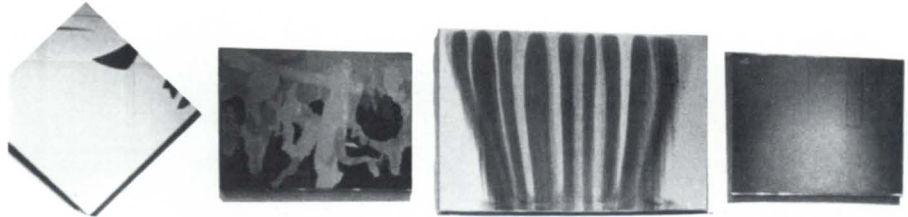
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Do I hear 20000?



The old masters are sold on DG—literally

by Andrea Beebe
Special to Focus

When the gavel banged down to open the auction season at Christie's in New York this September, probably not a soul was thinking about computers. Nothing in the auditorium would have given a clue that the venerable auction house was breaking in a brand new MV/20000. Most of Christie's clientele would agree that that's just the way it should be.

Christie's is no stranger to auctions—it has its roots in London, 1766, when James Christie began auctioning fine art. In the 18th century, Christie's became the center of

England's art world.

Today, Christie's is a publicly owned international auction company with more than 40 offices in 19 countries worldwide. Its New York branch opened nine years ago; four years ago, Christie's went on-line with an MV/8000.

According to Marshall Clarke, assistant vice president in charge of data processing, Christie's chose Data General machines after a study done in London five years ago. "All of the major companies were examined, and Data General seemed to provide the most for the dollar," he says.

The very nature of the auction business dictates that large volumes of information must be recorded, exchanged, and updated very rapidly. Controlling auction records via computer offers greater speed and convenience to Christie's employees, clients, and customers.

"Before (we had the MV/8000), if anybody wanted to get a sales result or information about the auction, they would have to go down and see one of the two cashiers directly involved with invoicing and sales," Clarke explains. "Now this information is available company-wide, depending on whether (the inquirer) has the security to obtain the information."

The MV/8000 was "just about out of capacity" when the MV/20000 was installed July 21. The MV/8000 is now used as a development machine, running CEO and, soon, a new marketing system. The MV/20000 handles all of the company's other applications, including property systems, accounting systems, and inventory systems.

Most of the software used at Christie's was written by Leasco, a software house in London. Maintenance is handled by Christie's seven-member computer engineering staff in New York.



Photo courtesy of Christie's, New York.



"We have a very small staff," says Clarke. "That's the way the system was designed—mainly, not to create a department."

The system essentially accounts for a sale item from receipt to release. Items include many types of fine and decorative arts, jewelry, silver, manuscripts and rare books, costumes, furniture, prints, photographs, stamps, coins, and vintage wines.

Once an item arrives at one of three receiving points in the New York City area, it is recorded in the system. Then the item— an old masters painting, for example—is assigned to a technical department, where it is manuscripted for sale. The process of manuscripting involves the creation of an accounting file for sales processing.

Manuscripted items are placed in upcoming sales. During auction season, which runs from September through June, Christie's holds from three to eight sales per week in its New York offices. At the finalization of a sales list, an accounting system is set up for the sale.

When an item sells, the computer produces an invoice for the buyer and then arranges for settlement to be made to the client approximately 30 days after the sale.

If an item does not sell, representatives from Christie's contact the client, who then must decide whether to put the item in another sale or to retrieve the item. The accounting system reflects the client's decision in its records.

In New York, the MV/20000 controls two offices several blocks apart, and 80 terminals of various kinds—mostly D200s and Emulogs. In addition to the cashiers, employees in accounting, receiving, and technical departments use the system.

Clarke's system engineers are developing a new marketing system, which will be the first major upgrade since the installation of the MV/20000.

According to Clarke, New York is not the only Christie's location using Data General equipment. The two London offices have

Andrea Beebe is a free-lance writer.

DGs, and the Amsterdam office will be getting an MV/8000. "Probably by the first of the year, or shortly thereafter, our offices will

be networked," he says. Eventually, Clarke says he expects Christie's to add several of its other international offices to the network.Δ

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Integrity is the best policy

Strategies for avoiding, detecting, and fixing corruption of INFOS data bases

by Brian Johnson
Contributing Editor

:INFOS:INTEGRITY

A few years ago, I delivered a paper on INFOS file design at a NADGUG national conference. Since that time, the paper has resurfaced constantly, probably because the video tape of the session has been floating around among the RIGs.

Changes in INFOS, especially the AOS/VS INFOS revisions made since an inner-ring server was introduced, have made it necessary to update the advice I gave in the original paper (for instance, I rarely recommend key or record compression on AOS/VS any more). Over the next few months—not necessarily contiguous—I'm going to rehash some of the issues raised in that paper.

Why is information about INFOS files showing up in a column for system managers? Because we're the ones who get stuck doing DDUMP/DLOADs, IVERIFYs, and recoveries. Unfortunately, the perpetrators of the file design are usually long gone by the time the first INVALID NODE ADDRESS shows up.

:INTEGRITIES

There are two kinds of integrity to worry about: logical and physical. Logical integrity can be defined as the state of a data base when the proper relationships exist between all the records and their keys, and only the keys and records which belong in the data base are present.

The production of tools to verify and maintain the logical integrity of the data base is the responsibility of the application designer. However, the responsibility for scheduling the use of these tools inevitably falls on the system manager.

Physical integrity can be defined as the state of a data base when the internal structures and pointers used by INFOS to access the keys and records are correct.

The INFOS IVERIFY utility is designed to check the data base for physical integrity. The responsibility for scheduling its use is also the responsibility of the system manager.

Note that the recovery issues (differential mode, checkpoint frequency, and COMLOG use) overlap to a great extent with the integrity issues. However, in this case I'm going to examine the integrity issues by themselves. A good design takes both into account.

:CORRUPTION

Every data base is susceptible to logical and physical corruption at some point in its life. Why so many of the designers of data base applications, especially ones who should know better, choose to ignore this issue never ceases to amaze me.

The most common causes of logical corruption in INFOS data bases are:

- Errors in the programs that modify the data base
- Operational errors, such as aborting a program in mid-transaction
- INFOS bugs (relatively rare compared to the preceding two, except for a few legendary revisions).

The most common causes of physical corruption are:

- Operational errors (crash or power failure without differential file mode enabled)
- Hard disk errors that occur subsequent to the initial successful write of an index or data base page
- INFOS bugs (rare, but not as rare as I'd like).

Because many of the causes of both physical and logical corruption are beyond the control of the programmer, a responsible data base design must include provisions for checking the logical and physical integrity of the data base, and correcting any instances of corruption.

:HOW_OFTEN?

It's difficult to give a recommended frequency for checking a data base for logical corruption. I prefer to run an integrity checker against the data base any time the system is ordinarily idle (nights, weekends, over holidays), rather than waiting for evidence of corruption to appear in reports produced from the data. Running an integrity checker against the data base while it is active, even at the lowest possible priority, will still have a disruptive effect on real users, so I avoid it.

A well-designed logical integrity checking utility should allow you to specify a substructure of the data base to be checked, and a range of keys within the structure. In this way, the check of the entire data base can be accomplished a chunk at a time over several days.

It's likewise difficult to give a recommended frequency for checking a data base for physical corruption, especially since IVERIFY requires exclusive use of the data base and cannot be interrupted once it starts. My feeling is that IVERIFY need never be run on a data base that has differential mode turned on, until evidence of physical corruption appears (e.g., file consistency error, invalid entry number in index, invalid node address, unexpected system call error return, or space management map consistency error).

:STRATEGY

Once corruption is detected, there are four possible strategies for dealing with it: ignore it, locate and repair the corruption, recreate the data base by recovering the "raw" records and rebuild the index, or reload of the data base from a backup (archive plus incrementals) hoping that the corruption does not also exist in the backup (not very likely, unfortunately). It should be noted that rebuilding the data base using utilities that simply copy the data base (e.g., Eagle Software's Rebuilder utility) is not a solution. These utilities were designed to recover wasted space and/or reorder the records for faster sequential processing.

Before analyzing the strategies, let's review the three types of possible data base structures.

:STRUCTURES

A Type I structure is one where all the records are indexed by the same number of keys, and the keys are contained in the data record, preferably at fixed offsets.

A Type II structure is one where the records are indexed by a variable number of keys, and all the keys and the information necessary to determine which keys match a particular record are contained in the record, preferably at fixed offsets.

A Type III structure is one where there is insufficient information in the record to determine either which keys index the record, what those keys are, or what the partial record contains.

Complex data base designs can be broken

up into subset structures, each of which matches one of these three types.

Note that Type III structures have a "feature" that the logical consistency cannot be verified. This usually precludes their use except in trivially small data bases, or in data bases that have a short lifetime (hours or days). Responsible data base designs avoid this type of organization due to the impossibility of rebuilding the data base in the event of physical corruption. This is what led me to assert in my original paper that it is irresponsible in most cases to design a data base that does not store in the record all of the information needed for rebuilding the index structure. It's also what makes me scrupulously avoid the partial record facility unless the record is updated with the partial record information any time the partial record is changed.

Now, let's take a look at the possible methods for checking and correcting logical integrity.

:IN_PLACE

This method works on Type I and Type II structures. It is the slowest method, and requires the most programming, but requires no additional disk space. It can also be used while the data base is available to other users.

The method involves writing a series of programs, one per structure. Each program scans either all the records, or a range of records in its structure, using the primary keys. It checks for the presence of the proper inversions as each record is encountered. Then each of the inversions must be scanned and the check repeated. Records that fail the check can either be deleted and rewritten on the spot, or they can be reported for manual repair using the INQUIRE utility.

In order to be absolutely thorough, the program that scans by the primary key should build a data base of keys and feedback values, which then could be used in subsequent passes for detecting the case of two similar records, one keyed only by the primary key and the other keyed only by an alternate key. However, this slows the check considerably.

This method can be used while the data base is in use, provided that problems are reported, rather than being automatically fixed on the spot (e.g., the programs asks in each case if it should make the repair).

:FLAT_COMPARE

This method works on Type I and Type II structures. It is relatively efficient because

much of the work involves sequential files. However, it does require sufficient disk space to hold as many copies of all of the records as there are inversions. For example, 1 MB worth of records indexed by a primary key and two alternate keys will require 3 MB of disk space for the sequential files, unless you use tape to store the ones not currently being processed.

The technique involves using DG's SORT utility to build a series of sequential files of data records by scanning the primary key and all the alternate keys. The sequential files produced by scanning the alternate keys are then sorted by the primary key and compared to the sequential file produced by scanning the primary key.

For Type I structures, the structure is logically correct if all the sequential files are identical.

For Type II structures, the structure is logically correct if the differences between the sequential files correspond to the records that are indexed by a non-standard number of keys. You will probably need to write a small program for each sequential file to check for this.

Once you've identified an instance of corruption, you will need to use INQUIRE or a custom program to correct the error.

This technique can be used even while the data base is in use, but it is very disruptive to the real users of the data base. At worst, you may have to ignore the handful of records that were added while you were creating the sequential files.

:REBUILD

This method works for Type I and Type II structures. It's the fastest, but it can require the greatest amount of disk space, and it demands the exclusive use of the data base for as long as it takes to rebuild it. This method skips the checking function (it assumes you have reason to suspect corruption already) and simply forces integrity via a brute force rebuild of the data base. That means that this method is particularly applicable to data bases where the file is physically corrupt (i.e., a check utility would probably fail with a fatal error).

The method involves producing a series of sequential files, one for each structure, from the data base. This can be done either by using a custom version of the infamous POOH program to read the VOLxx files directly and produce the series of sequential files in a single pass, or by using a series of

sort macros, one for each structure, to build the sequential files. POOH is definitely quicker. (More on this later.)

Once the sequential files have been produced, then the data records are verified (you might have to write a program to do this) and records that don't belong in the data base are removed from the sequential files. Then the sequential files are reloaded into a fresh INFOS data base using some combination of IXLOAD, SORT, and custom programs, depending upon the structure. IXLOAD is the quickest by a long shot, but it only works for Type I structures. Type II structures require either SORT or a custom program, depending on whether you can use SORT imperatives to describe the determination of whether to invert a record by a particular key. If not, you have to resort to the more complex logic possible in a custom program.

When using IXLOAD to load records that have alternate keys, a total of two times the sequential file size is required (IXLOAD uses SORT to sort the sequential file in place for each alternate key), plus the space required by the INFOS data base. Input sequential files stored on tape can only be used if the records are indexed by a single key; otherwise, SORT will fail when it attempts to sort the file prior to writing each set of alternate keys.

The main disadvantage of this method is that the data base can't be used until the rebuild is completed. The main advantage is that three things are accomplished: logical integrity is achieved, wasted space is eliminated, and sequential processing is speeded up considerably (if you take care to reload the records in the order they are most frequently accessed during sequential processing). As a result, I tend to favor this method, even to the extent of avoiding Type II structures during design (because using SORT to reload the data base is much slower than IXLOAD).

:+METHOD+

Except for very simple data bases (simple ISAM, or ISAM with a fixed number of alternate keys), a combination of the above methods is usually required. This is especially true for large data bases (more than 100 MB). In these cases, I inevitably produce both a logical integrity checking utility *and* a set of SORT/IXLOAD macros for off-loading and on-loading the data records.

:TESTING

Whatever method or combination of methods you choose, it is imperative that you

thoroughly test the procedures and programs *before you need them*. This is best accomplished by building a test data base that reflects the structure of the real data base, but only contains a subset of the records. The IF RECORDCOUNT syntax in SORT is handy for extracting records from the real data base to build the subset test data base.

If producing the necessary software requires resources (time, money, manpower), the time to get the approval and do it is now. Just remind your boss of the fun everybody had the last time you lost the data base. If that doesn't work, try working up some statistics on how much money it could have (or did) cost the company.

:SUMMARY

Avoid Type III structures like the plague. If this means raising hell with an OEM who supplied you with a package that uses Type III structures without an integrity checker and recovery program, *do it!*

Demand integrity checking, correction, and rebuild utilities from application designers

who use INFOS data bases. To my mind, a data base application is incomplete unless it includes these utilities.

Test the recovery scenario under calm conditions before it is needed. This will eliminate the frantic calls I get at least once a month requesting copies of POOH by Federal Express.

If you want to see a copy of the POOH program (three pages of COBOL) and an example of a set of CLI macros to off-load and on-load a real data base, send me a self-addressed envelope with enough postage for a two-ounce letter.

:NEW_TOPIC

Goodbye, X25_LMGR. Hello, XTS.

X25_LMGR had the good grace to not become RESIDENT if the only links it had were MCA based. XTS does not.

For those of you with MCA-only XTS systems, you can safely change the process type of XTS to SWAPPABLE. Priority is a thornier problem though. I changed my XTS to SWAPPABLE 2, but for some reason I haven't

figured out yet, it seems to be stuck with a TSE of 6 even though it only uses 1 millisecond every 2 seconds when idle (unlike X25_LMGR, which was quiet when idle).

Unfortunately, the only way out of this (short of CLASP) is to change it to SWAPPABLE 1, which puts it above interactive processes at SWAPPABLE 2. That will cause disruptive effects on interactive processes at SWAPPABLE 2 when XTS consumes more than 10 percent of the processor, but will at least allow AOS/VS to scavenge some of XTS unused pages for the benefit of other more active processes.

Net-net: I recommend SWAPPABLE 1 for MCA-only XTS situations. Δ

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*SORT1 starts by
tearing the list of arguments apart and
calling itself until at last it calls itself with
only one argument*

It takes all sorts

**More clever uses for
the CLI, and a batch
of questions from—
and for—readers**

by Jim Siegman
Contributing Editor

This month I'd like to start by sharing something that Russ Allen sent me. Until recently, Russ worked for a large DG site in upstate New York, but he was among the casualties of a staff cutback. Just about the time he was getting the bad news, Russ sent me some of the macros he had developed; several of them are quite interesting.

He demonstrated a very interesting technique, for example, with his CAR.CLI macro. (I'm not sure what the letters stand for, but he says the macro is based on a LISP command of the same name.) Although not really used as a macro, it provides a way of stripping out the first item of a list for use inside a command like [!equal] that can't handle variable size argument lists.

CAR.CLI

```
% 1% &
A typical example of its use would be something like:
string [!explode [!read Do you want to continue]x]
[!equal,[car [!string]],Y
process__yes
[!else]
process__no
[!end]
```

Note that the string is guaranteed to have at least one character, because we added an "x" to the end of the [!read]. Using [car] will strip only the first letter of the response (since we [!exploded] it) and trash the rest. Thus the [!equal] has only the required two arguments.

Another example I found interesting was the SORT.CLI macro. This isn't your typical sort macro: it doesn't call the SORT.PR program, but instead uses CAR.CLI and others to sort a list of numeric arguments and print them in ascending order. Although this routine is not very efficient, it does work— and it shows what a little clever thought can do with the CLI. Note that changing the !ult and !ule would allow sorting alphanumeric data (i.e., words) into ASCII sequence.

SORT.CLI

```
string/k
sort1 % 1-%
string
```

SORT1.CLI

```
[!nequal,% 2%,]
% 0% % 2-%
[!end]
merge % 1%
```

MERGE.CLI

```
[!equal,[car [!string]],]
string % 1%
[!else]
var0 % 1%
inorder Y [!string]
[!end]
```

INORDER.CLI

```
[!nequal,% 2%,]
[!equal,% 1%,Y]
[!ult,[!var0],[car [!string]]]
string [!var0] [!string]
[!else]
string [!car [!string]]
inorder N % 3-%
[!end]
[!else]
[!ule,[!var0],% 2%]
string [!string] [!var0] % 2-%
[!else]
string [!string] % 2%
inorder N % 3-%
[!end]
[!else]
string [!string] [!var0]
[!end]
```

That's it. Very simple. SORT1 starts by tearing the list of arguments apart and calling itself until at last it calls itself with only one argument. At that point it starts the merge, which rebuilds the string one argument at a time (by adding it to the front of the string and calling INORDER, which inserts it into the proper position in the string).

I haven't tried this macro with a long list of numbers, but I imagine it probably is a real dog on resources (don't cancel your SORT/MERGE licenses yet). In the words of the originator himself, the macros used to sort are "examples of how to (ab)use the CLI. . ." Be that as it may, it still demonstrates a very interesting technique.

The cards and letter (yes, *letter*—only one so far) have started trickling in, so now I can really begin to operate this column as a forum. For those of you not familiar with the procedure, this is it:

- 1) Find the "Quick Connect" card in this issue.
- 2) Fill it out with your question, comment, etc.
- 3) Don't forget to include your name if you expect a reply.
- 4) Mail it.

The *Focus* editor will pass the card on to one or more of the columnists, or anybody else he feels might be able to help you. I will include what questions I can in this column so that other users who may have solved your problem can get in touch.

I can't personally provide answers to all of the questions, so we

will treat it as a challenge to the users group to provide our fellow users with the information they seek. If you can help, contact either me or the *Focus* editors, and we will pass the information along as is appropriate.

The first card is from Mary Hartsock. She writes: "I would like information on DG to IBM mainframe and microcomputer connections." Although the request could easily develop into a few books or a monthly magazine, I think I can suggest a few starting points. DG has a fair offering of software (RJE, HASP, etc.) to talk to the mainframe world, and microcomputer shops provide a lot of terminal packages.

The most powerful micro connection I've seen comes from Rational Data Systems (based in Corte Madera, CA). Their PC/VS network, PopTerm, and other software allow you to connect the PC (XT or AT) to your DG via local area network, do file transfer, become a terminal, or act as a standalone PC. Most of the software is memory resident and available with just a few keystrokes. However, if your needs are limited to occasional small volume file transfer, maybe BLAST (from Communications Research Group, Baton Rouge, LA) or Kermit (in public domain) is all you need.

The second request is from B. G. Redmon. He is looking for software to drive Tektronix 41XX terminals for MV/8000s and MV/20000s. Unigraphics II (from McDonnell Douglas Manufacturing Industry Systems Company—my employer) supports these terminals, but the drivers aren't sold separately. Does anyone out there know someone who can provide Mr. Redmon with a lead on Tektronics terminal drivers?

Finally, John Edwards writes: "We have just purchased an MV/20000 for an all VAX shop. We have Ethernet and are now trying to make them talk. Do you have any suggestions for file transfer? Is there an AOS/VS Kermit? Does anyone translate DDCMP to TCP/IP, etc.?"

I'd like to offer my personal congratulations on a good move. Check out the article by John Grant in the August issue of *Focus* ("VAX-inating your DG data," page 42). He has written a series of articles that you may find useful. He's also writing a Kermit for AOS/VS, which might be finished about the time this reply is published.

You might also want to get DEC to fix the bug that causes the network to crash under certain fairly common conditions. (I think it requires an engineering change order on the Ethernet controller and VMS 4.4)

As for DDCMP, TCP/IP, etc., I'll have to ask *Focus* readers for help. Is there anybody who has advice on this subject for Mr. Edwards?

Δ

Jim Siegman is chairman of the NADGUG publications committee, and treasurer of the Chicago Area Data General Users Group. Send comments or questions to him c/o Focus Magazine, 5332 Thunder Creek Road, suite 105, Austin, TX 78759-4022.

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Shared libraries

They add speed and reduce memory demands—and they're easier than inner rings

by Tim Maness
Contributing Editor

Last March I started getting interested in shared libraries, but I found that none of the compilers available at the time would support the concept. Since then there have been new releases of the Fortran 77, PL/1, and Pascal compilers, and all of them provide support for shared libraries. I've been doing some experimenting with them, and thought this would be a good time to share what I've found.

One of the challenges of software development is to get more mileage out of a system. This usually means adopting techniques that either use less memory or execute faster—or if you're really lucky, maybe both. My columns from February and March of this year described one such technique, the use of inner ring programs to allow processes to share code, thereby decreasing the total amount of memory usage.

AOS/VS shared libraries make it possible for processes executing different programs to share commonly used routines. Like inner ring programs, shared libraries will decrease memory requirements, but they are faster, because there is no gate crossing and no need to do Trojan horse pointer checking. When linking programs that call shared libraries, just the interface is used, not the actual code and data. This generally means that it takes less time to link, and the resulting programs are smaller. And because shared libraries are linked separately from the programs that use them, it isn't necessary to relink those programs when a change is made to a shared routine.

Figures 1 and 2 illustrate how memory would be used by three different processes that use the same three subroutines. Figure 1 shows the routines linked separately in each process, while Figure 2 shows the memory that could be saved if the three routines were linked into two shared libraries. The .PR file that references shared library routines, but

Figure 1: Processes with same subroutines linked separately

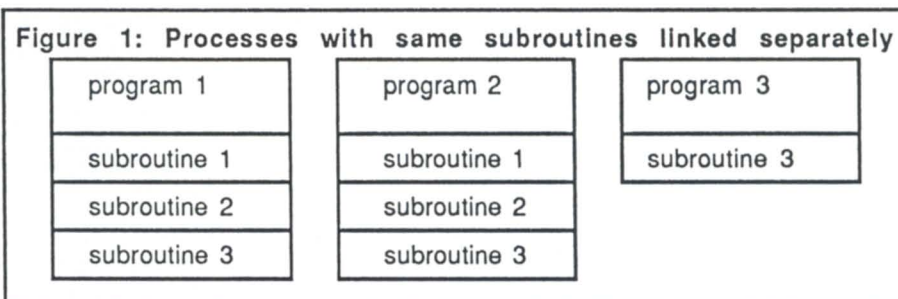
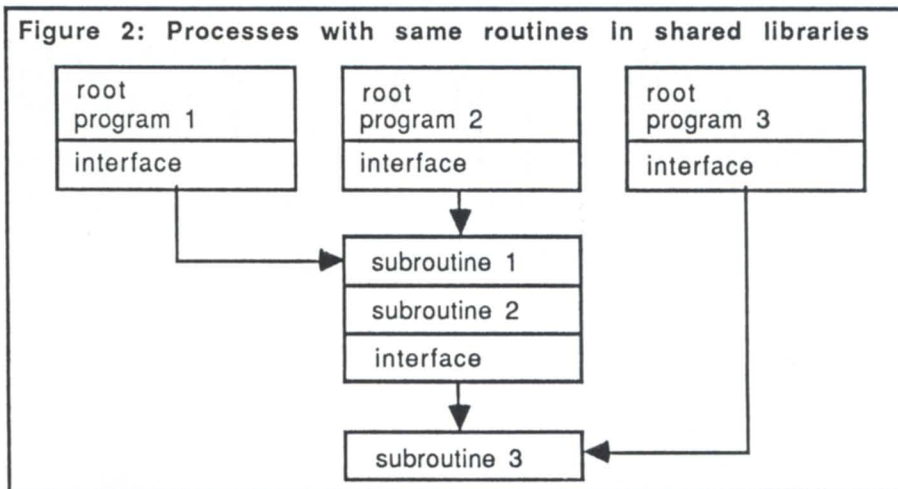


Figure 2: Processes with same routines in shared libraries



isn't part of a shared library itself, is called the "root program" or "root."

The following example illustrates the techniques used to build and use shared libraries. The root program TESTSL calls SL1__SUB1 and SL1__SUB2 both in shared library SHARED1. SL1__SUB2 calls SL2__SUB3 in shared library SHARED2. I'm assuming that all the routines are written in Fortran 77, but the techniques would be similar for other languages.

Shared library code must be *position independent*, which means that if you are referencing a value, you need to do it relative to the current program counter. Position-independent code is required because there is no way to tell in advance where the routine will be located in memory. To get position-independent code, the routines must be compiled with the /POSITION=INDEPENDENT switch. If you're writing in assembly language, you must use only program counter relative addressing.

We begin by defining shared library SHARED2, which will contain SL2__SUB3.

This is done by executing the SL__DEFINE utility (part of the AOS/VS Common Language Library tape) as follows:

```
) XEQ SL__DEFINE/LANG_RT SHARED2
  where SHARED2.SLE contains:
  SL2__SUB3
```

The /LANG_RT switch indicates routines that are part of the root program (and which will require the LANG_RT runtimes). This is always true if you're writing in a high-level language.

SL__DEFINE processes SHARED2.SLE and produces two files: SHARED2__SLD.OB and SHARED2__SLI.OB. The SLD file is the shared library definition file; it is linked with the .OB files that make up the library. The shared library interface file, SLI, is linked with a root program or shared library that can call shared library routines.

Once defined, the shared library, SHARED2.SL, can be created as follows:

```
) F77LINK/SL/O=SHARED2 SL2__SUB3
  SHARED2__SLD
```

Next, SHARED1 would be defined similarly:

```
) XEQ SL__DEFINE/LANG_RT SHARED1
```

where SHARED1.SLE contains:

```
SL1__SUB1
SL1__SUB2
```

SHARED1.SL is then built as follows:

```
) F77LINK/SL/O=SHARED1 SL1__SUB1
SL1__SUB2 SHARED2__SLI SHARED1__SLD
```

It was necessary to define SHARED2 first, so SHARED2__SLI.OB would be available when we created SHARED1.SL, because SL1__SUB2 calls a routine in SHARED2.SL.

With the shared libraries built, we create TESTSL.PR:

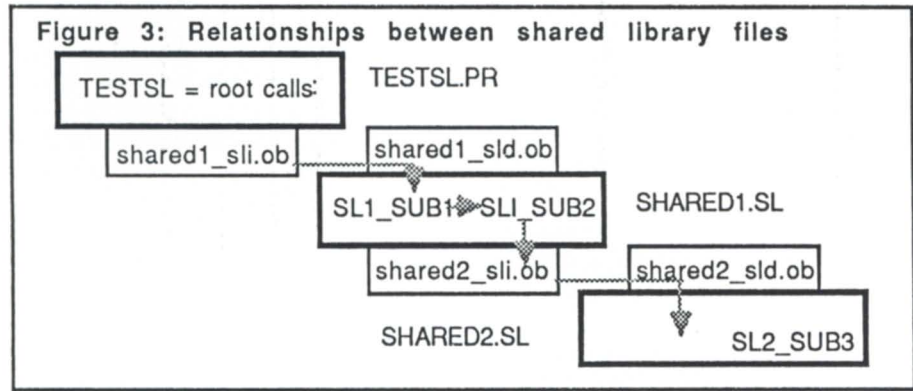
```
) F77LINK/ROOT TESTSL SHARED1__SLI
```

Figure 3 illustrates how the SLI and SLD files we just set up relate to one another. As routines in a shared library are called, the shared library loader, SL__LOADER.LB, loads the code into previously unused shared memory.

There are a few problems with the technique, however. SWAT doesn't support

You can get around this restriction with a little effort. Say, for example, we have several Fortran routines, some of which are in the root program and some in shared libraries. These routines use named commons to share global data values. Write the contents of the common areas to a file, then have the root program call a routine that does a shared open and shared read to load the data into the common. Then call routines in each of the shared libraries to do the same shared open and shared read before any other routines in the libraries are used. This shared open and shared read will cause common areas in the root program and the shared libraries to have the same location in memory.

Shared libraries are a very useful construct for decreasing total memory requirements when several processes use the same underlying routines. In addition to user created shared libraries, there are switches that allow any combination of shared or unshared



shared libraries, and it's very painful using the debugger, DEBUG, to figure out where the routines actually are in memory, to set break points, etc. For the present, it's better when debugging to link things as though there are no shared libraries. For our example:

```
) F77LINK TESTSL SL1__SUB1 SL1__SUB2
SL2__SUB3
```

This means that problems that result from the placement of a routine in a shared library will be hard to track down.

Routines in shared libraries can have their own unshared area, but they cannot directly access static external data in the root or other shared libraries. Parameter passing is the only way to communicate with shared library routines.

LANG_RT and shared or unshared language-specific runtime routines.

I ran the same test described in the March 86 article to compare times for calling a routine 100,000 times in ring 7 (883 ms), ring 6 using the inner ring technique (1842 ms), and in ring 7 as a shared routine (974 ms). To save memory, the shared library technique is clearly much faster than using inner rings to share code. Δ

Tim Maness is president of DMS Systems, Inc., a software development firm specializing in data base management. He can be reached at 1111 Brickyard Rd., Salt Lake City, UT 84106; 801/484-3333.

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DISCOS discovered

Does it really answer the wish for multi-ground RDOS?

by Tim Boyer
Contributing Editor

Now *this* is the life. I'm doing a rough draft of this article on one terminal. My ICOBOL system is up in the background. On another terminal, I'm running a BBASIC version of backgammon. The two terminals in billing are doing compiles, and I'm using CRTEDIT to correct a problem on another tube.

No, I haven't gone crazy, and no, I'm not running AOS. What I *am* doing is testing DISCOS.

A little background may be in order. About a year ago, I wrote an article on what I thought was the RDOS users' wish list. Chief among those wishes was a multi-ground RDOS.

Soon after, I received a call from a— well, not irate, but rather perturbed—Ira Ellenbogen. It seems that his company, Nanosecond Systems, has been selling a multi-ground RDOS for some years now, and he wanted to know how many grounds I wanted. Were 16 enough? When would the check be in the mail?

Ira is rather disturbed about the state of RDOS packages in the marketplace. He feels, and I agree, that there are hundreds of software offerings out there that could be useful to RDOS people, but are either underpublicized or have been put on a back shelf in favor of the AOS{/VS} versions. It's kind of like CP/M software, which for years was the standard.

There are still many, many machines out there running CP/M, and there must be literally tens of thousands of software packages available for that venerable operating system. But when was the last time you saw *Infoworld* review a program that runs under CP/M?

Now, I fully realize that, like MS-DOS in the PC marketplace, the Data General soft-

ware market is driven by AOS{/VS}, and certainly not RDOS. But what happened to the software that was out there when RDOS was *the* operating system? And where are all of the packages for DG/RDOS?

Anyway, back to DISCOS. I explained to Ira that my RDOS wish list was a generalized list made up of comments I had heard from other users. I really don't need multi-ground RDOS at this point—being a one-man shop means that you never get kicked off of the foreground. I added that I would love to do a review of DISCOS, if only to inform people that there are alternatives to moving to AOS{/VS}.

So here it is—my first product review. I hope that it won't be my last—if you have a product for the RDOS market, give me a call.

DISCOS comes with its own RDOS-like SYSGEN with some additional questions. It also has its own CLI, with commands to handle multiple grounds. Other than that, your RDOS programs should run without modification in any ground. During SYSGEN time you may specify up to 16 terminals as consoles, that is, additional grounds.

In the SYSGEN, you are asked how many grounds you will be using—4 to 16. You then need to specify, as you did for foreground and background, how many channels each of those grounds will use. It will then ask you how many consoles you want. You don't need to have a terminal for each ground (for example, you might want to run a dedicated communications program in one ground that needs no terminal I/O). For each console, DISCOS then asks if it is on a mux line, and if so, which line.

Once the system is generated and booted, you can begin running multiple grounds. There is a specialized version of the CLI with some additional commands to support running more than two grounds. BMEM works like SMEM, except you can specify which ground you wish to assign memory to. For example, BMEM 3 40 would assign 40 pages (80 KB) of memory to ground 3. EXBG starts a program executing in the ground, as in EXBG 3 CLI. And AGND aborts a particular ground.

If a particular mux line isn't used by a console, it behaves as it normally would. In my

case, I used three terminals for grounds and left the rest alone. I booted the system and executed CLI in the three grounds.

What a delight it was to run around the office and see three R prompts!

I then brought up ICOBOL, and the rest of my terminals came up with the log-on screen. Even with the three additional grounds eating up memory, there did not seem to be an appreciable slowdown in response time. We ran like this for a few days, and didn't have any problems. I could bring up the runtime system from any ground to which I'd assigned enough memory, and it would run just fine.

Since I don't have another multi-ground RDOS lying around the office, I won't be able to provide any benchmarks with comparable products. My only option is to compare DISCOS to RDOS itself.

I compiled a 2,500-line program in DISCOS, and then compiled the same program in RDOS foreground with the same amount of memory (80 KB). The program compiled in DISCOS in 6:05, and in RDOS in 6:09. I then gave each ground 100 pages (200 KB) of memory and tried again. With the additional memory, RDOS compiled the program in 1:52, or more than three times as fast. DISCOS, however, surprised me. It compiled the same program in 1:31—23 percent faster than RDOS!

Lesson Number One: ICOBOL will run in a very small amount of memory, but can use just about all you can give it. If you plan to do multi-ground compiles, be sure to give each ground plenty of memory.

Imagine how useful this would be for a systems developer—two or three terminals running ICOBOL to test the code, one being used by WordPerfect, and the rest being used by programmers. There would be no bringing the system down to write code, or buying multiple desktops so more than two people can write at once, or (shudder) writing code in ICEDIT!

Even if you're not a system developer, have you ever had to kick a programmer off of the foreground so you could use BLAST to get a file in? Or had two people standing in line to change two different programs, and



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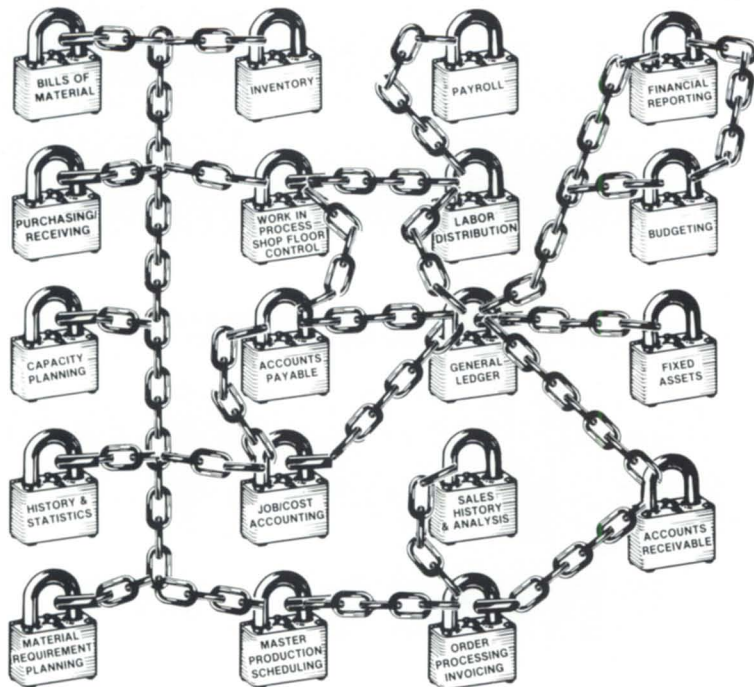
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*Although DISCOS works very well
with ICOBOL,
it was obviously not written for
that purpose*

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you couldn't afford to bring the system down to give each one a ground? Or wanted to run word processing at the same time someone was doing a compile?

In addition to the questions about other grounds, some other nice changes have been made to SYSGEN. DISCOS allows up to 992 KW to be used as high-speed RAM disk. It also allows for disk caching, shared user overlays, and inter-ground messages. To give you a little more control over your console I/O, the DISCOS SYSGEN allows you to specify the console input, output, and buffer sizes.

Besides multi-ground capability, DISCOS comes with some very useful utilities:

SPOOLER is able to take print jobs from different grounds and put them into a queue for later printing. This would become a necessity when you have 16 or so programmers all trying to print program listings at the same time.

EMONITOR tells you which directories and subdirectories a particular ground is using, how much memory the ground has been assigned, how much it is using, how many channels the ground has available and in use, which printer the ground is assigned to—in short, everything necessary to tune your DISCOS operating system to meet your particular needs and make the maximum use of your configuration.

TS.SV is a tape duplication program; it will copy tapes to a disk file for later duplication. I tried this with a diagnostics tape.

Diagnostics tapes are a pain to duplicate. They have variable-length records, which means that XFER can't handle them. I have a duplication program that I wrote in BBASIC, but, considering the state of my skills in BBASIC, it's slow, unfriendly, and I don't completely trust it. Using the TS utility is *much* easier.

Although DISCOS works very well with ICOBOL, it was obviously not written for that purpose. If you're running Fortran or assembler on your system, you'll get more use out of the supplied programs than I ever will. The documentation lists 14 new system calls, which I hope I'll never need to learn.

The release tape comes with the source

code of many of the utility programs—all written in Fortran or assembler. I have no idea what CHANNELS.FR is supposed to do, and I'm afraid to even *look* at BOOM.SR—I'm afraid it will detonate my terminals or something.

The only major criticism I have for DISCOS is the documentation. It reads like something that I would have written—and that isn't a compliment. Most of the information that you need to run DISCOS is in the documentation—somewhere. There are eight or nine different documentation files, and from their names only a few are immediately recognizable as documentation.

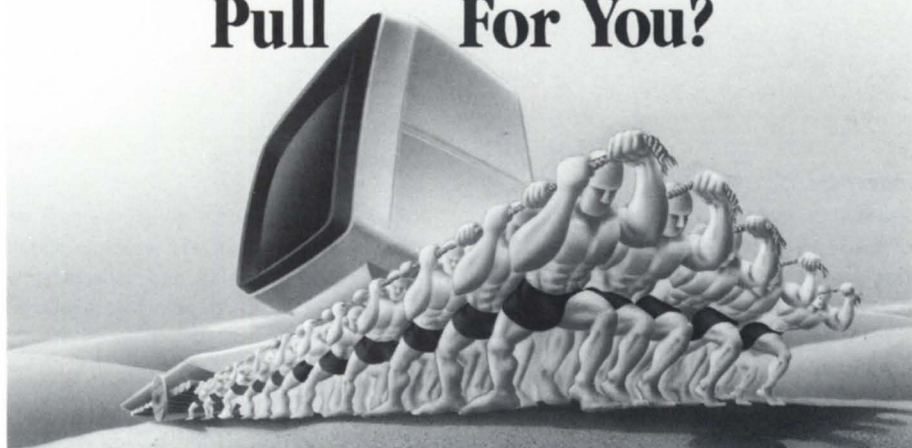
DISCOSDOC.01 through .03 were obviously parts I had to read. The rest of the documentation is hidden in files like QUESTIONS and XMTREC.DC. With different information in different files, there is obviously no table of contents, and to find anything you have to flip through fifty-odd pages of rather technical documentation. In short, if you aren't completely sure of what you're doing, buy DISCOS from your OEM and hand him or her any installation headaches.

All in all, however, I'm very pleased with the way DISCOS works. It's fast, compatible, and works as advertised. It comes with new features for the operating system that are worth buying even if it didn't have multi-terminal capability, and includes enough utilities to make running it easy. If you need to have more than one ground, this is definitely a product to consider. It sure is easier than converting to AOS!

DISCOS is available from Nanosecond Systems, P.O. Box 81, 313 4th Street, Woodland, CA 95695; 916/662-4334. The single-copy price depends on configuration, ranging from \$2,000 on a desktop to \$5,000 on an Eclipse. Δ

Tim Boyer is EDP manager at Denman Rubber Mfg. Co. and president of the Northern Ohio Data General Users Association. He may be reached at P.O. Box 951, Warren, OH 44482; 216/898-2711 or on the NADGUG bulletin board at 415/924-3652.

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(from page 22)

assembly language, I converted the F5 version of GET__SWITCHES to 16-bit assembler first (what a masochist!). After testing, I then converted it to 32-bit assembler (about 2,500 lines, of which more than half are comments!).

But wait, you say, "Why convert to 32-bit assembler? Can't 16-bit code co-exist with 32-bit code?" Not a chance! The 16- and 32-bit calling sequences use completely different stacks, and all 16-bit instructions (like JMP) that reference addresses are constrained to operate within the lower 64 KB of the address space. I now have three working versions of this routine: Fortran 5, and 16- and 32-bit assembler.

/3/D/F77 GET__SWITCHES/Coding example

I use GET__SWITCHES in hundreds of application programs, and it works like a charm. It is difficult to fully appreciate the

usefulness of this routine without using it and seeing it in operation. An example should illustrate the flexibility and robustness of GET__SWITCHES. Figure 3 shows how I would have coded the switches in the AOS{VS} DISPLAY utility.

Note that I have selected variable names and usage for the convenience of coding (LIST, SHOW__TEXT, etc.), rather than to match the switch name. You can always add code to change the state of the result to match the sense of the switch name.

If DISPLAY was coded as in Figure 3, then GET__SWITCHES would list the following error messages:

```
) X DISPLAY/XYZ
```

```
Error: unrecognized switch: /XYZ
```

```
Valid switch names are:
```

```
/ALL
```

```
/APPEND
```

```
/BYTE
```

```
/CONVERT
```

```
/DECIMAL
```

```
/FIRST=integer
```

```
/HEXADECIMAL
```

```
/IGNORE
```

```
/INCREMENT=integer
```

```
/IPHYSICALEOT
```

```
/L<=filename>
```

```
/LAST=integer
```

```
/LISTUDA
```

```
/NOLIST
```

```
/NUMERICONLY
```

```
/OBLOCKSIZE=integer
```

```
/ODENSITY=filename
```

```
/TEXTONLY
```

```
/UPPERCASE
```

```
/WIDTH=integer
```

```
) X DISPLAY ABC/XYZ
```

```
Error: argument 1 does not accept switches
```

```
) X DISPLAY/I
```

```
Error: switch not unique: /I
```

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• General Ledger	X	X	• Custom Software
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possibilities are:

- /IGNORE
- /INCREMENT=integer
- /IPHYSICALEOT

) X DISPLAY/OBLOC

Error: switch requires a character value:
/OBLOC

) X DISPLAY/FIRST

Error: switch requires a numeric value:
/FIRST

) X DISPLAY/FIRST=XYZ

Error: switch requires a numeric value:
/FIRST=XYZ

) X DISPLAY/

Error: zero-length switch: /

) X DISPLAY/FIRST=

Error: zero-length switch value: /FIRST=

) X DISPLAY ABC ZZZ/XYZ

Error: argument 2 does not accept switches

/3/E/FREE/Almost

This routine is coded in 32-bit assembler and conforms to the VS External Calling Sequence. I am prepared to make this routine available *free* to anyone who wants it. Just send me a tape; GET_SWITCHES and a Fortran 77 demonstration program will be yours. You may use it in your application programs, *but it may not be sold or used for commercial purposes*. I would be especially interested in hearing from developers at Data General—I think it would make a great system call—one that would provide a common interface to all user and DG application programs and utilities.

By the way, there is no point in sending an empty tape. . . I only have a few games and I would appreciate receiving some more (no BASIC, please; just AOS/VS .PR files). I also would be interested in sources for complex and fast arcade-type games, so I can see how it's done (i.e., multi-tasking, linked lists, etc.). Δ

Geological Survey of Canada Contribution 27686. Copyright © 1986, John A. Grant. All rights reserved. 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; 613/996-2325.

Allen-Bradley, DG form team for IA network products

Englewood, CO—Data General has joined with Allen-Bradley Company, Inc. in an independent hardware vendor agreement, and the two companies will jointly market Allen-Bradley's network products for the industrial automation market.

DG and Allen-Bradley will jointly sell and support hardware and software to allow DG users to communicate with Allen-Bradley's PLC-2 and PLC-3 programmable controller families running on Allen-Bradley's Data Highway local area network. The interface consists of a software driver and an RS-232-C Data Highway interface unit. Data General will sell and support the software driver, and Allen-Bradley will sell and support the interface unit. The companies say they will cooperate on sales opportunities over a wide range of industries.

The companies also will coordinate marketing of Data General computer equipment and Allen-Bradley's VistaMAP local area network, which is compatible with the Manufacturing Automation Protocol (MAP).

"A user's initial implementation of a MAP network and MAP technologies can be greatly simplified by an arrangement such as this," said Don McDougall, vice president of DG's industry marketing division.

The products covered by the agreement address two layers of MAP as defined by the Open Systems Interconnection reference model of the International Standards Organization. The layers are the physical and the data link layers, which define the electrical signals that establish, maintain, and deactivate the data connection. Additional Allen-Bradley software links network addresses with physical addresses and provides end-to-end message delivery.

The VistaMAP products covered by the agreement are:

- The Network Management Unit/Network Management Software, which provide name directory service, clock synchronization, and network diagnostics.
- The Head-end Remodulator, which receives and retransmits data over an IEEE 802.4 network.
- The Network Interface Unit, which links terminals, computers, intelligent machines, and other programmable devices to a MAP-compliant token bus broadband network via an RS-232-C asynchronous connection.
- The Bridge/Half Bridge, which can connect two broadband networks or Ethernet baseband subnetworks.

"Data General also has chosen Allen-Bradley to be a key vendor for broadband and carrier band modems on Data General's MAP interface board, scheduled to be available in 1987," McDougall said. "In addition, the companies will cooperate on MAP broadband design and installation through a contract now under negotiation for the services of Allen-

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Bradley's Communication division. . . . Allen-Bradley's capabilities to provide carrier band modems as well as broadband modems, coupled with their overall presence in the lower layers of plant automation, combine well with Data General's strengths at the upper layers.''

Intercon releases OFFICE/Publisher 1.20

Rochester, NY—Intercon Associates, Inc., announces a new release of its OFFICE/Publisher software publishing system for use with Data General's CEO.

According to the company, OFFICE/Publisher produces high graphic arts quality laser printer and phototypesetter output, with the ease and flexibility of CEO word processing; it was designed to eliminate the long learning period required by most typesetting and document preparation systems.

Enhancements to Release 1.20 include:

- Ability to control leading at any point in the document;
- Ability for a user to have multiple jobs published simultaneously;
- Multiple typographic style sheets for users or jobs, with the ability to restrict certain users or jobs to a particular style sheet;
- Ability to publish tables without headers;
- Ability to draw boxes;
- More aesthetically pleasing pagination, as a result of improved pagination logic.

List prices begin at \$5,000, depending on CPU size. Every current OFFICE/Publisher user as of August 1986 should already have been provided the new release.

OFFICE/Publisher runs on the Data General MV/ family of 32-bit minicomputers and requires CEO running under the AOS/VS operating system.

Intercon Associates, Inc., 1580 Emerson St., Rochester, NY 14606; 716/458-0860. Δ

Apogee introduces telemarketing software

Marlboro, MA—Apogee Systems, Inc. introduces the Prospector Telemarketing System for use on Data General's 32-bit line of computers. Prospector is designed to simplify and organize telemarketing operations, and increase selling time.

Prospector has three main features:

- It handles outbound and inbound telemarketing without requiring a change of programs. For outbound calls, Prospector searches the selected data base for prospects that fit pre-set qualifications, such as zip code range and SIC code. The appropriate script automatically appears on the screen along with the prospect data. Once the call is completed, the telephone sales representative (TSR) is alerted if there are any inbound calls to be answered.

- It has been designed to require minimum training time.

- It offers a "Management Window" that allows management to monitor any TSR's screen activity at the same time he or she is making a sales call. Management can also view the productivity of all TSRs in real-time:

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attempted and completed calls and sales.

The product allows for the development of multiple sales scripts, helping target the sales pitch according to the product or the prospect. The system also provides automatic scheduling and reminders of follow-ups: recalls, mailings, and appointments.

Options include interfacing to automatic call distributors, autodialing with voice sensing, and a module for handling fulfillment and direct response cards. The system is available in various configurations and can be customized and interfaced according to the needs of the telemarketer. Prospector interfaces with several word processing, reporting, spreadsheet, and modeling programs; it can service from 1 to 1,000 users.

Apogee Systems, Inc., 60 Brigham Street, Marlboro, MA 07152; 617/481-9339. Δ

MathPlan integrates Trendview graphics

Orem, UT—WordPerfect Corporation's

Data General product division has released MathPlan 2.11, an updated version of their spreadsheet package that integrates Data General's Trendview graphics. This will expand MathPlan's character-mapped graphics to offer options ranging from three-dimensional and shaded graphs to exploded pie charts.

Gene Bergman, marketing manager for DG products for WordPerfect, said, "With this integration, Trendview essentially becomes an invisible part of MathPlan, and the two programs function as one."

For an MV/4000, the price of MathPlan is \$2,000, and adding Trendview costs another \$320. Prices for MathPlan 2.11 on 32-bit systems range from \$1,200 (MV/2000) DC) to \$4,000 (MV/20000). The price to update previous revs of MathPlan is \$100. Trendview must be purchased separately from Data General.

WordPerfect Corporation, 266 West Center Street, Orem, UT 84057; 801/227-4000. Δ

Alternative memory for MV/4000, /10000, and S/280

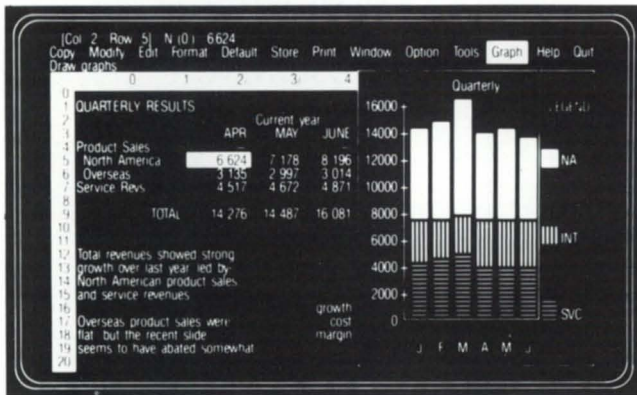
Orange, CA—Computer Technology Inc. announces the development of the MVM1 memory, an alternative memory designed for DG's MV/4000, MV/10000, and S/280.

The MVM1 is available in 2 MB, 4 MB, 6 MB, and 8 MB versions. According to the vendor, this memory is fully compatible with that of Data General and requires no hardware or software modifications. The use of 256 KB RAMs on a six-layer board allows up to 8 MB of memory per board.

Addressing can begin on any multiple of 2 MB in any available memory slot. This feature allows the board to be easily added to existing DG memory. No other changes to the existing hardware are required.

The MVM1 is compatible with DG's diagnostic programs. If a problem with the system occurs, the MVM1 can be eliminated as

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a source by means of the enable/disable switch.

Prices for single quantities are \$4,800 for 2 MB, \$7,200 for 4 MB, \$9,600 for 6 MB, and \$12,000 for 8 MB.

Volume discounts are available along with a 30-day trial period. Delivery is a maximum of 30 days ARO, although most often it can be made from stock. Leasing terms are also available.

The MVM1 is fully compatible with systems equipped with battery backup. When operating in backup mode, it will not exceed the current drawn by comparable DG memory. The product supports the error correction feature standard on the MV/4000, MV/10000, and S/280.

Computer Technology Inc., 1422 W. Collins Ave., Unit B, Orange, CA 92667; 714/538-2344. Δ

Free bitstream fonts for SAS/Graph users

Cary, NC—SAS Institute, Inc. has signed

an agreement with Bitstream Inc., Cambridge, MA, to distribute Bitstream typefaces to SAS Institute customers. The Institute will pay over \$250,000 for the collection of typographic fonts, which will be made available at no additional charge to SAS/Graph software customers. The Institute plans to include the fonts in a 1987 release of SAS/Graph software.

Bitstream's computer-generated fonts are high-resolution descriptions of letters in straight lines and segments of arcs, which are independent of equipment or size. They will add professional typeset-quality fonts to the presentation graphics capabilities already available in SAS/Graph software.

SAS/Graph software provides tools for device-intelligent information and presentation color graphics. The software produces charts, plots, and maps in a variety of patterns and in up to 256 colors. The graphs can be annotated and more than one may be displayed on a single page. SAS/Graph software supports most graphics terminals and plotters, and runs on DG Eclipse MV/ family machines with AOS/VS.

First-year corporate fees range from \$1,500 to \$10,000 for SAS/Graph software, depending on machine classification. Renewals are available at lower rates. To use the software, sites first need to install base SAS software, a data management, analysis, and report writing tool.

SAS Institute Inc., Box 8000, SAS Circle, Cary, NC 27511-8000; 919/467-8000. Δ

Optical disk subsystem stores a gigabyte

Southboro, MA—Data General's special systems group has introduced an optical disk subsystem designed specifically for DG computer systems and targeted at applications requiring the long term storage of permanent records.

The new 1 gigabyte optical disk subsystem (Model 50700D) is a compact, rack-mounted unit that uses easy-to-handle 12-inch remov-

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able disk media. Using WORM (write once/read many) laser technology, it is best suited for large scale archival applications.

"The optical disk subsystem is particularly useful in medical, data archiving, financial, image processing, and other environments requiring high-capacity, long term data storage," said Pete Roche, product manager for peripherals with the special systems group. "The optical disk is also a practical solution where access to large data bases is needed."

The average data transfer rate for the Model 50700D is 300 KB per second for read operations, and 100 KB per second for writing. It connects to Data General computer systems via the data channel (DCH) or burst multiplexor channel (BMC). The drive interfaces to the CPU-resident controller through a standard SCSI interface.

Supported on MV/ family machines running AOS/VS, the optical disk subsystem includes an optical disk drive, controller, external cabling, and power supply. Priced at \$29,995, it is available 60 days ARO. Δ

MV users can run PC software

Berkeley, CA—Virtual Microsystems, Inc. (VMI), is offering the Bridge System, designed to make data used on IBM PCs compatible with data on MVs. It also permits the offloading of MVs, allowing them to support more users.

VMI's Bridge System installs on an MV/ family system and allows users to run IBM PC software from any terminal on the system. Just as a Dasher user selects an application from a CEO menu, users can select PC programs such as Lotus 1-2-3 or dBase III.

Both hardware and software, the Bridge acts much like a PC LAN internal for the MV. The software runs on AOS/VS and provides utilities essential to Bridge operations. The utilities include the ability to store PC programs and files—virtual disks—on the large hard disks of the MV. AOS/VS can back up, date and time stamp, set privilege security,

send over a network, and print the IBM PC programs and data stored on the MV.

The Bridge includes an 86-board, which has four 8086 microprocessors and four megabytes of RAM (1 megabyte per processor). Each board is designed to emulate four very fast IBM PC XT's. The board installs onto the Nova bus of the MV. To run PC programs from their Dashers, users attach to these processors (on a first-come, first-served basis), download MS-DOS 3.1 and the PC program of choice into RAM, and execute the program by typing Bridge at the AOS/VS prompt, followed by the program name at the MS-DOS prompt.

The Bridge system offers MV users access to the largest software library in existence—the software for PC/MS-DOS. The Bridge's coprocessor board also reduces the problem of system loading because the MV is used primarily for disk access and terminal I/O.

Virtual Microsystems, Inc., 2150 Shattuck Ave., Suite 300, Berkeley, CA 94704; 415/841-9595. Δ

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CIPHER 910 Tape Drive (800/1600 BPI) .	1,950
CIPHER 920 Tape Drive	2,400
Kennedy 9300 TE/NRZI, 125 ips	2,800
STC 1953 Tridensity w/Formatter	8,500

PRINTERS/CRTs for DG

Centronics 1200LPM Band Printer	\$10,500
Dataproducts B600 600LPM Printer	3,750
Dataproducts B900 900LPM Printer	4,995
DG 4215 600LPM Drum	1,995
DG 4244 900LPM Drum Printer	2,995
DG 4325 300LPM Band Printer	2,295
DG 4434 Multifunction Slave Printer	395
DG 6193 TP2 Printer, RO	1,200
DG 6194 TP2 Printer w/Keyboard	1,295
Okidata SL 160, 160LPM	795
Printronix P300	2,200
Trilog T100 300LPM Printer	1,450
DG 6108 D200 CRT	350
DG 6166 D410 w/Keyboard	750
DG 6167 D460 w/Keyboard	945
DG 6169 D211 w/Keyboard	595

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DG 4257 ALM-16	950
DG 4340 AMI-8 w/Cable Set	1,095
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DG 4370 IAC-16 w/TCB	4,495
DG 4463 USAM 4 (Desktop MUX)	695
ZETACO 400 (8 Lines of ULM5 Emulation)	400

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• all equipment subject to prior sale. •

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Company	Page No.	R.S. No.	Company	Page No.	R.S. No.
Access Technology	55	1	IMSL, Inc.	59	-
Alpha-Kenco Inc.	27	2	Intercon Associates, Inc.	51	22
Ames Sciences, Inc.	57	3	International Computing Systems	20	23
Applied Computer Solutions	59	-	Jacobsen & Associates, Inc.	48	24
Axonix Corporation	50	4	JTW Computer Systems	10	25
Capitol Temptrol Corporation	59	-	Lions Gate Software Inc.	37	26
Catalina Computers, Inc.	1	5	McIntyre's Mini-Computer Sales Group	35	27
CMS/DATA	59	-	MICOM Computer Systems	C3	28
Cognos	13	6	Minicomputer Exchange	58	29
Cognos	15	6	Multivac System Consultants	53	30
Cognos	17	6	Nanosecond Systems, Inc.	59	-
Cognos	19	6	Newman Computer Exchange Inc.	16	31
Cognos	21	6	NPA Systems Inc.	47	32
Commercial Data Systems Corporation	52	7	Oracle	7	-
Commercial Data Systems Corporation	57	8	Peridata International	43	33
Comptek Ltd.	56	9	Program Systems, Inc.	56	34
Computer Engineering Associates	41	10	Rational Data Systems	45	35
Computer Wholesalers, Inc.	52	11	Rhintek, Inc.	10	36
Copley Systems	C4	12	R.J. & Associates, Inc.	34	37
Copley Systems	9	13	Security Computer Sales, Inc.	23	38
CS Laboratories, Inc.	5	14	Spectra Logic	24	39
DEMOS, INC.	45	15	Sysgen Data Ltd.	49	40
Diplomat Systems Corporation	C2	16	:SYSMGR	56	41
DMS Systems, Inc.	11	17	TRI-DATA Services Inc.	10	42
DMS Systems, Inc.	57	18	WordPerfect Corporation	3	43
Eagle Software	54	19	Xyrtin Xolutions, Inc.	53	44
Essex Computer Service, Inc.	49	20	Zetaco	38	45
Hanson Data Systems, Inc.	14	21			

(from page 17)

- Question and answer discussions (the format will be similar to that used at the Conference 86 CEO workshop)
- Talks by personnel from Data General's staffs for CEO development, software support, and documentation.

Attendees who would like to share any of their company's documentation, publications, or ideas, are asked to send "photocopy ready" materials along with their registration form and fee. (See the registration form on page 16.)

Workshop fees are \$75 for OASIS members and \$100 for nonmembers (includes a one-year membership). There is an additional \$25 fee for registrations after November 15 and for on-site registration. Workshop fees include luncheons and snacks on both days, plus a special welcome reception Thursday evening. Send the registration form and your check, payable to OASIS, to Wesley Thomas, OASIS treasurer, 903 South Hampton Road, Columbus, OH 43227.

Hotel accommodations are available at a

reduced rate of \$72/single at the Old Mill Inn, 202 North Maple Avenue, Bernardsville, NJ; 201/221-1100. Attendees must make their own hotel arrangements. When making reservations at the Old Mill Inn, identify yourself as a member of the "Beneficial group" to get the special rate.

For more information, Contact Charlene Kirian, OASIS president, at 614/764-6435; or Bobbie Pressman, OASIS vice president, at 312/948-7272. Δ

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After eight years of litigation, the Fairchild case is finally settled. The case grew from DG's policy of restricting licenses of its RDOS operating system to sites that had purchased a minimum configuration of Nova hardware—a practice that Fairchild's lawyers successfully argued was an unfair exercise of market power. In August, a U.S. District Court judge had settled the last legal question by enjoining DG from tying the licensing of RDOS to sales of Nova hardware.

Although the legal questions had been settled, DG still faced the prospect of years of legal expenses while lawyers argued about the amount of damages Fairchild and other manufacturers of Nova-compatible CPUs could claim. The company decided it would be better to put the suit behind it. The terms of the settlement call for Data General to pay the claimants \$52.5 million. This will amount to an after-tax charge of \$29.4 million (about \$1.10 per share) against DG's earnings.

Computasia, a subsidiary of Hong Kong Telephone, will provide two computerized telephone directory inquiry systems to Jabatan Telekom Malaysia. The contract was arranged through the General Telephone Directory Company (Malaysia), an affiliate of GTE Directories Corporation, U.S.A.

Called "Pantas," the project includes two MV/8000 systems to be installed in Kuala Lumpur in early 1987 to provide telephone directory service to the Malaysian peninsula. Two MV/7800 systems will be added in Kota Kinabalu, Sabah, at the end of 1987 to extend the service to Sabah and Sarawak.

Computasia will provide the software, consulting, training, and installation. The company recently installed similar systems in Thailand and Indonesia. The Computasia software includes multi-language capability, on-line directory updates, directory inquiry, directory typesetting, and electronic directory access through Viewdata.

A recent study published in the *Journal of the American Optometric Association* says older workers using video display terminals may be better off with progressive addition lenses ("invisible bifocals") than with conventional multifocals or reading glasses.

Because VDTs are usually viewed at a distance of 21 inches, rather than the normal reading distance of 16 inches, vision correction for intermediate distance viewing is helpful. Workers in the study preferred progressive addition lenses or reading glasses with a prescription for intermediate seeing distance on top and a near vision prescription on the bottom.

Cognos Corporation opened its ninth European sales and service office in Frankfurt in October. According to James Cluchy, Cognos' general manager for Europe, the Frankfurt office will generate more than \$1 million in sales in its first year.

Cognos also chartered a new federal sales district to focus on marketing to the U.S. government. The new sales district will operate out of the company's McLean, Virginia, office.

DG scheduled the opening of its new education center in midtown Manhattan on October 20. The center will offer regularly scheduled classes on DG software products.

To help bring down the cost of training, DG educational services has also negotiated travel discount programs with leading U.S. airlines, hotels, and car rental agencies. Discounts of up to 50 percent are available from major airlines. After registering for a class or seminar, students can call DG corporate travel to make travel arrangements.

Computer Associates International, Inc. and Data General have joined in a new ISV-plus agreement that expands the previous independent software vendor arrangement between the two companies. Customers can now buy CAI's financial, distribution, and administrative software directly from DG when they purchase their computer systems. Product service and support will be available only through CAI, however.

CAI also began trading its stock on the New York Stock Exchange in mid-September, under the ticker symbol "CA." The stock was formerly traded over the counter on the NASDAQ market system. CAI's revenues last year were \$191 million, with reported net income of \$18.5 million.

Zetaco, Inc. recently announced that Richard D. Clasen has joined the company as vice president of marketing and sales. Clasen worked for Control Data Corporation for the last 19 years in various capacities worldwide. Clasen will direct marketing and sales of Zetaco's DG-compatible peripheral controllers, and disk and tape subsystems.

When the Innova manufacturers' showroom facility opened in Houston, Data General was there with a permanent exhibit of electronic office solutions. Innova, "the workplace of tomorrow today," contains a 66-foot environmental time wall tracing the history of office automation, and a 12-minute multimedia presentation on office integration. In the "technology lab" portion of the Innova office, DG demonstrates its complete line of workstations and office automation software.

The exhibit includes two MV/4000 DCs, a D555 terminal running CEO and voice mail, a DS/7540 workstation running TEO/3D, a Dasher/One running CEO Connection and CEO's calendar function, and a DG/One Model 2 demonstrating CEO Connection and CEOWrite. "The breadth of Data General's product line and its integration capabilities were exactly what we were seeking to illustrate the automated workplace of today, extending well into tomorrow," said Andria Rossi, president of Rossi Consultants.

Kimtron Corporation, a manufacturer of DG emulating terminals and PC terminals, is moving to new headquarters in San Jose, California. The new office, which is twice as big as its predecessor, houses marketing, accounting, customer support, and a 20,000-square-foot warehouse. The company's manufacturing, assembly, and testing operations are handled in Korea.

Oracle Systems Corporation will repurchase as many as 500,000 shares of its common stock on the open market during the next six months. The stock will be used in the company's employee stock option program. Oracle's principal product, the Oracle relational data base management system, runs on DG (and many other vendors') hardware.

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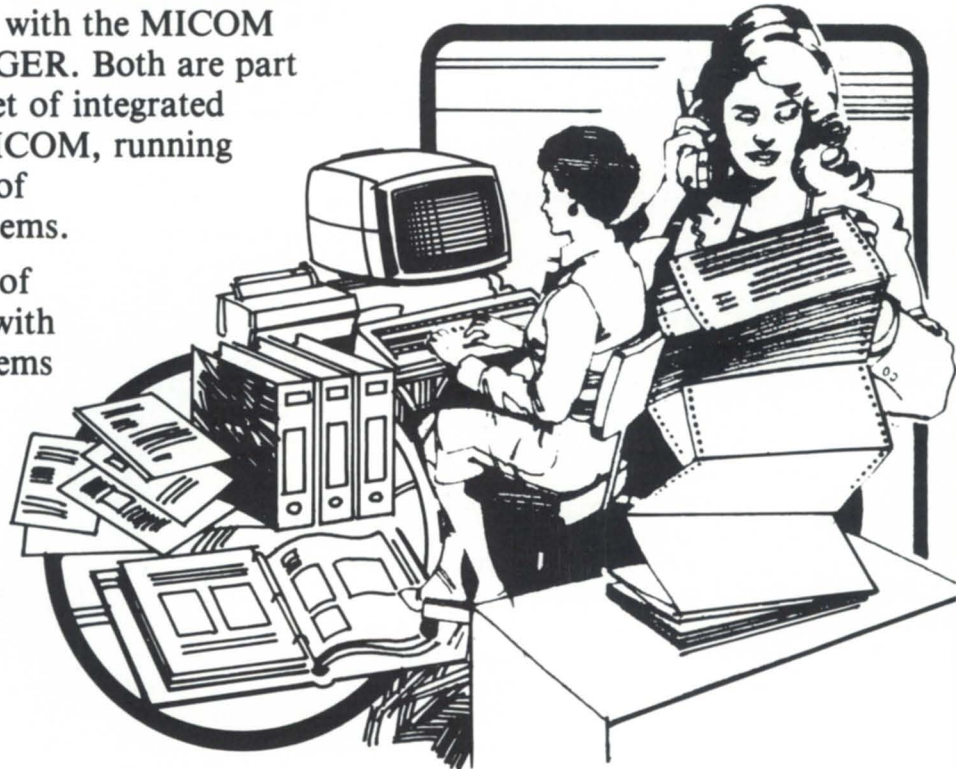
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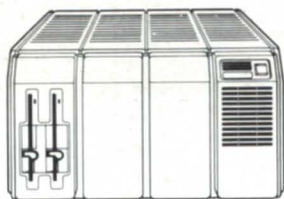
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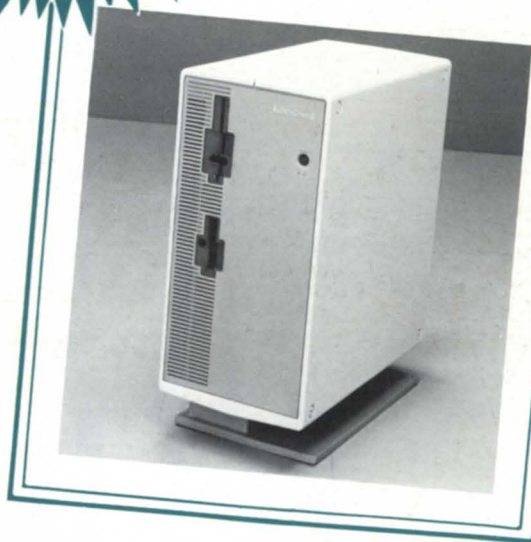
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