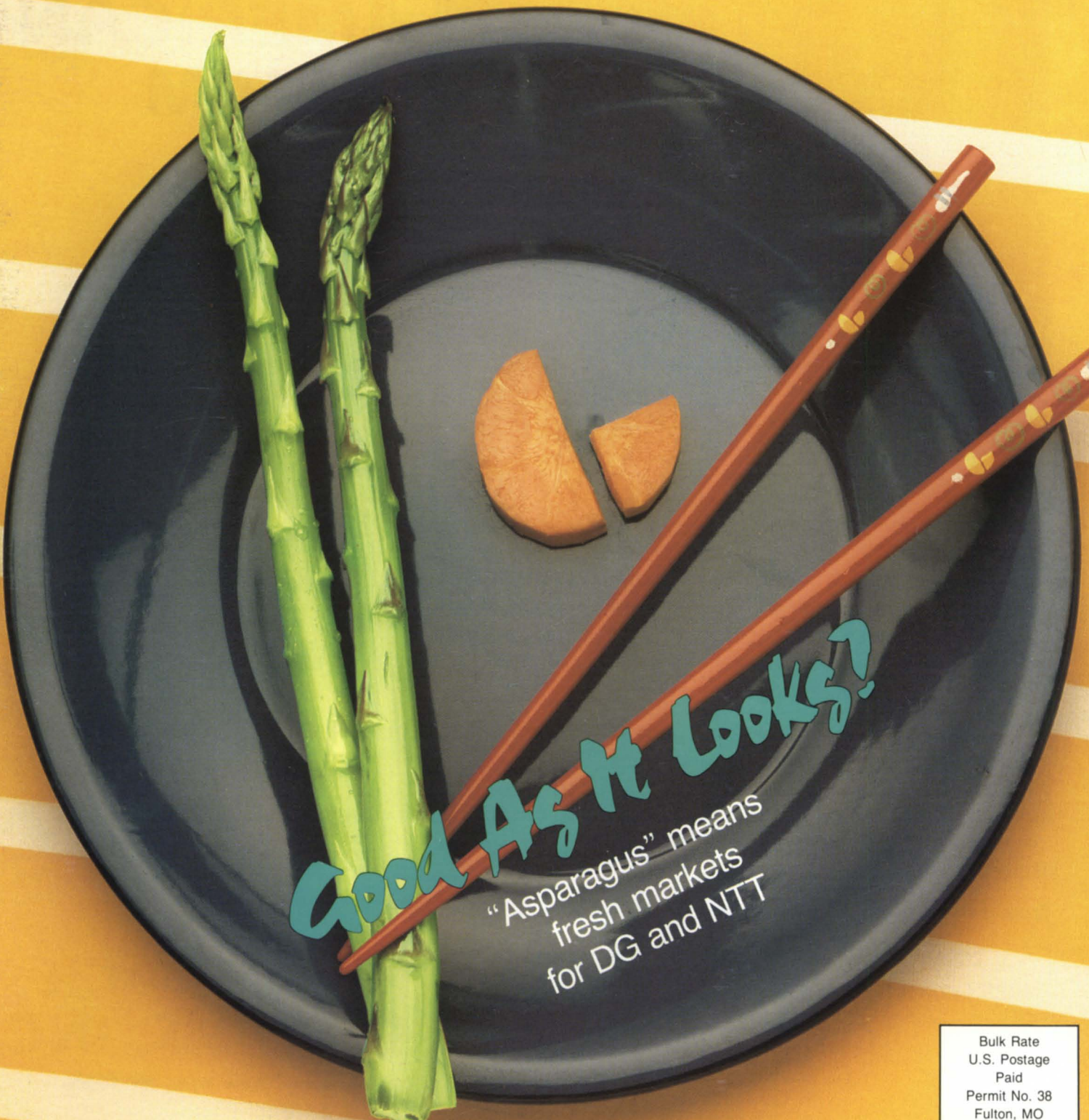


DECEMBER 1987

FOCUS

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Conference 87
Wrap-up

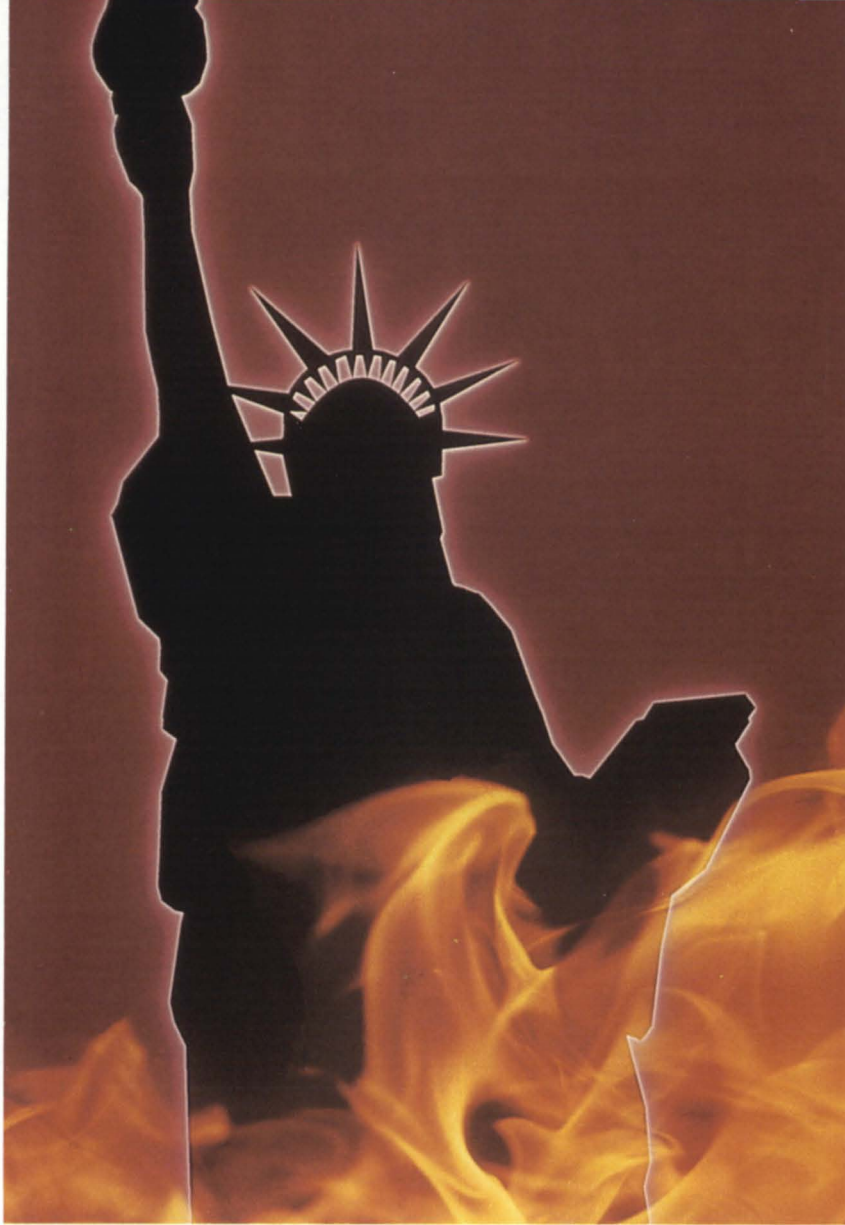
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GOOD FORTUNES

There were lots of winners in Las Vegas
by Joyce Carter
NADGUG President



DG VPs, Lyons, Fortune, and Keaney, made a surprise visit to the Executive Board meeting.

I, for one, feel richer for having gone to Las Vegas—and it's not because I won any money playing the slots (I didn't). I feel richer because of the growing sense of progress and cooperation that was so evident throughout Conference 87.

As NADGUG's new president, I get the dubious pleasure of trying to communicate everything that happened at the conference to those of you who weren't able to make it this year. That's a tall order. I could try to give some general impressions, but it's probably still too soon—the images haven't had time yet to sort themselves out into an orderly pattern. Instead, I'll have to fall back on a series of snapshots.

The Executive Board meeting. There were more than the usual number of new faces around the table, and perhaps less than the usual number of decisions to be made. The new faces were mainly new officers from established regional interest groups making their first trip to a NADGUG board meeting, but there were also representatives from several brand-new RIGs. It's good to see this kind of growth and participation from the regional level. NADGUG has a tradition of being open to new participants, and I expect some of those new faces will soon be showing up on various committees.

There were fewer decisions for the board to make this year, because the NADGUG staff and committees are doing their work so well. Barbara Hoogasian reported for the staff on general operations, and asked for funds to upgrade the membership software to make it easier to produce the member directory. Lee Jones reported for the Meetings committee that everything is on schedule for next year's meeting in Philadelphia, and that future meetings will continue this year's experiment with "tracks" of sessions designed for end-users, technical users, and MIS management. Jim Siegman, chairman of the Publications committee, reported on the status of *Focus* and the NADGUG electronic bulletin boards. Rene Dominguez's Planning committee discussed the status of the NADGUG computer system and our membership promotion programs, and introduced a proposal to form a special committee of executives from larger corporations to make certain NADGUG addresses their interests. Paul Duck, chairman of the RIG/SIG committee, gave a brief report on the status of the regional and special interest groups, but deferred the detailed reports until a special meeting over lunch on Tuesday, October 20.

It wasn't all routine, though. There was quite a lot of discussion about the electronic bulletin boards, and NADGUG members can look forward to some major improvements in service this year. Anna Mae Malozzi of DG Service offered to bundle some amount of connect time on the OIS bulletin board with NADGUG memberships, which would make usage of the OIS board much more attractive. The board also approved funds for Doug Kaye of Rational Data Systems to upgrade the board he sponsors to provide upload and download capabilities. There was even discussion about setting up a network of regional boards to help keep down telephone charges.

The Executive Board also approved a pilot project to start a NADGUG library of public domain software and shareware. Randy Berndt of the American Urological Society will be the first librarian, and he already has the beginnings of a valuable collection. Watch next month's

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THE PRESIDENT'S PAGE

issue of *Focus* for details on how to get a copy of the library.

In addition to the regular business, there were two pleasant surprises. One was a report by Chris Everett, the chairman of the Data General Users Group for the United Kingdom and Ireland, on the progress his group has made since reconstituting itself earlier this year. The U.K. group has set two goals for the near term: improving on the terms and conditions of doing business with Data General, and getting relief for users who are having trouble because of the additional memory required by rev 7.5 of AOS/VS. They can already report success on "a few small things, but useful things"—they got an extension of support for rev 6 and some pricing concessions on memory upgrades. Chris also extended an invitation for all NADGUG members to attend his group's annual general meeting in London on March 17-18, 1988.

The other surprise was a visit at the end of the day by three of Data General's vice presidents, Ray Fortune, Frank Keaney, and Dave Lyons. In the best tradition of open discussion between DG and its customers, the VPs answered every question the board members put to them; they didn't beat around the bush, and they made a persuasive case for DG's prospects in the near future. Without going into details, here are some things they said to watch for:

- An increasing emphasis on software and a "solutions" approach to marketing, along with the renewed emphasis on the VAR channel.
- An aggressive new advertising campaign to focus on substance more than image.
- Continuing concentration on research and development, with expenditures targeted at 12 to 15 percent of net revenues (the industry average is about 8 percent).
- More announcements of major contracts won in competition with DEC, Hewlett-Packard, IBM, and Wang.
- A commitment to pay serious attention to customers who report difficulties with DG policies, procedures, or employees. Ray Fortune summed up the VP's attitude when he said, "If you can give us the specifics, we'll follow them until we get you a solution."

The exhibit hall. The hall looked cavernous before the exhibitors arrived, but they proceeded to fill it up with the largest show in NADGUG's history,

whether you measure it in square feet, number of vendors, or foot traffic. Once again, the exhibits proved to be one of the "don't miss" features at our conferences—and not just for the vendors. For the first time, NADGUG had its own booth, and hundreds of members came by to get a T-shirt, play Kim Medlin's MV/blackjack simulation, and chat about our programs and activities. We had a call for papers available for people who want to start planning for next year's conference, and Benjamin Franklin was even on hand to promote next year's conference in Philadelphia.

Speakers. The keynote talk by Christopher Hegarty went beyond what most of us expected. Rather than just another motivational talk, Chris gave a very clear demonstration of what it means to put yourself on the line as an ambassador for the importance of the MIS function in modern organizations.

Having both Ed de Castro and Colin Crook on hand to deliver the address to the general session on Wednesday was a special treat. Colin had to leave immediately after his explanation of where DG is heading in the combined communications and MIS market that is opening up with the newly announced agreement with Nippon Telegraph and Telephone. However, Ed was able to stay long enough to be interviewed by the *Focus* staff. Watch for the interview next month.

We had an especially fine complement of speakers for the regular sessions, with a wider variety of subjects than has been the case in the past. As usual, the big draws were the system manager's roundtable and the AOS/VS roundtable. All of the sessions were taped, so if you want a copy, look for the order form in this issue.

Hospitality. Hmmm . . . Where do I begin? Polynesian dancers at poolside for the welcome reception. Strawberries and cream next to the NADGUG booth. Laser shows in the garden three times a night. Drawings for lavish door prizes. Water volleyball into the late hours. Hospitality suites sponsored by vendors. Continuous informal exchanges in the hallways. And of course, the constant background noise of the slot machines.

It was a lot of fun, but I have to admit it's good to get back to Omaha. Soon, though, I expect to be getting fired up about next year in Philadelphia. Will I see you there? Δ

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YOU LOOK VARVELOUS!

New Orleans conference promises good things for VARs

by Paul Duck

RIG/SIG committee chairman

The Data General VAR Conference, held September 20-23 in New Orleans, was met with great anticipation because of the changes DG recently made in its marketing focus. The VARs (value-added resellers) were looking forward to a fresh, new commitment from Data General to go along with the company's renewed emphasis on this channel.

I missed the Sunday night reception because of an overbooked flight from Tampa to New Orleans. (No surprises there.) Monday morning's session started with Data General executives reading two hours of speeches—and ended with almost all of them making a quick exit to the airport. I spoke to several VARs who were glad to hear the DG speakers make a strong recommitment to the VAR channel. However, most of them felt disappointed that the execs had left so quickly.

On the other hand, the sessions at the rest of the conference ranged from very good to excellent. The presentations were timely—especially in view of Data General's recent change of di-



The VAR Conference was held in the Hotel Meridien in New Orleans.

rection in marketing.

Perhaps the best part of the conference was the opportunity for informal conversations with Data General managers, especially Ward MacKenzie, the new vice president of VAR Marketing. In my opinion, DG definitely found the right leader for its renovated VAR program.

While in New Orleans, I interviewed MacKenzie. His objectives were very clear: "More new VARs and further development of existing VARs. We are definitely committed to strengthening our business partnership with our VARs."

I think an underlying message was delivered: This is a new day. Of course, this new day will bring a few storms, but it sure beats the hurricanes and tornadoes of the past.

Also at the meeting, DG previewed some new products, including multi-

user ICOBOL for the PC and a new series of high-speed band printers.

I found the discussions that were product-specific to Data General were extremely open. It's been many years since I have had the feeling Data General was doing so much listening.

The facilities at the Hotel Meridien were spectacular. Gerri Robella and crew deserve credit for putting together a great conference.

I went to the conference on the mission of trying to establish better relationships between NADGUG and the VARs, and I feel there was a lot of progress. But only time will tell. Δ

Paul Duck, a long-term supporter of NADGUG, attended the VAR conference as a representative of Orbi Inc. Currently serving as chairman of the RIG/SIG committee, Duck can be reached at 14482 McCormick Dr., Tampa, FL 33626; 813/855-2615.

DOMESTIC AFFAIRS

FEDSIG covers old and new issues

In the coming year, FEDSIG, the special interest group for users in the federal government or businesses catering to the federal government, will be lobbying to make sure that vendor support doesn't change since Data General enveloped its Federal Marketing division within its VAR Marketing and Development Group.

According to SIG president Emilio Naranjo, the group is concerned by this announcement mostly because they would like some assurances from DG representatives that service won't suffer; however, it will take time to see the effects of this development and how Data General will handle it.

Otherwise, the organization, which is currently more than one year old and 50 members strong, has some ongoing goals to attend to. These include providing information to government users, sharing software, addressing management issues pertaining to government, and making available to users some of the government publications of interest.



One of the group's greatest successes has been its newsletter, FEDRAG, which comes out several times a year. It is their most effective means of communication because of the geographic span

of the membership. The newsletter covers general product information, as well as items of unique interest to people working with the federal government, such as government procurement regulations.

The NADGUG conferences are the best time for group members to meet in person. FEDSIG started when approximately 20 people met at Conference 86 in Orlando, Florida. At Conference 87 in Las Vegas, the group met and discussed government-related issues such as the new Tempest computer, Ada, Unix, and government regulations on the certification of COBOL.

For more information, contact Emilio Naranjo, Division of Information Resources, Department of Labor OIG, Room 55504, 200 Constitution Avenue NW, Washington, D.C. 20210; 202/523-2813. Δ

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ACTIVE DUTY

DG's Federal Marketing effort gets a new focus

by Geri Farman
Focus staff

When news reached users this summer that Federal Marketing was no longer a Data General division, some wondered whether DG would continue its commitment to this market arena. The answer from Tony Faverio, manager of Federal Marketing, is clear. "We are as committed as ever to be an active player in the federal marketplace. In fact, the entire 200 person staff of the McLean, Virginia, office is still in place. What has changed is structure—and vigor."

Faverio now reports to David Lyons, head of Group Marketing, a change that he sees as providing less isolation and greater depth to his operations. "With Westboro behind us, I now have available about 300 marketing people who can help with our federal marketing efforts."

In other structural changes, John Williams, director of Federal Product Programs, reports to Ward MacKenzie, head of the VAR Marketing and Development Group, while Bob Nierman, director of Federal Sales, now reports to Frank Keaney, vice president, North American Sales.

While Data General's basic commitment hasn't changed, the company is pursuing a more focused strategy. "Rather than trying to be everything to everybody," Faverio said, "we are now concentrating on areas where we have the best product and price/performance." He sees Data General's competitive edge coming from its price/performance, open architecture, communications capabilities, and flexibility in packaging.

"The federal government is in a position to formulate standards," Faverio said, "and Data General has maintained a consistent strategy of meeting whatever standard emerges. For example, the federal government is a leading proponent of open architecture and open connectivity—areas where Data General is strong."

Data General's new PC connectivity "platform," DG/PC¹, is opening up new areas for DG throughout the government. As Faverio sees it, PC¹ allows DG to address a three-tier model of user requirements. Smaller locations that work primarily with PCs may not need a mini-computer, but would benefit from connectivity in most cases. Above that level, an MV can provide subregional or departmental communications power and connection to regional mainframes.

"Our open architecture allows for communication with various protocols," Faverio said. "We are a leader in this area. Others may have a solution for this type of situation, but not as elegant."

DG also offers a full menu of products that are useful—if not essential—for competing in the federal marketplace. These include Ada and the Ada Development Environment for defense contracts, AOS/RT-32 for real-time applications, and high-resolution graphics.

The Rugged and Tempest products announced last summer are letting DG serve another niche in the federal marketplace. John Williams, director of Federal Product Programs, and Fred Bedard, manager of Hardware Products, see the story of these two product lines as a "textbook" way of doing things.

"Our charter," said Williams, "is to develop specific federal-type products based on the standard Data General products. We don't get involved in the up-front development. We aim these developments at the prime defense contractors for the government, such as

Lockheed and TRW."

The Rugged products, announced in June 1987, were the result of 18 months of requests from salespeople and VARs and 7 months of research into the market. "The Rugged product development was customer-driven," said Bedard. "We developed a list of product requirements based on what the contractors, salespeople, and users said they needed." The resulting products not only meet military requirements for certain applications, they also fit industrial needs for a shop-floor computer. "The Rugged comes close to meeting many MIL-SPEC standards, but it is not meant to be used in combat. Rugged is designed for command-control-type operations."

Data General is making sure the Pentagon knows about these products. Briefings have been conducted to display the machines and to get further feedback from the users on their needs. "So far, the response from the Pentagon is 100 percent 'no problem,'" Bedard said.

Tempest products were based on a similar customer-oriented approach, but only after a "mistake" was made. The Tempest 4000 was developed with a fixed configuration that the product development staff felt would meet most needs. "The fixed configuration," Bedard said, "was a mistake."

Based on further research, the new MV/15000 T was introduced. Based on the MV/15000, the Tempest version includes three models—model 8, model 10, and model 20. The new approach offers more flexibility in terms of configurations than other vendors provide, and users can now mix, match, and upgrade their systems without having to recertify the machine.

In keeping with their strategy of adapting standard products to federal needs, the product development staff is now using PC¹ to interconnect Tempest PCs to Tempest superminicomputers. Δ

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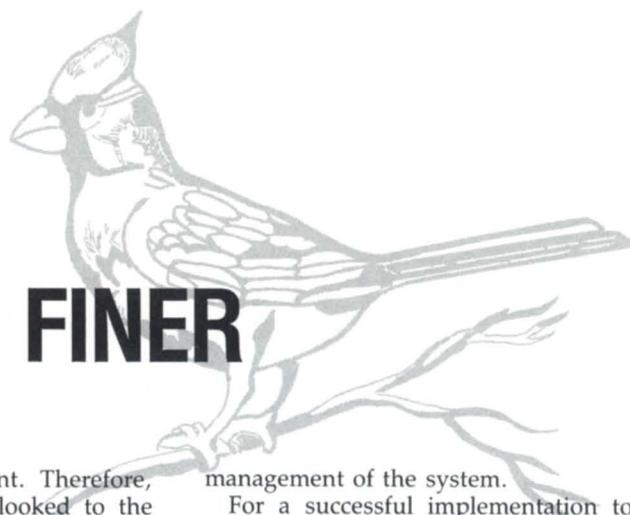
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NOTHING COULD BE FINER

North Carolina's state government is a case study in the benefits of office automation

by John Davis
Special to Focus

During the early 1980s, like many other organizations, the state of North Carolina began paying attention to ways of improving productivity, particularly office automation. The term "office of the future" came into vogue, and the interests of both the executive and legislative branches of government grew. The state's General Assembly appropriated funds, and an office automation pilot project was started.

After a thorough evaluation of office automation vendors, Data General was selected as the primary vendor for the pilot project. The pilot project was implemented within the Department of Administration. Shortly after the effort began, the senior management of North Carolina's Office of State Budget and Management decided to extend the pilot project into a full-fledged implementation effort for their entire office. With a staff of 50 people—mostly professionals and managers—they decided to fully implement Data General's Comprehensive Electronic Office (CEO) system by installing a terminal on every staff member's desk.

An MV/10000 was installed, along with 50 terminals and four printers. The software included CEO, Present, Trendview, BASIC, PL/I, and SNA.

In 1985, Governor James Martin came into office. Since 1979, the State Budget Office has administratively been part of the Office of the Governor, with the state budget officer as the gov-

ernor's executive assistant. Therefore, Governor Martin's staff looked to the State Budget Office for automation assistance. Since the Budget Office had some excess capacity on the MV/10000, some additional 20 terminals and printers were installed for use in the governor's office. Ironically, whereas the majority of users within the Budget Office were professionals and managers, the majority of users within the governor's office were in clerical positions.

While the governor's office is located in the state's administration building, the governor and his immediate support staff reside in the state capitol. Thus, a Desktop 20 was installed in the capitol for use by the governor's Press Office and by Governor Martin. (It has since been upgraded to an MV/2000 DC.)

The current configuration also includes Dasher/286s in the governor's Washington, D.C. and western North Carolina offices, connected to the MV/2000 DC by CEO Connection, while the MV/2000 is connected to the original MV/10000 by Xodiac. In addition, the MV/10000 is connected to other Data General MV systems by Xodiac and to the state's mainframe computer by SNA. DISOSS and DXA serve to connect the CEO mail network with the IBM DISOSS mail network.

The initial implementation within the Budget Office was unique for several reasons. First, everyone in the office was included in the implementation plan, so electronic mail and filing could be fully implemented within the office. Second, a large number of the users involved in the implementation were in professional and managerial positions. The unique problems and opportunities associated with providing office automation support for these "knowledge-worker" positions came into play. This type of implementation created some special problems related to training and support, as well as the

management of the system.

For a successful implementation to occur, we had to have the support of both senior management and the users. We already had the support of senior management, because they had made the decision to install the system. In order to enlist the support of the users, we implemented the system by committee action. Two committees were formed: a steering committee and a technical committee.

The steering committee was composed of a representative sample of the users, including some individuals who had a definite bias against automation. By making these individuals part of the implementation effort, they could immediately see the benefits of automation to their own jobs.

The technical committee was composed of the data processing staff within the office. They were responsible for the actual installation and subsequent support of the system. After the installation was completed, a third group came about—the entire user community. They held regularly scheduled meetings and training sessions.

The steering committee was responsible for planning the implementation. This included setting up standards, policies, procedures, etc. that related to the use of the system, as well as setting up an implementation schedule. A major by-product of this committee was a training plan. We had professional Data General trainers provide on-site training for all staff. A training room was set up that included 10 terminals, and one week of half-day sessions were scheduled.

The main problem with this approach was that too much information was thrown at the users in too short a time for them to remember more than the fundamentals of how to navigate through the CEO menus. Because of this, I wouldn't recommend that others

use the same training approach we did. Experience has shown that a continuing education is more beneficial. I suggest a single introductory session to show the user how to navigate around the CEO menus, how to send and receive mail, etc. Subsequent sessions can then cover specific topics, such as word processing, data tables, or Present. Only the staff that needs to use the

specific product needs to attend the session.

The end result is that training is provided to the staff that needs it. Managers don't have to sit through long sessions on detailed word processing topics, and the clerical staff doesn't have to sit through sessions on how to use the spreadsheet software.

Our current training plan calls for in-

dividual one-on-one sessions with each new staff member. After the introductory session, subsequent sessions are held as needed. In addition, we hold user group meetings on a regularly scheduled basis to cover new releases of software and continuing training on subjects of interest. In some instances, we have found that training isn't needed. For the busy manager who is pressed for time, a simple 10-minute session on how to turn on the terminal, how to log on, and how to send and receive mail may suffice in some cases. We usually leave a copy of the Data General *Read Me First* manual, though.

Getting managers and professionals to use the system can be an interesting problem. In some cases, a reticent manager might not see any advantage in using the system, and you will end up with a terminal that is never switched on. From the beginning, the Budget Office made a policy that all telephone messages must be distributed through the office via CEO electronic mail. This guaranteed that everyone in the office logged onto the system and accessed their inbox. In addition, senior management in the office communicated with the staff through electronic mail, and replies were expected to come back by mail. This spurred users to explore the rest of the system. The electronic mail feature has shown to be the most beneficial feature of the CEO system. It has become indispensable to the operation of the office.

In addition to training, our method of implementation has caused some specific problems related to the support and management of the Data General system. Initially, our plan was to support the system with existing personnel on a part-time basis. We found out quickly that this was impossible. Any CEO manager will tell you that the support of CEO, even for a small installation, is a full-time job. Now, we have hired an individual to provide full-time support of the Data General system and to provide training for new users.

With the large number of professionals and managers on our system, we must take a flexible approach to setting policies and procedures of use. I'm not about to walk into the governor's office and tell him to use the system only in a certain way. The key to keeping the user community happy is to respond quickly to problems that they may be having with hardware and/or software, to be flexible in working with the users, and to have a lot of patience

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in dealing with people, especially managers and professionals with little or no computer experience.

We have made some surprising observations from this experience. First, it's difficult to foresee how an office automation system will actually be used. During our planning stage, we outlined a number of areas to target for automation, including an elaborate MIS to be implemented entirely in CEO. To date, only a few of our targeted areas have been automated. On the other hand, quite a few of our success stories relate to projects entirely ignored in the implementation planning process. The bottom line is that until users get some experience with an office automation system, they cannot tell how they will use the system.

The next observation is that even the most reticent user will find some way to make use of the system—whether it's sending and receiving messages or full-speed-ahead word processing, everyone will reap the rewards of office automation. With equipment as inexpensive as it currently is, there is no reason not to fully implement office automation. Improved communications alone is enough to justify the installation of a terminal, even if nothing else is done on the machine.

Finally, do not get stereotyped in job roles as they relate to office automation implementation. The manager who does not want a terminal for fear of becoming a typist is being shortsighted when you consider that typing a document takes only a fraction of the amount of effort that goes into putting a document together. The benefits derived from sharing access to files and improved communication greatly enhance the ability of the manager and professional to do their job.

In summary, I would like to repeat some of the dos and don'ts of implementing office automation in a knowledge-worker environment.

1. You must have senior management support. If you do not have this, you might as well forget the entire project.

2. Get the users involved early in the

implementation process by including them in steering committees and user groups.

3. Provide training in a continuing education fashion, with a general introductory session, followed up as needed with sessions for specific tools.

4. Encourage users to make use of the system by distributing telephone messages through electronic mail and

having senior management communicate via electronic mail.

5. Hire a full-time support person; don't try to cut corners by doing it on a part-time basis.

6. Keep users happy by responding quickly to hardware and software problems.

7. Be flexible.

8. Above all, be patient. Δ

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SOMETHING IN THE AIR



An elaborate FAA system keeps air safety information on the up and up

by Sylvia Michaels
Special to Focus

Your plane is delayed because of engine trouble. A near miss has recently occurred over smoke-filled northern California. An aircraft is scheduled for preventive maintenance. Another aircraft has flown into restricted airspace. A passenger tries to carry a gun through airport security. An airline is fined for poor service and customer complaints. Where is this data maintained? How is it collected? How is it updated? As the airways have gotten busier, and as the competition among airlines has become more fierce, the collection of this data has become critical to ensuring safe and reliable air travel.

The Federal Aviation Act of 1958 requires the Federal Aviation Administration (FAA) to survey and enforce the Federal Aviation Regulations to promote effective and safe airline aviation. With this charter, the Aviation Standards Organization, specifically the Aviation Standards National Field Office (AVN), undertook the task of automating and making available to regional and field offices several data collection applications.

In 1978, Concept Automation, Inc. (CAI) began developing customized data

collection applications for the FAA, and installed a small, interactive, 8-bit Sycor computer system. Specializing in government contracts and customizing end-user applications, CAI implemented a prototype system in 1980 to test the ability of distributed data processing to meet the FAA's data collection requirements. Using the Sycor computer at the central headquarters in Oklahoma City, Oklahoma, and a Data General C/150 in a regional office in Atlanta, Georgia, CAI demonstrated that distributed processing was a viable solution to the FAA's data processing needs.

As this application was being developed, the FAA issued a Request for Proposal (RFP) for administration computer systems at the AVN headquarters and regional offices. These computers would provide office automation, data base telecommunications, and applications support for FAA installations nationwide.

Concept Automation responded to this newly issued RFP with a solution based on Data General's MV/8000 Eclipse

line of processors. The "good fit" between the DG processors, adherence to communications standards, certified compilers, and CAI's interactive applications all contributed to CAI and Data General's win over the other computer manufacturers competing for the contract.

FAA implementation

With the central (AVN) field office in Oklahoma City, 10 regional offices from Atlanta to Anchorage, and more than 300 field offices, a solid network was essential. The key to a successful implementation was that the central data bases in Oklahoma City had to be continually updated by the Safety System users in the regional and district offices.

The Safety System, a portion of the FAA's Aviation Safety Analysis System (ASAS), is a set of seven applications that represent the critical safety-related information the FAA collects and updates. These applications, accessed through menus, handle tasks like entering and updating information, generating reports, or initiating communications. Although the Safety System is only one of the data processing functions currently performed by the Data General processors, the AVN's vast communication needs make the implementation interesting.

The FAA's Safety System applications continually gather many types of data, including:

- enforcement information, such as fines issued and people stopped for carrying weapons through airport security
- service difficulties, such as malfunc-

tions and defect reports

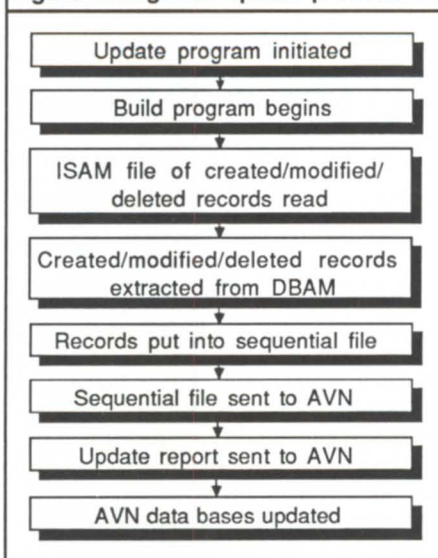
- air operator information, such as restrictions on flights the aircraft are allowed to make, whether they can carry passengers, and when they were last overhauled

- repair and training information on repair stations, certified pilot schools, courses for dispatchers and flight engineers, aviation maintenance schools, and certified pilot and mechanic examiners

- reports of airplane accidents and incidents and medical information on passengers and crew involved in airplane accidents.

Each of the approximately 300 district offices has a Burroughs B20 for its word processing and data processing requirements. The district offices log on to one of the regional Data General computer systems via a D200 terminal emulator connected to the FAA's Administrative Data Transmission Network (ADTN). Then data can be entered into the regional Safety System applications, or reports can be brought back to the field office using the Field Office

Figure 1: Regional update procedures



Report Transfer, a COBOL program developed by CAI.

The procedures and communications required to keep the central data base current are both critical and time-consuming. Each night, an AOS/VS batch

job is automatically queued on a staggered schedule from each of the regional offices. These jobs execute a build program that reads an ISAM file for keys of records that have been added, deleted, or modified since the last network update. These records are then extracted from the DBAM master files and put into a sequential file. The CLI command MOVE/FTA is issued to transfer the sequential files to the central host computer at the AVN. The regions and the central host are connected by a dedicated line through the FAA's ADTN. A report is generated and sent to the AVN, confirming what records were sent to the central data base. Next, a QSUBMIT is issued from the region to the AVN's batch input queue that starts an update program on the AVN (see Figure 1).

At the AVN, the sequential file is updated into the master data bases. After the central data bases are updated, the AVN system determines what updated information should be sent to the regional office (including information retrieved from the other regional offices)

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and performs the reverse of the AVN update process. This mechanism ensures that the amount of data processed and transmitted is kept to a minimum. A report of the records added to the AVN and errors encountered is printed, and a copy is sent to the region transmitting the data. Amazingly, the entire update procedure is accomplished without operator intervention.

Features of the Safety System

The Safety System implementation is successful because the system virtually runs itself. The AVN site that serves as the hub isn't staffed by any data processing professionals. The following points are examples of some of the Safety System features that make this possible:

- In the event a regional office must reload from a backup tape, the system initiates a procedure that calls the AVN system and asks it to resend all the data that was sent to the regional office since the previous backup was taken.
- Usernames and passwords must

match in order for file transfers to occur across the network or for users to run queries that access remote data bases. Any time a password corresponding to one of these usernames is changed, a program is executed to also change that password at the central site.

- When a user is deleted or added via PREDITOR at the regional sites, it is automatically added or deleted at the AVN via the password-matching procedure.

- Regeneration procedures within the Safety System rebuild INFOS data bases if a data base has become inaccessible because of corrupt keys. Separate data bases exist for each data collection application. If one data base does become corrupt, the other applications remain intact, and only one data base needs to be recreated.

- Appropriate cross-reference keys exist in all safety data bases. This feature allows relationships to exist between records in different data bases.

The FAA Safety System implementation is not limited to the AVN, regional offices, and district offices. The central AVN system is also connected to a Na-

tional Time Share System at Boeing Computer Systems, as well as to the Comprehensive Airmen Information System (CAIS) and the Aircraft Registry system that reside on the FAA's IBM 3090 mainframe. As the AVN maintains all the data that is collected in the district and regional offices, the National Time Share System acts as a backup to the AVN system.

The National Time Share System is also used to perform statistical analysis of the data maintained on the AVN, such as trends in airline component failures or the amount of near misses occurring in a particular area. The CAIS tracks data on all the pilots licensed to fly (health, fines, performance). The Aircraft Registry contains information on all aircraft registered in the U.S. (type of aircraft, plane numbers, maintenance of aircraft). The National Time Share System is connected to the AVN's Data General system via a 4800 baud dial-up communications line. Communication between the systems is based on 3780 bisynchronous protocol, doing RJE80 file transfers. A dedicated line is

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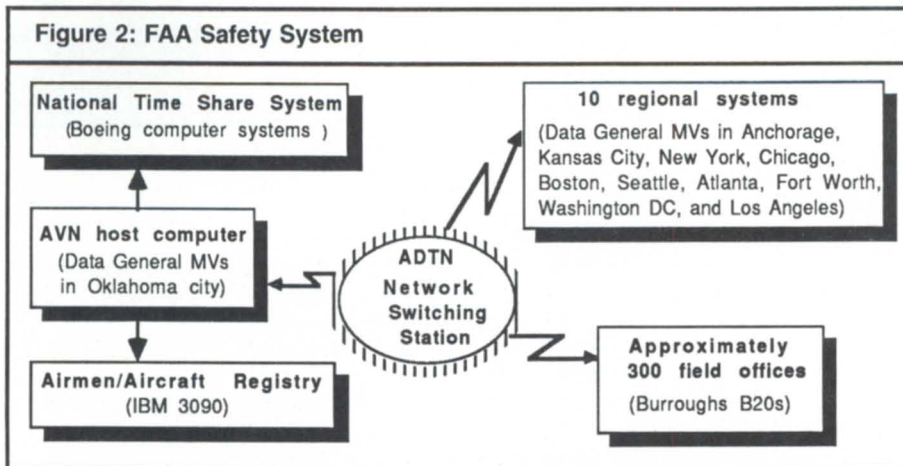
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Figure 2: FAA Safety System



also used between the AVN and the CAIS/Aircraft Registry.

Between the IBM 3090 and the AVN, CAI developed a protocol converter called the National Database Interface. This protocol uses RCX70 as a backbone, providing the screen-mapping necessary to allow a user on a Data General terminal to be logged on to the IBM 3090 and to be prompted for information

about the data bases the user wishes to query. 3270 protocols are supported for this application, but the actual syntax, error processing, and user interfaces are handled by the COBOL program developed by CAI. The user only sees menu selections, simple English status messages, and the requested data. Again, no data processing expertise is required, allowing any user from a

clerk to a maintenance inspector to access critical data.

Regional and district users log on to the AVN system to access the CAIS and Aircraft Registry system. A report of the queries performed is maintained on the AVN system, and the user may have the report transferred to the regional office. If the user resides at a district office, the log may be printed by way of the Field Office Report Transfer procedure (see Figure 2).

In conclusion

The next time your plane is delayed, a near miss occurs, or you walk through security gates at the airport, take a moment to think about what the FAA has to do to maintain and update this information. From the district, to the region, to the AVN, to the National Time Share System, this data is being collected and analyzed to promote safe and reliable air travel. Δ

Sylvia Michaels is the marketing support specialist for Concept Automation, Inc., 1319 Moran Rd., Sterling, VA 22170; 703/450-6000.

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THE ASPARAGUS CONNECTION

NTT and DG to break new ground

Asparagus is an unusual vegetable. It is one of a small group of perennial plants whose roots must be planted deep in very fertile ground. It must be fertilized well and cultivated for at least two years before its shoots can be harvested. Once established, however, the plant will multiply and produce an increasing number of shoots indefinitely. They are both tasty and nutritious.

It doesn't sound like the typical introduction for a new Data General product, but those were the words DG President Edson D. de Castro used in announcing "Asparagus," the code name for an agreement between DG and Nippon Telegraph and Telephone Corp. (NTT).

The agreement, made public on October 7, was signed through Nippon* Data General, an 85 percent owned subsidiary of DG. It covers the joint development of a new generation of high-speed digital integrated communications systems to be built around DG superminicomputers. When completed in 1989, the new systems will be the first to combine packet and circuit switching to handle data, voice, and computing capabilities in an intelligent private corporate network that can accommodate international communications standards, including ISDN (Integrated Services Digital Network), OSI (Open Systems Interconnection), and IBM's SNA (Systems Networking Architecture).

NTT will do the development planning and will jointly fund research and development work that Data General will conduct in Dallas, Westboro, and Rockville, Maryland. DG and Nippon* Data General will manufacture the systems in the U.S. and Far East.

"The remaining work on this project is not difficult," de Castro said. "It does not carry a high risk of failure. It simply takes time and capital. NTT has given us both."

NTT plans to market the networking system to its Japanese customers—who presently represent almost 5,000 data communications facility services in many of Japan's largest corporations and government agencies.

Deregulation and privatization have

stimulated growth and competition in the Japanese telecommunications and information processing industries. "Because of this competition," said Dr. Takahiko Kamae, director of research and development for NTT's Integrated Communications Systems sector, "It is very important that NTT offer more than quality service. The integrated system we are developing with Data General makes private information networks operate efficiently, implements functions from Data General computers, and offers an infinite possibility for advanced value-added connections."

NTT, with about 290,000 employees, is the largest company in Japan. It serves more than 46 million telephone subscribers and had more than \$36 billion in revenues last year. Although it has no manufacturing facilities, it does extensive research and development, and provides strong marketing and services.

According to Colin Crook, senior vice president of DG's Communications Systems Group, as NTT's current customers upgrade their networks, they will move to the more cost-effective and powerful "Asparagus" systems. "In fact, we expect they will begin purchasing Data General MV family superminicomputers, which will serve as the base of the networks, almost immediately," Crook added.

DG plans to sell its own version of the new systems throughout the United States and in other international markets.

"Asparagus" is intended to fill a void that now exists in the telecommunications industry. Organizations today already need to mix voice, data, image, and text on the same network, while providing additional functions such as security, control, accounting, protocol conversion, information translation, messaging, and bandwidth allocation. Recognizing the need more than a year ago, NTT began looking for a development partner among Japanese and U.S. firms. According to de Castro, DG won the contract for a few very good reasons:

- DG has been investing in telecommunications technologies and products since 1980. The company had already

developed technologies and strategies similar to NTT's, and had in fact anticipated many of NTT's business and technical requirements.

- DG was willing to work with NTT to develop something better, "rather than sell them a combination of off-the-shelf hardware and software."

- Nippon*Data General has been a presence in Japan since 1971, and NTT has been a customer for many years. "This long-term investment, patience, and attention to technical and cultural details were contributing factors to winning the agreement."

DG formed its Communications Systems Group in 1986 to build on the experience the company had been developing since the late 1970s. In 1981, DG was the first company other than IBM to use SNA to connect computers. CSG supports four functions:

- The Telecommunications Products and Technology division, based in Sunnyvale, California, designs, develops, and does pilot-line production of electronic components.

- CSG oversees joint engineering projects such as one with Actel Corp., a California semiconductor firm.

- Genioss, Inc., a division based in Dallas, was formed after DG acquired the Integrated Data Network operation of United Technologies, Inc. in 1986.

- Data General Telecommunications, Inc., based in Rockville, Maryland, was formed after the acquisition of Dama Telecommunications Corp. in 1986-87.

The "Asparagus" development work will be under the direction of Vahe Sarkissian, vice president of DG's Telecommunications Products and Technology division.

"This project combines the circuit/packet switching technology experience of our Telecommunications Division in Rockville, the voice/data integration experience of our Genioss subsidiary in Dallas, and MV superminicomputer-based data communications experience in Westboro, together with the vast telecommunications technology and network applications know-how of NTT. We believe we will have a truly differentiated product," said Sarkissian. Δ

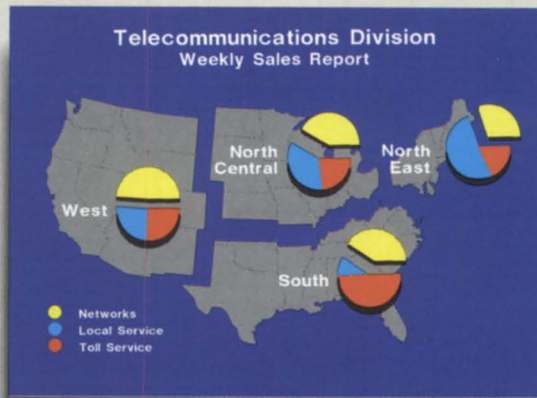


Edson de Castro, president of DG, and Takahiko Kamae, director of research and development at NTT, both like Asparagus.

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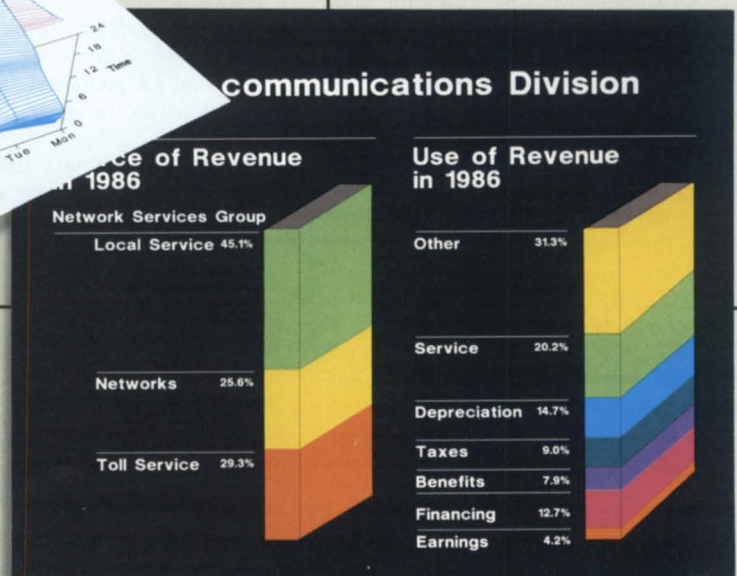
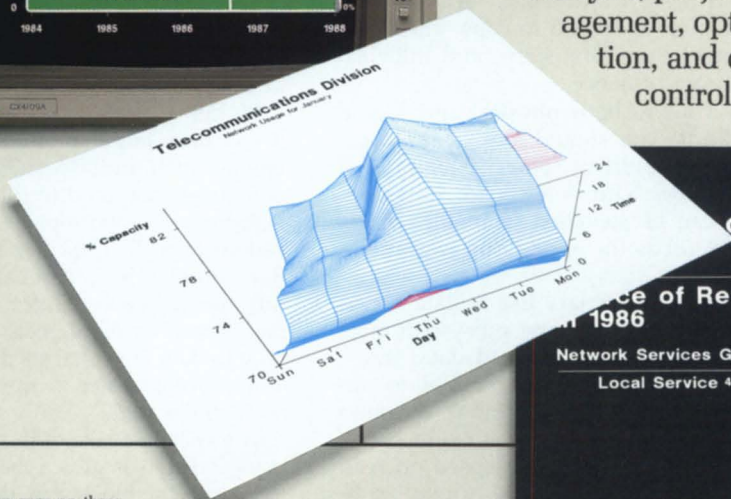
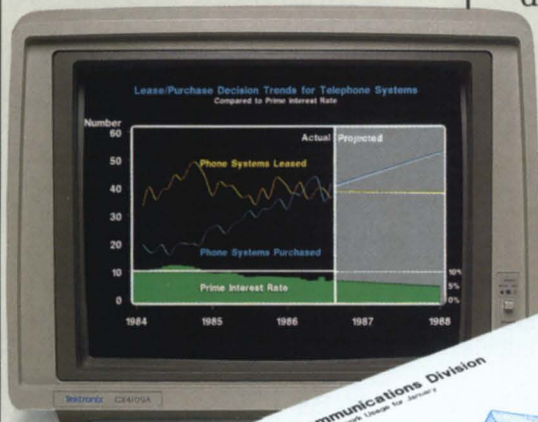
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TAPE MEASURES

Things to consider when shopping for a tape subsystem

by Julie Stevens with Janet Busse-Wolfgram

Magnetic tape may seem to be a "low-tech" or humdrum data storage medium to many of us, but tape technology has advanced significantly in the last decade, as much as any other storage medium, especially in speed, density, and integrity features. Usage of tape in Data General environments is as strong as ever.

In researching tape subsystems, you'll find a variety of choices: streaming, start/stop, PE, GCR, reel, cartridge, and buffers. No single combination of these options is always advantageous; more often, trade-offs are created that must be considered in the light of specific applications. If you begin your search by assessing the specific needs of your shop, your best option will become evident.

Most applications for tape subsystems are either primarily backup or primarily data access. You probably do some of each, but focus on your primary usage first.

When your primary use is backup

If your tape system will be used most often for backing up your magnetic disks, your first decision is whether to buy a streaming tape drive or a start/stop drive. This decision should be based on what backup utility you use.

If you usually do physical backup with, for instance, PCOPY, which copies everything on the disk, you will probably be happiest with a streaming tape drive that records in high density (6,250 bpi) to maximize the data on a tape, and runs at high speed (100 ips or a speed matched to your system to prevent stopping and repositioning).

In our recent lab tests, the streamer performed better on physical backups, because it is designed to move continuously, accepting data from the host and trying to keep tape motion going be-

tween commands. Check your software to ensure that it can transfer data at the drive's required transfer rate.

Many DG users who do physical backup now use cartridge tape drives with serpentine cartridges that hold the entire contents of one disk (up to 630 MB). Generally, cartridge tape drives are as fast as reel-to-reel drives, and they offer the added advantage of very large media capacity. Consequently, there's no need for an operator to stick around after normal hours and change reels or otherwise baby-sit the drive.

If you more often back up with a logical utility such as MSCOPY or DUMP II, you'll probably be happier with a start/stop drive. Some logical utilities copy only the data that was modified since the last backup, and others dump to tape only files that fit your template. Either way, the drive must stop and await the next command. The sophisticated servo mechanics in start/stop drives are designed to cope with these frequent stops and starts, and still yield high performance.

If you do both physical and logical backups, you should look at the dual-speed tape drives, offering high-speed streaming with low-speed start/stop, that can be switched (manually or via software) as the application warrants.

When your primary use is data access

If you use your tape subsystem most often for reading archived data, transmitting data from one system to another, or any of the other common "reading" uses of tape for which fast access is important, the speed on read operations will be your primary concern. You'll undoubtedly find start/stop tape drives attractive.

High-speed (200 ips) start/stop drives offer fast file search and are able to burst data at a very high speed—so

rapidly, in fact, that the drive must wait for the next system command. The start/stop mechanics reduce the "ramp-up" time that streamers need, decreasing the gap length and improving access time.

When reading the comparison charts, remember that a tape subsystem cannot be judged by only one feature or specification; its overall speed is affected by the combination of the inches per second, access time, data transfer rate, block size, and bit density.

When speed is important, you'll want the tape subsystem to interface the Burst Multiplexor Channel (BMC) in your DG processor. It's dedicated to disk and tape only, so it isn't as busy as the DCH, and it transfers data faster by doing it in bursts that need little or no CPU intervention.

Other factors to consider

Once you've determined whether you want a start/stop or streaming drive, you can examine other features.

Bit density can be a significant factor if you have large amounts of data. 800 bits per inch (bpi) doesn't put much on your tape compared to the newer technologies of 1600 bpi PE (Phase Encoded) and 6250 bpi GCR (Group Code Recording). The difference can be significant: whereas under PE, it might take seven or eight reels of 2,400-foot tape to back up a 300 MB disk, the same amount of data needs only two to three reels under GCR.

The specified size of the block of data being written is also a factor in speed: the larger the block size, the harder it is for the system to secure contiguous sections of memory for the transfer—hence, the operation may take longer, depending on how much memory your system has. However, large blocks



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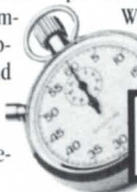


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mean fewer gaps on the tape, allowing more data per tape physically. This is one of those trade-offs between performance and efficiency that can only be judged in regard to your specific application and performance needs.

Buffers and caches were originally added to streaming drives to keep the streaming mechanics in motion. During a write command, if the host is feeding data at a rate faster than the drive can write, a buffer provides the holding tank from which the data can be trickled at the drive's speed, while accepting it at the host's faster rate. However, when the drive is not the limiting factor, the buffer doesn't provide any improvement in performance.

Nonperformance considerations

There are many considerations that affect your choice of tape subsystem, some of which are obvious, some of which are specific to your environment. A few items not to forget:

1. Physical limitations. Do you have space for a tape drive housed in a 42-inch or 60-inch high cabinet, or would a more compact cartridge tape drive that's less than 9 inches high be a better choice?

2. Data compatibility. If you use nine-track reels now, is it feasible to switch to cartridge? Portability and ease of use may be distinct advantages, but not if media compatibility is more important to your operation.

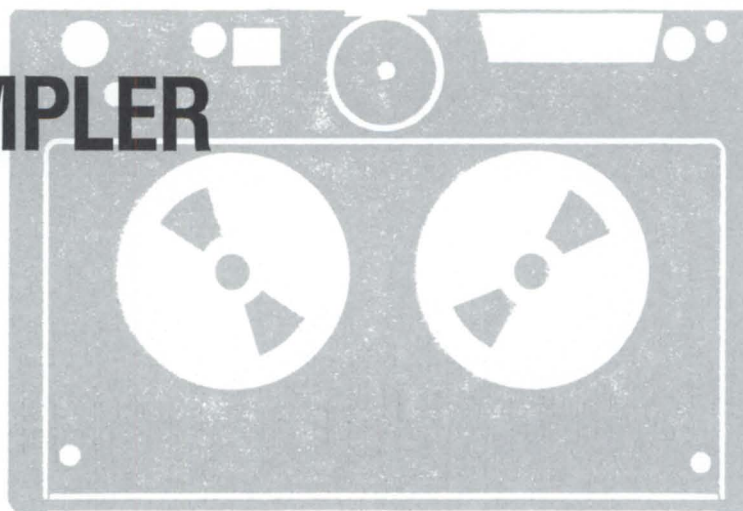
3. System compatibility. If you're buying a non-DG tape subsystem, be sure it is fully compatible with your processor, your DG operating system, and your standard DG utilities.

4. Price. Streaming tape drives are generally less expensive because of their less-sophisticated mechanisms, but start/stop drives may offer you the higher performance you need. Be sure cables, miscellaneous hardware, and anything else you need to be operational are included in the quote.

5. Maintenance and support. Don't leave home without it . . . and be sure your vendor can deliver the support you'll need during installation and afterward. Δ

Julie Stevens has been on the Marketing Team for Zetaco's DG-compatible peripheral controllers and disk and tape subsystems for four years. Janet Busse-Wolfgram is a customer support engineer at Zetaco. They can be reached at Zetaco, Inc., 6850 Shady Oak Rd., Eden Prairie, MN 55344; 612/941-9480.

MAGTAPE SAMPLER



A representative selection of tape controllers and subsystems for Data General users

Focus staff

So what are your magtape options? In large part, that depends on how adventurous you are. DG's packaged subsystems are the standard against which everything is measured, but other vendors provide a variety of subsystems that promise the same functionality, often at a considerable savings. However, it's the user's responsibility to make sure that the subsystem performs as advertised.

That's even truer for users who choose to build their own subsystems by assembling controllers and tape drives from different sources. Again, the savings can be quite substantial, but you have to know what you're doing.

If you're in the market for magtape, this sampler can provide a starting point for your search. The information was provided by six vendors who responded to a *Focus* questionnaire in time for our deadline. Because of the length of the responses, this article will be continued next month. Since none of them offered to ship us their products for independent tests, we had to take their word on the accuracy of the information. If something in the following list interests you, we suggest that you call the vendor and check with several references before you sign a purchase order.

Happy hunting.

Data General

4307.T Tape Subsystem

Intended for use with MV systems other than departmental systems.

DG software compatibility: AOS/VS, AOS/RT-32, MV/UX.

Number of drives supported: two per controller.

Media: 1/2-inch tape.

Recording densities: 800/1600/6250 bpi.
Block size: selectable.

Inter-record gap: .3-inch GCR; .6-inch PE.

Data encoding method: NRZI; PE, GCR.
Tracks: nine.

Data transfer rate: 780 KB/sec.
Access time (nominal): 1.2 ms.

Rewind speed: 480 ips.

Write error rate: 1×10^{-9} GCR.

Read error rate: 1×10^{-11} GCR.

Start/stop time: 1.2 ms.

Start/stop distance: .2 inches.

Physical dimensions: 61.75 inches x 25 inches x 29 inches.

Weight: 622 lbs.

Elements included in subsystem: cable, controller, cabinet.

Safety and industry standards met: FCC, UL, CSA, UDE.

Support available: DG Field Engineering.
Price: \$55,000.

6125, 6341-A Tape Subsystem

Intended for use with MV systems.

DG software compatibility: AOS/VS, AOS/RT-32, DG/UX, MV/UX.

Number of drives supported: one.

Media: 1/2-inch tape.

Recording densities: 1600 bpi

Block size: selectable.

Inter-record gap: .6 inch.

Data encoding method: PE.

Tracks: nine.

Data transfer rate: 48 KB/sec.

Access time (nominal): 70 ms.

Rewind speed: 120 ips.

Write error rate: 1×10^{-8} .

Read error rate: 1×10^{-9} .

Start/stop time: 70 ms.

Start/stop distance: 1 inch.

Physical dimensions: 6125—10.62 inches x 19 inches x 17 inches; 6341-A—29 inches x 20.75 inches x 30 inches.

Weight: 6125—36 lbs.

Elements included in subsystem: 6125—controller, cables; 6341-A—cabinet.

Safety and industry standards met: FCC, UL, CSA, UDE.

Support available: DG Field Engineering.
Price: 6125—\$6,800; 6341-A—\$8,375.

6351-N Cartridge Subsystem

Intended for use with MV/2000 DC, MV/1400 DC, DS/7500.

DG software compatibility: AOS/VS, DG/RDOS.

Number of tape drives supported: one.

Media: .15 inch.

Recording density: 10,000 bpi.

Cartridge capacity (formatted): 21 MB.

Cartridge capacity (unformatted): 24 MB.

Block size: 16 KB.

Data encoding method: MFM.

Tracks: 12.

Data transfer rate: 500 KB/sec.

Access time (nominal): 700 ms.

Rewind speed: 70.

Write error rate: 1×10^{-9} .

Read error rate: 1×10^{-9} .

Start/stop time: 400 ms.

Start/stop distance: 12 inches.

Physical dimensions: 1.625 inches x 5.75 inches x 8.0 inches.

Elements included in subsystem: tape drive, cabling.

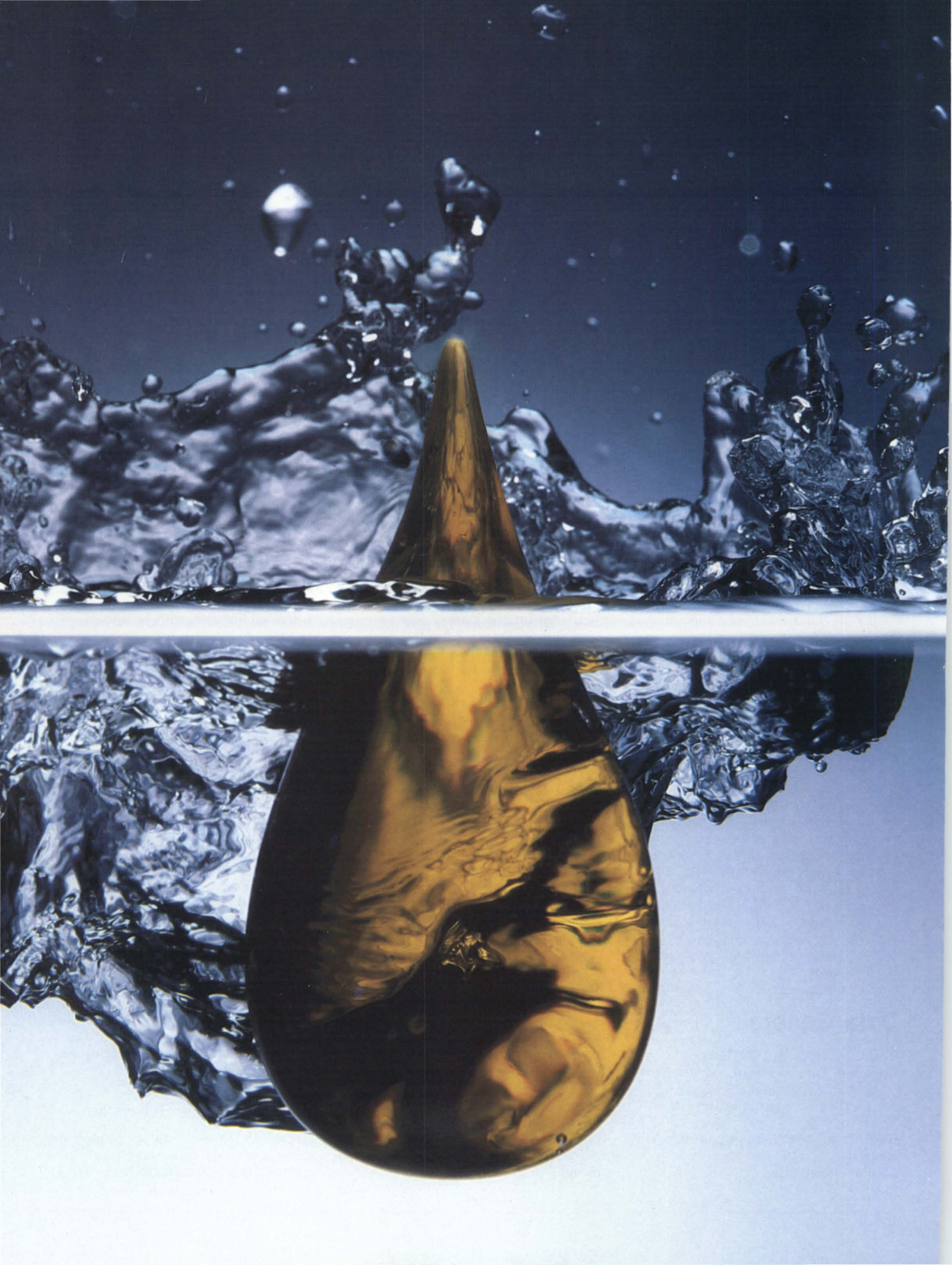
Safety and industry standards met: FCC, UL, CSA, UDE.

Support available: DG Field Engineering.
Price: \$1,500.

6299/6300 Tape Subsystem

Intended for use with MV Eclipse systems other than DC systems.

DG software compatibility: AOS/VS,



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AOS/RT-32, AOS, MV/UX, DG/UX.

Number of drives supported: three per controller.

Media: 1/2-inch tape.

Recording densities: 1600/6250 bpi.

Block size: selectable.

Inter-record gap: .45-inch GCR; .60-inch PE.

Data encoding method: GCR, PE.

Tracks: nine.

Data transfer rate: 312.5 KB/sec burst.

Access time (nominal): 5.6 ms.

Rewind speed: 200 ips.

Write error rate: 1×10^{-8} PE; 1×10^{-9} GCR.

Read error rate: 1×10^{-10} PE; 1×10^{-11} GCR.

Start/stop time: 5 ms.

Start/stop distance: .4 inch.

Physical dimensions: 24.5 inches x 19 inches x 16 inches.

Weight: 320 lbs.

Elements included in subsystem: 6299—cabling, controller; 6300—cabling, controller, cabinet.

Safety and industry standards met: FCC, UL, CSA, UDE.

Support available: DG Field Engineering.

Price: 6299—\$29,640; 6300—\$32,690.

6026 Tape Subsystem

Intended for use with MV Eclipse systems other than DC systems.

DG software compatibility: AOS/VS, AOS/RT-32, AOS, MV/UX, DG/UX.

Number of drives supported: eight per controller.

Media: 1/2-inch tape.

Recording densities: 800/1600 bpi.

Block size: selectable.

Inter-record gap: .6 inch.

Data encoding method: NRZI (800 bpi), PE (1600 bpi).

Tracks: nine.

Data transfer rate: 120 KB/sec.

Rewind speed: 200 ips.

Start/stop time: 5 ms.

Start/stop distance: .19 inch.

Physical dimensions: 24.5 inches x 19 inches x 19 inches.

Weight: 150 lbs.

Elements included in subsystem: cabling, controller.

Safety and industry standards met: FCC, UL, CSA, UDE.

Support available: DG Field Engineering.
Price: \$16,500. Δ

Contact information: Any Data General sales office can provide additional information.

Zetaco

BMX-2 Tape Coupler

DG hardware emulation(s): 6026, 6300/4307. For use with Nova, Eclipse, and MV systems.

DG software compatibility: RDOS, AOS, AOS/VS.

Number of drives supported: up to four.

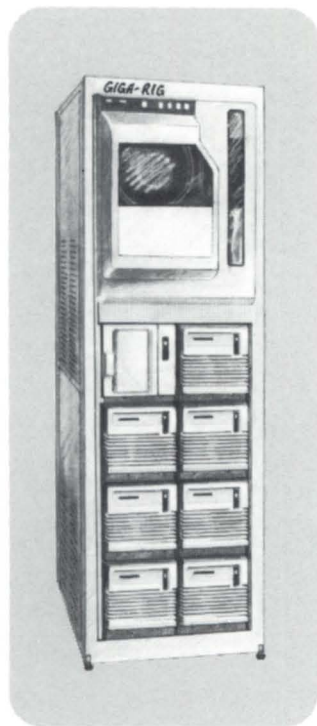
Elements included in subsystem: tape coupler, paddleboards, BMC jumper, cables, software support tape, technical manual.

Support available: telephone hot line; maintenance through GE or Grumman.

Price: \$2,745. Quantity discounts available.

Comments: BMX-2 interfaces DG's high-speed BMC or the DCH, and provides enhancements such as EPROMs, 2 MB/

for Nova, Eclipse, and MV Users



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sec data transfer rate, dynamic gap, and auto retry. It supports both streaming and start/stop tape drives with the Pertec interface. Configurable from the console, it fits FCC or non-FCC chassis.

ZDF-1 Disk/Tape Controller

DG hardware emulation(s): 6021 and 6125. For use with Nova 4, S/120, S/140, S/280.

DG software compatibility: RDOS, AOS. **Number of drives supported:** up to eight, plus up to four disk drives.

Elements included in subsystem: controller, paddleboards, software support tape, technical manual.

Support available: telephone hot line; maintenance through GE, Grumman, and DG.

Comments: For users who need to conserve on slots, the ZDF-1 offers disk and tape control on one unit. Drive characteristics are selectable from the console through the configuration software. High-speed file search, dynamic gap length select, and read/look ahead are special features.

ZIP-12 Tape Cartridge Subsystem

DG hardware emulation(s): 4307. For use with Eclipse and MV systems.

DG software compatibility: AOS/VS.

Number of drives supported: up to four.

Media: cartridge tape.

Recording densities: 16,000 bpi.

Cartridge capacity (formatted): 630 MB.

Cartridge capacity (unformatted): 750 MB.

Inter-record gap: adjustable via tape coupler.

Tracks: 24 (serpentine).

Data transfer rate: 250 KB/sec.

Physical dimensions: 8.75 inches x 19 inches x 19.6 inches.

Weight: 57 lbs.

Elements included in subsystem: tape drive with slide mounts, BMX-2 tape coupler, cabling, software support tape, technical manual.

Support available: telephone hot line; maintenance through GE, Grumman, and DG.

Price: \$15,395.

Comments: ZIP-12 is physically small,

yet a whole disk can be backed up without operator assistance.

ZIP-15 Tape Subsystem

DG hardware emulation(s): 6300/4307 under AOS/VS or 6026 under AOS or RDOS rev 7 and above. For use with Nova, Eclipse, and MV systems.

DG software compatibility: AOS/VS, AOS, RDOS.

Number of drives supported: up to four.

Media: nine-track magnetic tape.

Recording densities: 6250 or 1600 bpi.

Inter-record gap: adjustable via tape coupler.

Data encoding method: GCR (6250) or PE (1600).

Tracks: nine.

Data transfer rate: 313 KB/sec in 50 ips mode, or 625 KB/sec in 100 ips mode.

Access time (nominal): 6 ms in 50 ips mode or 12.5 ms in 100 ips mode.

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Physical dimensions: 24.5 inches x 19 inches x 16 inches.

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Support available: telephone hot line; maintenance through GE, Grumman, and DG.

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Comments: ZIP-15 is a dual-mode mag-tape subsystem, operating in either 50 or 100 ips mode and fully emulating DG tape subsystems. Optional 42-inches and 60-inches high cabinets. Δ

Contact information: Roger Young, 6850 Shady Oak Rd., Eden Prairie, MN 55344; 612/941-9480.

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MTO3 Controller

DG hardware emulation(s): 6125, 6021, 4196, and 4030. For use with any DG system using 15-inch-square boards.

DG software compatibility: AOS, AOS/VS, RDOS.

Number of drives supported: eight.

Support available: advance replacement, telephone support.

Price: \$900 (Qty. 100).

Comments: The MTO3 Magnetic Tape Coupler interfaces any DG or DG emulating computer to 1/2-inch or 1/4-inch tape drives equipped with an industry standard formatter, including streaming tape drives. It will control up to eight drives with speeds from 12.5 to 125 ips, and densities of 800 and/or 1600 bpi on standard tension arm or vacuum column tape drives, and 1600 bpi on streaming tape drives. The unit is fully software transparent with all operating systems that support 6125, 6021, 4196, or 4030 magnetic tape systems with no modification to the software.

MTO5 Controller

DG hardware emulation(s): 6125, 6021, 4196, 4030. For use with Nova, Eclipse, and MV systems.

DG software compatibility: AOS, AOS/VS, RDOS.

Number of drives supported: eight.

Support available: advance replacement, telephone support.

Price: \$900 (Qty. 100).

Comments: The MTO5 Magnetic Tape

Coupler interfaces any DG or DG emulating computer to 1/2-inch or 1/4-inch tape drives equipped with an industry standard formatter, including streaming tape drives. The Coupler will control up to eight drives with speeds from 12.5 to 125 ips, and densities of 800, 1600, and/or 6250 bpi on standard tension arm or vacuum column tape

drives, and 1600, 3200, and/or 6250 bpi on streaming tape drives. It will also control 1/2-inch cartridge tape drives with streaming speeds up to 200 ips and densities to 10,000 bpi.

DMT1 Controller

DG hardware emulation(s): 6125, 6021,

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4196, and 4030. For use with all Desktop Generation, Eclipse S/20, and C/30. **DG software compatibility:** All Desktop software.

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Support available: advance replacement, telephone support.

Price: \$1,140 (Qty. 100).

Comments: The DMT1 Magnetic Tape

Coupler interfaces any Desktop Generation computer to tape drives equipped with an industry standard formatter, including streaming tape drives. The Coupler will control up to eight drives with speeds from 12.5 ips up, and densities of 800, 1600, and/or 6250 bpi on standard 1/2-inch tension arm or vacuum column tape drives, and 1600

or 3200 bpi on streaming tape drives. The Coupler is contained on a single printed circuit card that plugs directly into the Desktop and connects to the tape drive via connectors on the PC card. The unit is fully software transparent with all operating systems that support 4196, 6021, or 6125 magnetic tape systems with no modification.

RMT1 Controller

DG hardware emulation(s): 6125, 6021, 4196, and 4030. For use with Rolm-Mil-Spec CPUs.

DG software compatibility: AOS, RDOS, AOS/VS.

Number of drives supported: eight.

Support available: advance replacement, telephone support.

Price: \$6,000 (Qty. 100).

Comments: The RMT1 Magnetic Tape Coupler interfaces Rolm computers to tape drives equipped with an industry standard formatter, including streaming tape drives. The Coupler will control up to eight drives with speeds from 12.5 ips up, and densities of 800, 1600, and/or 6250 bpi on standard 1/2-inch tension arm or vacuum column tape drives, and 1600 or 3200 bpi on streaming tape drives. The unit is fully software transparent with all operating systems that support 3364 or 3369 magnetic tape systems with no modification to the software.

DSC2 Controller

DG hardware emulation(s): 6125, 6021, 4196, and 4030. For use with all Desktop Generation, Eclipse S/20 and C/30 systems.

DG software compatibility: all Desktop Generation software.

Number of drives supported: eight.

Support available: advance replacement, telephone support.

Price: \$1,250 (Qty. 100).

Comments: The model DSC2 allows DG Desktop Generation users to connect SCSI interface tape drives and maintain full compatibility with operating systems that support the 6125 or 6026 tape system. Up to eight drives are supported, including 1/2-inch cartridge tape drives. The DSC2 is completely contained on one microprocessor controlled board that plugs directly into the Desktop Generation CPU and cables to the SCSI interface connector on the selected tape drive. Δ

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SHARE AND SHARE ALIKE

Shareware packages are appearing in the DG community. Let's look at a few

"Shareware" has been around for quite some time in the microcomputer arena, but it only recently surfaced in the Data General community. Briefly, shareware is software that the author releases to the public under a set of rules that—the author hopes—will encourage people to pay for it if they like it. The rules generally go something like this: (1) you can distribute all the copies you want, (2) you can use it as much as you want, (3) you can't charge for distribution (other than for actual media and shipping cost), (4) you must include everything the author says you must include, and (5) you should send the author the requested amount if you like the product.

Shareware is written with the philosophy that you ought to have the right to try before you buy, and pay (but not dearly) only for the stuff that's useful. If you send the author the requested amount (usually under \$50), you will be encouraging that person to write more or enhance what has already been written. If you don't speak up, shareware sources may dry up. The fees are usually cheaper than a demo copy of a "real" product.

However, as good as it may be, shareware is not without its risks. First, you are going to have to spend several hours evaluating the package to see if it's of any use. (I consider this an advantage rather than a problem, because it's a lot easier to evaluate a working production copy than trying to do it by reading manuals and talking to sales and technical reps.) The biggest risk is probably whether or not the software works. In the micro world, much of the shareware is second rate or trash; only 10 or 20 percent of what I've seen has any value at all. From what I've seen so far in the DG world, the percentage is much higher (unless you're including collections of CLI macros, in which case the duplication and triviality of some of

the macros in a collection can bring the percentage way down). However, it is still in the hands of the user to be sure that the use of the software will not destroy the system.

There are now a number of shareware products in the DG world. This month, I'll give two of them a mini-review.

The File Manager

The first is the File Manager from Kim Geiger. He is asking a mere \$30 for this utility, and if you send it to him at Last Days Ministries, P.O. Box 40, Lindale, Texas 75771, he will send you a tape, and you will have already fulfilled your fee obligation. There are also many users who will send you a copy of it, so you don't need to advance the cash—but if you find his utility useful, please pay for it. It certainly isn't much, and it helps to make the shareware system work.

The File Manager (FILEMNGR.PR on disk) is a menu-driven file management utility. It most resembles XTREE under MS-DOS. It allows you to copy, move, delete, view, and rename files. If you have decided that today is the day to clean out the 17 directories named MISC, MISC2, MISC3, TEMP, TEST, etc. under your UDD directory, this is the utility to simplify the job. It also makes easy work of sorting through the 350-file macros directory you got last week from an experienced user to find the 20 or 30 that will help you run your system. It allows you to jump from one directory to another quickly, and to view the list of files much faster than with F/S/AS. Also, a few simple keystrokes will allow you to view, move, copy, or delete files.

I found it quite useful, although it took me an hour or two to feel really comfortable with it. I imagine if I spent another week or two using it to clean up our entire system disk, which contains nearly 300 MB of fairly small files in numerous directories, I would become quite proficient. (I draw definite distinctions between being productive, being comfortable, and being proficient. It took me nearly two months to feel proficient with SED, even though I was productive after a couple hours.) It would also be useful if your word processor has a limited filing interface. If

the CLI scares your word processing department, give them this.

I was unable to test its integration with WordPerfect's Library. The help screens said that if the File Manager was included as a WP Library menu option, then the CTRL-F1 function key would return you directly to the WP Library menu.

All in all, I found it a rather well-written utility, and I would find it most useful as a tool to clean up my old "collection" directories and rearrange the good stuff, while purging the bad stuff en masse.

Although I gave it only a few hours of use, it didn't generate any problems: no corruption on the disk, or anything else suspicious. This leads me to conclude that all file handling is done through standard system calls and that the only direct access to the directory files is to get the initial listing of each directory. Thus, it's truly a tool for a file manager, not a file mangler.

I suspect there may be a limited life for this version, however. Since we members of the user community don't have any specifics yet (one week before the conference) on how the rev 8 AOS/VS disk structures might affect this program, it may be that it will need to be modified before it will work on rev 8. I hope one of the sessions at the conference will give some clues. I tested it under both 6.06 and 7.54 AOS/VS on an MV/4000. I'm sure that Kim will upgrade his software as soon as he can if it turns out that it's needed.

In order to give you a better idea of what FILEMNGR can and can't do, I'll describe the six features for my wish list. First, it doesn't address permanence. If a file has permanence on, you can copy but not delete it. There is no way (at least I didn't see it) to check the permanence or to turn it off or on. ACLs are treated in the same way, by being ignored (or perhaps that should read "enforced"). However, the users that would find this most useful would not miss that functionality. Second, you can't create or delete directories. Thus, you have to terminate File Manager, create/delete the directory, and come back in. Again, this is not a major issue—but it would be nice. Third, when you change the date for sort sequence, there is no immediate way to

see what the new setting is. You have to toggle back to name sequence and then back to date to see what date sequence you have.

Fourth, the first help screen would have been more useful if it had mapped out the functions by function or control key assignment and used those to bring up the help screens. Having a menu of topics is certainly a valid approach though; perhaps just a little chart on the bottom of the screen would be sufficient. Fifth, it would be nice to show the number of blocks on the file in data, index blocks, and waste, in addition to the size and type of the file. For sparse files (i.e., files with gaping holes in the middle, such as most .PR program files), this could get quite tricky, but it would be nice to have the option to turn it off or on. Last, but not least, is the ability to create a son CLI process.

microEMACS

The other package I checked out was a version of microEMACS that Phil Julian has re-hosted under AOS/VS. This is based on the popular EMACS editor, and seems to feature most of the functionality of the original.

The software includes all of the source code in C for the editor modules and many different systems (CP/M, VMS, MS-DOS, etc.). It also includes a compiled version for those of us without C compilers.

My first session lasted about two hours. During that time, I was able to determine that it's an extremely powerful and relatively fast editor with a number of excellent features. It allows multiple windows on the screen, multiple files, or both. In other words, you can have several different sections of the same file in several windows, or a piece of different files in each window, or multiple files open alternating between the one currently on the screen. There are many (maybe 100 or more) commands or functions that are built in to the editor (as opposed to about 40 for SED and 60 or so "base" commands in SPEED). Many are assigned (or "bound") to function keys or control keys, but more are assigned to two-key sequences such as (ESC)Q or ^X^M. Some are not bound and can only be executed by their command name.

However, with power comes complexity. The list of key assignments is several pages long and isn't complete (more about this later). There doesn't seem to be any rhyme or reason to

many of the key assignments, although this is something I have noticed about everything that has anything to do with C or Unix. Most frustrating is that the key assignments in the compiled version don't even allow the arrows to properly move the cursor around. This just contributes to the user-belligerent image I have of C-based software. Due

to the sheer number of commands and control keys, it will take a long time to become proficient with the editor. Don't get me wrong though, this is a fine editor, and if mastered, the rewards are worth it.

My big complaint is the lack of documentation. There are several text files that came on the tape, and all of them

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have a great amount of detail as to the commands and function key assignments—but none of them agree with what actually happens. One text file seems to be function key assignments for MS-DOS, another seems to be for DEC VT52 terminals, and the one that seemed to be for DG terminals didn't quite work on my D211.

Unfortunately, that is one of the problems with public domain software. The editor is powerful and flexible enough that I have decided that it will be quite useful, so I will eventually spend the time to figure it out using the old "push the button and see if it smokes" method. However, as I do so, I will be assembling notes on it for the

others in the office, so they won't have to experiment as much. On the other hand, if anyone out there has beat me to it, I would appreciate a copy of your notes.

I repeat: Be cautious.

Let me conclude by pointing out that shareware can be a gold mine, but you must realize you are getting software "as is." This is no different in many respects from the commercial software companies (we all know that no one, especially operating systems vendors, allows bugs in their software), but many people may not be comfortable relying on a package with limited support (if any) that is published by someone whose livelihood does not depend on that product. I tend to be one of those people, and that is why I am most interested in public domain software for development tools, rather than runtime production software.

Still more on macros. . .

I've just finished reading Mark Kratzer's article on macros in the October 1987 issue. He has some very good ideas and has organized them quite well, but there are a couple points I'd like to comment on.

Regarding the "PUSH ; PROMPT POP" technique, Kratzer said that you can only PUSH once using this technique. Not so. You can PUSH as many times after that as you want. You can also set PROMPT POP again, although it is redundant. What you need to be careful of is not to change your PROMPT to something else other than POP. He has a valid point concerning the use of PUSH and POP when using VAR0-VAR9 or STRING to pass data from one portion of the macro to another. I even tried it on our system to be sure.

A week later, I learned something rather astonishing. This technique doesn't work in AOS/VS rev 6. I know it worked in AOS revs 3.x, 4.x, 5.x, and 6.x, and it works in AOS/VS rev 4.x, 5.x, and 7.x.

The other point we disagree on is philosophical. He supports that using a HALTIT macro is more desirable than using nested conditions. When I was first introduced to the use of the "PATH/L=@NULL/2=ERROR" technique, I began to use it almost universally until I was confronted with the terrible disadvantage of having it log off users if they were in a captive environment. (By this, I mean one where the first thing that happens is PROMPT BYE, and then prompt always includes either BYE or

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POP from that moment on.)

Since then, I use the technique only in one of two situations: either the problem is so drastic there is no other feasible way out, or it is part of a stand-alone macro that is normally used from CLI and not called by user macros. Therefore, if I'm writing a macro that requires a number of conditions to be tested, I'll nest them. If the number of conditions makes for a long macro, I'll make two macros. The first does nothing but test all the nested conditions, and at the center is a single line that calls the second macro, which includes all switches and arguments intact (but verified). In either case, my [!end] statements are always labelled by which condition test they correspond to.

I'd also like to comment about the macro in the article's Figure 4. Note that this will only handle up to a three-digit PID number. I doubt that many users have a problem with this, but since PID numbers can be four digits (and soon five digits just by changing PARU.SR), I would like to propose changing the "%9%%10%%11%" in the fourth line to "%9%%10%%11%%12%%13%," thus including all digits of the PID number.

One technique that was not mentioned but was demonstrated by his listings involves making liberal use of comments and white space. There is almost nothing that makes a listing more readable than using plenty of blank lines to separate individual operations and to set off comments. This is fundamental not only to CLI but also COBOL, BASIC, Fortran, and darn near any other language I can think of (RPG doesn't count). This is probably why I have never had any desire to investigate FORTH, since every FORTH program listing I've ever seen attempted to code an entire program in two or three lines of gobbledygook. (My apologies if there is real hope out there; maybe only bad examples have found their way into my hands.)

I've just finished John Grant's article comparing SED and SPEED (October and November 1987 issues). John makes a number of statements about the shortcomings of SED that are not entirely correct. Mind you, SED certainly would not be my primary editor on AOS/VS, except that it is the only full-screen editor that you don't pay extra for; SPEED also has many more features than SED ever dreamed of. So even though I have a

love/hate attitude toward SED, I don't feel that John did it full justice. SED has most (but not all) of the limitations that he described, but what I feel is its most powerful asset was not mentioned in the article.

Item 1. The article states "The edit also forces SED to update the file when you exit, even if you didn't really change anything." Not so. If you use

the APPEND, DELETE, INSERT, MODIFY, or SUBSTITUTE when you BYE, the file will be updated. If you do not use them, it won't. However, the ABANDON command will exit SED, leaving the original file untouched, no matter what you may have done to it.

Item 2. There are a couple places in the article that imply you cannot do mixed case searches. Not entirely cor-

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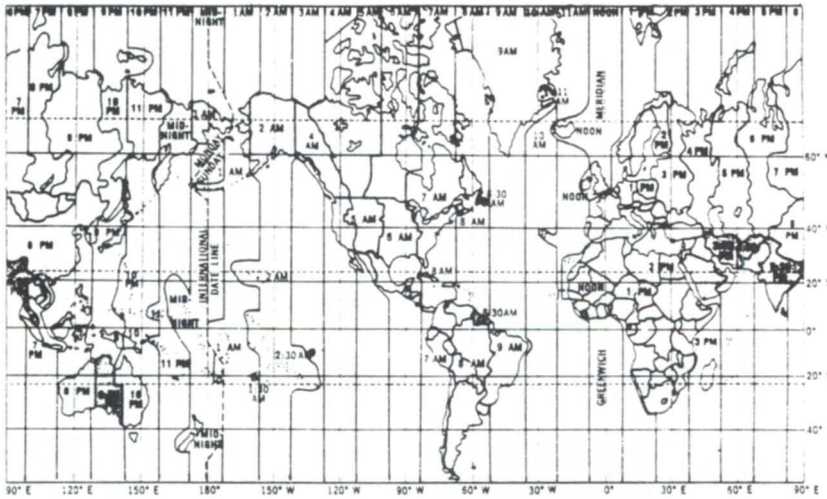
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rect. The example John used was looking for the word "CALL" in various cases. SED does allow searching for certain restricted types of strings without being enclosed in quotes. Basically, you do not need to enclose a search string in quotes if it is entirely numeric, entirely alpha (PIC 9(x) or PIC A(x) in COBOL terms), and does not include any punctuation (usually). Thus, the command "SUB 'CALL' for call IN ALL" would globally replace all occurrences of the word "call" regardless of case—upper, lower, or mixed. I do agree, however, that the command parsing rules are too limited and should allow any ASCII string without "white space" to be accepted.

Item 3. He laments the inability of SED to suppress intermediate results of search and replace operations on the screen ending. He made the statement "This makes SPEED a much better choice for writing batch edit macros that will silently edit a file." I agree that most of the time SPEED is the better choice, but not for this reason. If you are writing batch edit macros, all you need is a command line such as:

```
PROC/INPUT/OUTPUT=@NULL/CONSOLE. . .  
SED.PR/BATCH=command_file
```

and all of the normal screen output from SED will be discarded. As a matter of fact, due to my lack of proficiency with SPEED, this is the same technique I have been forced to use in the past to have silent edits of a file in batch mode.

Item 4. The article makes no mention of the function key assignments. One of the reasons I have tolerated SED for so long is that the default commands assigned to most of the function keys (with shift and control) are active at any point. I don't have to exit the modify mode to find the next occurrence of a variable; just hitting F7 or shift-F7 (forward or backward) does that for me. This function key command assignment gives SED 75 percent of its power. I am always amazed at how many programmers spend their lives using SED as their primary editor and have no idea how to use any function keys other than F1 or F2 (move up/down 20 lines at a time). Δ

Jim Siegman is a contributing editor to Focus, chairman of the NADGUG audit committee, and treasurer of the Chicago Area Data General Users Group. Send comments or questions to Datamark Corp., 3700 W. Devon, Suite E, Lincolnwood, IL 60659; 312/673-1700.

WASTED MOMENTS

Before you do that upgrade, take a long look at your software

The biggest bottleneck on most ICOBOL systems is disk I/O. While rummaging through various programs, I've found that a lot of the problem is self-inflicted. Before you spend a lot of hard-earned money upgrading your system to get better performance, take a look and see if the problem is in your software.

Recently, I had an opportunity to install a general ledger package written by one of the most popular ICOBOL software companies. (I won't mention any names, but their initials are MCBA.) If your installation is typical, *GL* is the bane of your system—it takes forever to run and brings the computer down to its knees. Part of this is the nature of the beast, but a good portion is due to the way the software is written. Consider the following:

The *GL* interface program merely reads the distribution files (*A/R*, *A/P*, and payroll) and makes a general ledger transaction out of each one. What I couldn't understand is why it took half an hour to convert 5,000 entries—considering that on an *S/140*, ICOBOL will write more than 3,000 records a minute and read about three times as fast. The secret was in the software.

The key of the *GL* transaction file looks like this:

```
FD GL-TRANSACTION-FILE
  RECORDING MODE IS FIXED.
  LABEL RECORDS ARE STANDARD.

01 GL-TRANSACTION-RECORD.
03 GL-TRANSACTION-KEY.
   05 GL-TRX-ACCOUNT-NUMBER.
     07 GL-TRX-MAIN-ACCOUNT          PIC 9(4).
     07 GL-TRX-SUB-ACCOUNT          PIC 9(3).
   05 GL-TRX-DATE.
     07 GL-TRX-YEAR                  PIC 9(2).
     07 GL-TRX-MONTH                 PIC 9(2).
     07 GL-TRX-DAY                   PIC 9(2).
   05 GL-TRX-TIME                    PIC 9(8)
```

The field *GL-TRX-TIME* is only there to avoid duplicate keys; after all, you may have many vouchers going into the same account on the same day. The *WRITE* statement, then, looks like this:

```
WRITE-GL-TRANSACTION-RECORD.
  ACCEPT GL-TRX-TIME FROM TIME.
  WRITE GL-TRANSACTION-RECORD.
  IF GL-TRANSACTION-FILE-STATUS = DUPLICATE-KEY
    GO TO WRITE-GL-TRANSACTION-RECORD.
```

Again, perfectly straightforward—accept the time in order to avoid duplicates, write the record, and in case of collision, go back and do it again. In most versions of COBOL, this code would work well. In ICOBOL, it slows down the program to a crawl.

Whoever wrote this had the right *idea*, but came up with the wrong results. The field is eight digits long in order to accommodate hours, minutes, seconds, and hundredths of a second. But in ICOBOL, the hundredths-of-a-second field is al-

ways zero! Therefore, the program takes a system that is fully capable of doing 60 writes per second and limits it to one per second.

What does this do to your execution time? Well, with the code as shown, it took 32 minutes to convert 5,300 records. I then added a 77-level item called *GL-INTERFACE-TIME* and changed the code to the following:

```
WRITE-GL-TRANSACTION-RECORD.
  ADD 1 TO GL-INTERFACE-TIME.
  MOVE GL-INTERFACE-TIME TO GL-TRX-TIME.
  WRITE GL-TRANSACTION-RECORD.
  IF GL-TRANSACTION-FILE-STATUS = DUPLICATE-KEY
    GO TO WRITE-GL-TRANSACTION-RECORD.
```

The program now finishes in a little more than six minutes—a fivefold increase! Better still, it puts the automatically generated transaction before any manual ones, making the trial balance much easier to read, as long as no one inputs any entries between midnight and 12:00:53 a.m.

This is just one example. I'm convinced that most of us could make big performance gains just by looking through the code to see if anything is being done that doesn't make sense. If you have good program documentation (you *do* have good program documentation, don't you?), you can probably find many more examples like this. I found one that I had been doing for years.

I wanted to make sure that, when updating our inventory file, my program was the only one using a particular record. So I wrote the *READ* statement like this:

```
READ-INVENTORY-ITEM-RECORD.
  READ INVENTORY-ITEM-FILE NEXT RECORD LOCK.
  IF INVENTORY-ITEM-FILE-STATUS = 94
    CALL PROGRAM "#W",
    GO TO READ-INVENTORY-ITEM-RECORD.
```

This technique wastes 3 seconds every time a collision is detected. Considering that this system will do about 110 *READS* per second, I'm wasting a heck of a lot of time there.

In my defense, this made a lot more sense when it was written—on a *CS/40* under *ICOS*. Unlike ICOBOL, *ICOS* was single-threaded I/O, which means that only one read was allowed at a time. Eliminating the "#W" would give me a nice, tight read loop that could have dragged the system right down. Now, however, with multithreaded I/O, I rewrote the paragraph to eliminate the wait. I just tested it, and can see no degradation on the other terminals. This is an excellent example of software that was absolutely valid a few years ago but has since become a drag on the system.

One of the first program changes I made on our system was to the order print routine. This program would take your order line item file, arrange it in picking sequence order, and print out your new orders. The problem was that if you only wanted to print the picking tickets that you had just entered, the program would allow you to enter a starting and ending number, sort the *entire* line item file, and then print the requested orders. I couldn't understand why it was taking an hour and a half to print 10 orders! I changed this so that the

system asked for order numbers first and then did a sort on the requested records. A 15-minute change saved us hours per day.

Of course, while I/O may be your biggest bottleneck, it probably isn't the only one. A bad habit I've noticed in some systems is the tendency to use PERFORMS for everything—including statements that are only executed once. This wastes resources two ways. First, the system needs to take time to do the PERFORM. Then, there has to be a paragraph name, which costs 4 bytes in your program's .PD. The worst case is an instance that I've seen many times. There's a statement somewhere in the program like this:

```
PERFORM CLOSE-INVENTORY-ITEM-FILE.
```

Then, somewhere down in the code—usually in an I/O-SECTION SECTION—there's the statement:

```
CLOSE-INVENTORY-ITEM-FILE.  
CLOSE INVENTORY-ITEM-FILE.
```

This type of programming adds nothing to the readability of the program, wastes cycles, and wastes memory. Why do it?

OK, now that you've cleaned up all of your programs, let's get them to load quicker. This one is easy, and will save you a good chunk of the time it normally takes to load a program. All you have to do is make your programs contiguous. This will keep ICX from searching all through your disk for the whole program. This works in RDOS, and I assume it works in

AOS/[VS], since all we're trying to do is keep seek time to a minimum. I do this each night after I've compiled all of my changed programs by using the following macro:

```
BUILD DDPD -. (DD PD) @TODAYSDATE@/A  
CDIR DUMMY  
XFER (@DDPD@) DUMMY:(@DDPD@)/C  
DIR DUMMY  
MOVE/A/V/R/D DZO -.-  
RELEASE DUMMY  
DELETE DUMMY.DR
```

This simply makes a BUILD file of all the programs that I've written or modified today, XFERS them to contiguous files in a dummy directory, and moves them back in. It takes only seconds to run, yet greatly decreases the calling time. How much? Well I tried this with two 18 KB programs calling each other 100 times. For a noncontiguous program, this operation took 80 seconds. But when I made both programs contiguous, it took 59 seconds—cutting the time by more than 26 percent. Well worth a minute of your time at the end of the day.

Odds and Ends Department

A friend of mine called the other day and told me that he tried to dump some files to tape, and while the CLI command he used looked perfectly reasonable, the results weren't *at all* what he wanted. I gave him a simple method to find out if the line he just typed is really what he wants to do, and I've decided to pass it along to you.

In RDOS, you can make a long command line short by using a combination of the < > and () characters. But if you're not quite sure of how these operate—and I never am—you can get into a lot of trouble. My friend wanted to dump four files to tape, and typed the command:

```
DUMP/V MT0:0 GLTRXFL(00,01).(NX XD)
```

Instead of dumping all four files, the first two got dumped to tape, the tape rewound, and then the next two got dumped right over the first two. Luckily, he saw it happen.

Of course, if you're unsure or paranoid, the best alternative is to type out all of the names. But if you're lazy like me, you just insert MESSAGE at the front of the line, and the CLI will tell you exactly what it's going to do. The above example would look like this:

```
MESSAGE DUMP MT0:0 GLTRXFL(00,01).(NX XD)
```

and it will return

```
DUMP MT0:0 GLTRXFL00.NX GLTRXFL00.XD  
DUMP MT0:0 GLTRXFL01.NX GLTRXFL01.XD
```

If instead, you had typed

```
MESSAGE DUMP MT0:0 GLTRXFL(00,01).(NX XD)
```

the CLI returns

```
DUMP MT0:0 GLTRXFL00.NX GLTRXFL00.XD GLTRXFL01.NX  
GLTRXFL01.XD
```

which is exactly what you want. It's a simple trick that can save you a lot of grief. Δ

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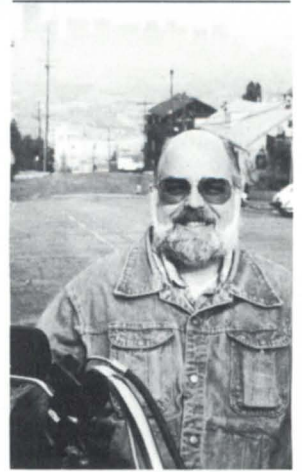
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CLEVER SCHEMES, NAGGING PROBLEMS

Evaluating popular file transfer protocols

:FILE_XFER

Last month, when I mentioned that I was making a freebie copy of a YMODEM program available on the :SYSMGR bulletin board, it occurred to me that quite a few of you might not be that familiar with the file transfer protocols currently in vogue in the personal computer subculture. So this month, I'm going to give you a mini-survey of what's available.

There are many communications protocols on this planet that can be used for file transfer, but I'm going to limit the discussion to those protocols in widespread use for casual file transfer between pairs of personal computers, file transfer between hosts and personal computers, and file transfer between two hosts (like AOS[VS] and AOS[VS]).

The most popular file transfer protocols fall into two categories: proprietary and public domain.

Proprietary protocols are of limited interest, because you're basically at the mercy of the protocol inventor when it comes to software support. Some examples of proprietary protocols are those provided by BLAST and DG/Gate.

Public domain protocols are more useful, because their support tends to be more widespread. For example, most PC-based bulletin boards support the majority of public domain protocols, but few support BLAST, and none I know of support DG/Gate.

The most common public domain protocols for the PC are XMODEM (nee MODEM7), YMODEM, and KERMIT. It's hard to find a PC-based communications package that doesn't support at least two of these.

:HISTORY

Many of the microcomputer protocols now in common use evolved under less-than-ideal circumstances. Take XMODEM, for example. Back in August 1977, a guy named Ward Christensen designed a protocol that he immediately put in the public domain. According to a memo he wrote in 1985: "It was a quick hack I threw together, very unplanned (like everything I do), to satisfy a personal need to communicate with 'some other' people." The original protocol was referred to as MODEM2, the name of the program that implemented the protocol on the CP/M operating system.

Over time, the program evolved into XMODEM, and everybody and their brother produced software to support the protocol on just about every PC in existence, as well as a bunch of minis and mainframes.

Eventually, XMODEM spawned some compatible protocols; the most compatible is known as YMODEM.

:ANALYSIS:XMODEM

XMODEM protocol involves sending a data file in blocks of 128 bytes, packaged inside a "frame" consisting of an ASCII SOH (start of header) character, a 2-byte block number field, the 128 bytes of data, and a checksum byte. If a block is received successfully and written to disk successfully by the receiving end, it responds with an ASCII ACK (positive

ACKnowledge). Otherwise, it requests retransmission by transmitting an ASCII NAK (negative acknowledgement).

All failures, including 10-second time-outs, detected by the receiver are retried 10 times before throwing in the towel.

Transmission is initiated when the receiver "polls" the sender by periodically transmitting NAKs. When the sender is ready, it responds by transmitting the first block of the file to be transferred (block number 1).

The sender signals the end of the file by transmitting an ASCII EOT (end of transmission) character and waiting for the receiver to ACK it. If the receiver NAKs the EOT, then the sender retransmits it until an ACK is finally received, or until the 10 retries are exhausted.

At this point, it is important to note that, because of a loophole in the protocol spec, the file can be considered to have been transferred successfully only if both ends agree that it was.

The block number field is a little peculiar and shows a lack of sophistication in the protocol design. The first byte of the field is the block number byte, which starts at 1 and wraps around to 0 after 255. The second byte is the ones-complement of the first byte, and is used to check that the first byte is valid.

The trailing checksum byte is computed as the numeric sum of the 128 data bytes, treating them as unsigned values between 0 and 255, with any carries discarded.

What I've just described can be referred to as "classic" XMODEM protocol. Most of the follow-on work involved adding frills. But before we discuss the frills, let's review the high and low

points of the classic protocol.

The advantages of classic XMODEM protocol are:

- It is *very simple*, so a lot of software is available to support it.
- Binary files can be transferred easily, since data bytes are sent "as is."
- The half-duplex (one end talks at a time) nature of the protocol, with tiny (1 byte) acknowledgement frames, worked well with old-style, split-speed modems that used a low-speed reverse channel.
- The short frame size is well suited to operation over noisy circuits, because it takes less time to retransmit.
- The short frame size results in fewer overrun problems at the receiver's end, especially on minis and mainframes where limited input buffer sizes are available.
- The protocol is receiver-driven, i.e., the sender needs only to respond to requests from the receiver; strictly speaking, the sender doesn't even need time-out capability.

The disadvantages of classic XMODEM

protocol are:

- The half-duplex operation and small frame sizes result in low overall throughput, especially at higher speeds.
- The checksum scheme is not robust: many common errors can go undetected.
- The file length at the receiving end will be rounded up to the next 128 bytes (the spec specifies padding of a short last record with the CP/M EOF byte: ^Z (032 octal).
- Any available directory information (attributes, DCR/TCR, DLM/TLM) associated with the file is lost.
- An 8-bit communication link is required. This eliminates most public-switched networks.
- Software flow control is not supported. This eliminates most of the new "intelligent" modems that use compression techniques or support error-free modes, and causes problems with most statistical multiplexors.

The first four problems are annoy-

ances. The last two problems can be serious.

Most of the enhancements to classic XMODEM protocol were made to address the first four problems. Addressing the last two problems would require significant changes to the protocol and would significantly complicate the programming logic involved. More complicated programming would be the Kiss Of Death; the key to the success of XMODEM protocol was—and is—its simplicity.

:XMODEM.CRC

The first change to classic XMODEM protocol was made by Chuck Forsberg, a Unix programmer at Omen Technology. While he was working on his YAM (yet another modem) program, Forsberg substituted a 2-byte CRC-16 (16-bit Cyclical Redundancy Check) for the simpler 1-byte checksum.

The checksum scheme fails to detect many common errors. For example, the corruption of any 2 bytes, such that their sum (ignoring carry) is still the

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same, will pass through undetected. CRC-16 will detect all single- and double-bit errors, all errors with an odd number of bits, all burst errors of 16 bits or less, 99.997 percent of 17-bit error bursts, and 99.998 percent of 18-bit and longer errors. That's good enough for most applications.

The tricky part was how to add CRC-16 as an option without making existing XMODEM programs obsolete. This was cleverly accomplished by adding a "negotiation" session to the beginning of the protocol. The decision of whether or not to use CRC-16 is left to the receiver (remember, this is a receiver-driven protocol). A receiver wishing to use CRC-16 polls the sender with a C (103 octal) byte instead of a NAK. If the sender supports CRC-16, it switches to CRC-16 mode and transmits the first block. If the sender doesn't support CRC-16, it just ignores the C. After a few tries, the receiver reverts to checksum mode and transmits a NAK in compliance with the classic protocol.

Voila! Downward-compatible CRC-16 support.

:XMODEM_1K

The next enhancement was to address the poor throughput caused by the small block size. To illustrate the problem, let's look at a typical PC-to-PC session using the classic protocol (checksum), 50 ms hard disks, and a 1200 baud communication circuit configured as 1 start bit, 8 data bits, and 1 stop bit.

Time	Receiver	Sender
0.000	ACK	
0.008		Read 128
0.058		Send frame
1.158	Write 128	
1.208	ACK	

Ignoring the overhead of the initial negotiation session, this results in a net throughput of 1,280 data bits/1.208 secs = 1059 baud, or 105.9 cps. That's 88.3 percent of the maximum bandwidth. Not too shabby.

Now let's try it again, but this time at 9600 baud.

Time	Receiver	Sender
0.000	ACK	
0.001		Read 128
0.051		Send frame
0.189	Write 128	
0.239	ACK	

This time we get 1,280 data bits/0.239 secs = 5365 baud, or 537 cps. That's only 55.9 percent of the maximum bandwidth. Pretty grim.

The solution, also developed by Chuck Forsberg, involves defining a second frame-type: the 1 KB frame. Its arrival is signaled by the sender using an ASCII STX (start of text) byte instead of an SOH byte to begin the frame. If the receiver doesn't support 1 KB frames, it will presumably NAK the frame, and the sender will eventually

switch to 128-byte frames, or simply abort. If the receiver does support 1 KB frames, it must be capable of handling any mixture of 128-byte and 1 KB frames.

Rerunning the two analyses that we did above, but using 1 KB frames this time, gives net data rates of 1180 baud (98.3 percent) and 8738 baud (91.0 per-

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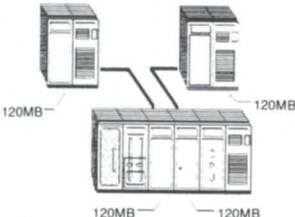
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cent), respectively. Quite an improvement.

The down side is that the circuit quality better be pretty good: it takes almost 9 seconds to retransmit a block at 1200 baud, even though only a single bit may have been wrong.

:YMODEM.BATCH

The last nagging problems are file size preservation and the loss of directory information. A clever scheme to handle this problem was developed by—you guessed it—Chuck Forsberg. It involves the transmission of a file information frame using a block number of 0 before any data blocks (whose block numbers begin with 1) have been transmitted.

A file information frame looks just like a 128-byte data frame, except that the data field consists of the file pathname in Unix format (lowercase, "/" directory separators instead of ".:"); the file length as an ASCII decimal digit string (e.g., 123456); the file modification time expressed as an ASCII octal digit string, whose value is the time in seconds since January 1, 1970, Greenwich mean time (GMT); the Unix mode byte; the file serial number; and "other fields." The separator between fields is a single space byte, except for the pathname, which is separated from the length field by a NUL (000 octal) byte. All fields, except for the file pathname, are optional, and should be set to NUL if not used. Most PC and non-Unix YMODEM implementations support only two of the optional fields, the file length and file modification time. This is also true of the YMODEM program distributed on the :SYSMGR bulletin board.

Each new file transferred is preceded by a file information block. A file information block with a NUL filename ("(0)") indicates there are no more files to transfer.

Lastly, one other change was the introduction of a cancellation request that uses a single ASCII CAN (030 octal) byte to signal that the receiver or sender would like to cancel in mid-transfer. Because of the danger of an ACK (00000110 binary) being corrupted into a CAN (00011000 binary), a later revision specified two or more consecutive CANS, with no intervening bytes or errors (time-out, overrun, etc).

:YMODEM.G.OPTION

One final XMODEM hack. To speed up throughput on error-free circuits, a variation of XMODEM-CRC was developed that removes the requirement to

ACK each frame. It substitutes a "G" (107 octal) for the initial "C" poll character and requires only that the final EOT be ACKed. This variation has received limited acceptance in the PC world, and is mostly limited to Unix systems and their pals.

:KERMIT

This public domain terminal emulator package/file transfer protocol has nothing to do with XMODEM/YMODEM. It's simply a classic example of a horse designed by a committee.

KERMIT was designed to provide a standardized, widely available facility for terminal emulation and file transfer on the widest variety of systems. The half-duplex file transfer protocol supports error-free binary and text file transfer over 7- or 8-bit circuits, with preservation of directory information. It uses a short frame size (for the benefit of minis and mainframes with small buffers), control character handling via 2-byte (7-bit) "quoting" sequences (to avoid flow-control problems and handle public-switched networks), repeated character compression (in an effort to achieve some semblance of performance), and negotiated transfer parameters (the sender and receiver begin by exchanging lists of their limitations).

KERMIT makes XMODEM with 128-byte frames look speedy. And YMODEM with 1 KB frames looks positively blinding.

:BLAST

BLAST uses a proprietary protocol similar to KERMIT's, but with the major difference that the protocol is full duplex and uses a "sliding window" technique (their term), which usually means that an SDLC-like (synchronous data link control—what XTS uses on ISC lines) acknowledgement scheme is used. This means that transmission continues even if an ACK hasn't been received for the current frame, and that only every eight or so frames need to be ACKed (i.e., groups of frames can be acknowledged with a single ACK frame). A NAK frame includes information on which frame was received in error, so retransmission can resume from that point (which can save considerable time).

Somehow, I once got the idea that BLAST provides some sort of automatic data compression, but I haven't been able to detect it transmitting a 10 KB file of blanks from my DG/One (running BLAST rev 8.0) to the MV/4000 (running BLAST 7.4.3).

BLAST has one minor annoyance: it

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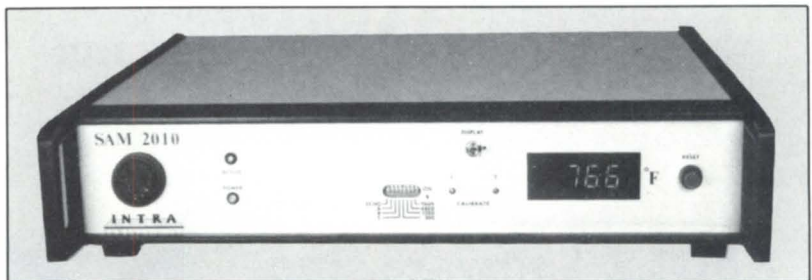
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defaults to a very short frame size (84 bytes), which results in low throughput due to the overhead of the frame "packaging" bytes. KERMIT is even worse in this respect: its *maximum* frame size is 96 bytes! Added to the half-duplex protocol it uses, the best-case KERMIT throughput is extremely poor and gets appallingly poor as the line speed in-

creases (always worse than XMODEM).

As we all know, people tend to stick with the defaults. BLAST claims to automatically optimize the frame size depending on the line quality, but I haven't noticed much of that happening on my test rig. The 96-byte frame size specified in BLAST configuration section seems to be the upper limit of

the frame size optimization. I've tried specifying larger sizes (512 and 1,024) on BLAST, and it helps appreciably, as long as the host is lightly loaded.

One other problem I have with BLAST is that it seems to like to change the file creation date by seven or eight hours (it varies) when transferring to AOS/VS from the DG/One.

BLAST also touts as one of their big advantages that if the phone connection is lost, the file transfer will resume where it left off once the connection is reestablished. I have yet to figure out how to take advantage of this feature, but I'll take their word for it.

Finally, BLAST is a bit pricey for what you get. I suspect that KERMIT will eventually supplant BLAST as the high-level protocol supported by the largest number of different systems, in spite of its appalling throughput, simply because of its availability and low price.

:SUMMARY

If you have a reliable 8-bit circuit (like a cable), use YMODEM batch so that the file length and modification/creation time are preserved. Its throughput is the best of all the protocols I tested.

If you have a noisy 8-bit circuit, use XMODEM, but try to use CRC-16 mode, as opposed to checksum mode, whenever possible. BLAST also works well on noisy circuits, but has somewhat lower throughput.

Use KERMIT only when forced to operate on 7-bit circuits, or on circuits that can't disable software flow control. KERMIT's other appeal is its DG and non-DG terminal emulation (e.g., VT100), or when you want to do idiot-proof or unattended transfers using its script facility.

BLAST is preferable to KERMIT if you have lots of money, you need high throughput, the line is 7 bits, or software flow control is a problem.

I've never used DG/Gate, so I can't comment much on it except to say that my spies tell me it works well, but it's proprietary, so that limits its usefulness.

Copies of AOS[VS] YMODEM.SR are available on the :SYSMGR bulletin board, along with PC versions of YMODEM and KERMIT and copies of the official protocol documents.

:WINNING.MACRO

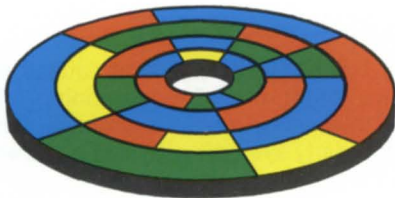
As I promised last month, I'm publishing the winning macro in the BUILD/ENAME contest. It is shown in Figure 1. It was submitted by Aron Langevin of

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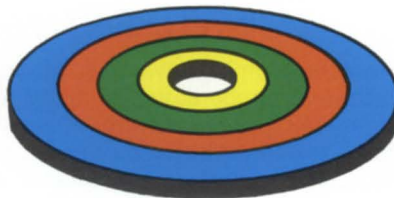
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Figure 1: Winning macro

```
[IEQUAL,%1%,]
WRITE HELP info
[!ELSE]
[INEQUAL,[!FILENAME %1%],]
WRITE %1% already exists.
[!ELSE]
FILESTATUS%\ENAME%/CPL=1/NHEADER/L=%1%/SORT %2-%
[!UNE,[ISIZE %1%],0]
[IEQ,,%0/ENAME%]
X/M SPEED %1%
<3D0S\
\;-1M@I\,&\1M>
ZJ-3M1D
FUH
)
[!ELSE]
X/M SPEED %1%
1WP
<3D0S\
\;-1M@I\,&\1M>
J<0S\.-\;<01S\.-\;>0S\,\VP-1,.-1K>
ZJ-3M1D
FUH
)
[!END]
[!END]
[!END]
[!END]
```

Mortgage Computer Applications.

In judging the macros, I erroneously assumed that a pure CLI macro-based solution would necessarily consume more processor time than a SPEED-based solution. I happened to mention this last month to some of the developers at DG, and was greeted with some skepticism. Shortly afterward, Craig Presson of DG's development staff sent me a macro that demonstrated that a pure CLI macro-based solution could be faster than a SPEED-based solution.

Well, I said that the judging would be arbitrary, and I guess it was.

Moral: No more macro contests. I promise. And no more assuming. Δ

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A BETTER VISION



20/20's integration with CEO improves on a useful tool

It sometimes seems as if everyone is talking about electronic spreadsheets, but I have a feeling there are still quite a few office automation users who don't yet know what an electronic spreadsheet could do for them. Basically, it's a general-purpose tool that can make the tedious chore of adding columns of numbers into the simple task of entering the numbers and pressing a key. You can use it to forecast sales, to do large-volume budgeting, to initiate feasibility studies, and even to do quality control analysis by changing target figures. It will even let you figure your easiest expense report, saving you time and costly mistakes.

Unlike the old, manual spreadsheets that occupied the entire surface of a desktop, electronic spreadsheets allow you to look at a "window" or multiple "windows" of the contents.

The various spreadsheets now on the market look pretty similar for the most part, although they offer different features. I am familiar with 20/20 by Access Technology. This particular product was developed from an early spreadsheet called Supercomp into the current problem-solving tool, 20/20 Release 2.

Access Technology offers 20/20 in versions for many different computers, including a micro version for MS-DOS machines, as well as a version for Data General minicomputers. The versions are similar, but the micro package still lags behind, with no graphics as of this date. The other drawback of the micro version is that it will *only* install on a hard drive. For users with hardware limitations, this forces them to purchase other vendors' software, or upgrade their current configuration.

A welcome addition in the current rev of 20/20 is the flexibility to let users customize the spreadsheet. Now, the matrixes of the spreadsheet can be labeled by number-number, letter-

number, or letter-row name. The status line will tell you the operating mode, the current cell location, the format of the current cell, and the data type (for example, label, value, or formula).

There are essentially three options when using the spreadsheet:

1. Issue a command.
2. Move around the worksheet.
3. Enter worksheet information.

Commands are issued by pressing the "/" key, then either moving the cursor (using the arrow keys or spacebar) to the desired command and pressing the return key, or pressing the first letter of the command to enact the command instantly. A mini help line under the command bar gives a brief description of the command chosen.

An on-line help facility explains certain functions. The ability to resume working and return to the previously chosen help screen is a favorite feature of mine.

Macros can make it a simple matter to perform tasks that you do repeatedly. You can program the macros to perform a sequence of keystrokes and commands with any punctuation or alphanumeric key you need in order to complete certain functions.

All 20/20 files are stored with an automatically attached extension of .W20. A LIST key provides easy access to these files.

The manual included with the software includes a tutorial to walk you through the steps of creating a spreadsheet. Until you have an actual application in mind, though, some of the functions may not "click." Access Technology also provides training classes and audio-visual tapes for learning the basic functions, advanced functions, and even the changes from Release 1 to Release 2. Templates are to be provided with the micro packages; however, when the new revisions were distributed, the templates were not yet completed, and as of this writing, I have not seen one.

20/20 features specific to CEO

Recently, Access Technology expanded the capabilities of 20/20 by inte-

grating with CEO (Data General's Comprehensive Electronic Office). 20/20 now has features to help you work within CEO. For example, you can:

- set the storage pathname in 20/20 so that files can be written to (and read from) CEO or AOS/VS
- set CEO mail options that allow you to send certified, urgent, and private messages from within 20/20
- use the /STORAGE FILES LIST command to display the current CEO filing options path.

You can also use the /STORAGE FILES LIST command to display a list of the mail messages you have in your inbox.

Integrating 20/20 with CEO

With the integration provided by 20/20, you can do the following:

1. access the interrupt menu from within 20/20, including:
 - take a phone message
 - create and send a message
 - process the mail you've received
 - view and update your calendar
 - access the reminder facility subsystems
 - view the CEO user directory
 - run a user application
 - view a document
2. use the CEO mail option to send files to other users
3. access the CEO calculator from within 20/20
4. transfer 20/20 spreadsheets from CEO to AOS/VS and from AOS/VS to CEO.

Keep in mind that the above integration will only work with the AOS/VS versions of 20/20. Unfortunately, they haven't come up with a way to integrate these functions using a PC and running CEO Connection! What did I hear? "...the impossible?" Yes, I guess you're right. Δ

Charlene Kirian is PC/OA instructor for the Online Computer Library Center, Inc., 6565 Frantz Rd., Dublin, OH 43017; 617/764-6435. She also serves as president of NADGUG's OASIS (Office Automation Special Interest Group).

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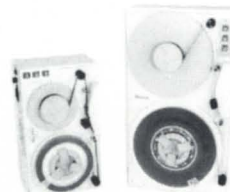
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NOVA/ECLIPSE, RDOS/AOS

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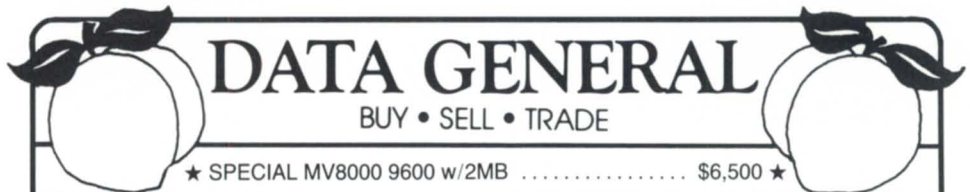
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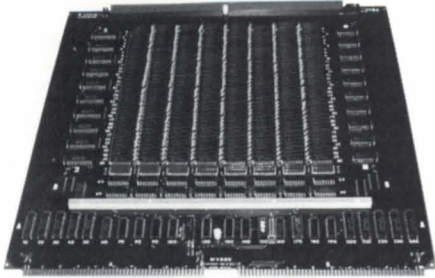
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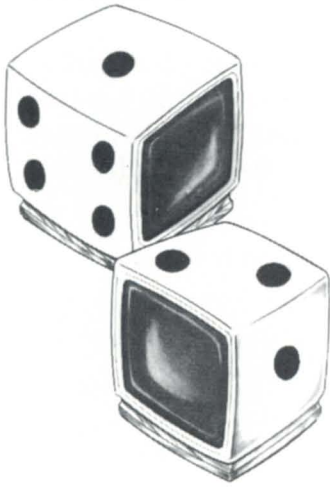
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D200/210 emulator for PC/XT/ATs and clones. Jan. 87, pg. 55.

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Applied Micro Technology, Inc.

New criminal justice software available for DG computers. June 87, pg. 58.

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Cipher Data Products, Inc.

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Intra Computer, Inc.

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Rhintek Inc.

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SPSS graphics to be released for DG MV series. June 87, pg. 58.

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SCIP announces memory add-in for DG CPUs. Jan. 87, pg. 56.

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Switched line/leased line security modem. Mar. 87, pg. 56.

Williams Automated Management Services, Inc.

WAMS announces new version of DBMS. Nov. 87, pg. 84.

Zetaco, Inc.

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DG announces multiuser ICOBOL

Westboro—Data General has announced a multiuser version of its Interactive COBOL programming language for the Dasher/286. The new software allows up to six terminals to be connected to the PC-AT-compatible system to support up to seven users.

The ICOBOL software supports multiple users on the Dasher/286, running the MS-DOS operating system. It is object-code-compatible with ICOBOL programs generated under DG's proprietary AOS/VS and DG/RDOS operating systems. The new ICOBOL runtime software allows users to implement existing applications on the Dasher/286 without conversion or recompilation.

ICOBOL, an ANSI74-compatible COBOL language, is available on all Data General systems, from PCs to the larger 32-bit computers. A single-user runtime version of ICOBOL is available for PC-compatible systems, including the DG/One model 2T laptop computer.

Two Dasher/286 packaged systems,

as well as a new four-line multipoint serial interface card, allow configuration flexibility. Each packaged system includes 640 KB of RAM, a 1.2 MB floppy diskette drive, EGA video PCB, keyboard, and the runtime ICOBOL software.

The multipoint serial interface card allows four additional terminals or printers to be connected to the system, for a maximum of seven users. Without the optional multipoint serial PCB, a Dasher/286 with a system console, two serial ports, and one parallel port will support up to three users and a printer.

Deliveries are 90 days ARO. The price is \$4,515 for a packaged system with a 20 MB disk, and \$5,265 for a system with a 20 MB disk and 22 MB cartridge tape backup system. The Dasher/286 and all options are supported by a one-year warranty. Δ

SAM2000 protects computers

New York—The SAM2000, announced by Intra Computer, Inc., is capable of powering down a host computer sys-

tem in the event of heat, humidity, air conditioning, smoke, water, or other environmental conditions endangering the computer.

SAM2000 can be mounted in a standard 19-inch RETMA rack. It includes an LED digital temperature display, two temperature probes, six inputs for various sensors (humidity, smoke, water, air flow, power-line monitor, intrusion), and four software-controllable relay outputs that can be used to power down a system and activate auto-dialers or other warning devices.

Host computer software packages are available to run on Data General's MV series systems with AOS/VS, as well as other mainframe and minicomputers.

Environmental conditions can be logged and monitored to ensure that values are in safe operating range. If not, the host system can alert users and repair personnel, and perform an orderly software shutdown, followed by a power-down if conditions become critical.

Intra Computer, Inc., 875 Avenue of the Americas, Suite 501, New York, NY 10001; 212/947-5533. Δ

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Several sources have confirmed that DG will no longer sell AOS/DVS, the distributed version of AOS/VS. It was introduced two years ago as an operating system that could tie multiple MV systems and workstations together as a single network. An internal DG announcement said that the operating system development effort will be re-directed to bring Unix onto a par with AOS/VS.

Ending the DVS product line has little practical effect on users, since only a handful of copies had been sold, and the objectives of the product can be met for the most part with Unix or DG/PC-I. However, it is a strong statement in favor of Unix as an alternative to AOS/VS (and all the commercial software written to run under AOS/VS).

Contrary to what we said last month, the Data General Users Group of the United Kingdom and Ireland did *not* postpone its autumn meeting. They held it October 7 at the U.S. Consulate in London, with more than 140 in attendance. The most controversial subject was the increased memory required by AOS/VS rev 7.5x. The membership adopted its new bylaws with a minimum of debate.

Following Data General's renewed interest in the VAR arena, seven directors have been appointed within the VAR Marketing and Development Group. They are: Ed Burke, director of Peripheral Product Development; Art Holmes, director of Processor Development; John McGlone, director of the Reseller Marketing Division; Herb Osher, director of Marketing; Jan Pieter Scheerder, director of Industry Standard Systems Development; Michael Taback, director of the development of technical and commercial workstations; and John Williams, director of Federal Products.

They will all report to Ward MacKenzie, the vice president of the newly revitalized VAR Marketing and Development Group.

The U.S. Forest Service has signed a \$1 million agreement with Data General that provides for full-site licensing of Intercon Associates' Office/Publisher, an electronic publishing software package specifically designed for Data General's CEO software. Data General will install and run the product according to specifications. The provision

of first-line user support is also part of the contract.

According to the Forest Service, the \$925,000 for the initial cost of the license will be offset by paper savings alone.

Data General has been awarded an \$8 million contract to implement a distributed network for J. Blackwood & Son. Ltd., Australia's largest industrial and engineering supplier. The network is expected to be the largest of its kind in Australia, linking the company's 13 branch offices and warehouses.

The sale includes 530 Dasher D215 terminals, five MV/15000s, four MV/7800s, and the MV/20000. Software will include Data General's CEO, as well as Wilson Computer Service's series 32 distribution and financial software and SCAMP, a telemarketing system.

The network is intended to expedite the high-volume business of the company, which provides a 24-hour supply service of more than 110,000 products to 60,000 customers who place more than 8,000 orders per day.

The Interior Department of the West German State of Baden-Wuerttemberg has awarded an \$11 million (U.S.) contract to Mannesmann Kienzle for an office automation project. Mannesmann Kienzle uses Data General's CEO software for automating large administrative units. The project will include the full range of DG's 32-bit systems, from the MV/2000 DC to the MV/20000.

After a two year study, the Ministry of Social Affairs and Employment has awarded Data General and Logica B.V. a \$32 million contract for a Dutch national employment information system network. The nationwide network will link employment bureaus in order to match unemployed persons with job vacancies more efficiently.

Data General's part of the contract, worth \$15 million, includes 64 MV/15000 and MV/7800 systems, as well as 1,600 workstations. The network will be integrated with DG's CEO office automation package and Xodiac network management software.

The MV systems will be installed in major cities throughout the Netherlands, including Amsterdam, Rotterdam, The Hague, and Utrecht. The network initially will be installed in pilot employment bureaus and five central support centers.

Maxon Computer Systems Inc. has announced its third-quarter earnings for the period ending July 31, 1987. The unaudited net earnings (including the share of CMS/Data's earnings and extraordinary items) were \$392,000 on sales of \$3.388 million. Undiluted earnings after an extraordinary item were \$0.25 per share.

CMS/Data, which is 50 percent owned by Maxon, reported sales of \$6.275 million.

During the next five years, sales of mid-range computers (minicomputers and superminicomputers) are predicted to increase by more than two times, according to an article in *MIS Week* that was based on the findings of the Market Intelligence Research Company (MIRC). The report said sales should climb from \$17 billion to about \$40 billion by 1992.

The Baxter System Division of the Baxter Healthcare Corp. and Sysgen Recovery Services have entered into a joint venture agreement. Baxter, a health care products and services company, and Sysgen Recovery Services, a disaster recovery services company, will offer contingency planning and hot site services to the more than 700 hospitals that currently utilize Baxter information systems. Under the agreement, Baxter and Sysgen consultants will jointly develop hospital-specific, custom disaster recovery plans.

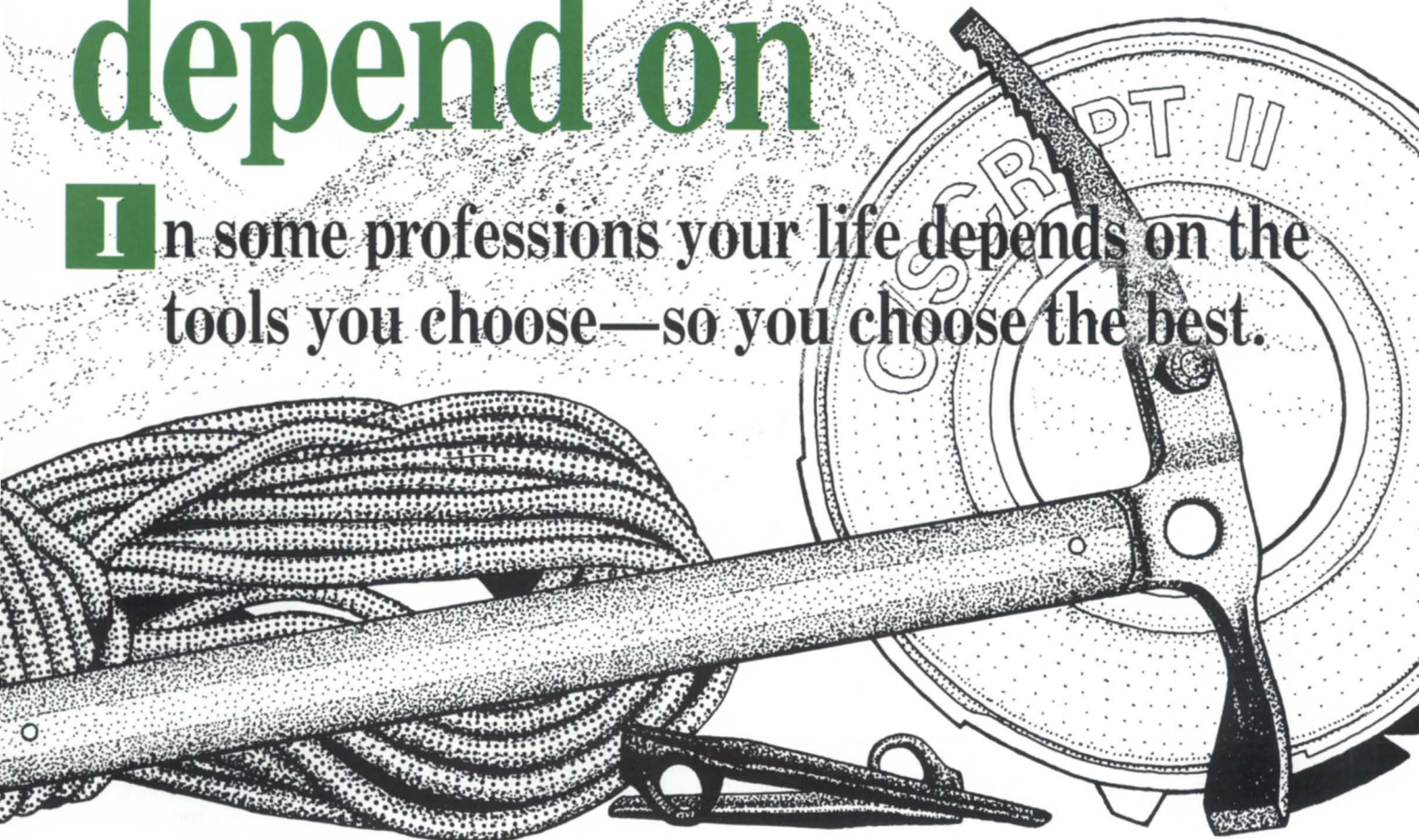
Sysgen will provide the hospital's recovery in the event of an interruption of their processing facilities.

The Department of Health and Human Resources has given DMS Systems, Inc. of Salt Lake City a grant for the development of an analytical data base management system for geneticists. The program will be based on Genisys, the DBMS developed by DMS.

Special utilities for storing and retrieving familial data have been incorporated in Genisys in order to facilitate genetic research. The grant will interface Genisys with analysis programs to allow pedigree manipulation and analysis functions to be called directly from the data base system. An expert system will be developed within Genisys so that predetermined strategies to guide the collection and analysis of data can be performed. Δ

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