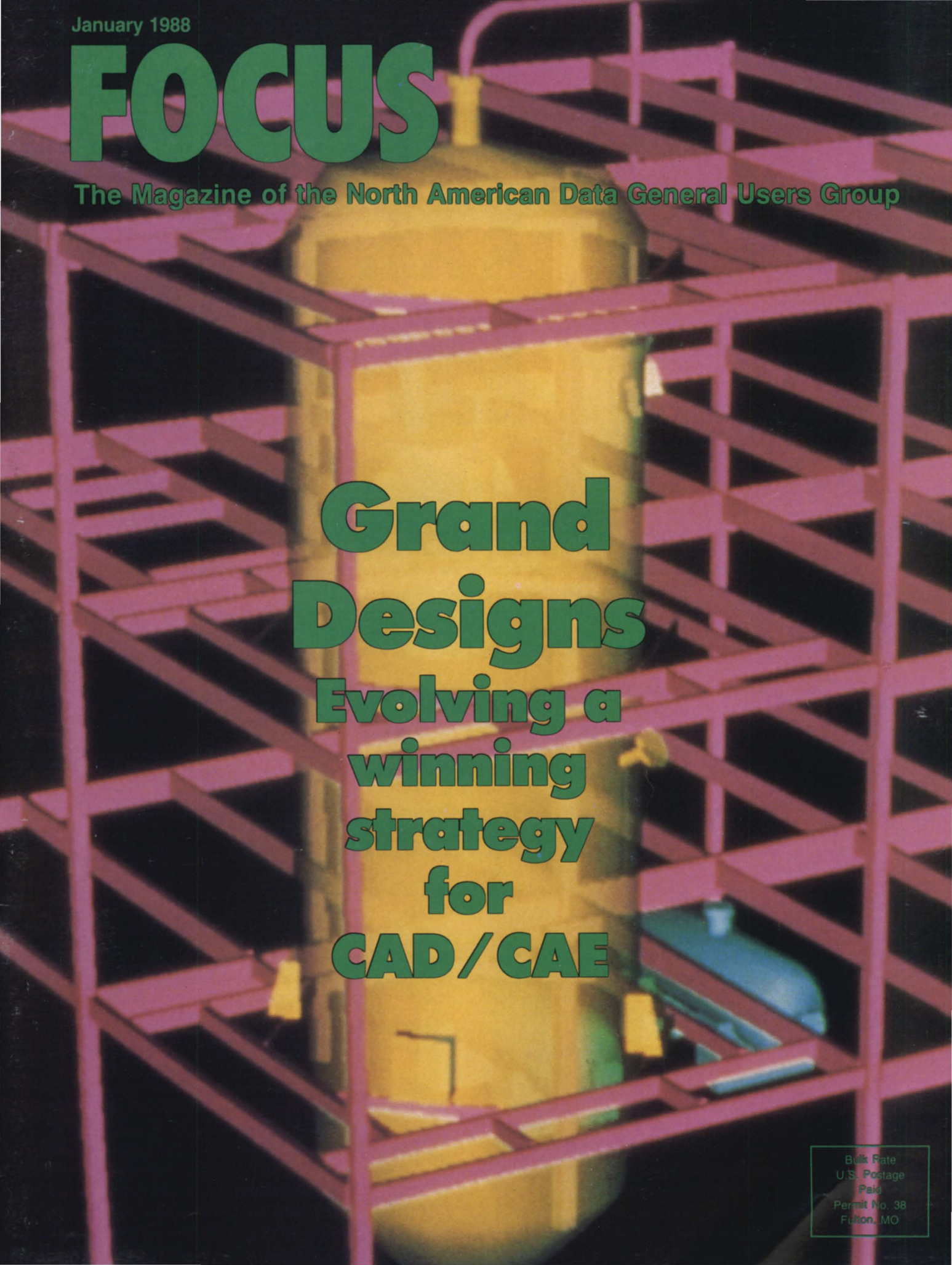
January 1988

FOCUS

The Magazine of the North American Data General Users Group



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'Tis The Season To Be Busy

A few resolutions for the new year

by Joyce Carter
NADGUG president

The new year is upon us, and we find ourselves recovering from the holiday shopping and festivities. Wasn't it fun trying to hide the presents from the little ones? Once again, I learned that assembling a bicycle is more frustrating than designing a new system. And many of us have had to face the hectic "year end" runs and program changes that had to be squeezed in regardless of the holidays.

Your NADGUG officers and committees have already started the new year and are hard at work. Paul Duck, chairman of the RIG/SIG committee along with Jan Grossman, eastern area coordinator and Dave Angulo, western area coordinator, met with the NADGUG staff November 17 in St. Louis to develop a strategic plan to increase the quality of the existing RIGs and SIGs and to increase the quantity of groups.

The Publications committee headed by Wes Thomas is busy planning the Editorial Advisory Board meeting and developing the layout and questionnaires for the membership roster. NADGUG has purchased additional software that will enable us to keep the needed data on line and to print the roster more easily than in the past.

The Planning committee is working on some good ideas, and I predict we will see some changes and improvements throughout the year and at the next conference.

Lee Jones of the Meetings committee, along with the NADGUG staff, Calvin Durden from the Planning committee, vice president Don Clark, and myself, met on December 1 for a post-conference meeting. At that time, we discussed all of the facts and figures gathered at the conference. We also worked on ideas and plans for the next conference.

NADGUG continues to grow each year, and the size of the conference has enlarged accordingly. This success can be attributed to the fine people who have led us in the past. Until now, there have been so few who have done so much for NADGUG that filling their shoes is impossible. I know that I cannot replace Calvin—and that isn't my job. This is the first year that the NADGUG leadership consists of members with relatively few years of experience with NADGUG, and it will be a real challenge for each of us to know what is expected of us and to do our jobs the best possible way.

Some of my goals for this year are as follows:

- actively "market" NADGUG and the RIGs and SIGs. There are still vast numbers of users who have never heard of us. We must find a way to make the users and Data General employees aware of us and what we can do for them
- utilize more of the excellent people in the organization in order to minimize the amount of work and responsibility for any one person and to create a larger base of quality leadership
- formalize job descriptions and develop written procedures in order to guarantee continuity, smoother transitions, and less frustration.

As you gear up for the year ahead, try to find time to rest and to sit down and read this issue of *Focus*. I hope that each of you have had a happy holiday season. Just remember that trying to locate that bad bulb in the Christmas tree lights wasn't nearly as easy as debugging a program. Δ

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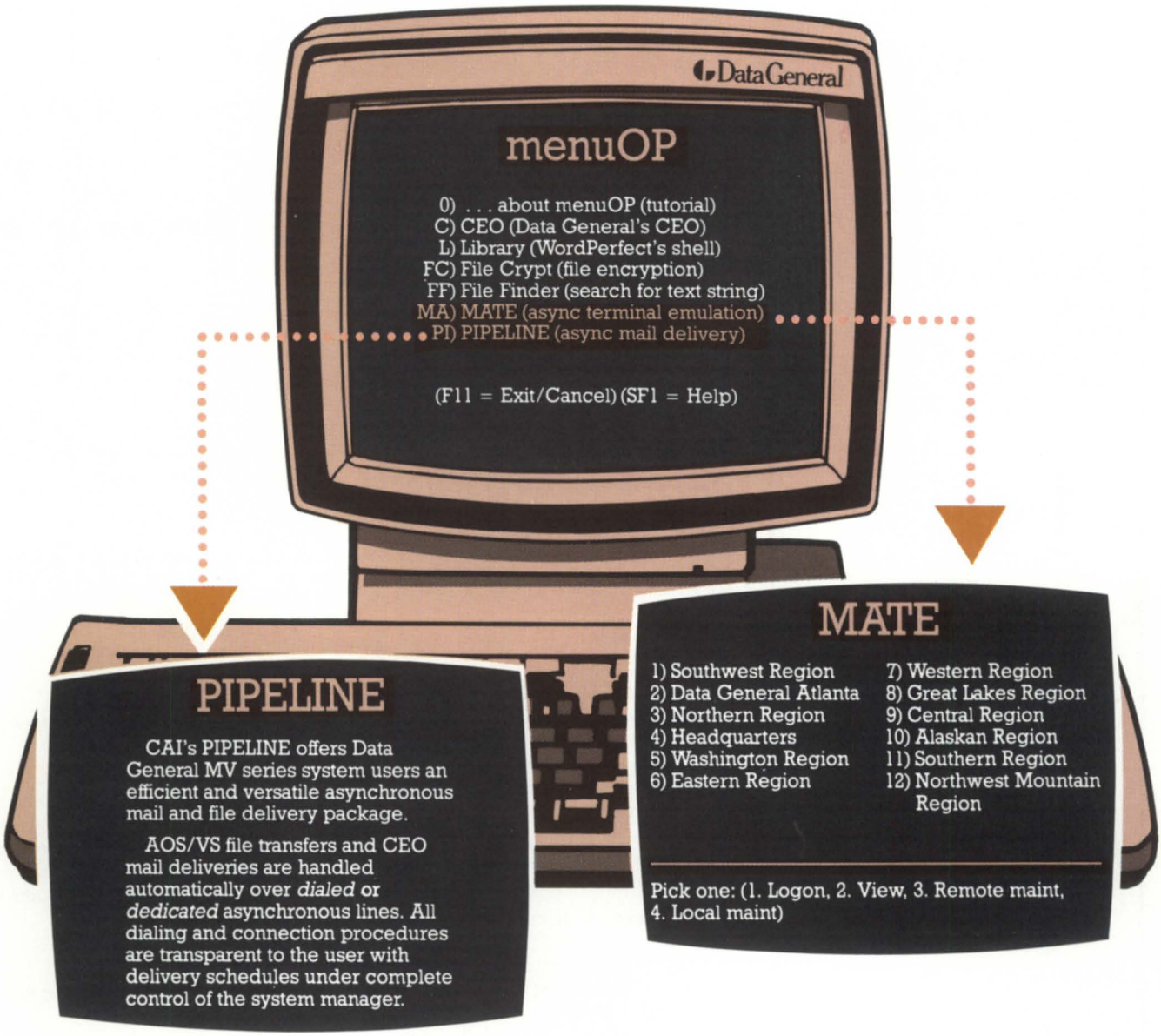

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LETTERS

October issue elicits constructive comments

Just to show that *Focus* does not go totally unread within Data General's product development organizations, I have a few errata and constructive criticisms for various articles in the October 1987 issue.

In "More on Macros" (pg. 32), the error macro featured in the first box doesn't go quite far enough. The traditional method is to define two macros, CLASS1_ERROR.CLI and CLASS2_ERROR.CLI:

```
Comment CLASS1_ERROR invokes the CLI's
Comment class1 mechanism with a user
Comment message. The setting of the CLASS1
Comment environment variable governs
Comment the actual severity class of the
Comment forced error.
Comment
WRITE%/L% %-%
DIRECTORY/L=@NULL,
```

```
Comment CLASS2_ERROR invokes the CLI's
Comment class2 mechanism with a user
Comment message. The setting of the CLASS2
Comment environment variable governs
Comment the actual severity class of the
Comment forced error.
Comment
WRITE%/L% %-%
TYPE/L=@NULL,
```

These macros have been around DG since rev 1 of AOS.

In the remainder of the article, two powerful techniques are missed. The concat macro (on pg. 34) could be spiffied up considerably, and the pointers on the use of temp files for extra variables can also be improved. Let's take them in reverse order. The following macro is extremely useful for storing intermediate results:

```
[!Equal,(COMMENT),( )]
SET.CLI
   (Re)creates a file called %1% containing
   %2-%. Terminates the file with ampersand-
   newline so that it may be [called] by other
   macros. The file AMPERSAND contains '&' as
   its 1 character
[!End]

DELETE/2=IGNORE %1\%
CREATE/2=ERROR/DATASENSITIVE/TYPE=UDF
   %1\%
WRITE/L=%1\% %2-%[AMPERSAND]
```

Also note that using the ?[PID].NAME.TMP convention for temp filenames will allow multiple users to use a macro in the same directory without collisions, and allow a brute-force and ignorance approach to garbage collection, i.e., "DELETE ?+.TMP" (typed carefully).

The power of the above technique is enhanced by using "function" macros (macros that "return" or "evaluate to" their result) instead of clobbering STRING all the time. CONCAT.CLI is an example of this technique:

```
[!Equal],(COMMENTS),( )]                    &
CONCAT.CLI                                  &
   Returns %-% with separators removed.     &
   e.g.,                                    &
   Write [Concat FASTER THAN LIGHT]         &
   FASTERTHANLIGHT                          &
                                            &
                                            &

[!End]&
%1%%2%%3%%4%%5%%6%%7%%8%%9%
   [!NEQUAL,(%10-%),( )][%0%
      %10-%][!END]&
```

There's no magic to the number nine, nor is any magic needed. There are bunches of string-processing macros that can be put together using these techniques. A good example is REVERSE.CLI:

```
[!Equal,(COMMENT),( )]&
     REVERSE.CLI
          Returns the atoms of a list in      &
          reverse order                       &
[!End]&
[!NEQUAL,(%3-%),( )][%0% %3-%] %2%
   %1%[!ELSE]&
[!NEQUAL (%2%),( )]%2%
   %1%[!ELSE]%1%[!END][!END]&
```

The last line of the macro is required to avoid an extra null argument.

These macros may be nested to achieve powerful results. Here's a silly example, a command that reverses the characters in a word:

```
) WRITE [CONCAT [REVERSE [!EXPLODE
   FOOBAR]]]
RABOOF
)
```

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LETTERS

There are a jillion more (SUBSTR, MIDTSTR, REMSTR, INDEX. . .), of which two very simple little guys are worthy of mention:

```
Comment CAR.CLI returns the first element of
Comment a list:
%1%&

Comment CDR.CLI returns a list without its first
Comment element:
%2-%&
```

Thus equipped, a clever CLI programmer owns the world.

In "Speed and Style, Alacrity and Grace" (October 1987, pg. 60): "[SPEED] will strip all null '⟨0⟩' characters from a file." Not if you supply the little-known /N switch: SPEED/N FOO will open FOO for update and not remove nulls. Further down the same column, we have a typo: ^T, not ^P, is "zero or more characters of white space," and it needs to be entered with a ^P preceding when you're typing directly at SPEED.

On the next page, if you need to "quickly scan a large . . . file without any intent to edit," then you would bring up SPEED without a filename on the command line, and use FR⟨filename⟩$ and Q⟨search-string⟩$ to do the search. *Much* faster, not to mention safer. Even better, try the SLATE editor from the Advanced Program Development Utilities package (model 30266).

Of course, the answer to the $64,000 question in "Wild Kingdom" (pg. 64), "Why is the code name for AOS/VS, XYZZY, pronounced 'magic?'" is that XYZZY is a magic word in the game Adventure. Also, you missed Toucan for the S/280. There's an apocryphal story that someone brought up the Aardvark in a manufacturing meeting in Westboro when the machine was new; someone else questioned the name, and the first speaker explained, "You know, they name all the new machines after birds." And if you think Kitevark was bad, then how about the keyboard that was developed for the Pegasus (D200), Zoo, and Starbuck terminals: Pega-ZooBuck! Last, but certainly not least, there was MP/AOS-SU, which started life as a clandestine project, hence the name Michelob: weekends were made for Michelob!

This was a very enjoyable issue of *Focus*; the only reason that I found a lot of nits to pick was that the material was good to start with.

Craig Presson (and friends)
Data General Corporation
Westboro, MA

Meeting in St. Louis

The RIG/SIG committee met with the NADGUG staff in St. Louis on November 17 for a planning session, and later attended the start-up meeting of the St. Louis regional interest group. The committee members are Paul Duck, president, along with Dave Angulo and Jan Grossman.

The committee's activities will center around two major goals: upgrading the quality of the existing interest groups (including reactivating some established groups) and starting more regional interest groups in large cities. Although an interest group can be started anywhere a need exists, several populous cities have been targeted.

In the eastern region, Philadelphia, Atlanta, Birmingham, and Toronto will be emphasized. In addition, North Carolina may generate a second group in order to better serve the growing user base there. Cities in the west include Phoenix; Austin, Texas; and the restart of the northern California group (NO-CAL FUDGE).

New special interest groups include DG/UX, for Unix; a TEO group; an AOS/VS performance group for system managers; and an independent SIG for Lion's Gate software. (More information on these groups will be available in upcoming issues of *Focus*.)

To implement their plan and ensure success, committee members will be contacting the Data General branch sales manager in each of these areas, and following up with letters and phone calls to each of the interest group presidents. Dave Angulo will cover the eastern cities, and Jan Grossman will take care of the western cities.

In other business, the committee is "beta testing" the combining of NADGUG and interest group dues. One regional and one special interest group (CADGUG and AOS[/VS]) will participate. Their members will be offered a flat rate for joining both the national and the local group. Money will be sent directly to NADGUG, eliminating the administration of money at the local level.

The committee, which will convene several times a year, will meet next at the Executive Board Spring meeting in Philadelphia in February.

■

The two-hour start-up meeting of the St. Louis area users group had a healthy showing with 42 people in attendance. Held at the local DG branch sales office, members of the RIG/SIG committee and the NADGUG staff gave a talk about the benefits and responsibilities of membership.

Officers will be elected at the next meeting. Anyone interested in joining should contact John True, Data General sales representative, in St. Louis at 314/567-4820.

■

Far from the Midwest, a Swedish users group (SWEDGUG) is under way. The first chairman is Bertil Kuhlemanmn of IVA, the Academy of Science. So far, six SIGs have formed there: AOS/VS, communications, 4GL and data bases, CEO, desktop publishing, and security. Approximately 90 people have joined the group—a strong percentage of the user base in Sweden. Δ

U.K. and Ireland Users Group forms limited company

The adoption of the resolution to establish the Data General Users Group for the United Kingdom and Ireland as a limited company topped the agenda of the group's 1987 Extraordinary General Meeting held in October at the American Embassy in London. The company, called Data General Users Ltd., limits each member's liability to £1, to be deducted from the first annual subscription payment.

Chris Everett was elected as chairman of the new company without opposition, and on resuming the chair, he presided over the election of other officers: Hugh Ross, vice chairman; Neal Clements, secretary; and Richard Finmore, treasurer. Additional members of the executive committee were elected: Nick Benwell, Mike Bull, Ron Burns, John Harwood, Dan Milosevic, and Mike Turnill.

Everett also reported on the committee's activities during the six months since its election in April. The obiec-

tives of the committee had been to improve relations with DG and to establish a more businesslike approach to the group's activities. Low turnout at a recent meeting in Manchester prompted this action. The topic, X400, had attracted only 23 people. However, DG's interest in the committee's work increased during 1987, with more DG managers attending executive meetings and following the initiatives.

John Harwood, reporting on the marketing and membership subcommittee, said progress had been made in attracting more members. Richard Finmore has been weeding a list of approximately 3,000 names to produce a set of people likely to be interested. A glossy publication is being prepared, and the subcommittee intends to send a copy to each of the remaining addresses. The cost will be about £3,600 total, but the audience was relieved to hear that DG will pay half of it.

Two special interest groups were formed as a result of the meeting. Ron Burns of the Dorset Institute of Higher Education met with about 30 delegates interested in forming a CEO special interest group, and there was an overwhelmingly positive response in favor of forming an AOS/VS special interest group.

Eddie Cunningham of DG spoke about AOS/VS 7.54. He said that new revisions of AOS/VS will always be necessary to fix bugs that have been reported, to provide new facilities, to support new hardware and software, and to improve the maintainability of the software.

New features in the 7.54 revision include disk mirroring, windowing support, MV/2000 DC reel-to-reel tape support, and rewriting of key modules in C. However, there has been a deterioration in performance for systems with limited memory. DG extended support for rev 6.06 until December 31, 1987, and cut memory prices to help people who are strapped for memory resources.

Iain Davidson, DG's U.K. general manager, talked about Data General's strategic and financial future. Davidson said their corporate strategy is to control the sources of critical technology, to offer a broad product line, and to offer low-cost but high-quality products. The current need is to solve customers' problems effectively in the way that they would like them to be solved—not a typical British approach, he said.

He attributed DG's $65 million loss for the quarter ending in June 1987 to over-optimistic sales forecasts, substantial lawsuit settlements against DG, and the costly acquisition of Dama Communications.

However, sales have been up 18 percent since July, and other financial measures were on target. "No financial crisis is now possible," he said.

The next meeting of the group, Conference 88, will be held in the St. Ermins Hotel, St. James, London, March 17–18, 1988. Topics to be presented will cover computer security and fraud, Unix, disaster recovery, and performance monitoring. Δ

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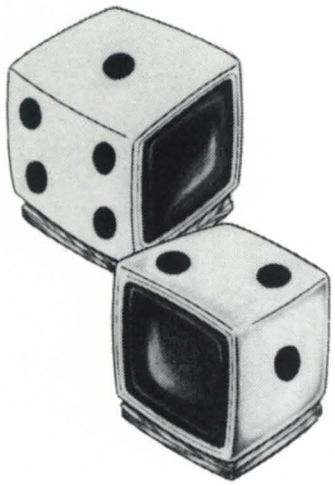

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QUIET, PLEASE

NADGUG's software library is open for business

by Randy Berndt
NADGUG software librarian

At the 1987 NADGUG conference in Las Vegas, the NADGUG Executive Board approved an idea that had been in the works for several months: a software library consisting of public domain and shareware programs for DG systems. Not knowing when to leave well enough alone, I volunteered to act as librarian.

If you have any public domain programs, utilities, or useful macros, please send them to me at the address shown below. Guidelines for submitting programs and a more formal method of djstributing the library are being developed and will be printed in *Focus* when they are available. Until that time, I will be using the same guidelines I used to distribute some of these programs previously.

All programs are distributed on an "as is" basis. The NADGUG software library cannot guarantee that any of these programs will work on your system. The library will make reasonable efforts to determine that the programs operate as described, but will not accept responsibility if the programs don't suit your needs or don't operate as described. It's your responsibility to ensure that you have the proper language licenses and that any other legal requirements have been satisfied before you operate these programs on your system.

To obtain these programs, send a 600-foot or longer tape, a return mailer, and sufficient postage to return the tape to you. Tapes should be sent to:

Randy Berndt
American Urological Association
6750 West Loop South, #900
Bellaire, Texas 77401
713/665-7500

The library currently contains these 11 programs:

1. VT100 emulator. A version of Kermit that doesn't have the file transfer protocols working yet, but does contain a fully functional VT100 emulator capable of running at 9600 baud. For AOS/VS. Submitted by John Grant. Last revised July 6, 1987.

2. Get.Switches. This subroutine was the subject of a series of *Focus* articles. The routines allow you to write programs that accept minimally unique switches in the command line. For AOS/VS. Submitted by John Grant. Last revised July 6, 1987.

3. Scan. This program will open more than 230 files simultaneously, and then scan each of the files for text strings. For AOS/VS. Submitted by John Grant. Last revised July 6, 1987.

4. Laminate. This program will combine two text files in several ways, including interleaving lines from each file. For AOS/VS. Submitted by John Grant. Last revised July 6, 1987.

5. DiskSpace/UserSpace. DiskSpace will generate a report showing the number of files and number of bytes in each directory, including optional subtotals by directory. UserSpace will generate a report showing space usage of all CPDs in :UDD (it resolves links), sorted in order of decreasing usage. For AOS/VS. Submitted by John Grant. Last revised July 6, 1987.

6. Glossary. This program will generate a list of words from an input file showing where the word occurs in the file. For AOS/VS. Submitted by John Grant. Last revised July 6, 1987.

7. Kermit. This program implements Columbia University's Kermit file transfer protocol for DG systems. For AOS/VS. Submitted by Phil Julian. Last revised July 13, 1987.

8. EMACS. EMACS is a public domain text editor. For AOS/VS. Submitted by Phil Julian. Last revised July 13, 1987.

9. Compression programs. These programs include COMPRESS, which uses the Lempel-Zev-Welch coding scheme, and other Unix-style compression programs. For AOS/VS. Submitted by Phil Julian. Last revised July 13, 1987.

10. TEX (terminal emulator with XMODEM). This program acts as a terminal emulator, and can transfer files between systems using XMODEM and YMODEM protocols. It also contains a "bootstrapping" program to allow installation on a system that doesn't currently support any file transfer protocols. For AOS/VS. Submitted by David Down. Last revised August 12, 1987.

Note: This program is being distributed as shareware. You may use it for 30 days free of charge. At the end of 30 days, you must either remove it from your system, or send the author a $45 registration fee.

11. QHELP (tree-structured help facility). QHELP is a program that compiles text files into a tree-structured help file on any subject. It was the topic of a session at Conference 87 in Las Vegas. Also included is a file built from AOS/VS help files. For AOS/VS. Submitted by John Grant. Last revised October 1, 1987. Δ

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TOWARD THE NEXT GENERATION

Edson de Castro told attendees at the 14th annual NADGUG conference that Data General's strategy is to meet the needs of users.

De Castro talks about becoming a full-service vendor

Data General is no longer the brash upstart in the computer industry. Even before the downturn in the industry sent DG's earnings into a decline, the company's officers were working on a new set of strategies to guide Data General toward a new role as an established company that can solve a full line of information processing needs. In the past year, the process has taken some new turns, and DG has responded by establishing new goals as well as returning to some old ones.

Focus spoke with de Castro in Las Vegas at Conference 87 to find out more specifically where these new goals will take the company in the future and what effects will be felt by DG users.

Focus: Two years ago, when you spoke to the users group in Boston, you said that by the year 2000 there might be only five full-service computer and information systems vendors in the country—and that Data General was going to be one of them. How would you update that statement at this point. Has DG's situation changed?

De Castro: I'm not quite sure about the number. I think I said there would be perhaps seven or eight. But overall, the assessment is still fairly accurate. We are beginning to see some new dimensions in the products and services Data General offers—for instance, in telecommunications—that will keep us on the same track toward full service.

Focus: The author of *Soul of a New Machine* reported that you told the MV/8000 developers "no mode bit," and that single statement crystallized the architecture of the MV series. Can you point to any similarly terse statements that are guiding strategies that DG will follow as it addresses full service across the board?

De Castro: That statement was really much more pointed, but I think it reflects one of the more important elements of our strategy—and that is protecting our customers' investment in software. I basically said in more detailed form that all the products of Data General would be a natural evolution for the customers we already have, so that we don't leave these people dead ended in the product line.

Focus: But it's pretty hard for some customers to see how their existing systems are going to fit into the kind of product line that DG seems to be evolving, for example, the telecommunications products that you will be developing with Nippon Telegraph and Telephone. Is that strategy of protecting the users present software investment going to continue with the same force?

De Castro: Very, very much. The key will be in the migration paths we offer and in the good relations we maintain with our customers.

Focus: During all the retrenchment the company has been going through, you have no doubt had to face some very hard choices in order to reduce the work force and manufacturing capacity by the amount needed to return DG to profitability. What were the general principles you tried to follow to help you make those hard decisions?

De Castro: The guiding principles were easy. What was hard was implementing details. As a total solutions supplier, we had to recognize that the days when a company could sell unsupported hardware are over. Providing good service is going to be increasingly important, and our plans for

Good financial news

"Data General has returned to operating profitability earlier than expected as the result of greater than anticipated revenue growth in the fourth quarter," said DG President Edson D. de Castro in announcing fourth-quarter financial results at the end of October.

A spokesman for Data General noted that the results came after two negative quarters, "and before the analysts expected—they anticipated it would not happen until Q1, 1988."

Despite the good news on earnings, DG reported an overall loss for both the quarter and the year. The losses were primarily due to a $53.8 million charge taken earlier this year as DG restructured operations to cut costs, but also included an extraordinary loss of $26.3 million to settle the lawsuit brought by Digidyne Corp. Figure 1 shows the current internal structure of Data General.

Revenues for the quarter were $332.3 million, up from $330.1 million for the same period last year. Operating expenses were also up, from $317.5 million for last year's fourth quarter to $329.1 this year. Income from operations was $3.2 million, compared to $12.6 million for last year's fourth quarter. After accounting for other revenues and expenses, extraordinary losses, and taxes, there was a fourth-quarter net loss of $22.6 million, or $.79 per share.

For the year as a whole, there was a loss from operations of $60.4 million (mainly due to the cost of restructuring) and an overall loss of $127.1 million, or $4.71 per share. Total revenues for the year were unchanged from last year's $1.27 billion.

Michael J. Geran, an analyst for E.F. Hutton, said the results were better

restructuring had to keep that in mind.

Likewise, we realized that we don't need to manufacture everything we sell. We can't do it all by ourselves, so we will strike relationships with other organizations. In other words, Data General is moving to supplement our strengths in basic manufacturing with strategic partnerships to get the job done.

Focus: With respect to the importance of service, will revenues from Data General Service continue to make up an increasing share of the total?

De Castro: It's true that revenues from service are increasing, but the cost of providing the service is also going up. Service is profitable, but it's not making up a larger share of our total earnings.

Focus: Most people still think of DG primarily as a minicomputer company, so it came as a surprise when Nippon Telegraph and Telephone signed Data General to develop the new telecommunications products it wants. How did DG manage to get this new business?

De Castro: Many people may still think of us as a minicomputer company, but we've broadened. In the last few years, we've spent a lot of money and gained a lot of experience on the communications side. Part of the reason why we got the contract was a fortuitous fit between what NTT wanted and what Data General has been working on. Both companies were headed in almost identical directions.

In addition, we had been doing business in a small way with Japan for 10 years through our Nippon Data General subsidiary. The length of a rela-

than the break-even he had expected. "They're on the road to recovery, but it will take time," Geran said.

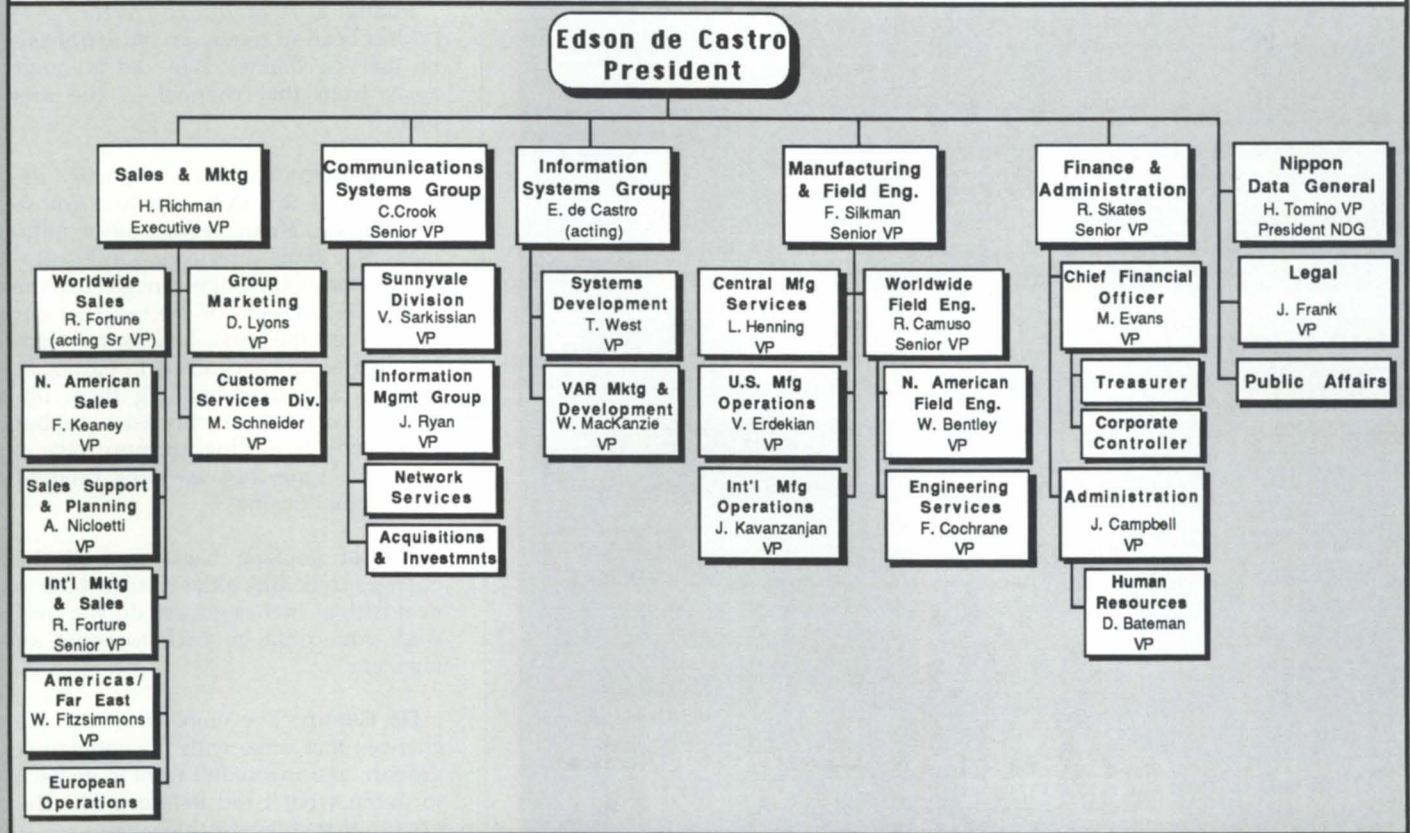
John W. Adams of the Boston firm of Adams, Harkness & Hill said that DG "is faring better than is generally known. Orders began to improve with the March quarter, and in recent months, the momentum has accelerated." Adams estimates that sales will top $1.45 billion next year, and projects per-share earnings of about $1.25.

"With continued increases in revenue and with the benefits of our cost-reduction program announced in July, we believe the company is well positioned for future growth in profitability," said de Castro. "However, the recent volatility in the world financial markets requires that the company maintain a flexible strategy to cope with market conditions."

De Castro noted that the company's efforts to strengthen its position in the value-added reseller markets have added about 85 new high-quality VAR customers, while the "Asparagus" agreement with Nippon Telegraph and Telephone Corp. establishes DG as a competitor in the telecommunications market (see *Focus*, December 1987).

Separately, DG announced it has entered an agreement with 16 international banks to establish a $200 million line of credit to be available for general corporate purposes. Δ

Figure 1: Corporate organization



tionship or business commitment is more important in Japan than it is in the U.S. They look for a "business understanding," and they don't depend on contracts the way U.S. businesses do. They are wary of pull-outs, and it was important to them to see the kind of commitments we had made as we got into the telecommunications field.

Focus: There has been a persistent rumor going back several years that DG was a target for a corporate takeover. Would you care to say anything about the possibility of this happening?

De Castro: Any company with a strong balance sheet and a depressed stock price is an attractive target for the raiders. We became aware of this several years ago, and took steps then to alleviate the problem with a stockholder rights package and other takeover defenses. It's nothing more than a rumor.

Rumors like this can make it more difficult for a business, because they can affect stock prices and the views of financial analysts, who in turn can transfer their views to employees and customers.

Focus: Part of the restructuring at DG has been to renew an old emphasis on the VAR channel. Why did DG move away from that channel in the first place?

De Castro: We never explicitly deemphasized the VARs. We just got so enthusiastic about selling office automation systems directly to larger companies that we benignly neglected the VARs. We lost sight of the fact that our success in the past had come from building small beachheads in particular markets and then building them up. We will continue to emphasize OA, but we're actively looking for more VARs at the same time, because they brought the original business.

Focus: Looking back over all the changes and difficulties you've had to deal with as DG has grown, do you ever wish you could go back to being an engineer?

De Castro: I've enjoyed all the job changes that came with the company's growth, and I wouldn't want to go back to doing what I did before. I like the growth that comes with change. Δ

FIRST DRAFT

Data General plots a course for the next generation of design and engineering applications

by Geri Farman
Focus staff

In mapping a strategy for computer-aided design and engineering (CAD/CAE), Data General has taken a hard look at the existing CAD/CAE environment. "What you see," said Terry Bennett, director of Data General's Manufacturing Industries Marketing, "is a tremendous diversity in CAD environments."

Companies doing CAD/CAE typically have a mixture of purchased and homegrown software, as well as a mixture of hardware vendors. "Workstations have made a big splash," said Bennett, "but when you look at the number of seats where people are trying to do graphical output to CAD packages, the large volume is still Tektronix—a 'dumb tube'. In addition, a full 60 percent of the seats are now PCs or PC clones or variants. Advanced graphics boards for PCs are furthering this trend."

Herb Osher, director of Product Marketing for VAR Marketing and Development, adds that the definition of a workstation is blurring. "There used to be a big difference between an engineering workstation and a PC, but the workstation is 'growing down', and the PC is 'growing up'. The true engineering workstation has graphics integrated on the board, rather than being an add-on—but even this distinction is going away."

Another element of the existing CAD/CAE environment that affects Data General's strategy is the rapid change in graphics hardware. "Graphics hardware is changing even faster than computers," said Bennett, "and there aren't very strong standards. To protect themselves, software vendors are starting to find ways to be hardware independent."

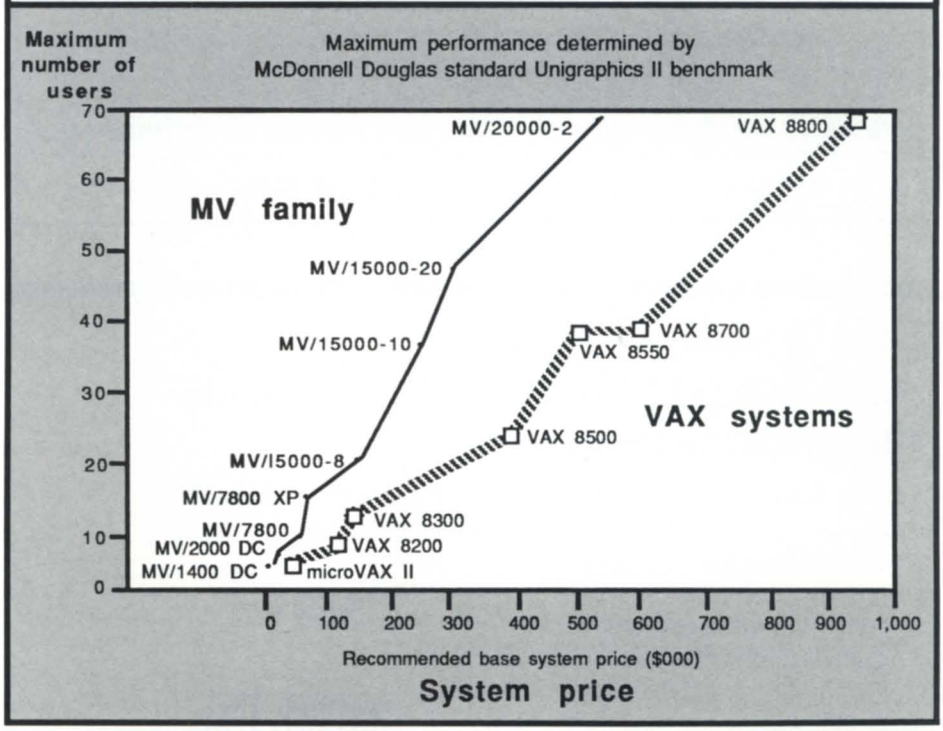
Coupled with these developments in CAD/CAE is the broader concern in CIM (computer-integrated manufacturing) of integrating the data generated by CAD or CAN (computer-aided analysis) with corporate operations. "The information heart in CIM strategy is to connect product and financial information. Companies need the design and engineering information captured in such a way that it's open and accessible to the rest of the process," Bennett said.

Putting all of these trends and goals together, companies are starting to see the value in using a back-end server that can talk to a wide range of graphic devices. The data base sits on the server and is accessible to various corporate operations.

Data General believes they have the right set of solutions to address these trends in the CAD marketplace, and are working on expanding this set. Right now, for example, they can take the MV line and incorporate it with a growing range of graphics devices through the PC*I platform. With PC*I, users can include everything from dumb terminals to 386-based PCs or Unix-based workstations integrated with servers on an industry-standard distributed network.

In support of this trend toward integrating resources, Data General was one of the participants at the first demonstration of Sun's NFS (Network File System). According to Osher, the NFS approach was the clear standard in the Unix environment. "In the non-Unix environment," he said, "the good news is that there are standards, but the bad news is that there are so many."

Figure 1: DG vs. DEC performance



Choosing the right direction for the AOS/VS environment is in the process.

Because Unix is becoming the choice of many software vendors in their effort to become hardware independent, DG is working to enrich their Unix environment as fast as standards come along to support it. The thrust of DG's efforts is to get Unix to operate smoothly and cleanly with the AOS/VS environment. This will allow companies to purchase a range of applications.

In the area of CAD and low-end hardware, Osher said that the DS/7500 works in both AOS/VS and Unix environments. One future direction for the workstation is to make it easier to customize. Third-party boards are already available for customization and Special Systems can provide add-ons as well. Regarding terminals, he said the next generation will address the need to have a single terminal that can work for either DG or DEC systems. The problem of a DG system working with DEC VT100 terminals or ANSI 3.64 terminals is acknowledged, but the direction DG is taking to address it is, for now, proprietary.

According to Osher, DG's strategy follows a larger trend in the computer industry. "The model of computing is changing. We see a network-based model where the network will stay in place and users will plug in different boxes—all sharing resources on this network. We're evolving our product line to support this trend."

An aggressive approach to applications software is also being pursued. "We're shooting at about 100 DEC VARs for 1988," said Bennett, "and we signed about 100 in 1987." According to Bennett, their success in this area is due to an advantageous set of terms and conditions, as well as a cooperative and amicable joint marketing and selling approach.

McDonnell Douglas' Unigraphics package is an example of their efforts this past year. In January 1987, McDonnell Douglas announced that they wouldn't market DG hardware with their software. Many people in the DG marketplace were concerned about what this meant for DG and CAD/CAE.

"What they did agree to, "Bennett said, "is to sell the latest version of their software for our latest platforms, unbundled, for five years. Given the changes you can expect in the computer market in five years, that was a tremendous commitment. They didn't

make that same commitment to DEC, even though most of their business is with DEC. Their direction is basically to be more hardware independent—the same direction we're going." Figure 1 indicates price/performance curves for Unigraphics on DEC/DG and new MVs versus older model MVs.

Another element companies look at when pursuing their own CAD/CAE strategy is high-end computers. What system are they going to use for that back-end server? Why should they use Data General instead of a mini-supercomputer such as a "baby Cray?"

Data General believes their systems offer clear advantages. "If you look at our product development," said Bennett, "you see that about every 18 months we have completely refreshed the MV line. In implementing our own CIM strategy, each of these MVs is a single-board system. We're now going from 1 MIPS up to 13 MIPS in a completely compatible line. One reason Data General can do this ahead of others is our tie with Nippon Data General. We can be a beta site for chip manufacturers. The initial documentation for these is in Kanji. If a company doesn't have Japanese engineers, they have to wait until the English version comes out with the chip."

"The advanced technology we're able to use allows more performance from a single processor. To do that with a standard operating system, communications, and software gives a tremendous advantage against 'baby Cray' companies where upgradability is in question and special programming is often necessary."

To get the Data General message to the marketplace, Bennett plans to continue trade show, press, and cooperative advertising with systems and software vendors. In addition, they are going directly to technical committees and beefing up their work with major consulting firms. "We have a very sound strategy and product set," Bennett said. "We have what we need, and we have the price/performance. We may even do relatively better in a down market, because people have to study what they do and get the best value."

Acknowledging that the recent reorganization and move back to Westboro may cause a small "hiccup" for his group (losing some valuable people), Bennett focused on the benefits. "Being located in Westboro, we'll have a greater impact on domestic and international marketing programs." Δ

TECHNICAL TURNAROUND

Data General is working to regain momentum in the technical computing market

by David Novy
Special to Focus

In 1982, Data General was becoming a leader in the technical computing market. The MV series had been named the computer of choice for several major technical computing software vendors, and the future looked bright.

Data General's presence in the technical computing arena has not lived up to the promise of 1982. There have been difficulties, but the company is making changes to deal with them. DG is now listening to the needs of its technical computing user community more than ever, and the products required to once again be competitive in the technical computing market are now in development.

In my opinion, DG's future in technical computing depends on being able to deliver the following products: a Unix operating system that can support commercial applications, commercially viable technical computing workstations, a minisupercomputing product line, support for Sun's Network File System in AOS/VS, support for VT100 terminal emulation in AOS/VS, and greater attention to solutions combined with price/performance—instead of price/performance alone.

There is no single reason why DG lost the momentum it had in the technical computing market in 1982. A variety of factors played a part, but the following are some of the problems that have to be overcome today.

1. AOS/VS doesn't have a large enough user base to make it attractive for large technical computing software vendors to port their products to Data General. If third-party vendors do make a port, it is often a subset of the full implementation, and/or enhancements to the DG port are a low priority.

2. Data General lacks a commercially viable technical computing workstation. The graphics interface for the DG workstation is proprietary. Few vendors are willing to write applications for a workstation with a limited market. Also, technical workstations are sold primarily based on price. Data General workstations don't have a price advantage compared to the competition, although they do have a performance advantage.

3. Data General doesn't have a stated minisupercomputer strategy. Today, technical computing applications have a voracious appetite for computer power. At present, the largest DG computer is only 12 MIPS.

4. DEC is the leader in the technical computing marketplace, and DEC has a broad, deep customer base. Therefore, DG can't make inroads into the technical computing market unless they can coexist with DEC computers. This means DG needs to use a strategy of penetration and displacement, rather than a "throw out DEC and put in DG" sales strategy. One company that has done well with this is Convex Corp. A Convex computer can be substituted for a DEC computer with minimum disturbance to an organization. DG needs to develop the same level of connectivity in order to penetrate DEC's market.

5. Data General doesn't support the VT100 terminal protocol in AOS/VS. The VT100 terminal protocol is the de facto industry standard. Data General has been excluded from bidding on several government contracts because it doesn't support this protocol.

6. DG needs to enhance the execution speed of its compilers and to modify them to support vectorized and parallel processing. Recent research indicates that most future gains in computer performance will come from software performance enhancements, not faster hardware.

As the issues listed above show, DG faces a difficult struggle to again be a leading player in the technical computing market. Fortunately, DG is adapting and confronting the problem in a number of ways.

1. High-level DG management is listening to the needs of the user community in the technical computing market. For example, three senior DG executives made a special appearance at the NADGUG Executive Board meeting to hear customer concerns.

2. DG committed substantial funds to strengthen its Unix product line for use in commercial applications. The file system for DG/UX will be enhanced, and office automation tools will be added. Data General has cancelled work on its proprietary distributed operating system, AOS/DVS. Resources previously targeted for AOS/DVS are now being applied to Unix development.

3. The Sun Network File System (NFS) is being ported to AOS/VS. NFS already exists for DG/UX. NFS is considered to be the leading protocol for heterogeneous networking of technical workstations. When NFS is ported to AOS/VS, DG users will have a high-performance link among their PCs, workstations, and mainframe computers. NFS is available from nearly all of DG's competitors, from the Cray II to the Amiga and the IBM PC.

4. Data General appears to be working on a minisupercomputer. DG has already demonstrated the ability to link multiple CPUs. The foundation for a minisupercomputer is the ability to do parallel processing on multiple CPUs.

5. DECnet is being ported to AOS/VS. Ki Research is beta testing a product that allows AOS/VS machines to be DECnet endnodes. The Ki Research DECnet product contains a VT100 emulator. The DG-DECnet product was a major reason why Data General won a substantial office automation contract with the New Zealand government.

6. Support for the VT100 terminal protocol by AOS/VS is in DG software development. Unfortunately, no release date for the product is available.

Data General is making a major effort to reestablish its presence in the technical computing marketplace. DG management is making the correct decisions required for a recovery. The major obstacle to the turnaround is getting everything done before the market loses interest. Δ

David Novy is a technical computing specialist at 3M Corp. He is also the chairman and newsletter editor for the AOS and AOS/VS SIG. He can be reached at 3M Center, Building 235–1D-19, St. Paul, MN 55144; 612/733-3320.

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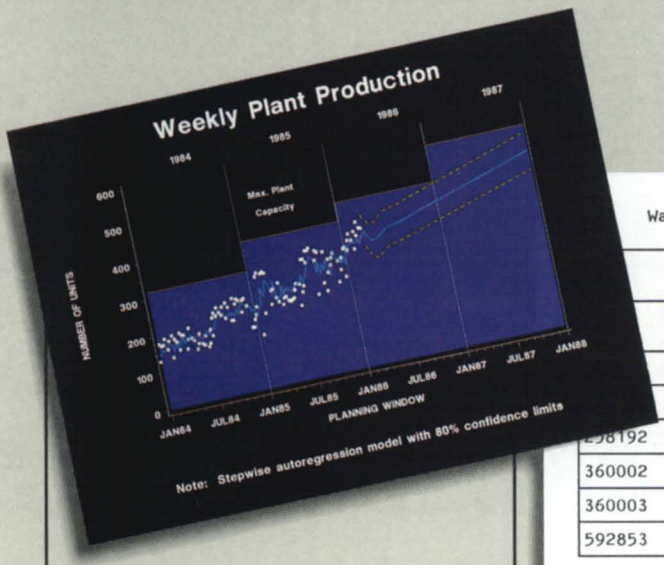

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	89450	5000	FRI, FEB 20, 87
298192	20110	1000	MON, MAR 30, 87
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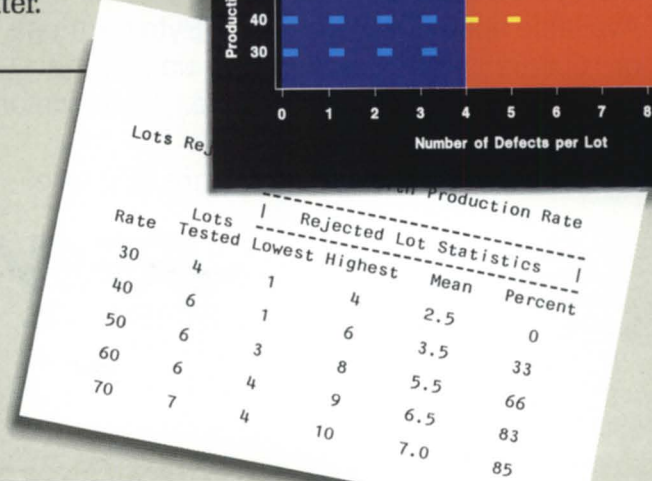

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		Lowest	Highest	Mean	Percent
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40	6	1	6	3.5	33
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* Computer Intelligence, January 1986.

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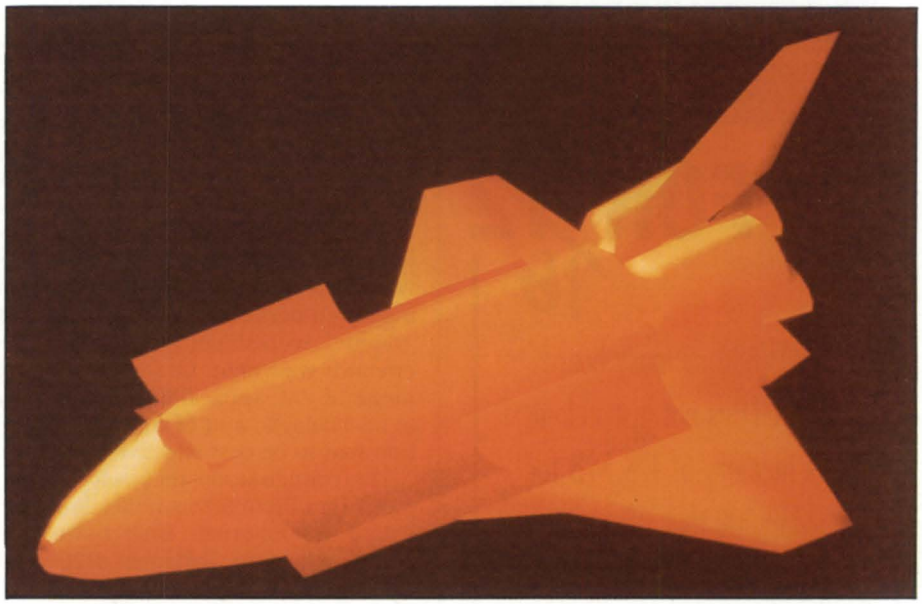
Overcoming the serial bottleneck for DS/7500 workstations

by Larry Borkowski
Special to Focus



Engineering workstations simulate contours from engineering drawings.

The CAD industry has undergone major changes since the first computer graphics applications were introduced in the early 1970s. In those days, the traditional CAD system consisted of a mainframe computer linked serially to multiple graphic terminals. The mainframe ran the CAD application software that generated a set of general drawing instructions uniquely describing a two- or three-dimensional image. This set of instructions, known as the display list, was then downloaded serially to the graphic terminal. The terminal contained a display list processor that operated on the set of instructions to generate the graphic image, which it then stored in the raster memory of the terminal.

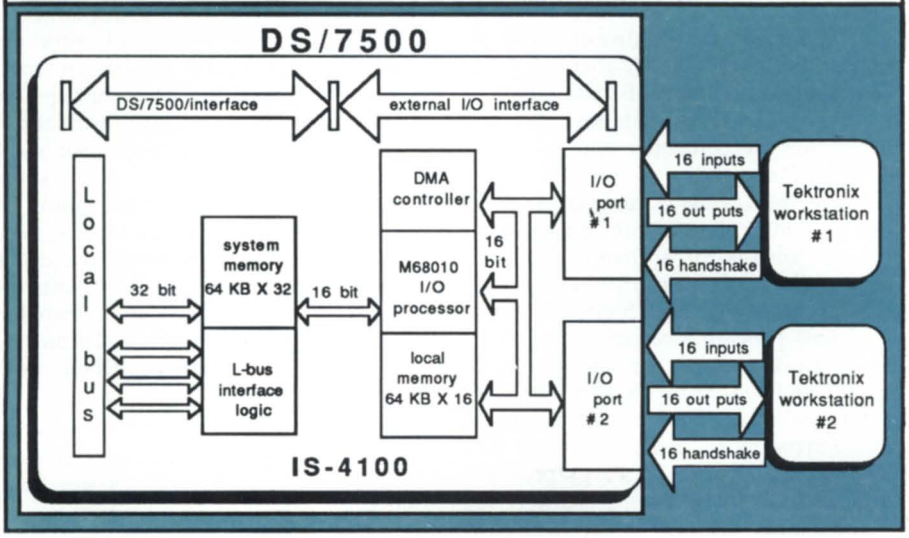
The concept of display lists resulted from an attempt to reduce the time it took to redraw the screen when a user wanted to see a different view of an object. Because the display list was stored in the memory of the terminal, the display list processor could operate locally to perform scale, rotate, pan, and zoom operations.

As 32-bit mini and superminicomputers became available in the 1980s, CAD applications began to migrate away from the mainframe environment. Departmental computing, utilizing multiple 32-bit systems linked as nodes in a distributed network, became popular. At the same time, the simple, monochrome, 2-D graphic terminal evolved into a sophisticated, color, 3-D graphic workstation.

As the complexity of the 3-D images being displayed increased, the size of the display list grew tremendously. With this increase in the amount of data being downloaded, the serial communication link became a real bottleneck. The typical size of a display list to describe a complex 3-D image is approximately 200 KB. With a 19.2 KB baud serial line, it takes more than three minutes to transmit a display list of this size to the workstation. To overcome the serial communication bottleneck, some users are utilizing high-speed parallel interfaces that transfer data at much higher rates.

One such product, the IS-4100 was developed by Indocomp Systems, Inc. for L-bus-based (DS/7500, MV/2000, and

Figure 1: The IS-4100 can replace serial connections to graphics workstations



MV/1400) Data General computers. The IS-4100 reduces the three-minute serial transmission time to less than 12 seconds by transferring data at rates up to one million bytes per second. It is an intelligent controller with an on-board 68010 CPU, local memory, DMA controller, and two parallel I/O ports that transfer data 16 bits at a time (see Figure 1). Up to four workstations can be interfaced to a single DS/7500 by using two IS-4100 controllers.

A major aerospace company recently implemented the first phase of a large-scale CAD system. Before embarking on a project of this magnitude, they analyzed their requirements and surveyed the current CAD marketplace. They wanted a distributed system supporting high-performance 2-D and 3-D graphic workstations with minimal operator wait time. In addition, a wide range of CAD application packages had to be available, and of course, the solution had to be cost-effective.

The configuration they selected consists of multiple DS/7500 nodes linked together via Ethernet. Each DS/7500 supports up to four Tektronix 4120 series color graphic workstations. The 4120 series consists of a family of high-performance workstations employing 19-inch color raster displays with an addressable pixel matrix of 1,280 by 1,024. The 4125 provides 2-D graphic capability, while the top-of-the-line 4129 provides 3-D capability for wire-frame generation, surface shading, hidden line/surface removal, and the local manipulation of 3-D images.

To achieve the required system throughput and to minimize operator wait time, they utilized the IS-4100 as the high-speed parallel interface between the DS/7500 and the Tektronix workstations. The IS-4100 is DRV-11-compatible, so the standard Tektronix DMA interface was used at the workstation. An AOS driver for the controller was provided by Data General.

Since the DS/7500 is compatible with the MV family architecture, a wide variety of third-party software solutions are available to perform engineering design and analysis. Some of these packages provide a complete engineering analysis system, consisting of automated drafting, finite element analysis, solids modeling, heat transfer analysis, etc. Furthermore, since Tektronix has been a major player in the graphic terminal and workstation market for many years, virtually every CAD software supplier offers a Tektronix-compatible display list output.

The application package that was initially implemented is PDA/PATRAN, an interactive graphics system that creates 3-D models upon which detailed engineering analysis can be performed. It allows the user to create a geometric model of an object by using a set of high-level graphics commands. The object is then subdivided into discrete elements through a process called "mesh generation." Next, the physical properties and material characteristics of the object are entered. Finally, the boundary conditions (i.e., forces, temperatures, pressures, etc. applied to the object) are defined. This data is then used to create the analysis model.

The resulting configuration achieved the objectives for the initial system by having the following characteristics:

- distributed system with multiple DS/7500s linked via Ethernet
- high-performance 2-D and 3-D graphic workstations with the Tektronix 4120 series
- minimal operator wait time with the IS-4100 parallel interface
- wide choice of CAD application packages available when using the DS/7500 and Tektronix workstation combination
- cost-effective, because one DS/7500 supports up to four workstations.

With the first phase successfully completed, the next step—to implement high-performance graphics on PCs—is in the planning stages. Tektronix has recently released the PC4100 co-processor board and PC-05/PC-07 terminal emulation software packages that essentially convert a PC to a color graphics workstation. The system configuration for phase two will be identical to the phase one implementation, except the DS/7500 will serve enhanced PCs instead of full-blown workstations. The primary advantages of this approach are cost and flexibility. A PC with the graphics co-processor and a high-resolution monitor is less expensive than a dedicated workstation. In addition, when the PC isn't being used as a color graphics workstation, it can run any of the popular PC software packages currently available. Transferring between Tektronix emulation and PC operation is accomplished with soft keys. Δ

Larry Borkowski is the president of Indocomp Systems, Inc., P.O. Box 157, Drayton Plains, MI 48020; 313/666-9715.

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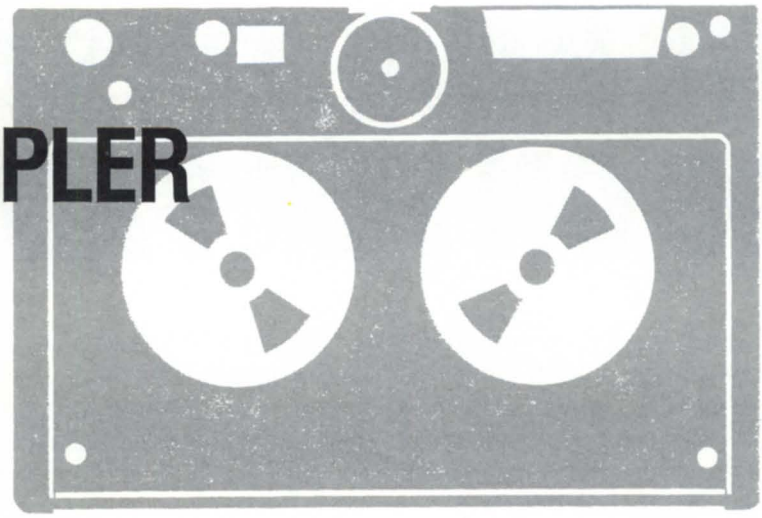


A representative selection of tape controllers and subsystems for Data General users. Part II

In the last issue, *Focus* listed the specifications of the packaged subsystems of three vendors, including Data General, in order to provide a means of comparing consumers' magtape options. This month, the sampler concludes with similar listings from four more companies—Aviv, Cipher Data Products, DataPlus, and Megatape. As mentioned last month, none of the products were sent to us for tests, so we have to rely on the information given to us by the vendor.

Aviv Corporation

TFS 409–990 Tape Subsystem

DG **hardware emulation(s):** 6300/4307 and 6026 on BMC. For use with MV series and Nova/Eclipse.
DG **software compatibility:** RDOS, AOS, and AOS/VS.
Number of drives supported: four.
Media: ½-inch magnetic tape reels.
Recording densities: 1600/6250 bpi.
Block size: 1–64 KB.
Inter-record gap: .3 inches.
Data encoding method: NRZI and GCR.
Tracks: nine.
Data transfer rate: 625 KB/sec.
Write error rate: PE—1 in 10^8 bytes; GCR—1 in 10^7 bytes.
Read error rate: PE—1 in 10^9 bytes; GCR—1 in 10^8 bytes.
Start/stop time: 70 ips streaming.
Physical dimensions: 14 inches x 17 inches x 22 inches.
Weight: 120 lbs. with battery.
Elements included in subsystem: TFC 409 controller, Cipher M990 tape drive, cabling, documentation.
Support available: Aviv field service and telephone support.
Price: $10,850.
Comments: available with Aviv Multiport option, which allows two to six computers to share one tape drive or bank of tape drives.

TFS 409-2921 Tape Subsystem

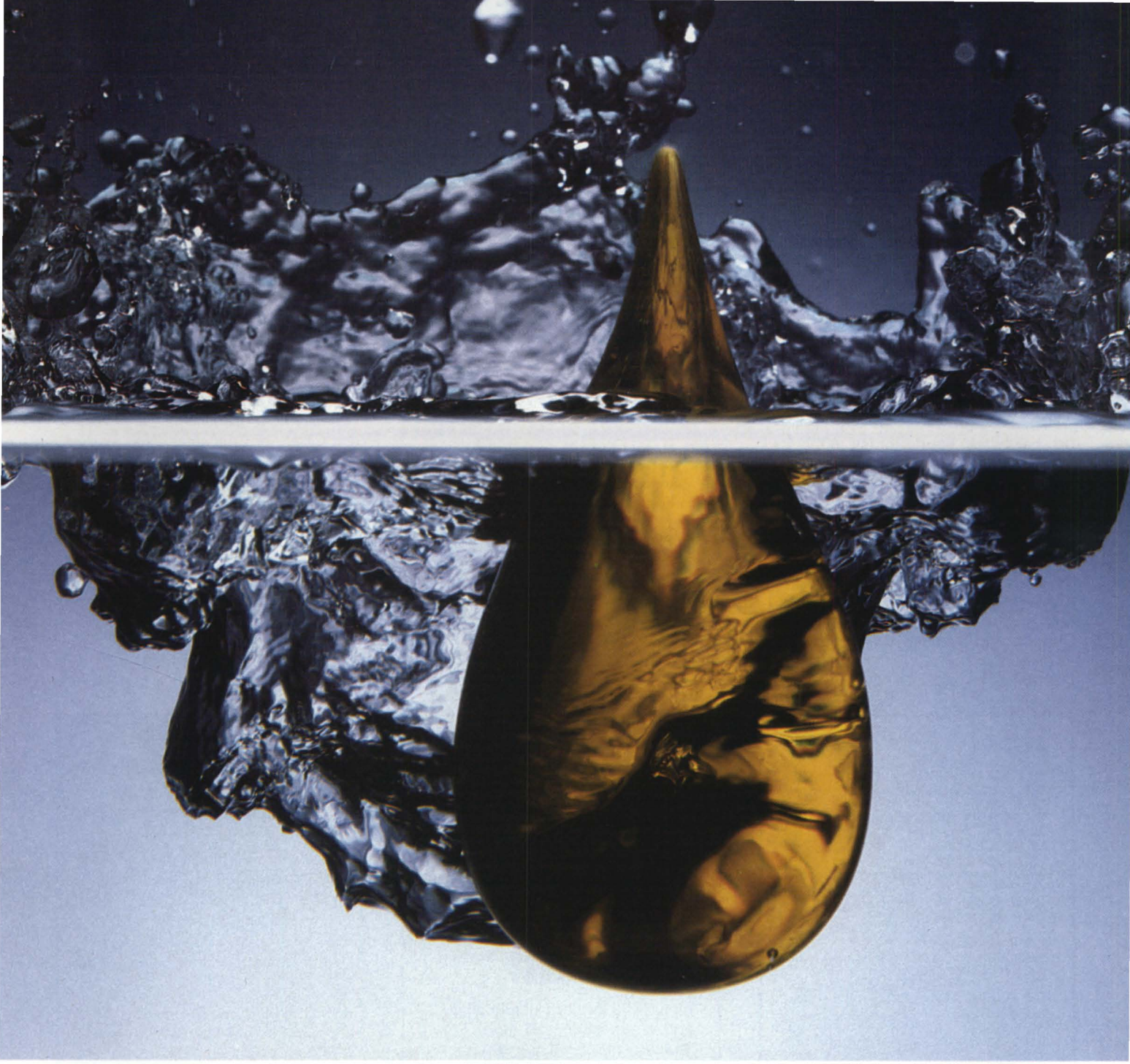
DG **hardware emulation(s):** 6300/4307 and 6026 on BMC. For use with MV series and Nova/Eclipse.
DG **software compatibility:** RDOS, AOS, and AOS/VS.
Number of drives supported: four.
Media: ½-inch magnetic tape reels.
Recording densities: 1600/6250 bpi.
Block size: 1–64 KB.
Inter-record gap: .3 inches.
Data encoding method: NRZI and GCR.
Tracks: nine.
Data transfer rate: 312 KB/sec.
Access time (nominal): .6 ms.
Rewind speed: 2.5 min.
Start/stop time: 50 ips.
Elements included in subsystem: TFC 409 controller, STC 2921 tape drive, 60-inch cabinet, cabling, documentation.
Diagnostics and/or backup utilities included: Drive has resident diagnostics.
Support available: Aviv field service and telephone support.
Price: $12,500.
Comments: available with Aviv Multiport option, which allows two to six computers to share one tape drive or bank of tape drives.

TFS 409-9251 Tape Subsystem

DG **hardware emulation(s):** 6300/4307 and 6026. For use with MV series and Nova/Eclipse.
DG **software compatibility:** RDOS, AOS, and AOS/VS.
Number of drives supported: four.
Media: ½-inch magnetic tape reels.
Recording densities: 800/1600/6250 bpi.
Block size: 1–64 KB.
Inter-record gap: .3 inches.
Data encoding method: PE, NRZI, GCR.
Tracks: nine.
Data transfer rate: 312 KB/sec.
Rewind speed: 2 min.
Start/stop time: 2.4 ms.
Start/stop distance: .35 inches.
Elements included in subsystem: TFC 409 controller, Telex 9251 tape drive, 60-inch cabinet, cabling, documentation.
Diagnostics and/or backup utilities included: Drive has resident diagnostics.
Support available: Aviv field service and telephone support.
Price: $16,500.
Comments: available with Aviv Multiport option, which allows two to six computers to share one tape drive or bank of tape drives.

TFS 409-9271 Tape Subsystem

DG **hardware emulation(s):** 6300/4307 and 6026. For use with MV series and Nova/Eclipse.
DG **software compatibility:** RDOS, AOS, and AOS/VS.
Number of drives supported: four.
Media: ½-inch magnetic tape reels.
Recording densities: 800/1600/6250 bpi.
Block size: 1–64 KB.
Inter-record gap: .3 inches.
Data encoding method: PE, NRZI, GCR.
Tracks: nine.
Data transfer rate: 468 KB/sec.
Rewind speed: 2 min.



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Start/stop time: 2.4 ms.
Start/stop distance: .35 inches.
Elements included in subsystem: TFC 409 controller, Telex 9271 tape drive, 60-inch cabinet, cabling, documentation.
Diagnostics and/or backup utilities included: Drive has resident diagnostics.
Support available: Aviv field service and telephone support.
Price: $18,700.
Comments: available with Aviv Multiport option, which allows two to six computers to share one tape drive or bank of tape drives.

TFS 715-2925 Tape Subsystem

DG **hardware emulation(s):** 6021 and 6125. For use with MV series and Nova/Eclipse.
DG **software compatibility:** RDOS, AOS, AOS/VS, and IRIS.
Number of drives supported: four.
Media: ½-inch magnetic tape reels.
Recording densities: 1600/6250 bpi.
Block size: 1–64 KB.
Inter-record gap: .3 inches.
Data encoding method: NRZI and GCR.
Tracks: nine.
Data transfer rate: 781 KB/sec.
Access time (nominal): 6 ms.
Rewind speed: 2.5 min.
Start/stop time: 50 ips start/stop; 100 ips streaming.
Elements included in subsystem: TFC 715 controller, STC 2925 tape drive, 60-inch cabinet, cabling, documentation.
Diagnostics and/or backup utilities included: Drive has resident diagnostics.
Support available: Aviv field service and telephone support.
Price: $13,700.
Comments: available with Aviv Multiport option, which allows two to six computers to share one tape drive or bank of tape drives.

TFS 715-1953 Tape Subsystem

DG **hardware emulation(s):** 6021 and 6125. For use with MV series and Nova/Eclipse.
DG **software compatibility:** RDOS, AOS, AOS/VS, and IRIS.
Number of drives supported: four.
Media: ½-inch magnetic tape reels.
Recording densities: 800/1600/6250 bpi.
Block size: 1–64 KB.
Inter-record gap: .3 inches.
Data encoding method: PE, NRZI, GCR.
Tracks: nine.
Data transfer rate: 781 KB/sec.
Access time (nominal): 2 ms.
Rewind speed: 60 sec.
Start/stop time: 125 ips.
Elements included in subsystem: TFC 715 controller, STC 1953/35 tape drive, 60-inch cabinet, cabling, documentation.
Support available: Aviv field service and telephone support.
Price: $33,300.
Comments: available with Aviv Multiport option, which allows two to six computers to share one tape drive or bank of tape drives. Δ

Contact information: Jennifer Basile, Aviv Corp., 26 Cummings Park, Woburn, MA 01801; 617/933-1165.

Cipher Data Products Inc.

Spectra 27 Plus Controller

DG **hardware emulation(s):** 6021 and 6125. For use with Eclipse and MV series. Also emulates 606X, 616X, 6122, and 6124 disk controllers.
DG **software compatibility:** RDOS, AOS,

(continued on page 55)

BY KIM L. MEDLIN

SHOW ME!

Bachman diagrams are a generic tool for visualizing data base layouts

Focus is fortunate to have regular columns for system managers ("AOS[/VS] Tricks" and "System Manager's Log") and software developers involved with specific languages ("Inside ICOBOL" and "BBASIC Business"). This is a new column aimed at anyone who is involved with the development of commercial (business) software. My discussions will span the various languages, tools, procedures, practices, and "tricks of the trade" that I've found valuable in software development in the Data General environment.

To give you a smidgen of background, I've been with DG since June 1980, with most of that time spent on software development projects of many sizes and complexity levels. Along the way, I've run across quite a few ideas that may help you streamline your own operations.

If you've read this far, you must be interested in the types of topics I'll be discussing. So let's get started.

The backbone of almost any software application is the data base design. All programs, data communications, and procedures are built around the data base. There are various file management systems from which to choose (INFOS, MINISAM, DG/DBMS, DG/SQL, etc.), and each has its own specific techniques for visually representing the data base structures. It's useful to have one method for drawing a data base layout that is independent of the file management system being used.

The best method I've found for generically visualizing a data base layout is the Bachman diagram, named after Charles Bachman, who was a key contributor to the original Data Base Task Group of the Conference on Data Systems Languages (CODASYL), the group responsible for the standardization of COBOL. I will use Bachman diagrams in future articles to describe data base relationships.

Bachman diagrams have many advantages:

- They're easy to learn.
- They allow visual representation of records and their relationships to each other.
- They're generic, i.e., they can be used with any file management system whether it uses hierarchical, network, or relational structures.
- They're easy to use for different levels of data base expertise.
- They allow for all major data structures used in the commercial environment: one-to-many relationships, many-to-many relationships, alternate keys, and subset relationships.

There are only a few basic symbols used when working with Bachman diagrams: record type (box), set (solid arrow), subset (dashed arrow).

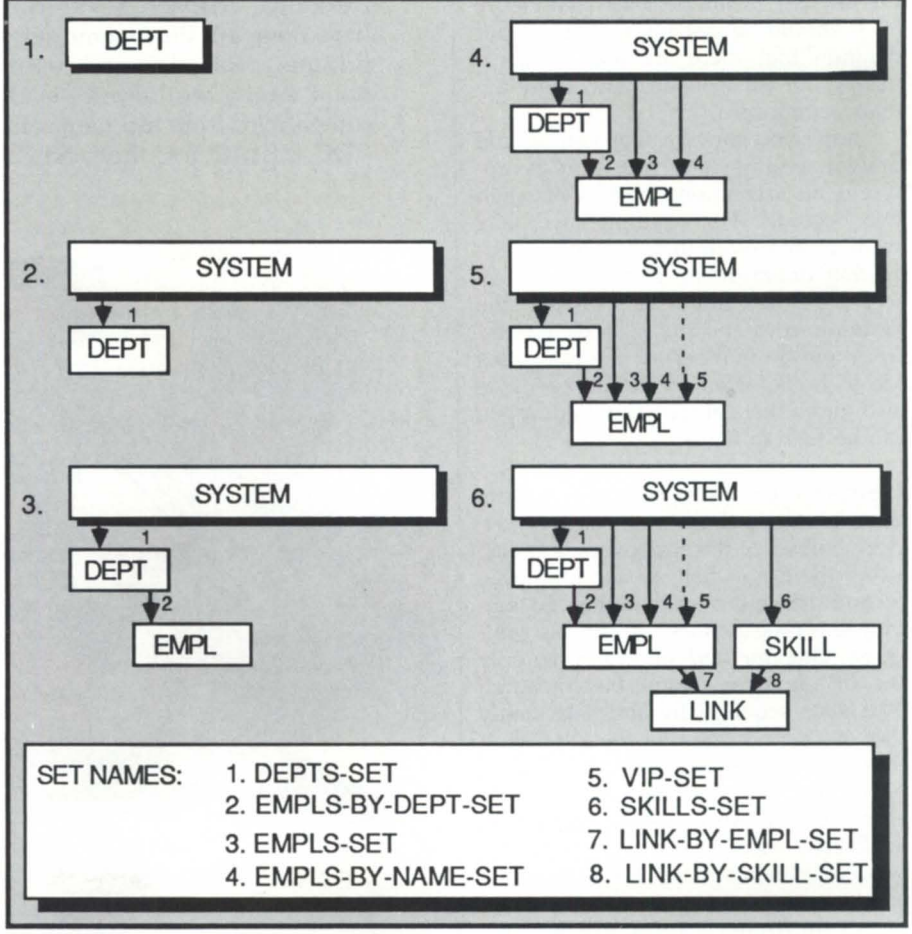
That's it! Those are all the symbols needed to represent even the most complex data base structure. Let's define each of the symbols separately and then see how they work together in a data base layout.

Record type—Represent a record type with a box. Insert the name of the record type inside the box. Let's say we're designing a data base layout for a personnel system that tracks demographic data about employees who are grouped into departments. The DEPTREC is represented with a box, as shown in Figure 1.

Note: It's important to understand that the box represents all department records, not just one occurrence of a department record. There will be one box for each record type in the data base.

Set—The set (represented by a solid arrow) indicates a one-to-many relationship between two record types. The record type where the arrow originates is called the owner record type,

Figures 1–6: Bachman diagrams



and the record type that the arrow points to is called the member record type. In our current example, the member record type is the DEPT-REC, and the owner record type is a special record called the system record. The system record is used when there is no other logical candidate for an owner record. The system record doesn't contain any data, and its only purpose is to allow record types to have an owner when they otherwise would not. Our one-to-many relationship between the system record and the DEPT-REC is shown in Figure 2.

A set then generally represents a sorted relationship between owner and member record types (sounds like our data base may be "R" rated). In our example, departments are ordered by department number. So far, we have represented the equivalent to an ISAM file, one record type with sorted-keyed access.

Let's take this one step further. For each department in our hypothetical data base, there are many employees. Ah ha. A one-to-many relationship again. So we draw another arrow from the DEPT-REC to the EMPL-REC (see Figure 3). It should be visually clear from our diagram that there are many departments. For each department, there are many employees.

I hope you can see that you should draw a set anywhere you want to represent an access relationship between two records. For example, we may want to access employees without accessing departments first. That's easy to represent. Draw a set between the system record and the EMPL-REC (sorted by employee number). If the EMPL-RECs are to be accessed by employee name also, draw that set too. These additions can be seen in Figure 4.

Subset—Let's assume it is a requirement of our application to routinely access a subset of the employees. Let's assume there is a field in the employee record that indicates whether an employee is classified as a VIP in this company. One method of reporting only the VIP employees would be to read all EMPL-RECs sequentially and select only the VIPs as indicated by the VIP flag. If there are a great many employees and only a few VIPs, this could be a very inefficient task. An alternative would be to directly access only the VIPs with a predefined relationship, a subset. Draw a subset with an arrow with a dashed line as shown in Figure 5.

When we read the EMPL-RECs by the VIP-SET, we access only the VIP records that were stored in the data base as being a part of this set. This can be a valuable resource saver when used appropriately.

Many-to-many relationships

You now know how to represent one-to-many relationships between record types. But what about many-to-many? They're not hard, either.

To illustrate, let's introduce a new record to our data base called the SKILL-REC. Each occurrence of this record type stores an individual skill that we want to track in our data base. Typical SKILL-RECs may represent such skills as COBOL expertise, INFOS experience, or basketball playing abilities (you never

know when you'll want to field a company basketball team).

The many-to-many relationship we want to create is between the EMPL-REC and the SKILL-REC. Why? Because each employee has a one-to-many relationship with skills, and each skill has a one-to-many relationship with employees. In other words, each employee has many skills, and each skill is known by many employees.

One of the few no-nos of Bachman diagramming is that you cannot represent a many-to-many relationship between two records by simply having each record point to the other. The correct manner of defining this record type is with the use of a link record.

In our example, the LINK-REC has both the EMPL-REC and the SKILL-REC as owners (see Figure 6). The contents of a LINK-REC will be the key fields of the owner records and whatever other information is useful to store for the combination of the owner records. For example, our LINK-REC contains the date the skill was learned and a level of expertise indicator for this employee.

To find out what skills an employee has, read the particular EMPL-REC and then read the first LINK-REC associated with that employee. You now know when the skill was learned and what level of expertise the employee possesses. The LINK-REC also includes the key field of the SKILL-REC. Using this information, you can access the SKILL-REC to find out more about that particular skill. Then read the next LINK-REC for that employee to obtain information about that employee's next recorded skill. This way, you can obtain information about all the skills of a particular employee.

To find out what employees have a particular skill, follow the above algorithm, except read the SKILL-REC first and then read related LINK-RECs. Each LINK-REC will have the data needed to find the EMPL-REC for additional employee information.

There you have it—the Bachman diagramming techniques. You are now well-armed to diagram any data base layout, no matter what file management system is applicable. In the area of application design, you may not know what file management system will be used in the development phase. The Bachman diagram will allow you to visualize the data base without being biased to a particular file management system's nuances.

A diagram that depicts the physical structure of a particular data base is useful when discussing detailed design issues. Use the Bachman diagramming techniques to communicate your data base design concepts to others when you want to convey the logical structure of the data base. This will ease the tedium of discussing physical attributes of a data base. Δ

Kim L. Medlin heads special projects for the Commercial Software Development Group of Data General's Software Products and Services division, where he specializes in writing custom software for DG's customers. He can be reached at Data General Corp., 3617 Parkway Ln., Norcross, GA 30092; 404/448-6072 ext. 2007.

SYSTEM MANAGER'S LOG

BY BRIAN JOHNSON

The system manager's panel led by Brian Johnson gave users the opportunity to make suggestions to Data General representatives.

VALUABLE EXCHANGE

System manager's panel provides wealth of information

:CONFERENCE_87:PANEL

This month's column summarizes the two-hour-long system manager's panel held last October at NADGUG's Conference 87 in Lost Wages, Nevada.

Before I dive into this, let me thank the DG personnel who agreed to be on the panel. I'm sure the discussion was as enlightening for them as it was for the users. Also, a special thanks goes to Ken Sutton of Education Management from Pittsburgh, Pennsylvania, who served his first term as user representative on the panel.

What follows is a list of the topics covered, more or less in the order they occurred. Any errors and/or omissions are my fault.

:PED/FLAGn

Users suggested enhancements to PED that would provide some more useful information—for example, changing those pesky /FLAGn switches to something more meaningful. I just searched the AOS/VS documentation for information on the flag words in the ?PSTAT packet, and the best I could come up with is "reserved." So why does PED include them? Must be for the DG development staff, I guess.

However, what I think the requestor was really asking for was some more meaningful per-PID data to help pin down who was using what resources and how. Personally, I've been dying to see for a long time things like unique KB per PID by ring (UKBPPBR), disk accesses (not blocks!) per minute per PID per drive (for both unshared and shared I/O), and CPU usage by priority level. Maybe the newly formed AOS[/VS] performance SIG will be able to accomplish something in this area.

:PORT_SWITCHES

There was general interest in the problem of how to deal with front-end port switches using IAC-16s. The consensus was that there needs to be some way for AOS[/VS] to tell the port switch when a user has logged off, so it can mark the port as available, and some way for the port switch to tell AOS[/VS] when the user has died, so it can terminate the process tree. The real issue is that equipping a system with all IAC-8s simply to deal with port switches is too expensive, too data channel intensive, and uses too many slots.

Part of the solution is available via CHAR/BREAK=BCOB, which will terminate the user's process tree upon detecting a break from the port switch. What's missing is something like CHAR/SBOL (Send Break On Logoff) to notify the port switch. Sounds simple enough. The DG panelists took notes.

:ATLANTA:INFOS

Some specific problems with Atlanta's support in the area of INFOS troubles were aired. A panelist promised to investigate.

On the subject of Atlanta in general, there seemed (to me, at least) to be a lot less discussion this year compared to previous years.

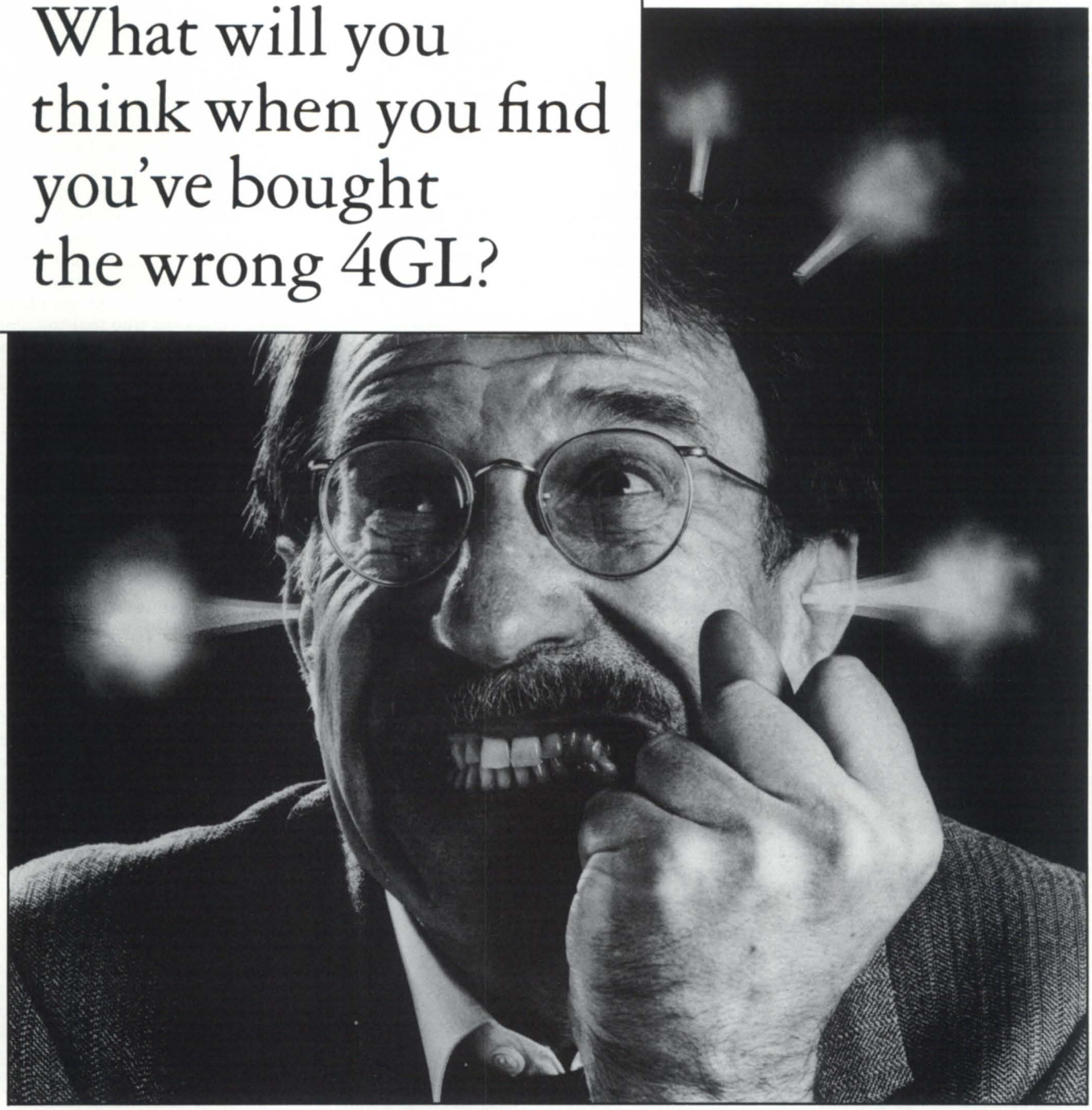
:CPUTIME

A request was made for better per-PID monitoring facilities. The requestor used CPUTIME as an example. I responded that, as an interim measure, I would make a copy of WHERE32.PR available on the :SYSMGR BBS. As far as I know, WHERE32 was a predecessor of CPUTIME and carried no particular license requirements. Except for a few cosmetic changes, it appears to be a replica of the CPUTIME program that is distributed as part of DG's Monitor package.

However, users should be cautioned that as of today (AOS/VS 7.57) the operating system still uses *estimated* CPU-time for system calls when charging PIDs (see my May 1986 *Focus* column). This means that any per-PID CPU-time measurements available under AOS[/VS] can be off by as much as a factor of five! Histogram-derived (i.e., sampling system-wide) CPU measurements are accurate within the limits inherent in histogramming (a few percent, assuming a long enough cycle and/or high enough RTC frequency). In other words, take the output of PED/CPUS, REPORT, and CPUTIME/WHERE with a large grain of salt.

Oddly enough, a source within DG told me that accurate measurement of

What will you think when you find you've bought the wrong 4GL?



CQCS, Cybertek Software Inc.'s powerful 4GL, is the language of choice for major Data General users from Massachusetts to California. Preferred because of its unique combination of benefits, CQCS was designed and developed specifically for Data General equipment, not just converted from another environment. With far superior machine efficiency than other 4GLs available for Data General users, applications development in CQCS is faster and easier than other products.

CQCS is what a 4GL should be. It requires so much less effort than the others – for example, a simple summary report in CQCS such as SUM SALES BY PRODUCT takes about ten lines of code in competing products! It also runs this report 5 times faster than the next fastest 4GL.

If you want to get the best from your Data General machine, you must try CQCS. Once you've seen it, you'll have seen the fourth generation language against which all others are judged.

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CQ
CS

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system call CPU consumption is already in AOS/VS 7.56+, but has been "disabled" for fear of a massive onslaught of STRs from users who suddenly find that charge-back invoices prepared based on SYSLOG CPU-time records would suddenly jump through the roof. I hope rev 8 will enable accurate charging with a published patch location for those who wish to stay with estimating until they can change their charge-back algorithms.

:INFOS

A request was made for automatic checkpointing, perhaps as part of the IFILE dialogue (like differential mode) or as a CONTROL message to the global server. Sounded reasonable to me. Notes were taken.

:DOCUMENTATION

There was a lot of discussion regarding the current state of documentation. One person claimed that a recent update notice for a particular product listed fixes as "none" and enhancements as "none." I remember seeing the same thing, but I just searched every release and update notice on my system and couldn't find the offending notice. I think it's true that the amount of detail about fixes and enhancements in some product's release/update notices has decreased, but I can't provide any specific examples.

There was a lot of support for the concept of "documentation tracks," similar to what was done at Conference 87 this year by designating sessions as end-user, technical, management, or mixed. Apparently, HP does something along this line with their documentation. This was the first time I can remember any request for something resembling what HP does.

A request was made for an index of manuals (DG said, "It's coming") and electronic documentation.

A request was made for a panic list expanded to include probable causes. Seems like Field Service might want to fund this project for its own benefit.

A request was made for more complete descriptions of the underlying action for a syntax. The example given was "Does a COBOL 'READ file RECORD INTO dest' affect both the FD and WS?"

:SYSMGR.SYSADM

The problems associated with systems managed by non-technical personnel came up. I concur on this one.

More and more systems, especially CEO systems, are run by office managers or senior secretaries whose main technical expertise is knowing the phone numbers to call for service for the fax machine, the photocopier, and the PCs.

Apparently, there is a new class of system managers out there that is actually more of a system administrator, and they need recognition. This trend underscores the need for systems that are simpler to deal with and for system manager documentation less foreboding than the phonebook-sized *How To Generate and Run AOS/VS* manual.

:ISC:SCHIZO

A request for dual-protocol support on MV/2000 ISCs was mentioned. Apparently, a second ISC on the tiny MVs is

not possible because of hardware limitations.

I suspect that things like losing flexibility to add a second synch controller are part of the price the designers of the low-end systems paid in order to get the system small, simple, and cheap to build.

:HELP:HELP

More than half of the attendees indicated that the AOS[/VS] help facility needs serious enhancing. Watching 14 screens worth of help on the CHARACTERISTICS command just to find the meaning of one switch isn't real popular.

John Grant of Canada presented a session earlier in the conference on his own structured help facility. I haven't investigated the details, but I'll try to get a copy onto the :SYSMGR BBS if I can.

John Grant demonstrated his QHELP facility to attendees at the NADGUG booth.

:IACS

There is a small contingent (according to a show of hands) of users with IACs that blow up regularly. The problem doesn't seem to be a generic IAC problem, it's more likely a power/cabling problem. Similar problems I've tracked down for clients inevitably turned out to be related to ground voltage differences between the processor location and the terminal locations.

:NEGLECT

There seemed to be a consensus that some of the field sales staff tend to concentrate mostly on new customers and neglect existing customers. This jives with my experience that getting DG staff to show up at local RIG meetings is like pulling teeth. NO-CAL FUDGE, the northern California RIG, just threw in the towel according to a letter I received recently. In a conversation with the RIG chairwoman, she indicated that the almost non-existent support from the local DG offices (four of them!) was a factor in NO-CAL FUDGE's demise.

:RECOVERY

Several users indicated that they would be willing to pay bucks for a service that attempts to recover data from failed data modules. Often, the culprit is blown electronics in the module, and the data recorded on the surface is just fine, but the data is lost when the module is swapped for one with working electronics.

:REV_8

All indications are that some AOS/VS rev 8 planning information is sorely needed. DG indicated that some articles about it are forthcoming here in *Focus*. There also seemed to be a general consensus that charging users a fee to at-

tend a session detailing the features and benefits of an upcoming rev of AOS/VS is tacky, at best. My personal suspicion is that the root of the problem is that Educational Services is chartered to give the sessions, and they take their profit center role more seriously than the longer term corporate goal of keeping the users informed.

A panelist from Corporate Systems Support indicated that part of their job is to bring local field office staff up to date on the details of impending major updates, and that the local staff could make that information available via presentations at the local RIG meetings. Now, if we could just figure out how to get the local staff to show up at the RIG meetings. . . .

:UPDATE.CLI

I touched on the CPU-intensive aspects of this topic last month, but an attendee also requested a more comprehensive update scheme, including things like automatic updating of :ERMES (a perennial fall-through-the-cracks victim). Amen.

A related request was made for the shipment of patched .PRs instead of patch files with messy patch procedures. As an afterthought, it occurred to me that making the system patching part of VSGEN would also be a welcome addition.

:ACLS

Another plea this year for reasonable ACLs on shipped products, especially +,E on .PRs to discourage users from snooping.

:SLATE

A request was made for the SLATE editor to be liberated from the SCCS product and made part of the general AOS/VS product.

:SPSS:DOC

A request was made for the ability to specify multiple copies of documentation updates as part of a subscription service, even if it meant paying an additional fee.

:SYSLOG:DETAILED

For the second year in a row, a request was made for tailored logging to satisfy sites where DOD security isn't an issue, but tracking of certain file accessing is. Same suggestion as last year: why not SYSLOG/ON/detail . . . /OFF/detail . . . instead of just SYSLOG/ALL or SYSLOG/NOTHING?

:UPD:MGMT

The need for password management surfaced. A typical example is password expiration to force users to change their passwords periodically.

:LOGONS

Logging of log-on attempts vis-a-vis Federal regulations was requested. My notes aren't clear on exactly what this means.

:BACKUP:OPEN_SHARED_FILES

Several attendees were interested in a facility to flush to disk any modified pages that are associated with open shared files, so that DUMP[_II] would see them. I pointed out that flushing the modified pages would still not render an INFOS file DUMP[_II]able, but the requestors were mostly BBASIC and ICOBOL types, or users of transaction logging files open in shared mode who claimed that simply flushing the pages would be acceptable in their cases.

OK. I still think it's tacky, but I volunteered to make a program called FORCE_SWAP available that might solve the problem. The program balloons as large as necessary to drive the system into catatonic memory contention for a short time, thereby flushing just about everything to disk. A bit of a sledgehammer approach, but I put the program on the :SYSMGR BBS as I promised during the session.

A later discussion with Ken Sutton led to a better solution that I coded up in about half an hour. Ken has subsequently tested it extensively enough to pronounce it Worthy Of General Distribution (WOGD). It's called SLUSH (for shared page *flush*), and it's also on the :SYSMGR BBS.

:MEMORY+

I had expected there might be some violence during the discussion on this topic, but the attendees were pretty well behaved.

Although several attendees expressed dismay at the increase in the size of AOS/VS going from rev 6.xx to 7.5x, most appeared to have accepted it with quiet resignation, in spite of the fact that some of us got about 10 minutes warning (the time between reading the new minimum memory requirements in the 7.5x release notice and installing the software). Also, the 7.5x release notice failed to mention the per-PID memory increase, which, it turns out, overshadows the incremen-

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tal jump in the base size of AOS/VS for systems with more than a handful of terminals.

Several requests were made in various sessions, including the system manager's panel, for specifics on how much more memory rev 8 would require. The answer offered in every case was the same: "We don't know yet."

I had a difficult time restraining myself when I heard that. I listened to several developers recite the worn, old lines about carefully analyzing the trade-offs between requested new features, speed, and memory consumption to arrive at the best strategies on what to add to AOS/VS and how to add it. "OK," I said, "so you analyzed the trade-offs like crazy before doing anything. So now tell me how much memory you traded off for those nifty new features and improved speed."

Answer: "We don't know yet."

There are three possibilities: (1) they really don't know, in which case, they really didn't do much of an analysis, (2) they know, but they aren't telling, because they think it would scare the hell out of us and spawn several lawsuits, or (3) the increase has more to do with internal DG software engineering issues, like recoding significant chunks of system software in high-level languages, than it does with design/enhancement trade-offs.

As you may have already guessed based on my March 1987 column in *Focus*, I reluctantly vote for the latter. I don't know about you, but I'm tired of buying extra hardware so that DG's development group can hire cheap C programmers to save the cost of some macro assembler training. One developer claimed that using C for the new file system "allowed us to do things that wouldn't have been do-able in assembly." Explain that one to me. Granted, it might have taken more development time, but "wouldn't have been do-able?" Personally, I'd be willing to pay a bit more up front to avoid executing a bunch of excess code trillions of times.

:MEMORY++

After the conference, I got a call from Frank Williams at SCIP (see their ad), who told me that they have been able to get MV/6000s to run up to 8 MB of memory, and MV/8000 IIs to 12 MB, with no modifications to the hardware. Contact Frank directly for details if you're trying to breathe a bit more life into your MV/6000 or MV/8000 II before rev 8 hits the streets. Don't forget to keep at least 3 MB worth of your old boards if you're under a DG service contract. You may have to reinstall them momentarily to avoid a finger pointing contest.

Frank also tried the same trick on an MV/4000, but two obstacles stood in the way: a missing address line driver and a limitation in the microcode. The first problem could be solved (with lightning-like termination of your DG service contract as a down side), but microcode modifications are probably out of the question.

A conversation with Pat Elliott of the Phenix City, Alabama, Board of Education produced the little-known fact that DG has offered an 8 MB upgrade for the MV/6000 for some time. The model number is 5715CB. MV/6000 users should contact DG for details.

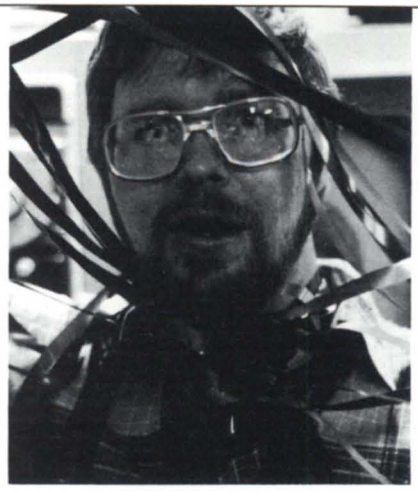
I suspect that cranking up the maximum memory on most low-end DG processors is not as difficult as it seems. Power is rarely an issue, given the new high-density memory chips. More likely, the limitations are the sorts of things Frank ran into: a missing address line driver (which looks like it was there in the past, but has been removed!) or a minor modification to the microcode. DG could make quite a few friends, and perhaps avoid losing a few hard-won customers, by making field upgrades available to those forced to stay on old revs of the software due to memory limitations. Nobody likes to have to replace their processor, especially when their load hasn't changed, simply to be able to use a new rev of the system software.

:SLEAZE_TOUR

Several marriages might crumble if I relate the gory details, so I'll just say it was the best tour so far (ranking up there with the dwarf acrobat at the Club Zanzibar in Toronto). Four a.m. came awfully soon. Early dropouts missed some classic chumming research. My apologies to those presenters with sparsely attended early morning sessions the next day. Δ

AOS [/VS] TRICKS

BY JOHN A. GRANT



LONG, WIDE LOAD

Assembly language for the beginner. Part I of IV

Q. Why do we write programs?
A. 1. To do our dirty work for us with unflagging enthusiasm, precision, and patience.
2. To have fun and impress our friends.
Q. Why do we write programs when we have a perfectly good CLI program to do our bidding?
A. 1. It's not smart enough.
2. A complex CLI macro is difficult to write, impossible to decipher, and will run too slowly.
Q. Assuming we are writing programs to augment the CLI, why should we (sometimes) write in assembly language rather than a high-level language (HLL)?
A. 1. The program will have less overhead in loading and executing.
2. The .PR file will be smaller.
3. To better appreciate just how nice it is to have HLL compilers.
4. To have fun and impress our friends.
5. To justify writing this article.

The runtime environment

Before we start writing any code, let's look at the basic memory structure of a program. All programs are made up of variables, constants, and instructions. The runtime environment must allow the value of variables to be modified at runtime, but it must also protect the constants and program instructions from being modified. AOS[/VS] does this with two principal memory partitions, which are called *shared* and *unshared*. Each of these partitions is subdivided into code and data areas that contain the following:

shared code—the actual program instructions
shared data—constants, text strings
unshared code—usually none
unshared data—COMMON blocks, non-stack variables

The write-protected areas are called "shared" because they can be shared between several copies of the same program executing at the same time (since their contents do not change during execution). All Data General compilers generate shared code: there is no code in the unprotected, unshared code area. (Can anyone tell what it is used for?)

The (simplified) internal structure of a .PR file is shown in Figure 1.

As you can see, the .PR file has the shared area at one end and the unshared area at the other end with a "hole-in-the-middle." Each of the shared and unshared areas is aligned on a memory page boundary (one page = 2,048 bytes), which makes it easy for AOS[/VS] to load your program when you XEQ it. To simplify matters a bit, let's ignore all of the virtual mem-

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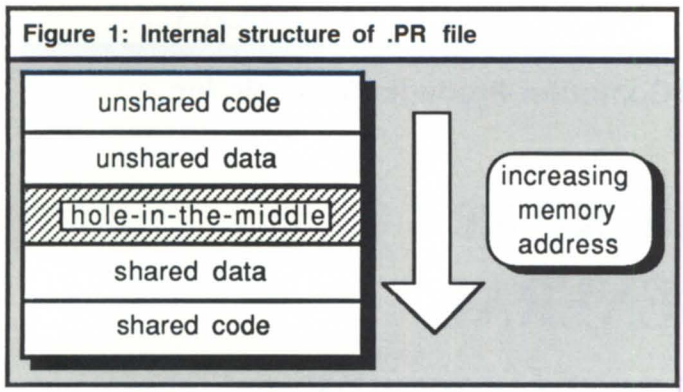
Figure 1: Internal structure of .PR file



ory operations, such as paging, and assume that AOS[/VS] simply loads your entire program into memory at once.

If this is the first copy of the .PR file that is being executed, AOS[/VS] picks up the shared area of the .PR file and loads it in memory, write-protecting all the pages. If another copy is already running (with the same pathname), then AOS[/VS] doesn't have to load the shared area: it simply sets up a pointer to the copy already in memory. The unshared area is then loaded into memory, but these pages aren't write-protected (remember, they contain variables). Now, what about that "hole-in-the-middle?" In the .PR file, it contains nothing, but when the program is running, it contains stack and heap variables. This area of memory is allocated at runtime in pages that are not write-protected.

Once all of this is done, AOS[/VS] takes over and guarantees that the shared areas will never be modified. If you attempt to write into a shared page, you will get a USER-TRAP, WRITE-PROTECTION trap (in Fortran: "Hardware Protection Violation. Write Access Denied"). The other common trap is USER TRAP, VALIDITY, which means your program has gone into the weeds and is trying to reference a page of memory in the next galaxy.

Here's an example that illustrates the importance of the concept of the shared and unshared partitions:

```
PROGRAM BOZO
  CALL STUPID(1)
  J=1
  PRINT *,J
  STOP
END
SUBROUTINE STUPID(I)
  I=2
  RETURN
END
```

This program will generate a WRITE-PROTECT trap, because the constant "1" (argument to ABC) resides in the shared data memory partition, and the "I=1" statement attempts to store "2" in that write-protected area. The same program on MS-DOS RM/Fortran 2.00 will not trap, and "J" will contain "2,"

Circle 31 on reader service card.

Circle 28 on reader service card.

not "1," as clearly stated. The compiler/operating system combination has allowed the program to *redefine the value of a constant*! You can see how nice it is to have shared areas looking after your best interests! Of course, the obvious solution is not to write dangerous code that modifies subroutine arguments, whether they are constants or variables.

The preceding discussion is directed at the originator of STR NDG-1245 (WEBO-32592), who requested an enhancement to F77 to allow the value of a constant (literal or PARAMETER) argument to be modified. I can't imagine why: F77 behaves exactly as it should!

Assembly language coding

Now that you are familiar with the structure of memory, let's look at the essential elements of an assembly language program. At the very minimum, your source file should contain:

```
    .TITLE TEST   ;names your module
XXX:              ;starting point for execution of the code
    .END XXX      ;stop assembling & make XXX the start
```

You will also have to indicate to the assembler (MASM) the memory partition in which you wish to place the code or data. This is done with the .NREL directive:

```
SHARED CODE     .NREL 1 (or .NREL 7)
SHARED DATA     .NREL 5
UNSHARED CODE   .NREL   (or .NREL 0 or .NREL 4)
UNSHARED DATA   .NREL 6
```

In practice, there is no need to distinguish between *data* and *code* in either partition, so use:
.NREL 0 for all unshared items, i.e., variables, and
.NREL 1 for all shared items, i.e., code and constants.

You can switch back and forth between the partitions any time you like: MASM stores code and data with attributes that match the last .NREL directive encountered. Once again, to keep things simple, let's assume that all variables are kept in the unshared area defined in the program at MASM time, rather than in memory that is allocated on the stack at run-time. This is not an efficient way to use memory, but it is satisfactory for small programs. Our skeleton program now looks like:

```
    .TITLE XXX

;))))variables
    .NREL 0
    ⟨put variables here⟩

;)))))begin
    .NREL 1
XXX: ⟨put code and constants here⟩

    .NREL 0
    ⟨put more variables here⟩

    .NREL 1
    ⟨put more code and constants here⟩

    .END XXX
```

Variables and constants

Variable declarations consist of the variable name and its size (expressed in number of 16-bit words of memory to reserve for the variable):

```
I:      .BLK 1      ;or .WORD  0  ;1 word     (INTEGER*2)
NPT:    .BLK 2      ;or .DWORD 0  ;2 words    (INTEGER*4)
SCALE: .BLK 2       ;or .DWORD 0  ;2 words    (REAL*4)
NAME: .BLK 128.                   ;128 words (CHARACTER*256)
```

Note that the default radix of MASM is octal, which means that it will consider 1000 as octal (512 decimal), and 128 will be illegal. If you want to specify a decimal value, place a "." after the number. Also note that the number of words of memory is the same for any variable with the same length, regardless of type.

Constants are exactly the same as variables, except that they have an initial value. There is no difference between a constant declaration and a variable with an initial value if they are both in the unshared partition. A constant is guaranteed to be constant by placing it in the shared partition.

```
ISTART:   .WORD 12.          ;16-bit integer constant
N:        .DWORD 12345678.   ;32-bit integer constant
XSCALE:   2.54               ;32-bit real constant
CON:      .TXT "@CONSOLE"    ;8-char constant
LCON:     .WORD (.-CON)*2    ;16-bit string length (bytes)
```

The .WORD declaration is used for 16-bit integers, .DWORD is used for 32-bit integers. Always use these declarations explicitly, and your code will have fewer potential errors. It is absolutely essential to differentiate between 16- and 32-bit integers! You may also use .WORD and .DWORD to declare 16- and 32-bit integer variables.

The .TXT directive is used to store a text string, two characters per 16-bit word with at least one null at the end. In case you need to reference the length of the name later, you can define another constant, LCON, which is the number of bytes in the text string. Define it immediately after CON; MASM will subtract the current location from the location of the start of the text string and multiply by two (two characters per word). The memory location in each of the shared and unshared areas starts at zero (relative) and increments by one for each 16-bit word.

Next month in part II, I'll discuss the actual methods of manipulating these variables and constants. Parts III and IV will deal with AOS[/VS] system calls. Δ

John A. Grant is a geophysicist with the Geological Survey of Canada, where he manages the Exploration Geophysics Subdivision's MV/4000. He may be contacted at 601 Booth St., Room 591, Ottawa, Ontario, K1A 0E8; 613/996-2325.

BY JIM SIEGMAN

ELEMENTARY EDUCATION

How to set element sizes correctly for better performance

Many people have been asking about element sizes on files—what they are, how to work with them, etc. In this article, I will give you a set of macros to help fix element sizes on a set of files in a directory. This will give you another tool with which to manage your system, but it doesn't explain why you would want to do it, or how to go about it.

Of course, all you really need to know about element sizes is the practical side, such as how to figure out the best element size and how to fix one that isn't. However, a little bit of theory never hurts—if you understand why something works a certain way, you are better equipped to figure out what to do about it.

The element size of a file is a number assigned at file creation time that tells how many 512-byte blocks of disk space will be allocated each time the file needs to grow. For most systems, your files will have an element size of 4 or 32. The element size must be a multiple of the default element size specified in the sysgen, and most system managers use the recommended default of four. Any file created on the system after that will have the same element size unless otherwise specified. The linker (LINK.PR), which is used to produce program files (type PRV), uses a default of 32.

All disk space will be allocated to a file one element at a time. All disk blocks in the element must be located contiguously (adjacent to each other) on the disk. However, different elements of a file can reside anywhere on the disk. If you have a file with many elements that are physically scattered all over the disk, this file has become fragmented. Generally, the more fragmentation, the more time it takes to access a given bit of information on the disk. This doesn't cause major performance problems until the fragmentation becomes extreme.

Let's look at a few examples using a default element size of four. This means that as soon as we write 1 byte of data into a file, one element of space must be allocated to that file. Since that is four blocks, we have just used 2,048 bytes of disk space to contain our 1 byte of data. However, as we write more bytes of data, they go into the same element, so no more disk space has to be assigned to that file until it grows to 2,048 bytes. Figure 1 illustrates the file structure on disk: a single element is allocated to the file, and all of the data can be accessed directly by reading that element.

OK, 2,048 bytes of data isn't enough for you. On byte number 2,049, the filing system has to do two things: first, it has to allocate another four-block element of disk to the file, and then, it needs to allocate another disk block for an index. This index will contain pointers to the two data elements. This is illustrated in Figure 2.

This process of growth can be continued for another 126 elements. With the default element size of four, this allows us to grow to a file of 262,144 bytes, as illustrated in Figure 3.

Figure 1: One-element file structure

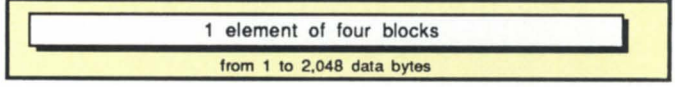


Figure 2: Two-element file structure

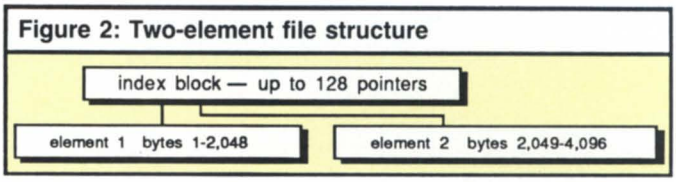


Figure 3: Maximum size file structure with element size of four

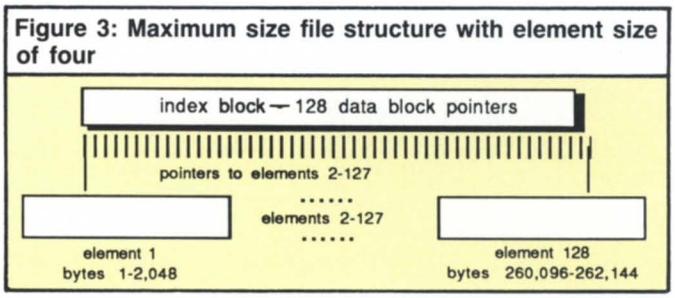
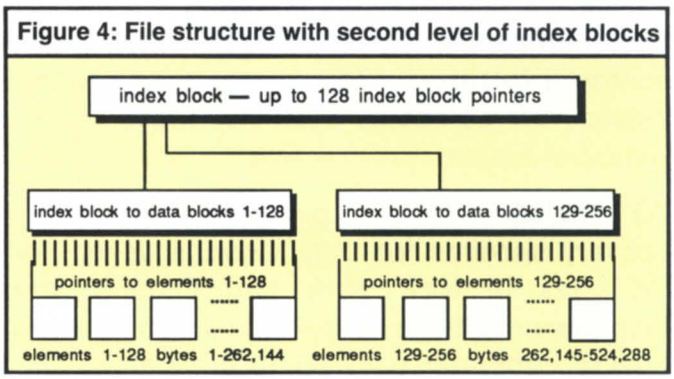
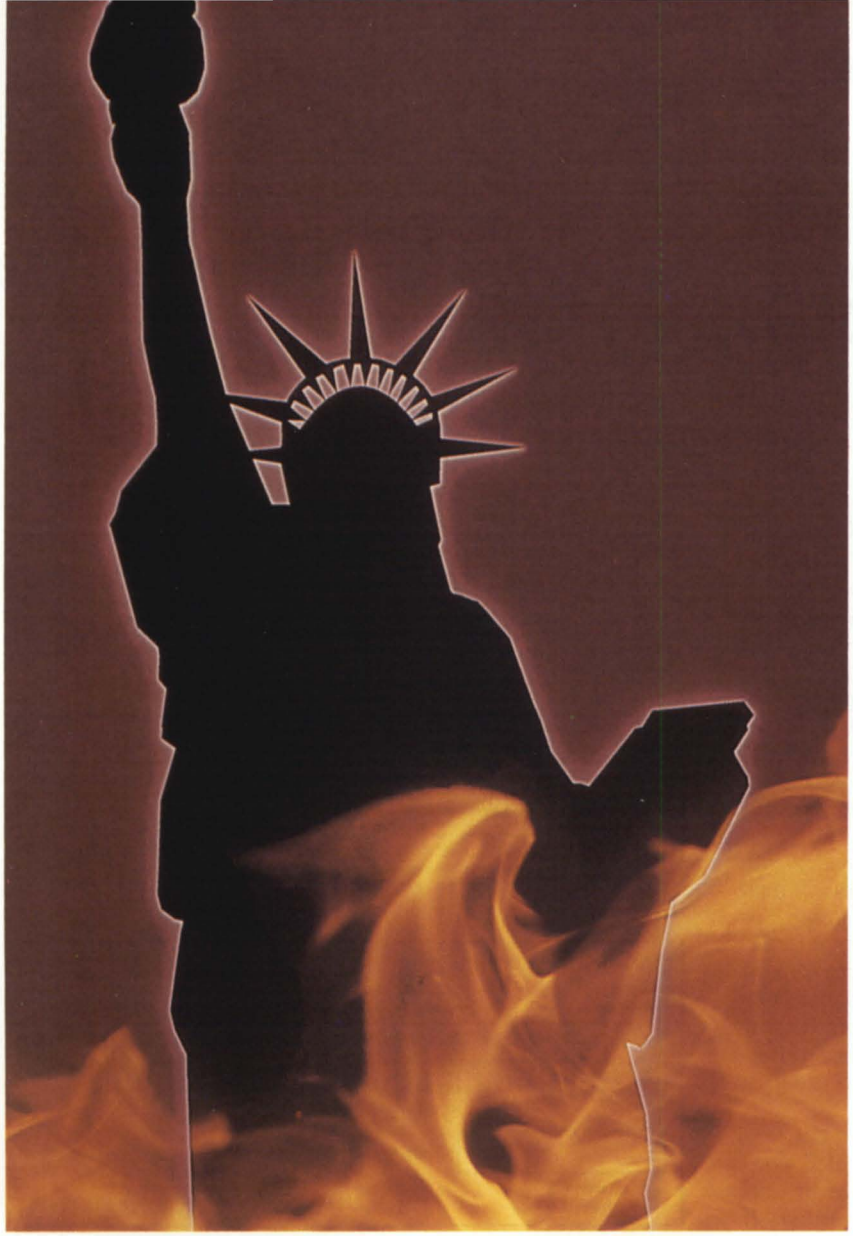


Figure 4: File structure with second level of index blocks



You can probably see what is going to happen next. When the file needs to expand more, we can't just add another element, since there is no room in the index block for another pointer. Therefore, we need to add another level of index blocks to the file. The top level of index blocks will point to the rest of the index blocks. The lower level index blocks will point to the data blocks. This is illustrated in Figure 4.

Let's look at what has happened. In the beginning, the file contained only one element, and any information in the



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file could be directly located in that one element. As it grew in Figures 2 and 3, the first level of index was added. Now to get to any bit of information, we have to first look in the index level to see where the data block is located on the disk. This gives a potential of two disk accesses to retrieve the data. (Frequently, only one access is necessary, because the top-level index block is eligible to be stored in the system cache, a section of memory reserved for often-used blocks of the disk. This technique works well, and for a commonly used file, the index block will usually stay in the cache at all times.)

However, when the file added a second level of index blocks in Figure 4, we lost a lot of things. Now, we have a potential need for three disk accesses to get to data in the file. Again, the top-level index is a candidate for cache, but the second-level blocks aren't considered as important, so they will be the first ones to be dumped from memory. If you have many large files with small element sizes that are being accessed randomly, you may have just ensured two disk accesses (one for the middle-level index block and one for the data) to get to your information.

To further complicate the problem, AOS/VS will allow one more level of index blocks to be added for a total of three levels. If you have ever added the /INDEX switch to your FILESTATUS command, you might see most of your files are 1/3 (meaning one of three possible index levels is used), with a lot of 0/3, a few 2/3, and I hope, no 3/3 files. Ideally, all files would be 0/3, but that would take inordinate amounts of system management time and lots of spare disk space. I hope you can see why a 0/3 or 1/3 index-level file generally poses no problem to the system, but a 2/3 or 3/3 does. This brings us to the question: What can you do about it?

The solution is to rebuild the file with a larger element size. In all of the examples above, we were using an element size of four. This allocates disk space 2,048 bytes at a time. Suppose we used an element size of 32. This would allocate disk space in elements of 16,384 bytes. Therefore, a file would be eight times as big before it needed an index block. With the element size of four, the second-level index block wasn't needed until the file grew beyond 262,144 (512 x 4 x 128). With 32, the limit is 2,097,152 (512 x 32 x 128). If we increase the element size to 256, our 0/3 file can be up to 131,072 bytes, and our 1/3 file can be up to 16,777,215 bytes.

So why not just change the AOS/VS default to something like 256, so we don't have to worry about the element sizes being too small? As I mentioned before, element sizes must be a multiple of the default element size. If you specified 256 in the sysgen, the smallest file on the system must be 256 x 512 bytes. Think of the effect on the macro directory alone. Every CLI macro would need one element of disk—which would mean 131,072 bytes of disk for every macro. If yours are like mine, they average a few hundred bytes in size, and this would mean wasting more than 99 percent of our disk in unused element space.

Now that you see the wisdom of keeping the default size small, we can look at ways to enlarge the elements on the files that need them. For performance reasons, it would be ideal if every file was assigned an element size large enough to make it a 0/3 file, so the file would be contiguous on disk.

However, this doesn't work out in practice. First, the limit on an element size is 65,536, so you can't make it bigger than that. Second, when the file needs to grow, you must have another contiguous chunk of disk of that size available. If you make your file contiguous with an element size of 22,648, the next time your data base grows, you will need another chunk of contiguous disk space at least that large. Otherwise, your application will blow up with a disk full error. I have seen this happen on disks that had more than 100 MB of unused space!

I like to pick a happy medium. Because one-level index files generally don't have a significant impact on performance, I calculate the element size for a large file to allow for future growth but to keep it under the one-level limit. If I had a file that was 10 MB, I would need an element size of 20,480 to make it contiguous—but when it grew, my application would probably crash. However, if I make the element size 256, it could still grow to 16 MB without needing a second index level, and the system should have little problem finding 256-block chunks of space unless the disk drive is very full and/or very fragmented.

Figure 5 shows the four macros I have written to help manage my files. It also uses the BUILD.CLI macro that Brian Johnson published a few months ago (August 1987, pg. 34). The macro you would use is called SCAN_ELEM. It uses the other three to calculate, compare, and change the element size if needed. To use this macro, you would do the following:

```
) DIR :SOME:DIRECTORY:PATH
) SCAN_ELEM +.CLI
) SCAN_ELEM +.PR
) DELETE +.OLD
```

Figure 5: Four macros

Listing 1: SCAN_ELEM.CLI

```
string ?[!user].[!pid].tmp
build/noc/length/elem/type=\ link/type=\ cpd/type=\ dir &
   [!string] [!equal,%1%,]+\ [!string][!else]%1%[!end]
check_elem [[!string]]
delete [!string]
```

Listing 2: check_elem.cli

```
write Checking elementsize for %1%
push ; prompt pop
calc_elem %1-4%
write
pop
[!nequal,%5%,]
   %0% %5-%
[!end]
```

Listing 3: CALC_ELEM.CLI

```
var8 128      ; Comment Change this for max elementsize for your site
var9 [!uadd [!var8],1]
var7 [!umul [!var8],7]
var7 [!udiv  [!var7],8] ; Comment 7/8 of max elem size

var0 [!uadd %2% 511]
var1 [!udiv [!var0] 512]
Comm var1 is the actual number of blocks used.
Comm round it up to next multiple of 4.
var2 [!uadd [!var1],3]
var3 [!udiv [!var2],4]
var4 [!umul [!var3],4]
Comm var4 is elementsize for contiguous file.
Comm compare to system limit of var8
[!ugt,[!var4],%3%]
   [!ult,[!var4],[!var9]]
      reset_elem %1% [!var4] %4%
   [!else]
Comment—let's go for a 1 index level file
      var5 [!udiv,[!var4],[!var7]]
      var5 [!uadd,[!var5],3]
      var5 [!udiv,[!var5],4]
      var5 [!umul,[!var5],4]
      [!ult,[!var5],32]
         var5 32 ; Comment make it 32 or more
      [!end]

      [!ugt,[!var5],%3%]
         reset_elem %1% [!var5] %4%
      [!else]
         write Skipping %1%. 1 level index needs element of [!var5].
      [!end]
   [!end] ; Comment end of compare for contiguous
[!end] ; Comment end of compare for current elementsize
```

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Circle 36 on reader service card.

Figure 5 continued

```
Listing 4: RESET_ELEM.CLI
write Remaking file %1% with elementsize of %2%.
write file size is [!size %1%]. Type is %3%.

delete/2=ignore %1%.old
rename/2=ignore %1%⟨,.old⟩
create/type=%3%/elem=%2% %1%
copy/a/buff=32768 %1%⟨,.old⟩
acl %1% [!acl %1%.old]
```

The macro will scan the files in the directory that match the template you give it. It skips links and subdirectories. For each file that matches, it will calculate the "best" element size for a 0/3 or 1/3 index. It then compares it to the current element size. If the current element size is larger than the calculated element size, it leaves it alone. If it needs to expand it, it renames the file to add ".OLD" to the end of the filename and then recreates it. The .OLD file is not deleted and thus must be deleted manually.

This set of macros has two minor operational problems. First, if you run out of directory space (such as in a CPD), and it blows up, whatever file was currently being processed has an incomplete copy of the file under its original name. The original untouched copy has the .OLD extension. You must change this manually. The other problem is the limit to the number of files it can do at one time. I haven't figured out what the limit is yet, but I generally don't do more than 30 or 40 files at a time, because I want to monitor the output.

Also, these macros are set up to never create an element size greater than 128. If you change the "VAR8" command in the third line of the CALC_ELEM macro, you can adjust this limit. I used 128 for our system, because we work with ICOBOL and test data files and normally have very few large files on the system. Since most of our files are less than 64 KB, this is a good setting. On a production system, you may find that 256 or 512 is a better limit. On a non-system disk that is dedicated to large data files, you may want to increase this to 2,048 or more, depending on the number of files and the size of the disk.

It's important that the macro maintain the file type and ACL setting of a file. Equally important is that the creation date and time can't be saved. Since it will attempt to change any file that needs it, you may need to turn superuser on before running it in a secured directory. 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.

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Zetaco introduces SCSI disk controllers

Minneapolis, MN—Zetaco has announced two new DG-compatible disk controllers, models SCZ-1 and SCZ-2, that support 5.25-inch hard disk drives with the small computer systems interface (SCSI). These SCSI controllers act as an electronic bridge between the DG processor and the SCSI command set.

The model SCZ-1 emulates Data General's Argus disk subsystems (6236 and 6239) and runs under AOS and AOS/VS operating systems. The SCZ-1 supports up to seven SCSI disk drives of varying capacities and interfaces DG's Burst Multiplexor Channel (BMC).

The model SCZ-2 emulates and replaces DG's Zebra disk subsystems (6060 and 6061). Running under the RDOS operating system, it supports up to four SCSI disk targets of the same size and interfaces DG's Data Channel (DCH).

Both controllers are available to OEMs and VARs 30 days ARO, directly from Zetaco. Quantity one pricing is $5,995 for the SCZ-1 and $2,695 for the SCZ-2. Volume discounts are available.

Zetaco, Inc., 6850 Shady Oak Rd., Eden Prairie, MN 55344; 612/941-9480. Δ

ICI introduces SCSI tape controller for Desktops

Placentia, CA—Intelligent Computer Integration (ICI) has introduced the model DSC2 controller for connecting SCSI-interfaced tape drives to Data General's Desktop Generation CPUs and Eclipse S/20 and C/30 CPUs.

The DSC2 can operate with either ½-inch cartridges, ¼-inch cartridges, ½-inch reels, or any other tape drives with a SCSI interface. It is software transparent with all Desktop magnetic tape operating software.

The DSC2 has a six-month warranty and comes with documentation and cabling to the first drive. The quantity 100 price is $1,500.

Intelligent Computer Integration, Inc., 1901 Petra Ln., Placentia, CA 92670; 714/579-7575. Δ

New MRP II version enhances costing methods

Torrance, CA—Compusource Corp. has announced release 4.2 of their MRP II system. Dynamic, an enhanced production/inventory control and accounting system, is available for all Data General systems operating under AOS or AOS/VS.

Key elements of the revised software

package include: choice of multiple manufacturing paths, enhanced customer service information system, improved labor distribution reporting, work-in-process raw materials costing, enhancements to payroll and accounts payable, and an updated fixed assets system that complies with current law.

In times of work overload, peak manufacturing, or unusual order sizes, users can choose up to 99 alternate manufacturing paths for each manufactured item prior to releasing the part to the factory floor.

An enhanced inquiry system allows users to identify customer orders/shipments by customer, part number, P.O. number, or date for up to one year and retrieve all orders and pertinent shipping information.

Dynamic 4.2 provides several ways for tracking costs of labor in work-in-progress. Exact labor cost by work order can be calculated using time in hundredths of an hour.

Up to 20 depreciation methods may be active with the fixed assets system, and up to four depreciation schedules can be applied for each asset (by book, state, federal, or other).

Compusource Corp., 21735 S. Western Ave., Torrance, CA 90501; 213/328-5150 or 714/879-8800. Δ

Computer Technology develops IAC for DG computers

Orange, CA—Computer Technology Inc. has developed the IMX-16, an intelligent asynchronous controller (IAC) for Data General's Eclipse and MV series computers.

The IMX-16 supports up to 16 terminals and other asynchronous devices. The controller is fully supported by AOS, AOS/VS, and AOS/RT-32 operating systems. It also runs Data General diagnostics. The board is pin-compatible with Data General's controllers, so it can be used in conjunction with, or in place of, DG controllers.

Each channel on this board is switch-selectable for RS-232, RS-422, or 20 mA current loop interfaces. This feature eliminates the need for multiple boards previously required to communicate with different interfaces.

The IMX-16 has an on-board microprocessor unit that reportedly processes instructions 10 percent faster than comparable Data General controllers. Also resident are 32 KB of static random access memory.

The IMX-16 comes with a two-year warranty, including a 24-hour spare/repair program.

OEM discounts are available.

Computer Technology Inc., 1442 W. Collins Ave, Unit B, Orange, CA 92667; 714/538-2344. Δ

Data General expands printer line

Westboro—Data General announced six new line and serial dot-matrix printers with price reductions from previous models.

The four new line printers range in speed from 300 to 2,000 lines per min-

ute (LPM). The 300- and 600-LPM printers are priced as much as 12 percent less than the models they replace. In addition, Data General has introduced 1,500- and 2,000-LPM printers suited for high-volume applications.

Prices for new models range from $7,695 for a 300-LPM printer to $34,995 for a 2,000-LPM printer.

Two new dot-matrix printers were also announced. These models are priced as much as 30 percent less than the models they replace. Available in narrow and wide carriage, the dot-matrix series features 80 or 136 column width, with 18-wire printhead.

A new narrow carriage model costs $850, and a new wide carriage model costs $1,095.

The printers are included in Data General's dollar volume discount agreement. Deliveries take 30 to 90 days ARO, depending on the model. Δ

New memory enhancement for MV/6000 or MV/8000

New York—Vanguard Computers, Inc., a division of Vanguard International Management Services, is offering a memory upgrade for Data General MV/6000 and MV/8000 computers.

Vanguard has upgraded original Data General 512 KB memory boards to 8 MB per board. The MV/6000 will accept one 8 MB board, and the MV/8000 (9300 or 9600 series) can accommodate two boards for a total of 16 MB. The previous ceiling on MV/8000 upgrades was 12 MB.

The cost is less than $10,000 per 8 MB board. Vanguard also provides memory upgrades for MV/4000, MV/10000, and S/280 systems.

Vanguard Computers, Inc., 421 E. 84th St., Suite 1F, New York, NY 10028; 212/734-3972, telex 226000 ETLXUR ATT: VIMS. Δ

EBASIC rev 2.00 gets facelift

Bowling Green, OH—Dacor, Inc. has announced rev 2.00 of the EBASIC compiler for DG's extended BASIC. EBASIC is the only compiler available for extended BASIC.

A screen management facility has been integrated into the language to include an interactive screen format editor, source screen compiler, and a screen manager can display an entire screen full of title, text, and variable data in a single program statement. Also, the programmer can accept and edit each input field individually.
each input field individually.

Other features include increased program size, eight-character variable names, program source include capability, INFOS II interface, integer and real numeric data types, and IF-THEN-ELSE and WHILE structured programming constructs.

EBASIC rev 2.00 is available for RDOS, AOS, and AOS/VS operating systems. A demonstration package is also available.

Dacor, Inc., P.O. Box 366, Bowling Green, OH 43402; 419/352-3568. Δ

(from page 28)

AOS/VS, IRIS, and BLIS/COBOL.
Number of drives supported: up to eight ½-inch Pertec-formatted stop/start transports. Also supports four SMD disk drives.
Data transfer rate: up to 1 MB/sec.
Data encoding method: NRZI, PE, and GCR.
Physical dimensions: 15-inch x 15-inch board.

Diagnostics and/or backup utilities included: self-test microdiagnostics. Spectra-Stream, a streaming tape backup utility, is also available.
Support available: telephone support.

Spectra 30 Tape Adaptor

DG **hardware emulation(s):** 6021. For use with Nova and Eclipse computers.
DG **software compatibility:** RDOS, AOS, IRIS, and BLIS/COBOL.
Number of drives supported: up to eight Pertec-formatted.
Data transfer rate: up to 1 MB/sec.
Physical dimensions: 15-inch x 15-inch board.
Comments: supports 800/1600/3200/6250 bpi including start/stop, streaming, and cache tape drives. Reads, writes standard nine-track tapes.
Support available: telephone support.

Spectra 120 Plus Controller

DG **hardware emulation(s):** 6021 and 6125. For use with Nova and Eclipse computers. Also emulates 606X, 616X, 6021, 6122, and 6125 disk controllers.
DG **software compatibility:** RDOS, AOS, AOS/VS, IRIS, and BLIS/COBOL.
Number of drives supported: up to eight ½-inch Pertec-formatted stop/start or GCR streaming transports. Also supports four SMD disk drives.
Data transfer rate: up to 1 MB/sec.
Data encoding method: NRZI, PE, and GCR.
Physical dimensions: 15-inch x 15-inch board.
Diagnostics and/or backup utilities included: self-test microdiagnostics. Spectra-Stream, a streaming tape backup utility, is also available.
Support available: telephone support.

Spectra 320 Plus Controller

DG **hardware emulation(s):** Lotus Tape—6021 and 6125. For use with Nova and Eclipse computers. Also emulates 606X, 616X, 6021, 6122, and 6214 disk controllers.
DG **software compatibility:** Disk—RDOS, AOS, IRIS, BLIS/COBOL, MIIS, and MUMPS. Tape—RDOS, AOS, AOS/VS, IRIS, BLIS/COBOL, MIIS, and MUMPS.
Number of drives supported: eight ½-inch stop/start or streaming transports, plus four disk drives.
Data transfer rate: up to 1 MB/sec.
Data encoding method: NRZI, PE, and GCR.
Physical dimensions: 15-inch x 15-inch board.
Diagnostics and/or backup utilities included: fault LEDs for self-test microdiagnostics. Spectra-Stream, a streaming tape backup utility, is also available.
Support available: telephone support.
Comments: Standard seven-sector read ahead feature eliminates need for interleaving, and increases performance. Δ

Contact information: Gerry Miller, 297 North Bernardo Ave., Mountain View, CA 94043; 415/964-2211.

DataPlus

2043 Tape Subsystem

DG hardware emulation(s): MTC 6125. For use with Nova and Eclipse.
DG software compatibility: MTC.
Media: 8 mm video.
Cartridge capacity: 2.4 GB.
Block size: variable.
Data encoding method: GCR.
Data transfer rate: 240 KB/sec.
Physical dimensions: 7 inches x 19 inches x 15 inches.
Weight: 40 lbs.
Elements included in subsystem: rack-mount unit, cabling, controller.
Diagnostics and/or backup utilities included: backup utility.
Comments: The 2043 tape subsystem provides high-speed, high capacity, reliable data storage on low-cost 8 mm data cartridges, while being transparent to existing software using DG's 6125 instruction set.

2064 Controller

DG hardware emulation(s): 606x, 6125, and 4096. For use with Nova and Eclipse.
DG software compatibility: Zebra, MTC, MTA.
Number of drives supported: eight, plus four SMD, HSMD, or ESMD disks.
Media: ½-inch nine-track reels; one Pertec-formatted drive.
Data encoding method: NRZI, PE, GCR.
Physical dimensions: 15-inch x 15-inch board.
Comments: The DataPlus 2064 is a multifunction controller for Nova-compatible computers, providing support for operating systems like IRIS, BITS, and BLIS/COBOL. It interfaces industry standard enhanced SMD disk drives and ½-inch tape drives with transfer rates in excess of 2.5 MB per second. The 2064 tape coupler is based on the standard nine-track ½-inch adaptor. The 2064 tape adaptor is software compatible with the DG 4096 and 6125, and is capable of handling ½-inch streaming tape drives.

2062 Controller

DG hardware emulation(s): 606X disk controllers. For use with Nova compatibles and Eclipse.
Number of drives supported: four QIC-02 tape plus four SMD, CMD, or LMD disk controllers.
Media: ¼-inch cartridge.
Data encoding method: GCR.
Data transfer rate: 90 KB/sec.
Physical dimensions: 15-inch x 15-inch board.
Diagnostics and/or backup utilities included: diagnostic, format, backup.
Comments: DataPlus 2062 is a multifunction controller for Nova-compatible computers. It interfaces industry standard CMD/LMD/SMD disk drives and QIC-02 ¼-inch tape drives and supports the IRIS, BITS, BLIS/COBOL, and other Nova-compatible operating systems. The on-board tape APL PROM includes a complete tape driver, allowing specialized tape programs to simply call the necessary tape commands. DataPlus also offers the 2063 controller, which interfaces Nova compatibles with enhanced SMD disk drives and QIC-02 ¼-inch tape drives. The 2041 controller supports four QIC-02 devices and includes the DataPlus Qicopy backup utility. Δ

Contact information: Bob Fleischer, 2750 Oregon Ct., M3, Torrance, CA 90503; 213/618-2090.

Megatape Corporation

MT-500 Cartridge Tape Subsystem

DG hardware emulation(s): MT. For use with MV/4000 or larger, Eclipse.
DG software compatibility: standard backup utilities.
Number of drives supported: four.
Media: ½-inch cartridge.
Recording densities: 10,666 bpi.
Cartridge capacity (formatted): 432 MB.
Cartridge capacity (unformatted): 500 MB.
Block size: 32 KB (smaller block sizes accommodated).
Data encoding method: GCR.
Tracks: 24.
Data transfer rate: 240 KB/sec.
Rewind speed: 200 ips
Write error rate: None allowed.
Read error rate: 1 bit in 10^{11}.
Physical dimensions: 8¾ inches x 19 inches x 19 inches.
Weight: 60.5 lbs.
Elements included in subsystem: tape drive, controller, cables, cleaning kit, installation (excluding travel).
Support available: 24-hour factory exchange program.
Safety and industry standards met: UL and CSA.
Price: $13,500.
Comments: Streaming subsystem is capable of storing the entire contents of a DG 354 MB Argus disk on a single cartridge, permitting unattended after-hours backup.

MT-750 Cartridge Tape Subsystem

DG hardware emulation(s): MT. For use with MV/4000 or larger, Eclipse.
DG software compatibility: standard backup utilities.
Number of drives supported: four.
Media: ½-inch cartidge.
Recording densities: 16,000 bpi.
Cartridge capacity (formatted): 630 MB.
Cartridge capacity (unformatted): 750 MB.
Block size: 32 KB (smaller block sizes accommodated).
Data encoding method: GCR.
Tracks: 24.
Data transfer rate: 240 KB/sec.
Rewind speed: 200 ips.
Write error rate: Write errors not allowed.
Read error rate: 1 bit in 10^{11}.
Physical dimensions: 8¾ inches x 19 inches x 19 inches.
Weight: 60.5 lbs.
Elements included in subsystem: tape drive, controller, slides, cables, cleaning kit, installation (excluding travel expenses).
Support available: 24-hour factory exchange program.
Safety and industry standards met: UL and CSA.
Price: $15,250.
Comments: Generally able to store the entire contents of disks used with DG systems in a single cartridge. Operates with the DG backup utilities, DUMP, and PCOPY. Δ

Contact information: Ritch Long, 1041 Hamilton Rd., Duarte, CA 91010–0317; 818/357-9921.

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Jim Kavanaugh says don't give up. He promised during a heavily attended session at Conference 87 that the AOS/VS development group would put together a series of articles on the new rev 8 file structure, starting in December. However, back in Westboro, he found a full desk and a lot to do. Watch for the articles to begin within a month or two.

■

With ease of migration as the goal, Data General announced UNIBOL, a language compatible with DEC's DIBOL-38. UNIBOL allows DIBOL to run under the AOS/VS operating system. Compatibility with DEC in order to reach new markets is part of Data General's revised strategy.

This release is one of a series intended to attract DEC VARs and other customers, according to Ward MacKenzie, vice president of VAR Marketing and Development.

"As part of our strategic marketing commitment to new and prospective VARs, we have also developed a series of programs to make migration to Data General easy and cost-effective. This effort is vital to attract prospective VARs and to maintain a strong cooperative business relationship with our current VAR base," Ward said.

■

Recent promotions within Data General include the following: Joe Forgione is the new director of Communications in the Product Marketing division. Barbara Babcock is now the division director of the Product Marketing division, replacing John Scanlon. Scanlon is now the director of the newly formed Software Business division. This division will handle the marketing for all software products.

In other divisions, Mike Klatman has been promoted to director of Corporate Public Relations, and Norm Hodge is the director of Worldwide Marketing and Sales Support within the Worldwide Field Engineering division.

■

Citicorp Information Resources (CIR) and C.U. Processing, Inc. (CUP) have settled the litigation involving copyright infringement of CIR's GEAC-based credit union processing software.

The judgment awards $2 million to CIR and prohibits CUP from using CIR's software designs.

■

The results are in from the simulated blackjack game at the NADGUG booth at the conference. Lars Wenning racked up the high score of $6,250, averaging a profit of $575 for each hand played. About half of the 149 entries should be glad that they weren't playing in the casinos, because 72 people lost money on each hand. Among the suspicious-sounding aliases logged on was an Ed de C—with a best score of zero.

Blackjack was on line in Las Vegas.

■

Five attendees left as prizewinners after the drawing held at the conference general meeting. Doug Crail of Healthcare and Retirement Corp. won a trip to the U.K. users group meeting to be held next March. Mark Pagano, a programmer for Marathon Oil Co., received a free DG/One.

Roger Kernodle, information systems coordinator for the Southern Medical Association, and Kyle Whitehead, a system manager for WordPerfect Corp., each received two free tickets to the *Folies Bergère*, the show at the Tropicana Hotel.

Chris Grobler, information systems manager for Middleburg Steel and Alloy Ltd., won a computer-based training starter kit from Data General's Educational Services.

And the winner is. . . .

■

Data General has signed a $3 million VAR agreement with Computer Management Dynamics (CMD), a supplier of student information software based in New Boston, New Hampshire. CMD sells the Integrated Student Information System (ISIS), a software package designed to handle the administrative areas of institutions for higher education. The company has been a VAR for DG since 1980.

■

DataSafe Corp. has been designated by Westvaco Corp., a pulp and paper company, as their alternate site backup computer service. Sales for Westvaco in 1986 were $1.8 billion.

Based in Charleston, South Carolina, DataSafe has offered alternate site services since April 1987.

■

Data General Educational Services offers two new computer-based training courses for users of CQCS and Sort/Merge.

The self-paced CQCS course teaches users to operate selected Cyberquery commands to generate formatted tabular and graphic reports. The course, which can be completed in 12 to 14 hours, covers an overview of Cyberquery, generating a report with a basic query, process options, output, fixing queries, errant commands, managing query files, qualifying queries, math operations, formatting reports, generating graphs, managing graphs, and other advanced techniques.

The Sort/Merge course is designed for programmers with AOS/VS experience and knowledge of the SED text editor and INFOS II or sequential files. The course concentrates on using the utility on sequential and INFOS II files.

Completion of this course, which takes approximately 10 to 12 hours, enables users to: sort and copy records, merge multiple files into a single file, edit record fields, delete duplicate output records, delete records according to specified conditions, create Sort/Merge command files, and create reports using the Report Writer.

■

Penta Systems recently installed a $1 million electronic composition system at Waverly Press in Baltimore, Maryland. Waverly Press prints periodicals and books, specializing in medical, scientific, and technical typography.

The new installation includes two MV/15000 computers, each with four 592 MB disk drives. It also includes two 800/1600 bpi magnetic tape drives, 16 Penta Saturn terminals, and four Penta WYSIWYG workstations.

"We ordered the first computer in mid-June, and in less than a month, it was delivered, installed, and fully operational," said Fred Carter, Waverly's production manager. "The second computer was installed in September, and we are operating as planned." Δ

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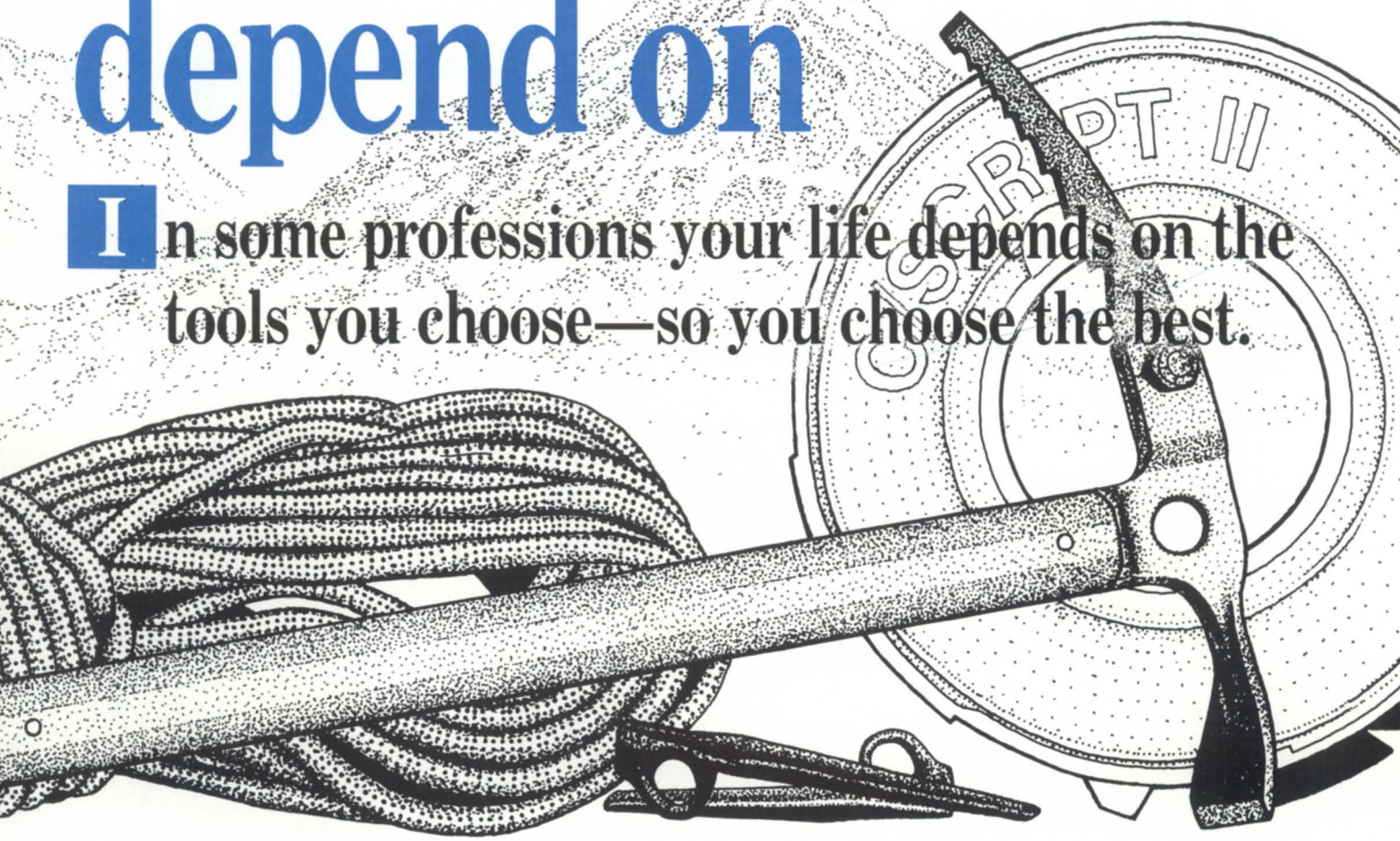

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