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The Magazine of the North American Data General Users Group



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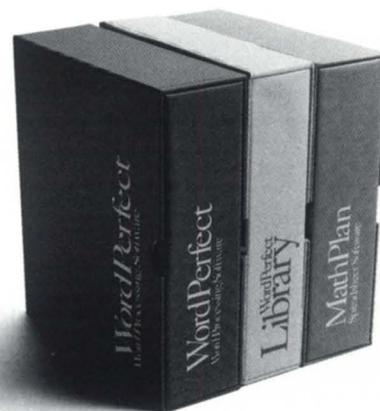
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not only the most popular word processing product in the U.S. PC market, but it holds more than 50% of the PC market in Norway and 75% in Holland. Its fast, easy, resourceful style is well known throughout Australia, Canada, Europe, Scandinavia, and even the Far East.

In addition to software for DG and IBM PC computers, we also have versions for the VAX and Apple IIe/IIc/IIgs. Later this year, we will be running on the Macintosh, Amiga, Atari ST, IBM 370 mainframes, and some UNIX computers.

Down-home concern

Such widespread success in other markets does nothing but strengthen our commitment to the DG Division.

To enhance our telephone support, we recently hired Chuck Swank, previously the Factory MIS Manager at Ore-Ida foods. We've also organized a new testing group to carefully inspect

products and develop new software. Word processing is only a part of our product line.

After just four months in the market, WordPerfect Library for AOS/VS, our office automation solution for DG systems, is now installed on more than 150 machines. The integrated electronic mail, calendar, scheduler, shell, and phone message systems are proving to be valuable office tools.

In *Data Base Monthly*, Tom Robinson described WordPerfect Library: "Their technique for putting jobs on hold and switching among them is easy to use, easy for users to grasp, fast, efficient, and just plain clever."

In addition to WordPerfect Library, MathPlan (our spreadsheet) and P-Edit (our program editor) round out the WPCORP product line for DG hardware.

More on the way

As DG introduces more machines, we're ready with the software to get the best perfor-

CONFERENCE 87 COUNTDOWN

Who says planning is most of the fun?

by Calvin Durden
NADGUG President

It's hard to believe that Conference 87 is only four and a half months away. I've helped plan eight of our NADGUG annual meetings now, so I have a pretty good perspective on what it takes to make one of these events turn out like everyone hopes they will.

The planning actually begins about four years in advance. The first step is to select a city that can accommodate us—not so easy a task as you might think. We start by selecting a general region of North America, and then we look at the facilities and general attractiveness of specific cities until we find one to recommend to the NADGUG Board.

With about three years to go, the Board will have selected a city, but then it will take about another year to review the facilities and negotiate with the hotels over rates. Now that NADGUG's growth has put us beyond what most hotels can accommodate, we will have to begin working with convention centers as well, and the negotiations will become more complex.

By the time we get to the two-year mark, we hope to have a contract signed with the facility that suits us best. This gives the NADGUG Board the information it needs as it looks ahead to set conference fees and budgets. The matter can rest there for the time being—which is a good thing, because by this point most of our attention has to go into planning the conference for the current year.

Until this point, most of the work goes on behind the scenes, and only a few of our members need to put much time into it. With one year to go, how-



ever, the pace quickens dramatically. We depend heavily on our NADGUG staff and on the professional events planners "loaned" to us by Data General. There are too many details for volunteers to keep up with: preparing and mailing a call for papers, planning the agenda, arranging for speakers, organizing the exhibition area, negotiating with the hotel for food and hospitality, planning publicity, printing and mailing registration materials, coordinating staffing and computer support, and handling the logistics of getting a small army of people to a faraway city. You name it, and our NADGUG staff is doing it for us.

As each year goes by, we try to devote more attention to making each conference an event to remember. Last year's meeting in Orlando certainly fell into that category, and all indications are that Conference 87 will, too.

Our NADGUG staff has been invaluable in all this, but they can't do it all for us. A case in point: the meetings committee is taking more leadership in planning the actual conference events this year. In February they held a special joint meeting with the *Focus* Editorial Advisory Board. They discussed how conference attendees have changed over the years, and they thought about the

types of sessions that would appeal to those who didn't come primarily for technical information (which has always been a strong point of our conferences).

Together, the two committees thrashed out a blueprint for a conference agenda that will emphasize three parallel tracks of sessions for end-users, system managers, and MIS managers. Rather than choosing conference sessions from the applications that were submitted, they are actively seeking speakers who can make presentations tailored to the needs of those who will attend. This kind of initiative promises to make the agenda for Conference 87 even better than before.

We're seeing a similar kind of initiative from the companies who market products for the Data General community. The number of companies requesting booth space in the exhibition area is higher than before, and they are requesting more space on the average than at past conferences. They have discovered that the NADGUG conference is not just a chance to show their wares, but also an excellent opportunity to listen to users and get ideas for new products to serve the community.

No matter how much effort goes into planning the agenda and developing the exhibit area, the crucial ingredient for the success of Conference 87 is *you*. As more individual members have taken the initiative to attend each year, each conference has gotten better. So talk with your companies about the benefits of attending; get the conference on your calendar and in your budget. The real fun of Conference 87 isn't in the planning, but in being there. Δ

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

NADGUG's electronic bulletin boards

(300 or 1200 baud modem)

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OIS (to get an OIS ID and password, contact a DG field engineering telemarketing

representative) 800/325-3065

In Massachusetts 800/952-4300

In Canada 416/823-7830

NADGUG membership, address changes

NADGUG staff 617/898-4067

Editorial questions, comments, article suggestions

Greg Farman or Carolyn

Kelly (please send product announcement to the address listed below) 512/345-5316

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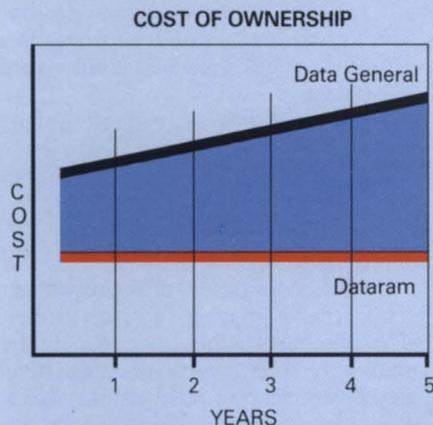
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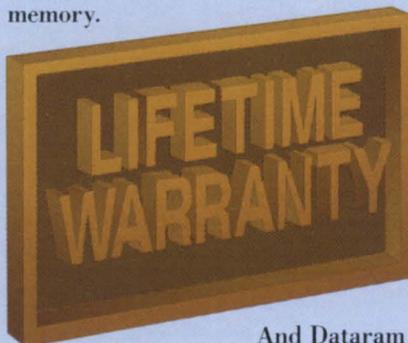
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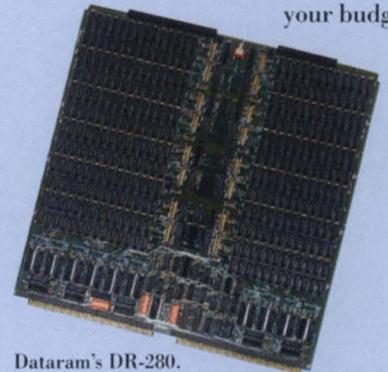
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LETTERS



ICOBOL on an IBM PC

The February "Discoveries" column printed a query from Dan Lapp of CASI, who asked if there were software products available that would (1) run ICOBOL programs on an IBM PC, and (2) develop (compile) ICOBOL programs on a PC for execution on a PC.

Jim Siegman's answer was that he knew of none.

The Falcon Co-Processor from Strobe Data, Inc., will both run and compile ICOBOL on an IBM PC/XT or PC/AT.

True, the Falcon Co-Processor is not a "software" product. It is a combination PC card and software package that combines with the PC to emulate a complete Nova 4 or Eclipse S/140 system, with the PC peripherals subbing for the standard Nova or Eclipse peripherals.

ICOBOL, running on the Falcon, compiles as it normally does, in its own DG environment. The user has the option of setting the MS-DOS switch, so to speak, and targeting his compilation to the MS-DOS environment, or compiling for the DG environment and running the compiled code on the Falcon.

If any of your readers would like more information, I can be reached at 206/641-4940. Ellen Oliver
Marketing
Strobe Data, Inc.
Bellevue, WA 98005

Just our type

(The following message appeared a few months ago on the NADGUG bulletin board. Since the current issue addresses electronic publishing, this is as good a time as any to answer it—Editor.)

Msg#: 852 *DG GOSSIP*

01/24/87 11:24:42 (Read 78 Times)

From: DOUG KAYE

To: FOCUS

Subj: NEW FORMAT

I haven't gone to the trouble to figure out whether you changed fonts, reduced leading, or both in recent issues, but I found it hard to read. The articles looked "heavy," too. I'm sure there are dissenting views.

Editor's note: Doug was right: we did change both the font (i.e., the typeface)

and the leading (i.e., the spacing between lines of type) in the February issue. We are still refining the changes we initiated then. If any other readers have a dissenting view we'd like to hear about it.

The changes came about for a variety of reasons. First, we were running out of room in the magazine. Our policy has been to match every page of advertising with a page of editorial material, but since our need for editorial space has grown faster than advertising, we needed a way to make the editorial material more compact.

At the same time, we were looking for a more esthetic way of presenting the technical material that is such a large part of the magazine. It tends to include a lot of long words in upper case that look dark and forbidding on the page, and long command lines that are always difficult to make fit.

Our solution was to reduce the amount of white space at the top of pages, and to set the text in 9-point Palatino roman with 10-point leading. Code samples from one to six lines are set in 8-point Futura condensed with 10-point leading. Longer code samples are pulled out as figures and made to fit as near the reference in the article as possible. Palatino is slightly wider and more graceful than the Times roman we used previously, and Futura allows a lot more characters per line. The tighter leading and narrower margins let us get about 50 more words per page.

Typography is an esoteric subject, and tastes vary widely. Please let us know what you think about the changes we made in your magazine.—G.F.

Erratum

The May issue of *Focus* proved once again that editors are not omniscient. The lead article on hot sites implied that only four companies are actively marketing disaster recovery services for the DG community. We missed at least one: Computer Engineering Associates, based in Baltimore, has been providing emergency backup services for some time. Please let us know if we missed anybody else. Δ

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SUPPORT CAN BE BEAUTIFUL

Start-up help

Those of you who would like to organize a RIG or a SIG might be interested in the help offered to new groups



by the NADGUG RIG/SIG Committee, the NADGUG staff at Data General, and the DG sales offices and marketing/development group. They also offer continuing assistance to groups that are officially recognized by the Executive Board.

According to the most recent NADGUG membership guide, the start-up program includes \$200 funding to help cover initial costs of organization. One hundred dollars of this money is a grant, and the other \$100 is an interest-free loan to be paid back to NADGUG once a group becomes financially self-sufficient. Submit requests for funding to the NADGUG staff.

Users may also request a start-up kit that includes sample newsletters, by-laws, and start-up notices from other groups. General guidelines are provided as well as suggestions for initial membership drives, group promotions, and meeting agendas. Address labels for NADGUG members in the relevant geographic region or with the same special interest are available for first mailings. Information included in the kit is updated periodically. The latest addition is a list of speakers and topics from other groups' meetings designed to generate ideas for planning programs.

New groups can get notices of their first meeting covered in *Focus*. The com-

plete roster of all RIGs and SIGs is published in the magazine twice a year. The NADGUG staff can also make available extra copies of *Focus* for groups to hand out at their first meeting.

Lastly, the local DG sales offices offer support for RIGs, and the marketing/development group does the same for SIGs. These offices can assist by authorizing people on their staff to work with DG users who are interested in developing the group; by mailing membership promotions or meeting announcements to customer lists; by planning locations for meetings and scheduling speakers; and by financing these types of support.

Continuing support

Once a group petitions for and receives recognition from the Executive Board, it is eligible for more benefits. (Guidelines for the petitioning procedure are included with the start-up kit.)

1. The development bonus program provides each official RIG and SIG with one free conference registration for a group to award to one of its members. This item is valued at \$300.
2. NADGUG will also match dollar-for-dollar the cost of engaging speakers at meetings. The expense must be submitted to the NADGUG staff for reimbursement.
3. To encourage participation at the Executive Board meetings, NADGUG will fund the cost of room and lunches for the two-day Spring Executive Board meeting for the official representative of each recognized group.
4. At the Fall Board meeting, NADGUG provides each group representative with a half-price conference discount. This offer is separate from and in addition to the free registration awarded to each group.
5. RIGs and SIGs receive periodic mailings about product information, Executive Board news, and NADGUG developments.

Contact the NADGUG staff at the North American Data General Users Group, c/o Data General Corporation, 3400 Computer Dr., MS-C228, Westboro, MA 01580; or call 617/366-8911, ext.4067. Δ

N.T. EDGEs in

More and more user groups are tired of swallowing their Adam's apple saying GUG all the time. Taking their lead from the LA EDGE, the North Texas End-users of Data General Equipment have received official recognition from the Executive Board at the spring meeting. The group has been meeting informally since October 1986, according to Dave Starr, president.

So far, the group averages about 20 to 40 people per meeting. With help from the local Data General branch office, several mailings have been sent to approximately 250 area users. There are more than 400 DG sites in the Dallas/Ft. Worth area, according to Starr. Some people have come from as far as Denton and Waxahachie to attend the meetings.

Officers are Dave Starr, president; Pat Cathey, vice president; Marco Fehlbaum, secretary; and Robert Perkins, treasurer. The Board of Directors are Gary Orren, membership; and Curtis Mitchell, meetings. Two positions, newsletter editor and programs director, remain open.

Yearly dues are \$30 for end-users and \$50 for vendors.

For more information contact Dave Starr at I.S.T., 1750 N. Collins, Suite 200, Richardson, TX 75080; 214/437-9802. Δ

A plug for TUG

Founded almost eight years ago, the TeX User Group (TUG) has more than 2,000 members internationally including about 200 institutional members. (Data General is one.) The purpose of the group is to promote the use of TeX, a public domain publishing system, created by Donald Knuth.

Bart Childs, president of TUG, is a specialist on TeX used with Data General computers. He said that although TeX is designed to work on all computer systems, it works better on DG equipment than most others because of the user-friendly AOS/V5 front-end. Group members are unified in the belief that although TeX may not be easier to implement than WYSIWYG typesetting systems, the finished product is of a higher quality. Presently, users of TeX

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are perfecting an interface with TeX on Cray superminicomputers.

TeX was specifically designed to make book quality pages and handle mathematical equations and characters. For this reason, the American Mathematical Society, located at Brown University in Rhode Island, has been the host and home base for TUG. However, now the group is in the process of separating as a legal entity.

A staff of four people, also located in Rhode Island, work full time for TUG. They include an executive secretary, an administrative assistant, a secretary, and a system manager (known as the TeXpert) who also teaches courses

nationwide.

The group's activities include subsidizing members to present papers at invited conferences and to teach courses on TeX to private companies and institutions. TUG is a nonprofit organization that also publishes a perfect-bound newsletter (it looks more like a manual) called TUGboat three times a year. TUGboat provides general communications, product and software announcements, and problem solutions to members that usually only have the chance to meet at the annual conference each August.

This year, the three-day conference will be held at the University of Wash-

ington in Seattle. Tentatively scheduled presentations include: a status report, a business meeting, a one-day forum on the use of TeX in the humanities, and a talk on the use of TeX with languages reading from right to left as well as left to right.

TUG officers are: Bart Childs, Texas A&M, president; Rilla Thedford, Intergraph Corp., vice president; Alan Hoenig, City University of New York, secretary; and Samuel Whidden, AMS, treasurer.

For more information, contact the TeX User Group, c/o American Mathematical Society, P.O. Box 9506, Providence, RI 02940-9506; 401/272-9500. Δ

UK users tackle major issues

by Greg Farman
Focus Staff



"Venue" took the blame for the disappointing turnout at the annual general meeting of the United Kingdom and Ireland Data General User Group (DGUG), held April 2-3 in Birmingham, England. "The problem isn't that we held the meeting in Birmingham," said Richard Finmore, the newly elected treasurer of DGUG. "The problem is that we *didn't* hold it near London."

With fewer than 100 members attending the two day meeting, DGUG officers and board members were concerned that the group—which has about 400 members overall—stood to lose several thousand dollars on the conference. Nonetheless, for those who made it to Birmingham the conference provided informative presentations, frank exchanges of views, and a lively business meeting.

The keynote talks were on two subjects that interest DG users on both sides of the Atlantic: contract conditions for the purchase of computer hardware, and intellectual property rights related to software licensing.

The first speaker, Ted Sumbridge, is a recognized expert on hardware contracts. Sumbridge chaired the committee that developed the Model Conditions of Contract that have been endorsed by the UK's Office of Fair Trading and other groups around the world. After explaining how the model conditions give buyers more protection than most existing contracts, Sumbridge

went on to analyze Data General's standard contracts. "The smallest print I've come across," he said, "and as one-sided in favor of the supplier as any I have seen." Sumbridge urged purchasers to negotiate with suppliers to get better contractual terms, but added that some companies—notably IBM—refuse to alter their standard contracts.

Guy Vanderbergh, a professor of Law at the Free University of Amsterdam, discussed the forms of legal protection for intellectual property, the contractual rights and responsibilities provided by software licenses, and software product liability laws. Vanderbergh described how case law and tradition have combined to produce software licenses that do little to protect the rights of purchasers. He concluded with several suggestions for users' protection.

A resolution that passed at the general meeting directed the officers and directors of DGUG to review Sumbridge's and Vanderbergh's recommendations, and to work with Data General to see whether DG's contracts and licenses can be brought into conformity with their recommendations.

Other program highlights:

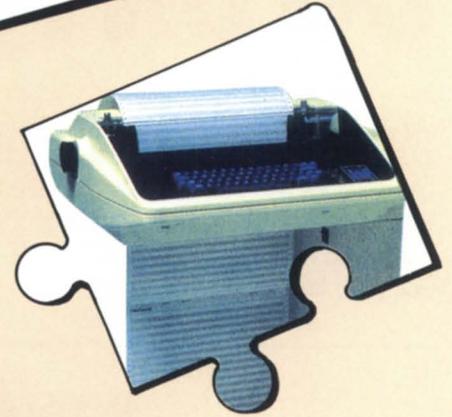
- Tony Deakin, a consultant based in Yorkshire, described how Brierley-Almond Limited had gone through an almost painless upgrade to an MV/7800.
- Mike Harrison, DG's sales and market-

ing manager for the UK and Ireland, described DG's business strategy.

- Ivor Coleman, DG product marketing manager, reviewed recently introduced products.
- Ron Lloyd from DG's advanced technology product marketing group in Denver explained AOS/DVS.
- A panel of DG managers fielded questions from the audience about products and policies.
- Judith Rose of the Arthur Young Consultancy described strategies for implementing office automation.
- Brian Johnson, the AOS/VS consultant and *Focus* columnist, spoke on the increased memory demands of AOS/VS rev 7.

Brian Cooper, the retiring chairman of DGUG, presided over the general business meeting's committee reports, operating plan, and budget recommendations. A slate of officers was elected for the coming year: chairman, Chris Everett; secretary, Neal Clements; treasurer, Richard Finmore; vice chairman, Hugh Ross; editor, Nick Benwell; and directors, Mike Bull, Barry Whiteford, Mike Turnill, Dan Milosevic, Derek Hooper, Brian Cooper, Ron Burns, Steve Page, and John Harwood. Finally, the newly elected chairman, Chris Everett took up a potentially divisive issue: a new constitution for the group. After lengthy debate, the constitution was tabled, and will be resubmitted at the earliest practical opportunity.

The UK and Ireland group is sponsoring a trip to NADGUG's annual conference next October for two of its members, and a number of other DGUG members are planning to attend. Similarly, NADGUG will sponsor a trip to the UK for next year's DGUG meeting. Δ



Bring all the pieces together

Bringing together all the hardware components of a system can be a rather confusing experience. There are the issues of what's the best CPU for today as well as tomorrow? How much disk space is required? How much memory? And how many users are going to use the system? Now there is a company dedicated to communication solutions for the Data General User.

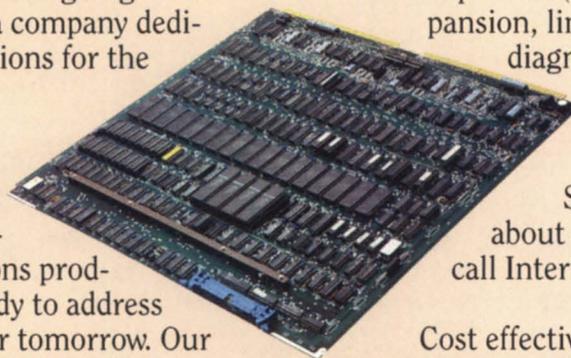
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NOT A HOBBIT IN SIGHT

CADGUG's visit to Gandalf proves interesting

by Dave Angulo
CADGUG Secretary



CADGUG members who attended the March 23 meeting held at Gandalf Data were astonished at both the facilities and the products they saw there. Howard Gunn, Gandalf's vice president of marketing, explained how Gandalf had started in the early 1970s with short haul modems and then expanded into multiplexors. Now the company's major product is PACXNET, a local and wide area network manager that can connect peripherals and CPUs from different vendors. PACXNET provides a single sign-on to the network, transformation of protocols, higher bandwidths than Bell's, integrated voice and data communications, and network management (including bypassing of inoperative nodes).

According to Gunn, PACXNET maps onto the first four levels of the ISO OSI standards and provides 23 levels of security before the users reach the CPU security.

Jerry Goudie followed with a talk on the technical aspects of PACXNET. He said that the PACX 2000 will allow any terminal on the PACXNET network to connect to the CPU until all of the ports are filled. When a user logs off, any other user at an open terminal can log on and access the CPU.

Goudie said that the PACX 2000 is programmable and can be configured in just about any way imaginable. For example, it can be programmed to log off a user when it detects that the channel is idle—taking into account both the length of time the channel is idle and whether to look at communications going from CPU to terminal, terminal to CPU, or both directions. (The latter factor could be important for CEO users who get a periodic update of the clock on their screen from the CPU.) All of this can be programmed to specific nodes or specific usernames (or any combination).

The PACX 2000 can connect several terminals to several CPUs, terminals to terminals, CPUs to CPUs, and PCs to

anything else including other PCs. A session can be suspended, connected to another node, and then the first session can be resumed without having to be terminated. Specific nodes can be constricted on a per node or per username basis, or any combination. If the PACX 2000 is connected to a modem, it can be programmed to do dial-backs to enhance security.

Multiple PACX 2000s can be tied together in a network with coaxial lines, fiber optics, or AT&T T1 (digital data) lines. When they are tied together in a network (whether at the same site or at remote locations), users that sign on to the second PACX access the network as though there was only the one PACX.

Each PACX 2000 can have up to 1,920 channels. For smaller sites, the PACX 200 has 128 channels. Jerry Goudie claimed that Gandalf has a few customers that have 12,000 subscribers to a PACX network.

The PACXNET also has gateways to X.25, IBM SDLC or bisynch networks, and to Ethernet. This is achieved by redundancy of logic (the backup logic, when needed, will automatically kick in without losing users currently logged on to the network), redundancy of power supply (they share the load until one fails), and redundancy of inter-PACX linkage. The costs average about \$150 per channel.

The presentation portion of the meeting was followed by a tour of the factory, which is very highly automated.

CADGUG Semiannual Report—Spring 1987

Statistically, 1986 was a poor year for CADGUG. Membership is down, expenses are up sharply and will be up even more in 1987. We were unable to plan our meetings far enough ahead to give our members a one-month notice. This seems to adversely affect attendance at meetings.

However, the group doesn't seem to be doing as badly as the statistics im-

ply. Participation is actually up. The formation of a committee dedicated to increasing participation seems to have helped in this respect. We have finally worked out all the details and have begun publishing our newsletters in *Focus*. We have plans for membership growth, and, finally, we are getting enough ahead in planning our meetings to be able to publish them in our newsletter.

Our current budget anticipates income of \$5,000, expenses of \$6,725, and a current balance of \$1,800. Our major expenses are sending a representative to NADGUG Board meetings twice, hosting the annual CADGUG dinner meeting, and paying the NADGUG membership dues.

Our current membership numbers are as follows: 19 corporate members, 57 associate members, 40 individual members, 4 officers, and 40 DG employees. We also carry 35 prospective members on our mail list. We hope to be able to arrange some reduction in the fees CADGUG pays to get NADGUG memberships for all our members. With the dues for NADGUG going up, our expenses will be greater than the dues we charge our members.

Among other concerns is the access to the NADGUG computer. We think that all RIG/SIG chairs should have access to the NADGUG computer for mail purposes. We also think that the RIG/SIG chairs, the NADGUG committee chairs, and the NADGUG officers should have read access to the NADGUG membership list.

1987 CADGUG officers and committee chairs

President—Art Lewandowski, Republic Service Bureau, 312/420-6800

Vice president—John Eymann, DB Credit, 312/948-7272

Secretary—Dave Angulo, Angulo Consulting, 312/342-7368

Treasurer—Jim Siegman, McDonnell Douglass Automation, 312/318-0700

Past president—Dave Angulo
Program committee—Don Mungovan, QST Industries, 312/930-9400

Technical committee—Charles Goes, Association Consultants, Inc. (ACI), 312/930-0020

Financial committee—Jim Siegman
Membership committee—John Eymann

Participation committee—Paul Gibson, First United Leasing, 312/498-0992 Δ

HIGH T_EX

Typesetting for everyone

by Bart Childs and
Scott T. Boyd
Special to Focus

Since the advent of the computer era, computers have helped us to organize and present our thoughts in increasingly readable ways. Computer users now have become the local experts when it comes to the production of beautiful documents.

Just about anyone with a computer and a laser printer can produce documents that look almost as good as if they had been professionally typeset. This is a great benefit. Since fewer people are involved in getting the thoughts on paper, there is less chance of confusion or misunderstanding causing mistakes to appear in the final product. It also reduces the time it takes to produce a document, as well as reducing the total cost.

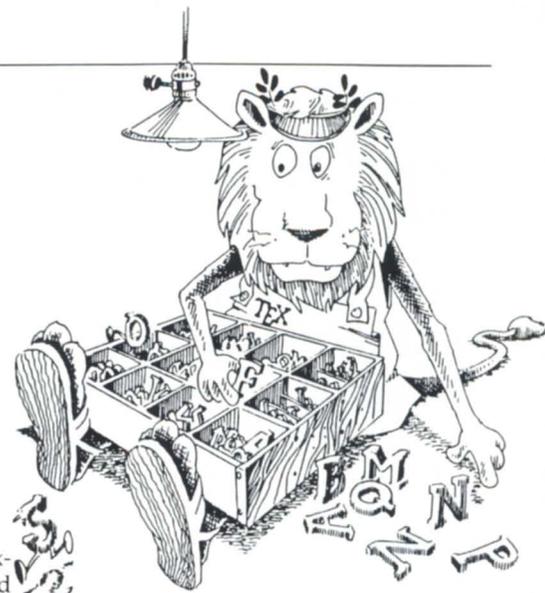
However, most of the word processing systems available now are still rather crude. A professional typesetter can almost always make improvements on word processing generated documents. The output can be improved with the use of page layout systems, but they are either expensive or have limited capabilities. There is *one*

system, however, that is both inexpensive and highly capable. It is called TeX (pronounced tech) and was created by Dr. Donald Knuth of Stanford University.

TeX is a system that runs on just about any computer you can think of. Knuth designed and implemented it with this in mind. He also placed TeX in the public domain. When people became interested in the power TeX had to offer, they made sure that it was made available on the machine of their preference. In fact, the TeX user Group (TUG) has more than 2,000 members and is growing quite rapidly. TUG supports ongoing efforts to promote the use of TeX by offering classes and a variety of services. (See Roundup in this issue for more information.)

What sets TeX apart from the rest? TeX provides the functions that previously have been available only on expensive, hard-to-use typesetters. TeX provides kerning, ligatures, and a robust hyphenation scheme.

Kerning is the placement of letters so that their spacing looks pleasing to



the eye. For example, the abbreviation for Washington state can look pretty bad if the letters are not kerned together. This one is not kerned: WA. This one is: WA. See how the last one looks better?

Ligatures are used to save a little space. They are the combination of two or more letters that occur together frequently into a single character. For example, ffl (as in waffle) is replaced by ffl. Ligatures are done for economy of print space while maintaining a high level of readability. Originally, in the hot lead days, they were done because of difficulties in placing the characters next to each other. Everyone is so used to seeing them that most people do not even notice them.

Hyphenation should be automatic, and should be kept to a minimum. TeX

Donald Knuth, *The TeXBook*, © 1984, Illustrations by Duane Bibby, Addison-Wesley Publishing Company, Inc., Reading, Massachusetts. Attached illustrations. Reprinted with permission.

Portion of author's original text using TeX

This entire article was created on a popular micro-computer using a standard text editor. T_EX was run on it and it was proofread on the screen. However, since a good printer was not available, it was then shipped over a modem to an MV (and a VAX) where T_EX was run again. It was printed on a 300 dot per inch laser printer. No changes were required between the micro and the superminis. T_EX provides an unheard of portability across computer lines. The output generated on the microcomputer's screen is guaranteed to match exactly the output of the laser printer or any of the wide array of output devices which support T_EX.



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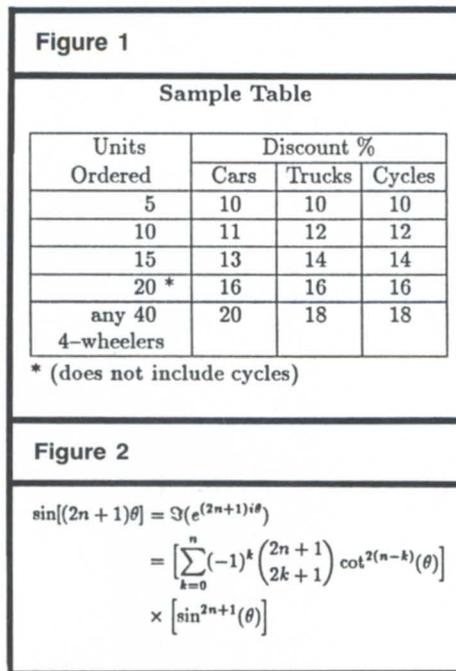
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a Generation ahead.

does both for you. It understands English and a number of foreign languages. In fact, at least one other product manufacturer thought so highly of TeX's hyphenation scheme that they borrowed it for their product.

Spacing between words and lines should be consistent. Some word processing systems seriously compromise readability by putting large amounts of white space between words to make the margins justified. It may look nice, but it generally hurts readability. This is because people read by recognizing the shape of words and phrases, and the extra white space actually hides that information from your eyes. TeX ensures consistently readable spacing, and offers center, left, and right justification.

Fonts. TeX comes with a full suite of fonts, and can be taught new ones. TeX can do *italics*, **bold**, *slanted*, sans serif, and a number of others. TeX can make big fonts, bigger fonts, and even bigger fonts, and so on in an array of sizes and typefaces. Each document can use dozens of fonts.

Tables. TeX can make elegant tables. Figure 1 shows a simple table.



Mathematics. TeX does a beautiful job formatting mathematics, and it is rather simple to learn. Figure 2 is an example.

Of course, TeX also has those features found in common word processors. For example, section and page numbering is automatic. Running heads and footers are no problem either. Although some word processors have trouble with footnotes, TeX can footnote automatically and splits footnotes across pages if necessary. TeX also can generate a table of contents, an index, a list of figures, or a list of tables. Graphics can be included. However, graphics are usually device specific, and only a limited number of printers are currently supported. Δ

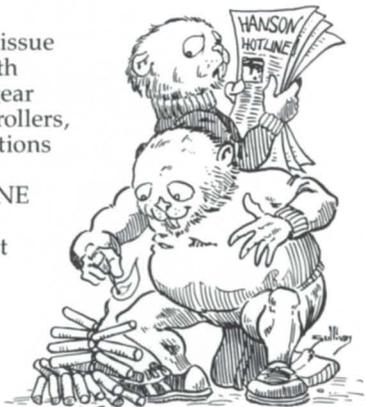
TeX is available for most Data General computers. For more information write: TeX Project, Computer Science Department, Texas A&M University, College Station, TX 77801-3131; or call 409/845-5470.

Here's a 4th of July celebration you'll really get a bang out of.

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FINE PRINT

Office publishing: an extension to office automation

by John Paroda
Special to Focus

Desktop publishing is getting an amazing welcome in the office environment. Although there are many reasons for this reaction, in my opinion, the main reason is the drive for efficiency that reflects today's business climate. Corporations worldwide are compelled to do all kinds of things better, faster, and cheaper.

A company may spend as much as 10 percent of its revenue on publishing. These expenditures go toward publishing billions of pages of corporate literature that can cost up to \$400 per page to produce. This literature includes memos, reports, proposals, presentations, and technical and marketing product support documentation.

With management's new awareness of these expenditures and the electronic publishing technology that is now maturing, a tremendous opportunity exists to decrease overall corporate publishing costs.

While attending Rochester Institute of Technology's School of Printing in the early 1970s, I watched photo-composition replace molten lead techniques of putting type on paper. While employed with Xerox Corporation in the 70s and early 80s, I watched office automation evolve. It seemed inevitable that these two technologies would meet. I now work for Intercon Associates, Inc., which was founded on the

BEFORE AND AFTER

A comparison shows what office publishing can do

Focus sent a sample of text and a chart to Intercon Associates, Inc. and asked them to print it using their office publishing system. The following is an explanation of how OFFICE/Publisher software dealt with our request.

OFFICE/Publisher accepts formatted CEO documents, composes, paginates, and outputs them automatically to a variety of laser printers and typesetters. Running exclusively on the Eclipse MV/ family of 32-bit superminicomputers under AOS/VS, OFFICE/Publisher is suitable for the preparation of most office documents including reports, proposals, correspondence, contracts, and technical hardware and software manuals.

Three main subsystems include text entry and editing; composition and formatting; and output and delivery. OFFICE/Publisher uses CEO as the front-end text entry and editing subsystem. It makes use of all major CEO

features. A limited copymark command set (entered on the word processing document or defaulted via a user specified style sheet) enables users to features and a limited copymark command set (entered on the word processing document or defaulted via a user specified style sheet) enables users to produce high quality documentation without sacrificing the flexibility and ease of use of CEO. All copymarks remain with the document when mailed through electronic mail or archived for future revision work.

In its shared CEO environment, all OFFICE/Publisher capabilities are available at each terminal connected to the processor. By operating through word processing, OFFICE/Publisher provides a familiar text entry and editing subsystem; most users can be productive after just three or four hours of training.

Two samples of text (each from existing DG technical publications) have been created using a D460 terminal and rev 2.23 of CEO. Each figure was then copymarked as required.

Figure 1

Program-Accessible Elements

Figure 2-2 depicts the various registers and flags in the controller that are accessible to the programmer. In general, the registers are used to temporarily store commands issued from the host, read subsystem status, program the controller card for data channel operation, and also as temporary registers for data transfers to and from the host. The Busy and Done flags provide status for operations initiated by program commands. This section briefly describes the individual registers and flags.

Memory Address Register

The memory address register is self-incrementing and contains the address of the next memory location to be accessed for a data channel transfer. The register is written to by a Specify Memory Address Instruction (DOB) from the host and is read by a Read Memory Address Instruction (DIB).

premise of bringing the two technologies together in the office environment.

If you're on the verge of getting involved with electronic publishing, you are probably finding it a difficult and challenging task. Salespersons have

probably pitched their wares to you. More than likely, you've been to a number of seminars and local or national shows and have seen everything from standalone WYSIWYG (what you see is what you get) workstations to

traditional typesetting and editorial systems.

From one end of the scale to the other, they all fit under the heading "electronic publishing." They are computerized systems that can be used to create, compose, make up, and output medium to high quality master pages for xerographic reproduction or offset printing.

Some systems offer output just to phototypesetters, others only to laser printers, while a few offer both. More and more of them can create and handle graphics. Some can merge text and graphics to create compound documents. At minimum, most allow space to be reserved for illustrations and photos.

The bottom line appears to be that there are as many types of systems as there are types of documents. The dilemma is to choose the most appropriate electronic publishing solution for your own publication needs.

How do you select a system that will meet your needs, provide a good return on investment, not completely disturb your current operations, and not be outdated within a year?

The intent of this article is not to recommend a particular solution, but rather, to define office publishing, identify why you should do it, and determine what is important when making a selection.

Office publishing: what is it?

Many synonyms for electronic publishing systems are now in use—corporate electronic publishing, office publishing, and the most popular, desktop publishing. Regardless of what you call it, office publishing is the ability to produce typeset quality documents in offices. You can add as much detail to your definition of typeset quality as you like, e.g., the ability to create graphics; produce compound documents; control font, point size, hyphenation, justification, and format; etc. The detail of the definition is all based on your needs: your needs will dictate how you define and select the office publishing solution for your company.

Since the advent of laser printing technology, some believe that the ability to typeset text/characters; control font, face, and point sizes; create various formats; and compound documents is solely the function of the output device. Office publishing is not achieved with just an output device, but with sophisticated software. The software

Figure 1 and 2 contain typical document characteristics seen in most OA environments. That is, they contain some straightforward text with indents and some tabular text both with and without ruling.

To format and compose Figure 1, a copymark command to change the 10-point default type size (default via the style sheet) was used twice—to change the type size of both paragraph headlines to 14 point. The commands can be set up as individual CEO function keys, command keys, or by the CEO text attribute overstrike process.

Regardless of the method used, any copymark can be edited to create any other copymark. The boldface attribute for the text was entered via the text attribute feature of CEO—the exact same method one would use to add the bold attribute to text that was going to be printed without using OFFICE/Publisher.

Figure 2, the more difficult of the two, required more copymarks because of the larger variety of type sizes, tabular text with ruling, and other attributes such as interline spacing (leading) and controlling the placement of text within columns. Although there were only eight unique commands entered, the format required multiple entry of a number of them. For example, the command to center text within the ruled columns was used once for each column entry. The final result: a total of 21 copymark commands were required to set Figure 2.

Although Figure 2 required a significant number of commands, it nonetheless was created using CEO. It demonstrates the control users can have over all aspects of typography, composition, and page makeup when using CEO and OFFICE/Publisher. In the past, quality of this type would require phototypeset copy and/or the work of a graphics illustrator. Δ

Figure 2

Specify Command (DOA)

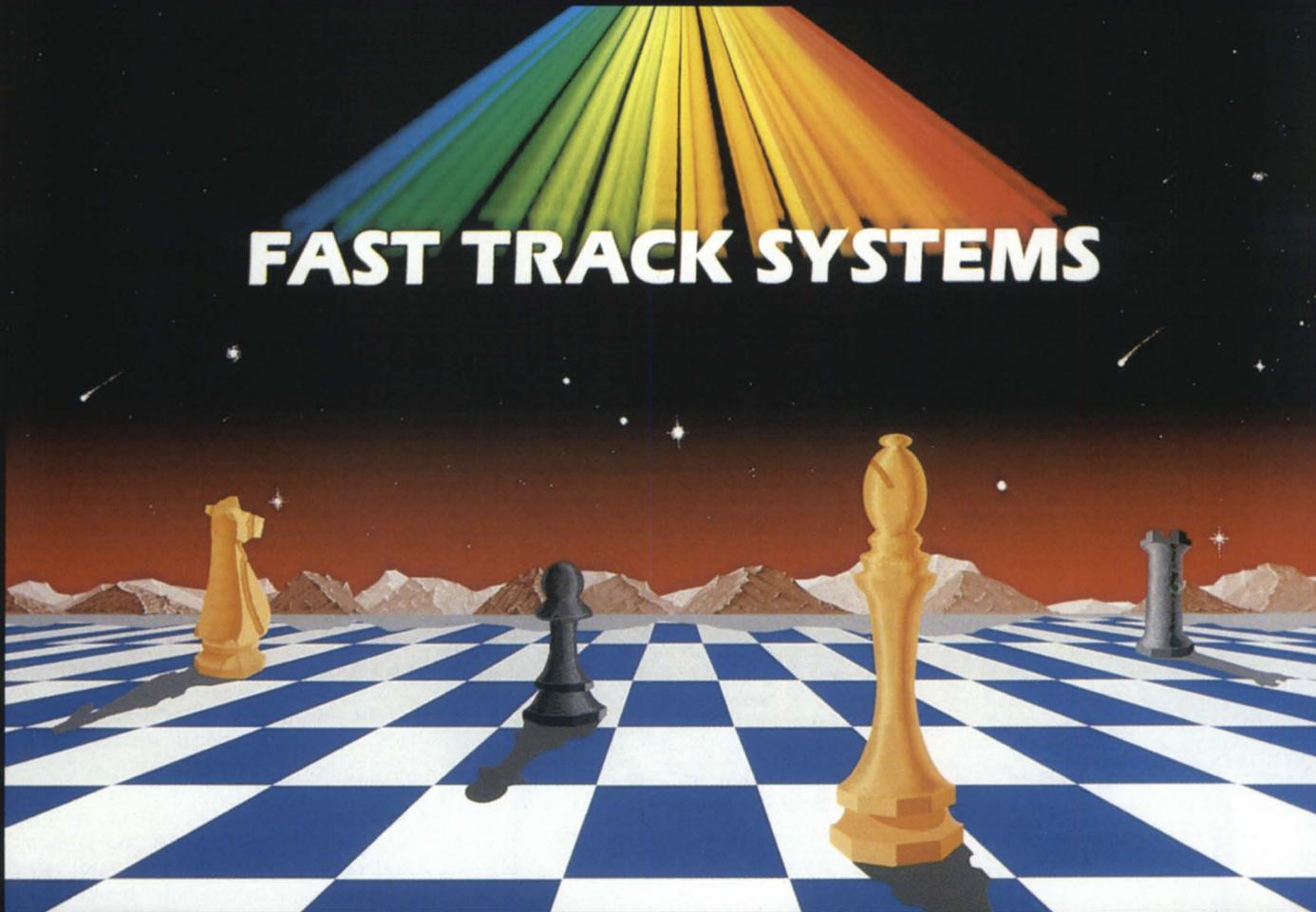
0	0	0	DR	Command	Function		
0	1	2	3	4	6	7	15

Bit Values	Commands
000	Read Disk
010	Write Disk
011	Format Track
100	Diagnostic Operation
101	Get Sector Count
110	Seek Cylinder
111	Recalibrate

Read Status (DIA)

Context: A "Get Sector Count" command was not issued previously.

0	T00	Dsk ID	Dsk Typ	nok	0	NR	SE	WF	AE	CE	OT	BS		
0	1	2	4	5	6	7	8	9	10	11	12	13	14	15

A large, vibrant rainbow of light rays emanates from the top center of the page, shining down onto a chessboard. The chessboard is set on a desert landscape with mountains and a starry night sky. Several chess pieces are positioned on the board: a yellow knight on the left, a black pawn in the center, a yellow king in the foreground, and a grey rook on the right.

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is the key to producing the desired format. The output device, i.e., laser printer or phototypesetter, must have the capability to carry out the commands given it by the software. Therefore, the output device has to be considered, again based on your needs, when making an office publishing system selection.

Your needs are primarily based on

the type of information or documents currently being produced in your office that require typeset quality. These documents may include reports, presentations, policy/procedure manuals, proposals, and even daily correspondence. Whatever the document, the typeset quality you apply to that document will help identify the capabilities of the office publishing system. For ex-

ample, if your documents contain no graphics, you don't necessarily need an office publishing system with graphics capability.

Why do it?

Of course, having the ability to produce typeset quality within your office environment provides a positive facelift on all your existing documents, including daily correspondence. The most important thing that an office publishing solution brings is money savings. The savings can be classified into two primary areas: (1) reduction in outside spending to achieve graphic arts quality, and (2) reduction in turn-around time.

One word of caution. Benefits and savings are directly related to the basic question, "What are you going to use the office publishing system for?" Too often the wrong solution is purchased for a company's specific needs. That decision is usually based on a search for the lowest cost system, rather than answering the question, "What am I trying to accomplish with the system?" Selecting a system that fits your needs will provide immediate benefits and demonstrable savings.

What's important?

The size and diverse needs of the market led vendors to offer a patchwork of publishing "solutions." This fragmented approach is now causing an integration problem, especially for those users of office automation systems and/or word processing systems.

Today, PC desktop systems, WY-SIWYG workstations, and phototypesetting systems are all attempting to address the needs of the users.

All these systems have a place in this enormous market. However, the problem is economically integrating these systems into your office automation environment in order to allow smooth electronic flow of information among all the corporate entities.

In my opinion, office publishing is a logical evolutionary extension to the term "office of the future." Therefore, the *total integration* of the publishing extension is equally as important as the decision of which system to purchase. Δ

John C. Paroda is the executive vice president of Intercon Associates, Inc., a software house which sells DG publishing packages. He can be reached at 1580 Emerson Street, Rochester, NY 14606; 716/458-0860.



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PUBLISHER'S CLEARINGHOUSE

DG offers a variety of tools for electronic publishing

The increasing emphasis on electronic publishing and esthetic computer output hasn't been missed by DG's product planners. Data General offers its share of wares, namely CEO Decision Base, CEO Drawing Board, CEO Wordview, desktop laser printers, and most recently, DG Fontstyles.

DG Fontstyles combines graphics with CEO Decision Base. It includes 12 new presentation-quality typefaces that can be used with the other Data General graphics software packages. Designed for the AOS/VS environment, DG Fontstyles supports six filled and six unfilled fontstyles as well as international character sets.

The font capabilities are licensed from Bitstream, Inc., a vendor of digitized fonts located in Cambridge, Massachusetts. DG Fontstyles costs \$550 per license, independent of CPU class.

CEO Decision Base enables users to create graphic charts from spreadsheets or data tables. These graphics can then be stored in the CEO filing system as Graphics Kernel Metafile (GKM) documents. Charting applications now include bar, pie, line, x-y (scatter), and surface chart options.

CEO Decision Base is an integrated decision support package that provides spreadsheet, personal data base, and business graphics capabilities. This software, used with Present, treats spreadsheets and data tables separately.

Charting data from both creates business graphics. This is accomplished by pressing the command function key and entering "chart."

It is completely integrated with CEO software, including CEO word processing, mail, and file management.

CEO Drawing Board allows the production of picture or text graphics using an icon-style menu, function keys, and a command language. It can be used with cursor keys, a mouse, or a data tablet. Output options include

hardcopy printouts, overhead transparencies, and 35 mm slides. It can be used with Dasher monochrome or color terminals.

CEO Drawing Board, which runs on MV/ series computers under AOS/VS, is based on Data General's Graphic Kernel System (GKS). GKS allows graphics created on DG computers to be universally displayed on other GKS supported devices. It also gives CEO Drawing Board the ability to produce GKM output files, which can be filed, viewed, mailed, and printed from any AOS or AOS/VS version of CEO. Trendview, CEO Wordview, and DG Fontstyles are also based on the GKS.

CEO Wordview software provides a means of producing quality word charts from MV/ family computers. It offers nine different font styles in multiple sizes and allows for underlining, justification, italicized text, and word wrap features. In addition, CEO Wordview has the option of centering all text vertically and horizontally on the page. It also automatically adjusts spacing and page formatting and has a preview option to review layout before printing.

This software package is fully integrated with CEO software and shares the functionality of CEO word processing features. By converting CEO word processing documents into a user-specified word chart format, CEO Wordview eliminates the manual re-typing that was formerly necessary to make such presentation-quality documents. It is accessed directly from the CEO main menu by using the edit document option and specifying the document type to be created as a "WDV" file. It recognizes all tab and centering codes as well as any bold and underscored text attributes used in the word processing version of the document.

Lastly, Data General has designed two high-speed, high-resolution letter quality desktop laser printers.

The 4557 and 4558 models include four built-in ISO-standard character sets: Courier 10N, Courier 10N bold, Courier 10N italic, and Courier 15N. They support either cassette or manual paper feed and offer page set-up and spacing options for all four margins and line spacing. They provide pitch and print orientation (portrait/normal

or landscape/rotated) options when an appropriate font is either in ROM or in the currently loaded cartridge.

They can print super- or subscript characters and can print on transparency stock. With 1.125 MB of memory, they print full-page graphics at 300DPI by 300DPI using vector print mode, and they support all CEO business graphics products.

These desktop laser printers contain a built-in default font and support additional typefaces through optional font cartridges.

Printing speeds for cassette feed pages are 6.9 sheets per minute for legal size paper and 8.1 sheets per minute for letter and other size paper. Manual feed takes 5.1 sheets per minute for all sizes of paper.

As of April 1987, the model 4557 costs \$3,560 and the model 4558 costs \$6,055.



In a related vein, Data General has announced an Independent Software Vendor agreement with Intercon Associates, Inc. for desktop publishing software that can be fully integrated with CEO automation software.

OFFICE/Publisher is designed to accept CEO-formatted documents and re-compose, paginate, and produce graphics-quality output for use with most popular laser printers or for phototypesetting.

According to Barbara Babcock, director of systems and software for DG's Product Marketing Division, "We estimate that the market for electronic publishing systems will reach \$5 to \$7 billion by 1990. Customers are interested because they want to produce more of their documents in-house and to reduce printing costs and improve the quality of what they publish."

Users can access standard CEO functions such as electronic mail, file management, and calendar, while also having access to a wide range of typesetting capabilities. Specific commands can be created within CEO to add OFFICE/Publisher features that let users set type size, column size, and justify margin ruling, and then produce camera-ready output of each page set.

Prices for OFFICE/Publisher start at \$5,000 for use on the entry level DG Eclipse MV/2000. Δ

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THE LASER'S EDGE

Printing on the HP LaserJet from a Data General AOS/VS system.

by David A. Down
Special to Focus

In an article that appeared in the December 1986 issue of *Focus* (page 18), I discussed the hardware features of the Hewlett-Packard LaserJet printer and mentioned ways that we use it with our DG systems. This time I will go into more detail about how to do things with it.

We have four major applications for the LaserJet. The primary use is simple word processing. Printing plain text files (especially program listings) in 2-up format also consumes a lot of paper on the LaserJet (but a lot less than it would on the line printer). Rasterization of Trendview graphics is done in our department for daily graphs of system performance. Lastly, designing special forms, tables, templates, etc., enhances our user manuals and other publications.

Writing utilities for the LaserJet requires a good understanding of how the HP performs page formatting. There is an abundance of commands for controlling the operation of the LaserJet. Most of the commands consist of variable length escape sequences.

Unfortunately, the HP is a write-only device and has no provisions for returning any status or error code. This means that if you make a mistake and

Figure 1: COLS command summary

COLS is a program for generating multiple column listing files. It includes support for HP LaserJet printer functions.

To create a multi-column listing file enter:

```
COLS [-<options>] <input file> <output file>
```

where <options> are one or more of the following (and may be omitted):

- b - Bold overprinting (shifted, HP implied).
- b<n> - Select paper bin #, 0-4 (default=1, HP implied).
- c<n> - Characters per column >8 (default=page width or calculated).
- c<n> - Number of columns 1-8 (default=1 or calculated).
- d - Delete <infile> after processing.
- e - End of line wraps to next line.
- f<n> - Select font # (default=builtin font, HP implied).
- h - Format output for HP printer.
- l - Legal size paper (8.5 by 14), (default= 8.5 by 11)
- l<n> - Left margin (default=0).
- m - Manual paper feed (HP implied).
- n<n> - Number of copies (default=1, HP implied).
- p<n> - Page size in lines (default from table).
- r - Rotated output (HP implied).
- s - Small character font (HP implied).
- t<n> - Top margin (default=0, HP implied).
- v - Verify <infile> name and date as <outfile> header.
- w<n> - Page width (default from table).
- x<n> - Horizontal spacing (chars/inch, default=10 or 16.7)
- y<n> - Vertical spacing (lines/inch, default=6 or 8)

NOTE: Options 'b, f, h, m, n, r, s, t, x' and 'y' are only valid when creating output for an HP LaserJet printer. The horizontal and vertical spacing may be specified with fractional values.

If 'c' is omitted, it will default to 1 column with the width of the page. If 'c' is less than 9, it indicates the number of columns to generate, and the column width will be calculated with at least 1 space between columns. If 'c' is greater than 8, it indicates the column width, and the number of columns will be calculated with at least 1 space between columns.

HP LaserJet printable page areas (default spacing):

SIZE	DEFAULT		NORMAL		ROTATED	
	CPI	LPI	CPL	LPP/legal	CPL/legal	LPP
Normal	10	6	80	63/81	106/136	48
Small	16.7	8	133	84/108	176/226	64
Paper size in inches:			8	10.6/13.6	10.6/13.6	8

Figure 2: HPRAST command summary

HPRAST is a rasterizer program for converting D450/D460 vector graphics files into HP LaserJet raster graphics files.

To generate a D450 vector file from TRENDVIEW in batch mode, enter:

```
TRENDVIEW/TYPE=D450/DEVICE=<vectors> <commands>
```

To generate a D450 vector file from TRENDVIEW interactively, enter:

```
DEVICE "<vectors>" TYPE D450; DRAW; DEVICE "@CONSOLE"
```

where <vectors> is the vector file to be created, and <commands> is a TRENDVIEW command/data file that includes the DRAW command.

To convert a vector file into a raster file enter:

```
HPRAST [-<options>] <vectors> <raster>
```

where <options> are one or more of the following (and may be omitted):

- a# - Assign plot to a macro # (LaserJet+ only).
- b - Blank leading raster lines are ignored.
- c# - Print '#' copies (default is 1).
- e - End of plot eject suppression (default is eject).
- f - Form feed starts new page (default is erase).
- h - Thick horizontal lines (default is thin).
- k - Keep macro after reset (used with 'a').
- m - Manual paper feed (default is paper tray).
- n - No reset (default is reset before plotting).
- r - Rotate image for landscape plot (default is portrait).
- s# - Scale factor in % (default is 100%).
- v - Thick vertical lines (default is thin).
- x# - X-position in 1/100 inches (default is 0).
- y# - Y-position in 1/100 inches (default is 0).
- 1 - 300 dots/inch for 2.67 by 1.92 inch plot area (unscaled).
- 2 - 150 dots/inch for 5.33 by 3.84 inch plot area (unscaled).
- 3 - 100 dots/inch for 8 by 5.76 inch plot area (default).
- 4 - 75 dots/inch for 10.5 by 7.68 inch plot area (unscaled).

<vectors> is a D450 vector graphics file (created by TRENDVIEW), and <raster> is the HP raster graphics output file. <raster> can be a disk file, a plot queue, or the console (@CONnn) the HP is on. For multiple plots in one file, separate pages with a form feed (octal 14) and use the 'f' option to cause a page eject.

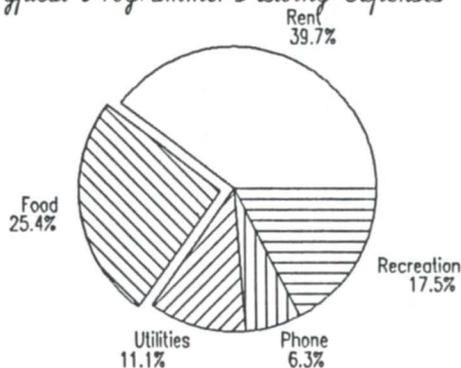
Note: When the plot size '4' option is selected, the rotate('r') option must also be used unless it is scaled down. If the plot is a full sized plot, when the vector file is created, the TRENDVIEW command 'DISPLAY 0 0 .985 1' must be used to prevent the right edge of the plot from being truncated if it goes all the way to the right. A scale option of 's98' also works.

Figure 3: Integrated word processing and text

This is a simple, initial, unsophisticated test of the integration potential of text and graphics using the HP LaserJet Plus printer. Additional work to make the interface more user friendly and to define standards will be required.

Note the following Trendview graph at 150 Dots per inch.

Typical Programmer's Living Expenses



Sampling: Austin Lab

The LaserJet Printer offers a number of opportunities. The DG printer may offer even more but has not been evaluated at this time.

the command isn't valid, the HP will simply ignore it. The only indication that something is wrong is that the printout doesn't look right. Complex sequences like defining a downloadable font can be very frustrating to debug—it's like a compiler only reporting there was a compile error, and not telling you what the problem is or where it occurred!

Word processing

We use WordPerfect for word processing on our DGs. Our primary WP printer is the HP LaserJet and LaserJet+. We still have a few NEC Spin-writers, but they are in the "second-hand clothes" category.

WordPerfect has a very flexible printer configuration and setup facility that lets you tailor the formatting of documents to fit any printer and to set defaults for page size, margins, etc. Users can either use the defaults or set their own parameters for their documents. For common settings, the actual printer commands are hidden from the users and the escape sequences aren't generated until the document is formatted for a particular printer.

WordPerfect has built-in commands for selecting alternate fonts within a document. It requires the font selection commands to be entered when the printer definition is set up, but this is easy for users. Both cartridge and downloaded fonts can be used, but it is up to the user to make sure that the appropriate cartridge has been plugged in the printer or that the specified font has been downloaded.

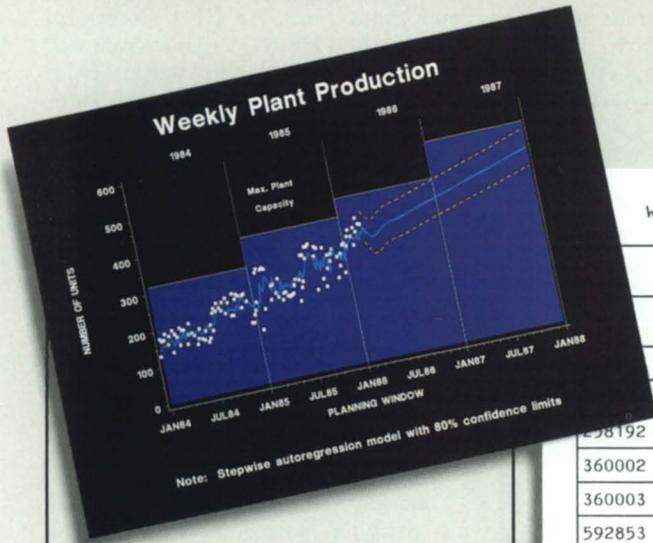
This is seldom a problem when only one person uses a printer, but when a printer is shared among a group of people, changing the paper or the font cartridge can result in another person's output being messed up. Not changing things back to normal when you are done is guaranteed to make you unpopular with other users. Also, downloaded fonts must have unique ID numbers and there is a limit to how many fonts will fit into memory at one time.

Using overlays with WordPerfect requires a bit more attention by the users. Like downloaded fonts, it requires the user to make sure the overlay is resident in the printer before it is referenced. The overlay is invoked by imbedding the escape sequence in the document.

For commonly used overlays, it is best done with a WP macro to keep

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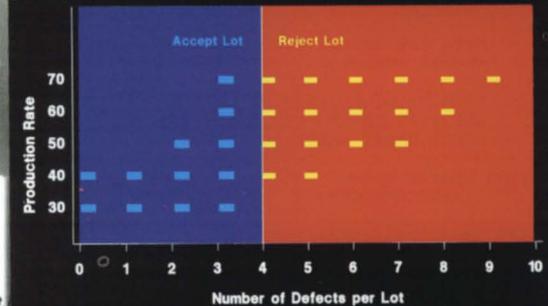
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Production Rate	Lowest	Highest	Mean	Percent
30	4	1	4	0
40	6	1	6	33
50	6	3	8	66
60	6	4	9	83
70	7	4	10	85

things simple. The user must make sure the spacing of items in the document fits the overlay. The overlay can either be selected for each page that uses it, or called as a repeating overlay that is automatically added to every page by the printer until reset. Graphics can be added to WP documents by defining them as an overlay.

Text formatting

I developed a text formatter named COLS for column formatting of plain text files to the LaserJet. It can also do limited formatting to disk or other printers. Text can be formatted in one to eight columns with selectable page size, orientation, margins, CPI, and LPI. Output can be in any font and

it supports multiple copies, manual paper feed, paper bin selection, and bold overprinting. (Refer to Figure 1 for the command summary for COLS.)

We usually format our program listings so they will be printed in the small font, rotated, so two columns appear side by side. This puts two 64-line pages onto one physical page, and still allows 87 characters per line in each column. Rotated small print with 1 column is good for spreadsheets, providing up to 226 columns on legal size paper. For maximum density, I created a 6-point font that lets you squeeze 22 characters per inch and 16 lines per inch to allow four logical pages to be squeezed onto one physical page and still be readable.

Raster graphics

An increasing number of users are finding that the LaserJet can make a quick convenient hardcopy graphics device (typically less than two minutes to print a Trendview screen with 9600 baud connection). An HP rasterization utility named HPRAST that I wrote will take D450/D460 graphic output from Trendview (primarily vectors and bars), and create a raster graphics image ready to print on the LaserJet.

Output can be at 75, 100, 150, or 300 dots per inch, scaled to any size, and positioned anywhere on the page in either portrait or landscape orientation. (See Figure 2 for the command summary.) The output can also be created as an overlay macro for insertion in a WP document. (See Figure 3 for an example of a Trendview pie chart imbedded in a WP document.)

Forms creation

The LaserJet+ has some commands for drawing horizontal and vertical lines and bars with shading or fill patterns. These can be combined with other commands to create standard forms, tables, and other simple graphics. The problem with these commands is that they are cryptic escape sequences that are hard to read. The ideal way to design forms is with an object-oriented bit-mapped display using a mouse or trackball. There are many such programs for the Macintosh, but in the DG environment, unless you have a graphics workstation, you are restricted by a character terminal with limited graphics ability, if any.

I had to be satisfied with creating a forms definition language and writing a compiler named HPFORMS that would generate the appropriate HP codes. The forms commands are line oriented and semi-free-form. There are commands to generate all the commonly used HP LaserJet escape sequences that are easy to read and understand. (See Figure 4 for a command summary.) The commands are at a somewhat higher level than the LaserJet commands so that one command line may generate many escape sequences. The forms commands allow measurement in inches, centimeters, or pixels, and may be absolute or relative to the current position.

I've included a sample of a form created using this forms language, along with a fragment of the programming that created it. Figure 5 shows a function key template for a fixed record edi-

Figure 4: HPFORM command summary

HPFORM is a utility for generation form control sequences from a command file.

Calling format: HPFORM <command file> <output file>

The general form of a command line is:

<command><sp><arguments><sp><comments>
where <command> must start in the first column, <sp> is 1 or more spaces and/or tabs, and <sp><comments> are optional. Blank lines are ignored. Arguments are separated by commas without imbedded spaces.

HPFORM commands are:

BOX Draws box with border of 'WIDTH' and contents of 'FILL'.
[FILL=<type>, POSITION=<h>,<v>, WIDTH=<pixels>,]<hsize>,<vsize>

COMMENT Comments are ignored.

DEFAULT Set one of more default values for subsequent commands
COPIES=<#>, EOL=(CR,NL,LF), FILL=<type>, FONT=<#>, WRAP=(ON,OFF), WIDTH=<#>,
ORIENTATION=(LANDSCAPE, PORTRAIT), SCALE=(INCHES, CENTIMETERS, PIXELS)

FONT Selects fonts by attributes and changes fonts by number
ASSIGN=<#>, DELETE=(<#>,TEMP,ALL), PERM=<#>, TEMP=<#>,
SYMBOL={ROMAN, MATH, ANSI, USASCII}, STYLE={BOLD, NORMAL, ITALIC},
PITCH=<#>, POINT=<#>, TYPE={COURIER, ELITE, HELVA, LINEPR, PICA, TMSRMN}

HLINE Draws horizontal line to the right with width 'WIDTH'.
[POSITION=<h>,<v>, WIDTH=<pixels>,<length>

MACRO Defines, invokes, and changes macros by number
CALL=<#>, EXECUTE=<#>, START=<#>, STOP, PERM[=<#>],
TEMP[=<#>], DELETE[=(<#>,TEMP,ALL)], OVERLAY[=<#>]

NOTE Displays <text> string on the screen when HPFORM processes it.
"<text>"

ORIGIN Sets the origin to be used by subsequent position commands.
<horz>,<vert>

PAGE Sets margins, page size, paper source, and action.
LEFT=<#>, LENGTH=<#>, RIGHT=<#>, TEXT=<#>, TOP=<#>,
EJECT, RESET, PAPER={CASSETTE, ENVELOPE, LEGAL, LETTER, MANUAL}

POSITION <horz>,<vert> Sets the current position.
(SAVE, RESTORE) Save/restore current position.

SPACING Sets horizontal/vertical text spacing.
CPI=<#>, HMI=<#>, LPI=<#>, VMI=<#>

TEXT Prints one or line lines of <text> (','s will advance a line).
[FONT=<#>, POSITION=<h>,<v>,<length>]"<text>". . .

VLIN Draws vertical line downward with width 'WIDTH'.
[POSITION=<h>,<v>, WIDTH=<pixels>,<length>

Commands and arguments may be shortened to any unique abbreviation for the context in which they are used (i.e. enough to distinguish between options). Positioning notes: '+' or '-' or <horz> position indicates the new position is relative to the old position. If one of <horz> or <vert> is '0', it doesn't change. Fill types are 0=none, 1-100=grey level, -(1-6)=pattern #.

Figure 5: Fragment of program to format FRED2/PSE template

CLI	SORT	PRESENT	BACKUP	RESTORE
—	—	—	—	—
ALIGN	SPLIT	MERGE	END PAGE	VIEW/EDIT
HELP	INDEX	FORMAT	BEGIN/END LINE	GO TO
EXECUTE	COMMAND	PREVIOUS SCREEN	NEXT SCREEN	

Ctrl Shft				
REPLACE	MOVE	COPY	INSERT COPY	
FIND	TEXT ATTRIB	CENTER	LOG. DELETE DEL. FIELD	
INSERT	INSERT SPACE	DELETE CHARACTER	DELETE	INDENT

Ctrl Shft				
ABORT				
FIELD HELP		PLACEMARK		
BACK FIELD			ERASE	
CANCEL/EXIT	READ	SAVE	CALC	

FRED2/PSE Template Rev. 2.31

```

text pos=6.20,1.85,"BEGIN/END"
text pos=6.55,2.15,"LINE"
text pos=6.55,2.60,"NEXT"
text pos=6.40,2.90,"SCREEN"
text pos=8.21,0.25,"RESTORE"
text pos=8.60,0.40," "
text pos=8.00,1.20,"VIEW/EDIT"
text pos=8.36,1.98,"GO TO"

comment Function key labels for F6 thru F10
origin 13.00,1.5 Upper left corner of the second set
text pos=0.49,1.20,"REPLACE"
text pos=0.70,1.98,"FIND"
text pos=0.55,2.76,"INSERT"
text pos=2.80,0.87," "
text pos=2.65,1.35,"MOVE"
text pos=2.80,1.60," "
text pos=2.65,2.00,"TEXT"
text pos=2.50,2.23,"ATTRIB"
text pos=2.80,2.35," "
text pos=2.50,2.75,"INSERT"
text pos=2.50,1.25,"SPACE"
text pos=4.42,1.20,"COPY"
text pos=4.76,1.65," "
text pos=4.45,2.15,"CENTER"
text pos=4.76,2.35," "
text pos=4.45,2.75,"DELETE"
text pos=4.20,2.98,"CHARACTER"
text pos=6.40,1.05,"INSERT"
text pos=6.55,1.35,"COPY"
text pos=6.03,1.80,"LOG. DELETE"
text pos=6.11,2.15,"DEL. FIELD"
text pos=6.40,2.76,"DELETE"
text pos=6.61,2.42," "
text pos=6.30,2.90,"INDENT"
    
```

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for program I wrote. We print the templates on light cardboard, three to a page (the Laserjet handles it fine as long as the manual feed is used). Notice the use of macros for the parts of the form that are repeated.

Creating forms tends to be trial and error. Without the ability to interactively design the layout, it becomes a batch process of successive approximation. Centering text labels is particularly time consuming. I've thought about adding commands to automate this more, but proportional spacing makes calculations very messy.

Conclusions

With the addition of some support utilities, the HP Laserjet can be used on DG systems to produce good quality printed output. It doesn't come close to the abilities of a desktop publishing system using a Macintosh and a LaserWriter, but for those of us with limited budgets and/or restrictions on what kinds of equipment can be purchased, the Laserjet is a compromise that can service simpler applications well. Δ

David A. Down is a systems consultant in the Distributed Computer Services department of Cities Service Oil and Gas Corporation. He can be contacted at Mail Stop 15STB/TC, P.O. Box 3908, Tulsa, OK 74102; 918/561-5504.

Circle 52 on reader service card.

DECODER RINGS AND BIT BUCKETS

A painless introduction to encryption. Part I

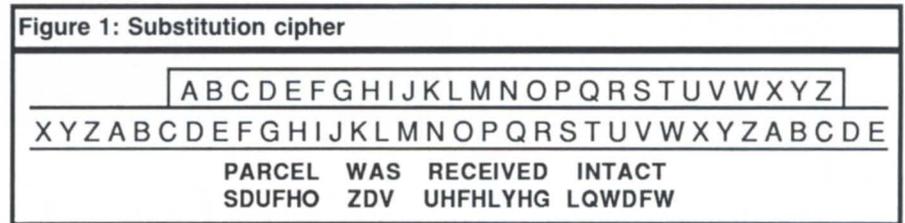
by Tom Gutnick
Special to Focus

For thousands of years, people have been concerned about maintaining the confidentiality of their data and messages. About five centuries before Christ, a schemer named Histiaeus needed to get a message from the Persian court to his son-in-law in Greece, telling him that the time was ripe for revolution.

Of course, he needed to be sure that the message would not be intercepted, so Histiaeus shaved the head of a trusted slave and tattooed the message on top. Once his hair had grown back, the slave travelled to Greece, and told Aristagoras, "Shave my head and look thereon."

Even when not fomenting revolution, today's typical computer system manager faces increasing security threats and challenges. For example, files stored on unsecured computers are accessible, or data being transferred between computers or terminals is vulnerable to undetected interception, particularly when microwave or satellite communications links are used. When personal workstations are added to the picture, security issues become more complex, as potentially sensitive information gets dispersed to desktops and diskettes far from the view of the central systems staff. How can a system manager sleep at night?

Although techniques for protecting information have become more sophisticated since the days of Histiaeus, they are all based on principles which can be easily grasped—like the decoder ring from a CrackerJack box. This article describes some of those basic techniques. Next month, I'll talk about how they have been incorporated into



powerful encryption schemes.

Substitution ciphers

One of the two basic forms of encryption is the substitution cipher, which is familiar to many schoolchildren. One of the earliest examples is the Caesar cipher, or displacement cipher. Attributed to Julius Caesar, the mathematical description for the Caesar cipher is:

$$\text{ciphertext_character} = (\text{plaintext_character} + 3) \text{ modulo } 26$$

which is just a fancy way of showing that you would use a D instead of an A, a T instead of a Q, and so on. (See Figure 1.)

As we all know, after Julius Caesar, the Roman Empire suffered a terrible decline. By the time of Caesar Augustus, they were displacing by only one character instead of three (A = B, G = H, etc.). Maybe Augustus couldn't cope with anything more complex, or maybe he just figured that everybody else was too ignorant to be able to decipher his messages. (Remember the movie 2001: A Space Odyssey? Remember HAL, the computer who went insane? Many people were convinced that the name HAL came from a one-character displacement.)

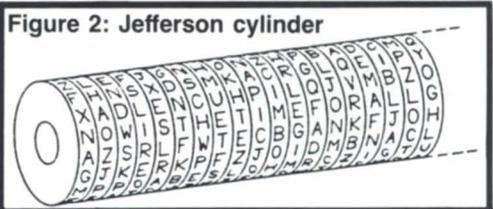
Obviously, with only 26 possible combinations, a displacement cipher was easily deciphered. Later came monoalphabetic substitution, in which a jumbled alphabet is used. A good example of monoalphabetic substitution is the cryptogram puzzle published in many newspapers.

In 1674, the Chevalier de Rohan was

being kept in the Bastille. His accomplice had died without confessing, and if de Rohan's friends could get this news to him, he could maintain his innocence and probably be released.

The night before he was to be questioned, de Rohan received a fresh shirt, which had been sent in from the outside. On one sleeve, he found an inscription: MG DULHXCCLGU GHJ YXUJ LM CT ULGC ALC.

Up at dawn, the Chevalier tried to read his shirt, but was unable to make sense of it. Confessing to the crime, he paid with his life—all because he was unable to translate the message: LE PRISONNIER EST MORT; IL N'A RIEN DIT. (The prisoner died; he said nothing.)



Some schemes that aren't secrets, such as the Morse code for telegraphy, are really forms of monoalphabetic substitution. The Captain Video decoder ring I had when I was a kid is, too. (I'm probably showing my age, here.)

By jumbling the alphabet in various ways, there are 26! (26-factorial, or about 4×10^{26}) possible combinations. Although this sounds like a lot, monoalphabetic ciphers can be figured out by using some simple logic. In the English language, E tends to be the most frequently used letter, followed by T, followed by O; TH is the most fre-



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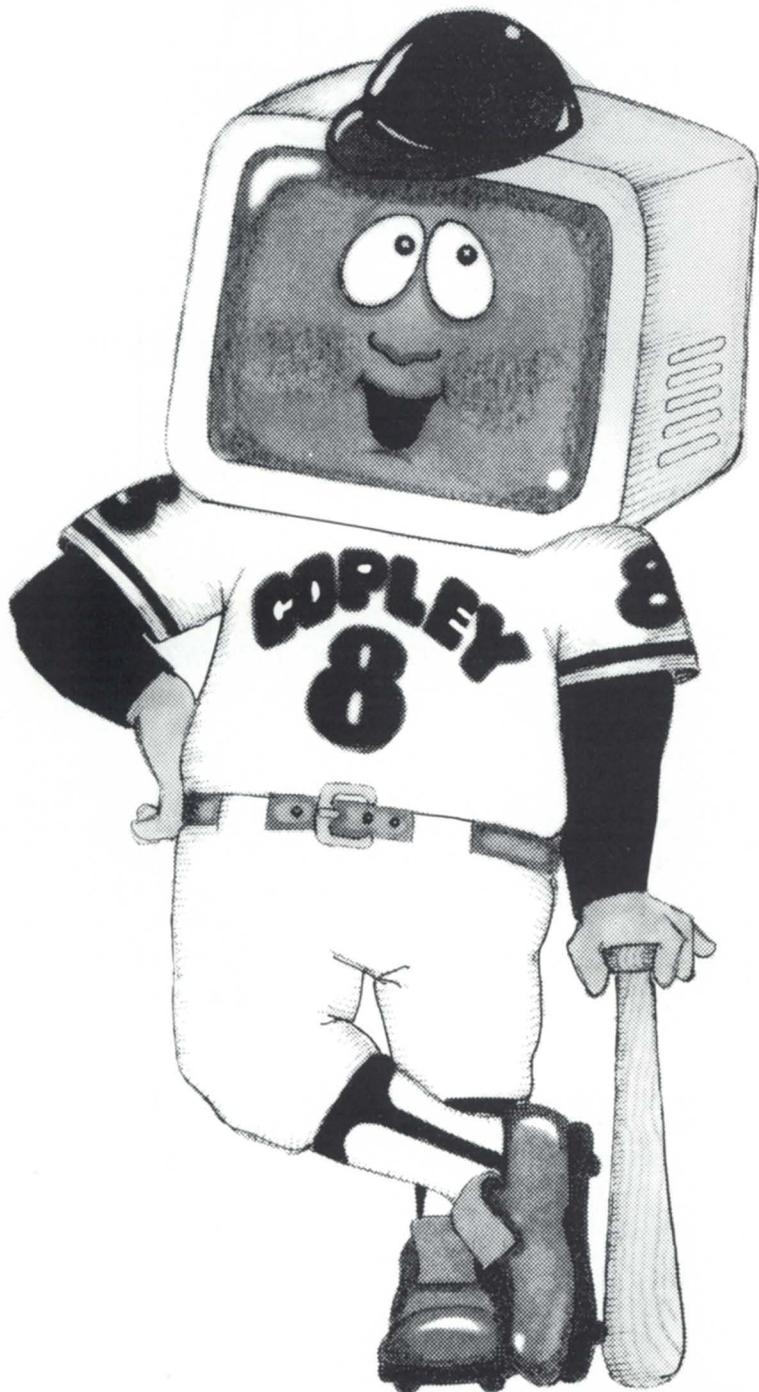
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quently used two-letter combination; SS is the most common double-letter combination. Armed with such knowledge, a cryptanalyst can make rapid progress in deciphering messages.

The next great advance in cryptography was polyalphabetic substitution, based on the use of multiple jumbled alphabets. The encipherer has several simple substitution alphabets at his disposal. Each successive character in the plaintext is enciphered with the next successive alphabet.

Giovanni Battista della Porta (in 1563) and Blaise de Vigenere (in 1586) were probably the first to come up with this scheme. The Jefferson cylinder (see Figure 2), developed by Thomas Jefferson in the 1790s, is a good example—so good, in fact, that the U.S. Navy was still using the same basic device into the 1920s.

Figure 3: Transposition cipher

Plaintext:

MEETING AT DAWN ON BEACH

Transposition:

M	E	E	T	I
N	G	A	T	D
A	W	N	O	N
B	E	A	C	H

Ciphertext:

MNABE GWEEA NATTO CIDNH

Unfortunately, polyalphabetic ciphers are also of little value against a skilled cryptanalyst, particularly if he has a computer (and it need not be a very powerful one, either) at his disposal.

Transposition ciphers

At the same time that some generals and mathematicians were experimenting with substitution ciphers, others were developing transposition ciphers. Instead of substituting new characters, transposition ciphers take the original characters and jumble them into a different order. Anagrams can be thought of as transposition ciphers; "love to ruin" may really be a call to "revolution."

In order to be useful, a transposition cipher must have some method to its madness—the intended recipient of the message must be able to easily figure out the message. Figure 3 shows an example. By writing the plaintext horizontally in a grid, and then reading the

ciphertext vertically, some degree of secrecy is attained. Columnar transposition becomes less crude as the pattern of reading off the enciphered characters is made more complex.

Product ciphers

The average transposition cipher is also no match for the skilled cryptanalyst. The next step in the development of good encryption schemes was that of the so-called product ciphers, which combine substitution and transposition. Product ciphers are much more secure—but, because of the number of steps involved, are much more prone to mistakes in both the encoding and decoding. A cumbersome, time-consuming, and error-prone scheme is not going to be well-received on the battlefield.

In order for product ciphers to be useful, they should be implemented with cipher machines. Perhaps the most famous cipher machine in history, an electromechanical device, was the Enigma machine, used by German forces during World War II. (*The Ultra Secret* and other books describe how British intelligence could read many of the messages sent by the Germans.)

How do we go about implementing a cipher machine electronically? Transpositions and substitutions can be done with very simple circuits (or even software algorithms). Figure 4 shows a

Figure 4: P-box

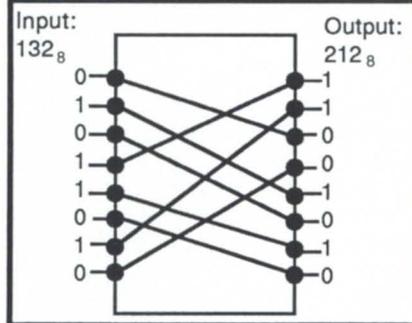


Figure 5 shows the schematic for an S-box—an electronic implementation of a substitution cipher. In Figure 5, a three-bit plaintext input selects one of the eight lines exiting from the first P-box, which can apply a permutation, or transposition, to a string of bits. The binary number 01011010 (octal 132) would transpose to 11001010 (octal 212). With appropriate internal wiring, any of 8! (40,320) possible transpositions can be effected.

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stages and sets it to 1; all the other lines are set to 0. The second stage is a P-box, which transposes the bits, so that a different line is input into the third stage for conversion into binary again. With the wiring shown, 0 would be encoded to 2, 1 would encode to 4, 2 to 5, and so on. Again, depending on the P-box, any desired substitution can be performed.

An electronic implementation of a product cipher would be a sequence of S-boxes and P-boxes connected together.

Methods of attack

Making you an expert code-breaker is beyond the scope of this article. (There are many good books on the subject.) But a few words on crypt-analytic techniques may give you some appreciation of the problems involved in maintaining the confidentiality of data.

The hardest job for the cryptanalyst is the "ciphertext only" attack: all that exists are the encrypted messages with no external clues. All but the most robust algorithms, however, yield readily to the analytic techniques developed over the years, especially with the assistance of computers.

The code-breaker's job is easier if he can mount a known plaintext attack. He has available some plaintext and the matching ciphertext. By determining the encryption algorithm and key, it will be much easier to read any future messages. How, you may ask, could we get the plaintext? As one example, market changes lead to predictable instructions being sent to bankers or brokers. Or, if your modems are encrypting data between your terminal and computer, somebody intercepting the communications would look for character sequences such as "Press New-Line to Begin Logging On".

The ideal situation for the code-breaker is one in which he can mount a chosen plaintext attack, that is, he introduces some plaintext of his own choosing into the encipherment process. During World War II, the British intelligence services had difficulty deciphering the Germans' "Enigma" messages as the Germans changed the keys. At one point, the Royal Air Force made a bombing attack on a light buoy. The buoy was of no strategic importance, but, as the British expected, subsequent Enigma messages describing the attack included the comparatively rare word "leuchtonne."

(continued on page 62)

FAST EBCDIC TO ASCII CONVERSION

Recoding selected sections in assembly proves well worth the trouble

This month I'm going to depart from my usual approach of demonstrating tricks with AOS/VS system calls and do a bit of assembly language. Don't cringe. It's really not that difficult, and the routine presented here is a good example of how to speed up a program by recoding selected portions of code in assembly language.

Quite often a programmer is faced with the dilemma of choosing either high-level language I/O routines (like READ and WRITE in Fortran 77) or system-level I/O routines (like ?READ/?WRITE or ?RDB/?WRB). You can't mix Fortran 77 and system-level I/O on the same file because Fortran 77 does its own buffering between the high-level READ/WRITE routines and the eventual ?READ/?WRITE system I/O.

This means that if you require absolute byte positioning within the file, then all access to that file must be done with system level ?OPEN, ?CLOSE, ?READ, ?WRITE, ?SPOS, and ?GPOS routines.

Another example is conversion between EBCDIC and ASCII character sets. Fortran 77 does not support any such conversion (nor should it), but AOS/VS allows that option to be selected in the ?READ and ?WRITE system calls. Unfortunately, using ?READ or ?WRITE also means that Fortran OPEN, CLOSE, READ, and WRITE cannot be used. An alternate solution is to write a procedure to perform the character conversion while still using standard Fortran file access.

Since there is no simple mapping between the EBCDIC and ASCII character sets, the fastest way to perform character translation is to use the decimal value of the character as an index into a table containing the required values. In a high-



Figure 1: Subroutine f77_ebcdic_to_ascii

```

subroutine f77_ebcdic_to_ascii(buffer)
character*(*) buffer
byte      ascii_table(0:255)
data      ascii_table/...../
integer   i,j

c>>>begin
do i=1,len(buffer)
    j=iuchar(buffer(i:i))      !get EBCDIC
    buffer(i:i)=ascii_table(j) !extract ASCII
end do
return
end

```

level language like Fortran 77, this might be implemented as shown in Figure 1.

The "ith" entry in the DATA-initialized "ascii_table" table contains the ASCII character corresponding to the EBCDIC character that has a decimal value of "j." This table must contain 256 entries, one for each possible 8-bit character value in the range [0,255].

Now, if you try such a routine, you will find that it doesn't run particularly quickly. (Mine took 1,326 seconds for 10,000 buffers of 10,000 characters each, on an idle MV/4000 with floating point.) This is a classic example of an algorithm that can be recoded using assembly language: it is short, simple, and can always be replaced with the high-level language version for portability.

The routine in Figure 2 will convert a string of characters from EBCDIC to ASCII using the WCTR character translate instruction.

Once the pointers are set up, the entire translation can be done with a single WCTR instruction.

The TITLE, DEFARGS, DEFTMPS, DEF, FENTRY, FRET, and END macros are provided with the Fortran 77 product. They simplify the task of coding the interface to Fortran 77 by generating appropriate .TITLE, .NREL, .ENT, and .END pseudo-ops. In addition, they define the offsets of the two arguments from the frame pointer. The extra underscore characters used in the TITLE and FENTRY macros are required in order to generate the appropriate EBCDIC.TO_ASCII title and

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Figure 2: Subroutine EBCDIC_TO_ASCII

```

;subroutine EBCDIC_TO_ASCII(ba.buffer.nc.buffer)
;Calling Sequence:
; arg 1:  BA.BUFFER (integer*4 byte address of buffer
;          which contains a string of EBCDIC characters
;          to be converted to ASCII)
; arg 2:  NC.BUFFER (integer*4 no. of characters to be
;          converted)
;
; title ebcdic_____to_____ascii ;(.title, .nrel 1)
;
; defargs
;   def ba.buffer      ;arg 1      ;(ba.buffer=-14)
;   def nc.buffer      ;arg 2      ;(nc.buffer=-16)
;   deftmps            ;no stack variables
;
;>>>begin
;   fentry ebcdic_____to_____ascii ;(.ent, wsavs 0)
;
;   xlef 0,table        ;address of b.p. to table
;   xwlda 1,@nc.buffer,3 ;no. of characters to convert
;   wneg 1,1            ;negate for 'translate' option
;   xwlda 2,@ba.buffer,3 ;byte address of output buffer
;   wmov 2,3           ;input buffer is the same
;
;   WCTR                ;do it!
;
;   fret                ;return (wrtn)
;
;-->macro to store pairs of characters
** .macro store
**   pair=-1
**   .do .argct/2
**     pair=pair+1      ;i.e. 0,1,3,5
**     a=pair*2+1       ;arg 1,3,5,7
**     b=a+1            ;arg 2,4,6,8
**     ka*400+kb        ;1 pair of args per word
**   .endc
** %
;
;-->local data
table: .+1*2
; .enable sword          ;16-bit storage
;
; store 0 0 1 2 3 0 11 14 177
; store 0 0 0 0 13 0 15 16 17
; store 20 21 22 23 0 12 10 0
; store 30 31 0 0 34 35 36 37
; store 0 0 0 0 0 0 27 33
; store 0 0 0 0 0 5 6 7
; store 0 0 26 0 0 0 0 4
; store 0 0 0 0 24 25 0 32
; store 40 0 0 0 0 0 0 0
; store 0 0 0 56 74 50 53 174
; store 46 0 0 0 0 0 0 0
; store 0 0 41 44 52 51 73 136
; store 55 57 0 0 0 0 0 0
; store 0 0 0 54 45 137 76 77
; store 0 0 0 0 0 0 0 0
; store 0 140 72 43 100 47 75 42
; store 0 141 142 143 144 145 146 147
; store 150 151 0 0 0 133 0 0
; store 0 152 153 154 155 156 157 160
; store 161 162 0 0 0 135 0 0
; store 0 176 163 164 165 166 167 170
; store 171 172 0 0 0 0 0 0
; store 0 0 0 0 0 0 0 0
; store 0 0 0 0 0 0 0 0
; store 173 101 102 103 104 105 106 107
; store 110 111 0 0 0 0 0 0
; store 175 112 113 114 115 116 117 120
; store 121 122 0 0 0 0 0 0
; store 134 0 123 124 125 126 127 130
; store 131 132 0 0 0 0 0 0
; store 60 61 62 63 64 65 66 67
; store 70 71 0 0 0 0 0 0
;
; end ;(.end)

```

entry point; each time a “_” pair of characters is passed to a macro, one of the “_” characters is stripped off. The arguments for TITLE and FENTRY are passed through three and four levels of other macros respectively.

The AOS/VS External Calling Sequence (VS/ECS) uses a

call-by-reference scheme. The address of each argument is pushed on the stack. This address is a BYTE address for CHARACTER variables and a WORD address for other variable types (INTEGER, REAL, and LOGICAL). This makes it impossible to write a subroutine that can accept either a CHARACTER or nonCHARACTER argument. In order to allow the EBCDIC_TO_ASCII routine to be used with any type of variable that contains the EBCDIC string, I have coded it so it requires the BYTE address to be passed explicitly. This can be generated using the intrinsic F77 BYTEADDR function:

```

character*1024 cbuffer
call EBCDIC_TO_ASCII(byteaddr(cbuffer),len(cbuffer))

```

or

```

integer*2 i2buffer(512)
call EBCDIC_TO_ASCII(byteaddr(i2buffer),1024)

```

If the routine was coded to accept only a CHARACTER buffer as an argument (directly in the CALL sequence), the routine would still require a second argument for the number of characters in the buffer. Fortran 77 subroutines can use the intrinsic LEN function to determine the number of characters in the CHARACTER variable, but there is no equivalent in assembly language. Simulating the LEN function in assembly language requires some knowledge of the undocumented dope vectors that Fortran 77 pushes on the stack for CHARACTER variables. It is simpler to supply the number of characters as another argument.

Translating the same 10,000 buffers of 10,000 characters each with EBCDIC_TO_ASCII only takes 266 seconds (compared to 1,326 seconds for the F77 routine, i.e. five times faster). This is a significant increase in speed, and is probably comparable to the speed of the character translation in ?READ.

To write the equivalent ASCII_TO_EBCDIC routine to perform the reverse translation, all you have to do is invert the ASCII/EBCDIC table (shown in EBCDIC_TO_ASCII above—although, why you would want to translate perfectly good ASCII characters to tacky old EBCDIC is a mystery to me). In fact, you can write a completely general translator by filling in a table outside of the routine and passing it in as an argument. Just remember that the table must be a full 256 bytes in length for WCTR.

A fast translation procedure such as this can be used to translate between upper and lower case or to strip parity (8th) bits. You can even create a translate table that will add parity bits to the characters. (You can write a small program to compute parity for each character and print out the values.) If certain characters are to be discarded, they can all be translated to a single value.

This simplifies a subsequent procedure that picks them off, because then it only needs to scan for a single value, i.e., with the fast Fortran 77 INDEX function. If the contents of the buffer are being written to the console screen, a quick way to discard some of the characters is to translate them all to NUL (“(0)”). The NUL character is not printable and will be ignored by the terminal. Δ

John A. Grant is a geophysicist with the Geological Survey of Canada. He is also system manager, chief cook, and bottle washer for the Exploration Geophysics Subdivision's MV/4000. He may be contacted at 601 Booth St., Room 591, Ottawa, Ontario, K1A 0E8; 613/996-2325.

BBASIC HALL OF SHAME. PART 2

More techniques that should be reported to the Better Business BASIC Bureau

Last month, I brought you some of the worst programming methods I've seen in Business BASIC. Rest assured, I'm not done yet. There are other techniques that are still more horrible.

I should mention that I'm not making up these examples. I've seen each and every one of them used—many of them more than once.

8. ON ERR for other than global conditions: The ON ERR THEN GOTO is one of the most unstructured things a BBASIC program can ever do. Imagine a program that continues to execute someplace else if any statement should fail. This may not be so hard to keep up with if the purpose is to catch something unexpected, and if you put the ON ERR in statement 0011.

But some programmers write code that expects to encounter errors. Therefore, they have ON ERR statements scattered throughout the code. If you lose track of what your last one was, the results can be catastrophic—especially if you have another error before you finish dealing with the first one, and it sends you into a hard loop.

With the current rev of BBASIC, it's possible to write code so that the only errors are the truly unexpected ones. Hence, Henne's Three Rules of ON ERRs:

- A. A single ON ERR THEN GOTO statement is allowed at the beginning of the program.
- B. The statement referenced by the GOTO must be ON ERR THEN INT.
- C. Never write code that you expect could get an error.

9. RESTORE NNNN, where line NNNN doesn't exist: Try it—it actually works. BBASIC treats this just like a RESTORE with no statement number.

Until, of course, you put one in. Then, your program may not work anymore.

10. Automatic DIM statements: Type A(2)=0 without a DIM A(n), and BBASIC assumes you meant to say DIM A(10). Type A(0,0)=0 under triple precision, and BBASIC uses up 740 bytes. You didn't really mean to do that, did you?

11. ENTERs and ERASEs: If your program is too big, one of the sleaziest solutions is to ERASE some of the code while it is running. Then, watch the next guy try to fix the program. (That luckless next guy might even be you, a year from now, long after you've forgotten what you did.)

You can make a sleazy situation worse by then ENTERing in more code in place of the stuff you ERASEd. Now, the program that is actually running bears no resemblance to the code that has already been executed, and there will be few clues left that the program changed itself. Someone is certain to try to fix it one day with disastrous results.

It should also be noted that the ENTER statement really isn't very fast, and performance can usually be improved by finding a cleaner technique.

12. SWAPs instead of CHAINS: This will probably be controversial. I find the CHAIN statement much better to use for an important reason: if there is an error, or I need to escape, I stay in the program I'm running instead of dropping back as I would had I used a SWAP. Then, I can examine what's happening, fix the code, and continue execution. In short, take full advantage of the interactive features of BBASIC.

We use the CHAIN wherever we can (almost always). There doesn't appear to be a down side, so why SWAP?

13. Meddling with the BASIC.ER file: I couldn't believe this one the first time I saw it. Because the programmer was running out of program space and channels, he put all his operator prompts and output masks into the BASIC.ER file. Then, he used the ERM\$ function to get them out. Since that file is always open, this came for free.

Or did it? Next time a new revision

of BBASIC comes along, it's going to be tricky to install. Assuming the person installing it knows a trick has been played, should he install the old rev BASIC.ER file with the new rev of BBASIC, or should he try to copy the changed records? What if BBASIC is using those locations now? Better to leave the whole system at the old revision!

14. Meddling with the contents of BUFF\$ in a K* statement:** This is another one I would never have even thought of doing. Yes, if you are using 512-byte keys, useful data is stored in the second argument of a KADD (or KDEL, etc.) statement. Yes, you can get at it and even change it. And yes, it's a pretty stupid idea to do so.

The first place I saw this was in one of the BUSIXXX products released by Data General. The layout of the data in BUFF\$ is not documented, and therefore, subject to change by Data General. In fact, when you use 2,048-byte keys, the layout is different. Perhaps this is part of the reason why the BUSIXXX products are no longer supported by DG.

15. Almost any STMB or STMC statement: No, I'm not telling you to stop using them. Most of them are needed at one time or another. But understand that they were created for specific reasons, in most cases connected with the operating system. If it changes, you'll have to change how you use them. Like from RDOS to AOS or AOS/VS.

But it is wise to also think ahead. What if someone gets BBASIC going on MS-DOS or UNIX? Are they going to be able to duplicate STMBs and STMCs completely? Be prepared! Put all your operating system stuff in a few short, easy-to-change modules, and separate them from the rest of your code. Keep your actual applications clear of the things.

16. Programs that are too large: "But George!" I hear you say. "You've just told me I can't ENTER/ERASE or mess with the BASIC.ER file to cut down my program size. Now I can't make them big? Give me a break!"

I sincerely believe that a program

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that is almost 28 KB in size in Business BASIC is nearly always written incorrectly. It may be the best code in the world, but with the number of lines of code you can program in 28 KB, it's hard to believe it all has to be in one module.

Of course, it's still going to happen. I strongly suggest that when you get

within 1 KB or so of the maximum, you spend some time thinking of ways to make your existing code smaller before you write the rest of the program.

I've heard some tragic stories of people who stripped the comments out of programs to make them fit, then couldn't figure them out to fix them when they broke. Or used the OPT

utility to decrease the size, then lost the original program, and couldn't go to a new rev.

If I was to give the most important advice of all, it would be to never compromise the readability and maintainability of your programs. If we've learned anything during 10 years in business, hundreds of installations, thousands of programs, and millions of lines of code, it is that such compromises are never worth it. Bad code always comes back to haunt you.

Come up with a clear set of programming standards and naming conventions. Make sure all your programmers know them. Enforce them. Use them. Don't change them unless you have to.

Something that can help a lot with standards is using good program skeletons and code generators. Many of the worst abuses are as a result of programmers trying to take shortcuts or the easy way out. Handing them the code to do those things on a platter is the only effective way to make sure they don't cut corners. Life will be easier for them if you have skeletons and generators that are good examples of programming.

Next month, I'll get a bit more positive, and talk a bit about techniques for Integrity Programming—ways to make systems more robust and reduce the amount of maintenance needed.

■
In other notes, DG has quietly reduced the price of software again on the MV/7800, while increasing its software prices by 3.3 percent overall. The price of a full Business BASIC is now down to \$2,550. When the MV/7800 was first released, it cost \$5,950 and was subsequently reduced to \$5,100.

Some users who were unhappy with their MV/7800s and then upgraded to the MV/15000 Model 8 had another surprise: while the 7800 has 14 I/O slots, the standard MV/15000 Model 8 has only 7. This isn't always enough to fit all the IACs, disks, and other devices that are needed. An expansion chassis is available, but it isn't cheap. Δ

George Henne, a contributing editor to Focus, has worked with Business BASIC users for nearly a decade. He is the vice president of MAXON Computer Systems, and can be reached at 575 Madison Avenue, Suite 1006, New York, NY 10022; 416/445-4823.

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A REPORT OF SORTS

Most people don't recognize the power and flexibility of sort/merge

In several of these columns, I have made statements about the power of the report/writer in AOS/VS Sort/Merge. I even said that I preferred it to INFOS Query, since it had nearly all of the power and sometimes let you make one less pass on the data to be processed. This month I want to explain why.

It has been a while since I developed the application discussed here. At the time, AOS/VS Sort/Merge allowed for the easiest and quickest development of the reports I needed to generate. What follows are the command files to read a data base, extract and sort the records, and format them into a final report with multiple levels of subtotals.

The report was developed in about three hours with test runs and minor format adjustments taking about another two or three hours over the next four or five days. Therefore, it didn't have much of an impact on other programming projects that were in process.

At the end of the special runs, it was put into production. The following month, we made a few more minor tweaks, which took maybe another half hour. The overall development time would have been significantly less if I had been more familiar with the report writer—I spent a lot of time with my head in the manual. Fortunately, it was a fairly decent manual.

The project in question got started with a request from management that went something like this: "We need a report that can be run each month end that will show us the sales of each item

Figure 1: INVOICES.QFORMS

START_FORMAT	IDHREC	
REC_ID	1	8
POST_DT	9	14 DECIMAL TSO
COMPANY	15	16
CUSTNO	17	22
INV_NO	23	28
INV_LN	29	32
INV_YR	33	34
INV_MM	35	36
INV_DD	37	38
PR_CODE	39	43
DESC	44	73
SHADE	74	83
PRICE	84	92 DECIMAL TSO
P_UNITS	93	94
QTY	95	104 DECIMAL TSO
Q_UNITS	105	106
EXT_AMT	107	115 DECIMAL TSO
AR_DEPT	116	117 DECIMAL TSO
GL_ACCT	118	121 DECIMAL TSO
SLM_1	122	126
SLM_2	127	131
COMM_1	132	136 DECIMAL TSO
COMM_2	137	141 DECIMAL TSO
PTS_FLG	142	142

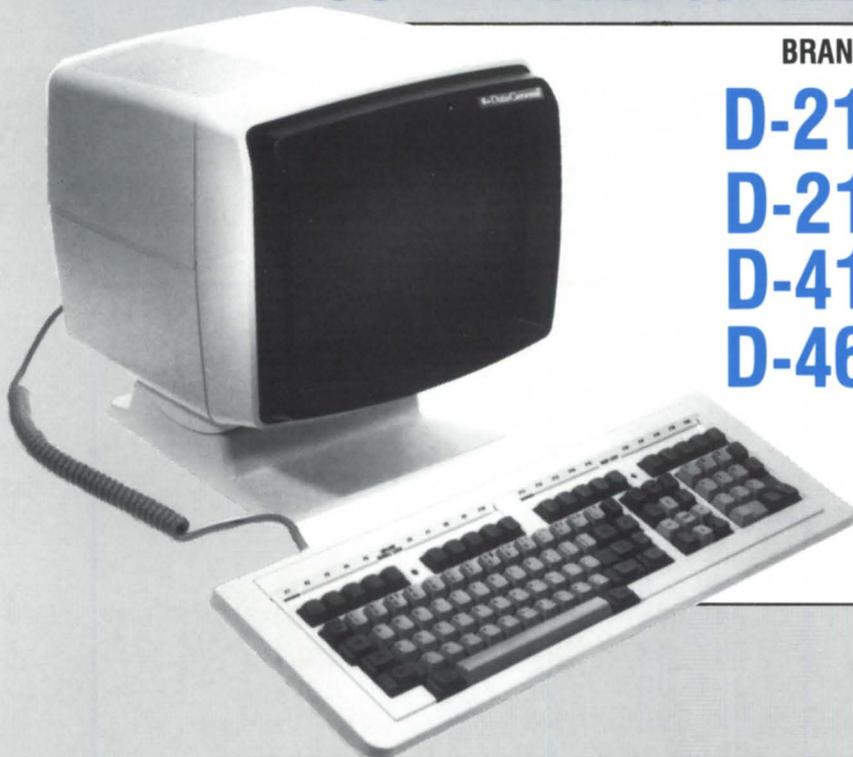
in a particular department. The report needs to show the total of each product and shade (color) sold. It should also show the selling price and calculate the total dollar volume. Can you do it?"

I said "Sure, but when do you want it?" They asked if I could get last month's numbers by tomorrow? I said "No, the data entry won't be complete until the day after tomorrow, but I could have it about three hours after that." They muttered something slightly

unprintable and added they needed it for each month of the last two years. I said our history files only went back 14 months, so that was as far back as I could go.

After some discussion, they decided that two years was a long time and a lot of data and maybe they should start with only one year's worth. I felt that was a wise decision and added it would take an extra day or two to get all the history. I had full intentions of using

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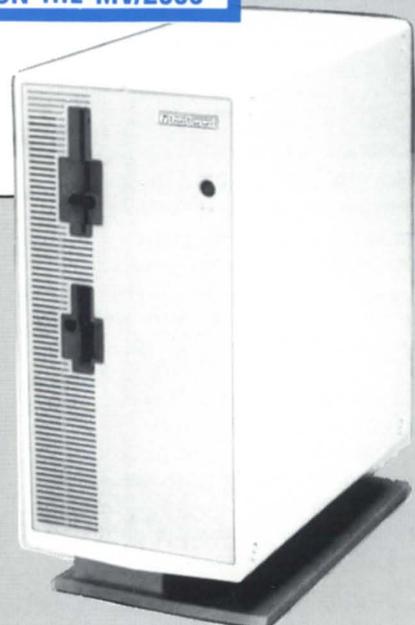
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the history for the test runs while awaiting the completion of the data entry for the current month. I could probably hand them everything they needed ahead of my projected schedule of three or four days if the test runs went well and the format looked good.

When creating a Sort/Merge report you need to create three things. The first is a record layout, the second is a report layout, and the third is a command file to run it. (Actually you can do without the third if you key it in interactively, but I prefer to have mine saved on disk.) I would then QSUBMIT the command file and let it run in the AOS batch stream.

The record format is stored in the QFORMS file; interestingly enough, it has the same format as an INFOS Query file. (Hooray for the lazy person who didn't want to write another format parser and saved me the work of learning two instead of one!) Thus, my QFORMS file for my A/R invoice history data base (INVOICE) was stored in a text file named INVOICES.QFORMS and could be shared with INFOS Query. The report format was stored in the RFORMS file, INVOICES.RFORMS.

The sort command file was stored in a series of files, one for each month, with the filename XXX.SUMMARY.-MMM.YY where XXX was the department, MMM the month, and YY the year. Had I taken a little more time, I could have written a CLI macro to build the command file for me, but since this was supposed to be a one-shot request, I didn't bother. As it turned out, I ended up making a dozen copies of the command file to last us for the following year, at which time they made some more to last the rest of that year, and so on.

The INVOICES.QFORMS text file is shown in Figure 1. Each record format in the file begins with a START-FORMAT statement, followed by a name for the record. Each field in the record is then given a name, the starting and ending bytes, and the field format with an alphanumeric default. The record formats are really quite simple, but the text file has one major requirement: you *must* separate the columns with the tab key. Sort/Merge looks for the tab as a delimiter. Spaces simply will not do. You must use an editor such as SED, which preserves the tab as a single character. Most word processors can't be used to build this file.

Figure 2: INVOICES.RFORMS

```

START_REPORT   JANSUM
QFORMATIDHREC

COL/LIN      132

DEFINE      W_QTY      QTY / 1000
DEFINE      W_EXT      EXT_AMT / 100
DEFINE      W_PRIC = PRICE / 10000

PICTURE     W_QTY      9999999VS
PICTURE     W_EXT      999999V.99S
PICTURE     W_PRIC     9999V.9999S

HEADER      11'Invoice'
HEADER      110'Date'
HEADER      117'Prod'
HEADER      123'Shade'
HEADER      139'Quantity'
HEADER      149'Unit Price'
HEADER      164'Ext Amount'
HEADER      190PAGE

DETAIL      11INV_NO
DETAIL      19INV_MM
DETAIL      111'/'
DETAIL      112INV_DD
DETAIL      114'/'
DETAIL      115INV_YY
DETAIL      118PR_CODE
DETAIL      124SHADE
DETAIL      135W_QTY
DETAIL      149W_PRIC
DETAIL      163W_EXT
DETAIL      176DESC

BREAK      SHADE      10'      Total Shade  --'
BREAK      SHADE      35TOTAL(W_QTY)
BREAK      SHADE      50'-----'
BREAK      SHADE      63TOTAL(W_EXT)
BREAK      SHADE      76'-----'

BREAK      PR_CODE    10'      Total Product ---'
BREAK      PR_CODE    35TOTAL(W_QTY)
BREAK      PR_CODE    50'-----'
BREAK      PR_CODE    63TOTAL(W_EXT)
BREAK      PR_CODE    76'-----'

TOTAL      110'      Total Report ----'
TOTAL      135TOTAL(W_QTY)
TOTAL      150'-----'
TOTAL      163TOTAL(W_EXT)
TOTAL      176'-----'

BREAK      SHADE      POST_BREAK_SPACE
BREAK      PR_CODE    POST_BREAK_SPACE
    
```

The report format is stored in a file called INVOICES.RFORMS. Again, multiple report formats can be stored in this file, although only one is shown here. The report format shown in Figure 2 is the final version that went into production. Even though we have two levels of subtotals and breaks, this is still a fairly simple report format.

The file is extremely free form. I could have grouped the entries by fields instead of the print line they were on. The order in which the level breaks are introduced does make a difference, but other than that, you could mix the lines up in nearly any order, and it would still produce the same report. This is a prime example of a non-procedural language, and it's one of the things that supports Data General's claim of being a generation ahead.

Some details of the report definition are worth noting, for example, the pictures. All three pictures have a V to define the location of the decimal point. The "." in the picture gives the location of the printed decimal point.

Thus, I could have achieved the same effect if I had defined the W.PRIC as PRICE/10 and the picture for W.PRIC as 9999.999V9S. Sort/Merge assumes that all numeric fields in the file are integers. The three DEFINE commands adjust the working variables so that they have the same number of decimals as their counterparts in the COBOL programs.

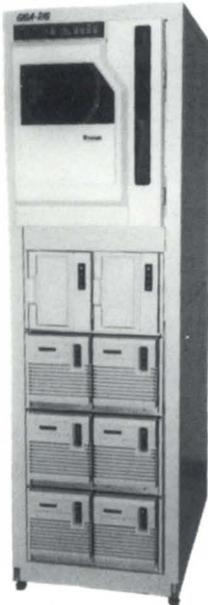
The header and detail lines require the three fields shown in Figure 2. They are the line and column numbers and the field value. There can be up to nine headers and detail lines defined, although only the ones defined will actually print. Alphanumeric fields are filled with the same rules as a PIC X(nn) in COBOL. Numeric fields are zero suppressed and will retain the sign in the data file. There are two reasons that I defined working variables for the numeric fields I wanted to print. First, to show the decimal point, and second, to separate the sign so it would not be printed as a trailing sign over-punch (TSO).

Again, as in the QFORMS file, the RFORMS file requires that the columns be separated with tabs. Using spaces instead of tabs will cause sort/merge to fail with complaints about being unable to find the QFORMS or RFORMS definition.

The control file is the Sort/Merge command file. This file is used to specify the RFORMS, the input data base and path, the sort fields, and the record selection parameters. The sort command file shown in Figure 3 takes records from the INVOICES data base, with the first selector having the value INV BY CUST. The second selector is composed of bytes 15-32, which contain the company, customer, invoice number, and entry number.

Since the products included on the report were all part of one company, we can use the path statement to scan only the records for that company. Because the report sequence is company, product, and shade, I have specified those sort fields and added the rest of the primary key to insure a unique se-

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Figure 2: INVOICES.RFORMS

```

INPUT INDEX IS "INVOICES",
PATH IS "INV BY CUST","01":"02",
RECORDS ARE VARIABLE UPTO 142 CHARS.
OUTPUT REPORT IS "JANSUM".
KEY 15/16.
KEY 39/43.
KEY 74/83.
KEY 17/32.
IF 33/34 <> "85" THEN SKIP.
IF 35/36 <> "12" THEN SKIP.
IF 39/43 < "30000" THEN SKIP.
IF 39/43 > "32999" THEN SKIP.
SORT.
END.
    
```

quence. The selections for date and product are also made here in the command file. It helps to build your QFORMS file first since the command file requires starting and ending byte numbers to define the fields.

In summary, I think that Sort/Merge is one of the more underrated products

that Data General sells. It is capable of a lot more than just being called by high-level languages for sorting records. I have converted tapes between ASCII and EBCDIC, written a number of simple master file listings, and even written an entire mailing list system as a demonstration of its abilities. Al-

though the report writer has some very binding limits, it can be quite useful for ad hoc reporting—and the data base scanning and selection criteria, record massaging, and sort key flexibility give it a power all its own.

Time for our visit to the mailbag...

John Tsia of Cigna Dental Health asks, "What are the recommended percentages of busy and average seek for system disk and other disks? Why? Some users have suggested..."

John, I noticed your card came from the December 86 issue of *Focus*. By now, you have probably seen Brian Johnson's excellent series in January and February of 1987. I have only one thing to add to what B.J. said. One of our clients was concerned that his system disk had more than 80 percent of the total accesses, leaving less than 20 percent of the workload for the other two disks. However, further investigation showed that disk activity was so light (partially due to copious amounts

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of memory) that it was actually spending more than 98 percent of its time idle. The moral: rules of thumb are generally good starting points for system performance tuning, but don't get caught assuming that your system behaves like the proverbial typical system.

Many thanks to Madeline Baugher who sent in information for John J. Walton (in the mail visit of the December 86 issue). There is a text on DG assembler by Stuart Smith, published by Ginn Press, 191 Spring St., Lexington, MA, 02173.

Hemant Shah of Tata Eng. & Locomotive Company in Bombay asks, "How is ERMES used as a UDF file, although linked, and what purpose does ERMES.SR serve? What are the various system ERMES.OBs that come with AOS/VS?"

:ERMES is the system error message file. It is used by the ?ERMSG system call (which is used by the CLI MES-SAGE command) to retrieve the text of

an error message when given the error code number. ERMES.SR is the source code for ERMES.OB and contains more documentation. The other ERMES.OB files (several for system utilities and at least one for each language) also contain error messages specific to that package. You should edit :UTIL:LINK_ERMES.CLI to include any or all of the ERMES.OB files on your system and use it each time you install or update a package so that your ERMES file stays current.

The only problem you will have if you don't do this is anytime a program goes out for a message that hasn't been linked into the ERMES file, you get the infamous UNKNOWN MESSAGE CODE XXXXX. I can't begin to tell you how many people blame Data General for this when they haven't built a new ERMES file. In most cases, it's simply because they don't realize they need to.

Hemant also asks, "Is there any software to help understand AOS/VS memory dumps?" Yes, indeed. DUMPANAL is just one of the utilities designed for

this purpose. Unfortunately, I have never had a chance to investigate it myself. I hope one of our readers can help us here.

One last comment

I just returned from the NADGUG Executive Board meeting which was held at the Tropicana Hotel in Las Vegas where Conference 87 will be held this October. The facilities are great, the rooms are nice, the dinners are cheap even for us gluttons (\$4.95 for a 12 ounce prime rib dinner, and even that was considered a little high), and entertainment is in abundance (although it could get expensive). Hope to see as many as possible of you there. Δ

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

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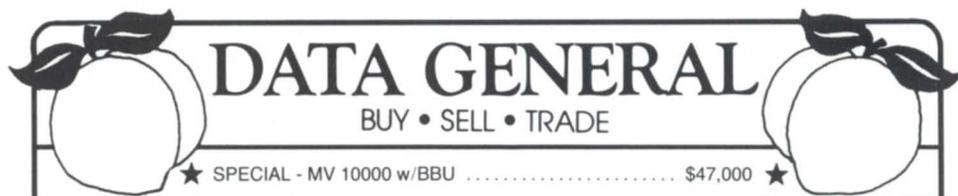
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Shared code can dramatically reduce disk usage, memory requirements, and maintenance time

:LARD_OF_THE_RINGS

It's not very often that you run across something new that is a winner in virtually every respect. A couple of months ago, it happened to a client of ours. As a result of making some cosmetic changes to his system, he:

- reduced his disk space requirements by an average of 310 KB per program, or a total of 500 MB for 1,600 .PR files
- reduced application .PR link time by 75 percent
- reduced his overall memory requirements by increasing the number of *shared* (as opposed to *shareable*) pages per PID
- eliminated the need to recompile every application program when changes were made to the in-house subroutine library.

Ah, but I can hear the chorus already: "There's no free lunch. It must have cost something." Yes, it did. It now takes about half a second longer to XEQ a program, and the program consumes about 1 percent more total CPU than it did previously. Horrible consequences, huh?

:FLASHBACK

A little background is necessary about my client's operation. What Burger King is to hamburgers ("Have it your way..."), this guy is to payroll.

His operation consists of four IBM 1130 clones and two identically configured 8 MB MV/4000s. As you read this, the 1130s are being carted off to the local scrap-iron dealer. But right now, their main function is to provide something for the bank of air conditioners to cool while the first parallel and live runs are being done on the MV/4000s.

Each MV/4000 has a 147 MB system disk, and four 335 MB 8-inch Winchester configured as 277 MB drives. The two systems are XODIACed to-

gether using an MCA. During the day, one system is used by the programmers to convert and test the programs from the 1130, and the other is used for word processing and administrative functions. At night, the operators swoop in and run payroll programs like crazy all night long.

For the last year or so, the staff has been busily converting about 1,600 payroll programs, 400 supporting COBOL subroutines, and a handful of ancillary utility programs to run on the MV/4000.

The nature of the payroll business is such that no two companies run their payroll the same way. The initial conversion is just the tip of the iceberg. Each new company will require a small (about 50 to 75) complement of custom programs to be produced, usually involving some minor changes to existing nonstandard programs.

Aside: I predict that the end of the world will occur when the number of payroll programs in existence exceeds the number of employees in existence. The end is near.

:STRAIGHT_FORWARD

The most common approach to a conversion like this is pretty simple. Compile all the subroutines and use the .OBs to build a big OURS.LB file, then link all payroll programs with the OURS.LB and the COBOL and LANG_RT libraries to produce a .PR file. Since this is a conversion, you would probably also want to generate the .DS and .DL files for use with SWAT. They did.

The average main payroll program involved in this case is about 2,000 lines of COBOL, including the COPY files (mostly SELECT, FD, and WORKING-STORAGE). The average number of subroutines loaded from OURS.LB is around 50, consisting of a few hundred lines each of COBOL.

The resulting .PR files were about 400 KB each. Let's see, 400 KB times 1,600 programs...that's about 640 MB of disk space for program storage alone. Add to that the storage for the .DL and .DS files for each .PR, and we're talking major league disk consumption.

Disk space is only part of the problem, there are also some logistical problems with this approach. Each time a

change is made to a routine in OURS.LB (not uncommon in the early days), the library had to be rebuilt, and all 1,600 payroll programs had to be reCLINKed. Quite a few nights and weekends were spent during the conversion with both MV/4000s CLINKing their brains out. And the links took a long time, primarily due to the combined size of OURS.LB, the COBOL libraries, and the LANG_RT libraries.

We also noted a more subtle, but potentially more serious problem, that involved the memory requirements of the programs. Luckily, this operation is mostly batch, so only a handful of payroll programs are running at once. (See :STREAMS?, below.) It was clear that at some point in the future, the prospect of customers running some subset of the programs on-line via dial-ups was a possibility.

Analysis indicated that the chance of the same two programs running at once was nearly zero, and because of the way AOS/VS shares the code and shared data portions of programs, this meant that for all purposes, each program was effectively unshared, except for its AGENT and INFOS components in rings 3 and 4.

Actual measurements put the per-PID memory consumption of the payroll programs at about half a megabyte each, or two programs per megabyte.

At the time, both MV/4000s had only 3 MB each, so this was definitely a problem. Four batch streams soaked up 2 MB (0.5 MB times 4). The operating system, XODIAC, and the other global servers soaked up 2 MB, for a total of 4 MB. Some of the payroll programs used INFOS, and the memory shortfall meant no room for a respectable size LRU cache to help INFOS avoid lots of physical I/O. In short, a disaster. But an upgrade to 8 MB on each machine in anticipation of AOS/VS 7.xx got around part of the problem. The disk storage problem still remained.

:PUSH

Some of you may have gotten a little lost in the last section when I mentioned AGENTs and rings, so here's a mini-tutorial on them.

For reasons primarily related to system security, DG divided the 4,294,901,760-byte (4,096 MB, or 4 GB)



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address space of the MV/ into eight equal-sized, 512 MB rings, something like the concentric rings you see in the trunk of a tree. They numbered the rings 0 through 7, with ring 0 corresponding to memory addresses 0 through 511 MB, and ring 7 corresponding to memory addresses 3,584

MB through 4,096 MB. This scheme produces a memory address that looks like this:

bit#	0	123	4	31
	@	ring#	word offset	within the ring

The first bit, marked @, is used to indicate an indirect address; one that points to another memory location that contains the actual address of what you're looking for, or yet another indirect address.

The hardware design of the MV/ protects programs and data in the inner rings from being either accessed or clobbered by the programs in the outer rings. Any attempt by a program in a ring to access an inner ring (i.e., below its own) results in a hardware trap, which is reported by AOS/VS as an "inward address" error.

AOS/VS assigns the rings as follows:

Ring	Contents
0	AOS/VS kernel, including system cache
1,2	Per-process data, primarily page tables
3	AGENT.PR and LPMGR.PR
4-6	Local server programs, such as INFOS (ring 4) and DBMS (ring 5)
7	User program .PR file

Each process (PID) has its own copies of rings 3 through 7, but ring 0 is common to all processes.

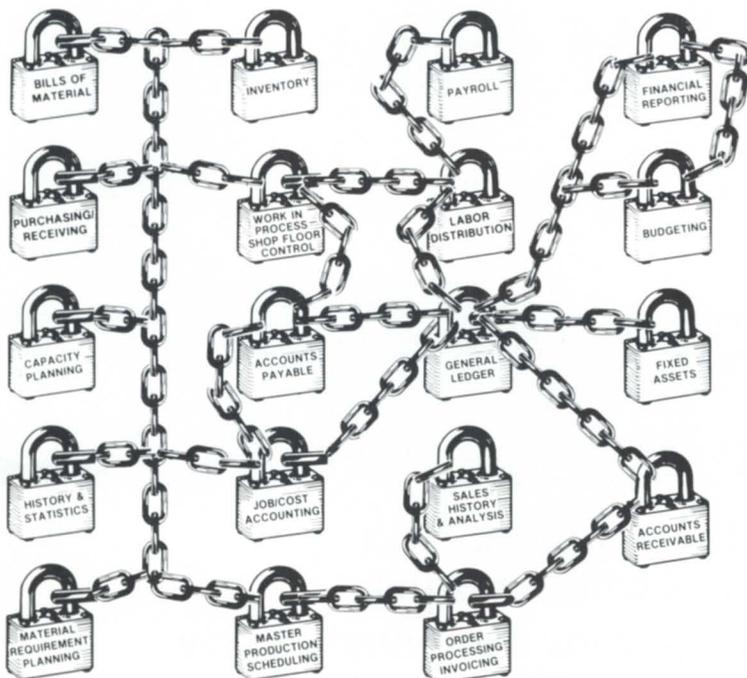
Note that each ring has a separate .PR file (pathname) associated with it. Ring 7 programs are loaded as a result of EXECUTE, XEQ, or PROCESS commands, and the ring 7 program then "ring-loads" any inner ring servers it needs (except for ring 3 which is automatically loaded for you by AOS/VS).

For example, LINKing ICALL32.OB with your program will cause :INNER.RING:RING4.PR to be ring-loaded into ring 4 the first time you make an INFOS request. This association of a .PR pathname with each ring is key, as we will shortly see.

Within a ring, AOS/VS by convention (not because of hardware constraints) separates the address space into two general categories: unshared and shareable. The unshared part of the address space contains code (rarely) and data (typically) that are specific to the process. The shareable part of the address space contains code (typically) and data (less typically) that are capable of being shared between multiple processes.

If a process ring requests that a shareable page be added to its working set, either indirectly via the page fault mechanism, or directly via the "shared page I/O" system calls, then AOS/VS checks to see if any other process, or

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the Shared LRU Cache, contains a copy of the page with a *matching disk address*. (A disk address consists of a device code, unit number, and sector number within the unit.) If the answer is yes, then the system increments the use count associated with the page and adds it to the requesting process' working set.

In the example above, if the original use count of the page was 1, and the new use count is 2, then the page just changed from shareable to shared.

Simply stated, two processes can share a page only if both of their requests refer to the same AOS/VIS pathname. For example, if two processes are running PAYROLL.PR, but one is running file :PROGS:PAYROLL.PR and the other is running :UDD:BJ:PAYROLL.PR, they will not share the same copy. Instead, AOS/VIS will (rightly) treat this as two occurrences of two separate programs.

That seems simple enough, but what about the case of two processes running PAYROLL1.PR and PAYROLL2.PR, both of which are COBOL programs whose bulk is made up of the routines from OURS.LB, COBOL.LB, and LANG_RT.LB. Can't the common parts be shared? It seems a shame, but the answer is no. The disk addresses don't match.

:POP

Getting back to our discussion of the straightforward approach to implementing a suite of programs, we can see that any means we can devise to increase the incidence of page sharing by similar, but different programs, would be a big winner in terms of total and per-PID memory requirements.

Luckily for us, DG provides two relatively easy-to-use mechanisms for attacking this problem: shared libraries and inner ring libraries.

:SHARED_LIBS

Back in the discussion of rings and shared pages, I mentioned that a shared page can also be added to your working set by a shared page I/O request. This involves opening a file as a shared file (?SOPEN) and reading pages into your address space using shared page I/O requests (?SPAGE and ?RPAGE).

This facility is commonly used by INFOS, DBMS, and others to allow multiple users to access the same index and data files, while only requiring one copy to be in memory regardless of the

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number of users. However, there's no reason why this same technique cannot also be used to read in pages of code that can then be executed, with all users of the same shared code using the same copy (i.e., page).

:GENEALOGY

Several years ago, the AOS/VS de-

velopers addressed the problem caused by the somewhat single threaded nature of PID 1, the global peripheral manager process. At that time, a process requesting character I/O had its request intercepted by AGENT.PR in ring 4 (which, among other things, pre-processes all system calls) and converted into an IPC message to PID 1.

The global peripheral manager then carried out the request, in cooperation with any software running in the IOP or IAC, and notified the AGENT of the request's completion via a return IPC message.

This approach had three significant problems: the global PMGR process could become a bottleneck, the PMGR necessarily ran RESIDENT (and at a high priority—with the potential of shutting out all other processes when it got busy), and OP (PMGR's username), rather than the actual user, got charged for a lot of the CPU time involved.

The solution they arrived at was to have the AGENT in ring 4 read shared code pages from a local PMGR into its address space. This local PMGR would then perform the bulk of the work involved with character I/O, and the global PMGR would be reduced to acting as a traffic cop between the local PMGRs and the hardware devices (IOPs and multiplexors). Because all the processes' AGENTs use the same local PMGR (:LPMGR.PR), the incidence of sharing is high. Because the local PMGR is executed as part of the address space of each process, it runs at the same priority as the process, and the CPU time it uses is charged to the process. In other words, all goals were achieved.

Earlier, I said that each ring has a .PR file associated with it, but I showed two .PR files for ring 4. The actual .PR file pathname associated with ring 4 is :AGENT.PR. LPMGR.PR is used by ring 4 as a shared library.

:IN PRACTICE

I'm thankful that the benefits of shared libraries were not lost on the language groups. They saw how the same technique used by the AGENT to load and execute LPMGR.PR in ring 4 could be used by ring 7 user programs to load and execute a pre-packaged version of LANG_RT and the language-specific libraries in a way that would allow all the similar (but not same pathname) programs to share a single copy of the library pages.

The technique is relatively simple, and details can be found in the documentation for the specific language. But let's take a look at a specific example using two COBOL programs and some user subroutines, also written in COBOL. The CLINK commands for the two programs are:

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```
) CLINK/DBMS=DUMMY/INFOS PROGA SUBRA &
&)SUBRC SUBRD
) CLINK/DBMS=DUMMY/INFOS PROGB SUBRA &
&)SUBRB SUBRD
```

These commands produce two programs, PROGA.PR and PROGB.PR. Both contain SUBRA, SUBRD, COBOL.LB, and LANG.RT.LB. When both programs are run, none of the ring 7 pages can be shared because the pathnames don't match.

Now let's try linking these two programs using the shared library facility:

```
) CLINK/DBMS=DUMMY/INFOS/SHARED PROGA &
&)SUBRA SUBRC SUBRD
) CLINK/DBMS=DUMMY/INFOS/SHARED PROGB &
&)SUBRA SUBRB SUBRD
```

The first thing you'll notice when you do this is that the size of the resulting .PR files is dramatically reduced compared to the previous example. That's because the bulky COBOL.LB routines are replaced by a small routine from COBOL.SLI.OB (SLI = Shared Library Initializer), and the bulky LAN-

G.RT.LB routines are replaced by SL.LOADER.LB. (The language development groups at DG must not talk to each other, otherwise this would have been called LANG_RT_SLI.OB.)

At program execution time, the two initializers allocate space in the shared area of the ring and use shared page I/O to read in their respective shared libraries: COBOL.SL and LANG_RT.SL. Execution proceeds normally, with the exception that two programs with different pathnames are now sharing the bulk of their code (the libraries). Only the first program to be executed actually caused disk I/O to COBOL.SL and LANG_RT.SL. The second program simply caused the use counts of the already resident library pages to be incremented. No I/O took place. Not a line of the application source code was changed.

:SO_FAR_SO_GOOD

Well, that takes care of DG's part of the address space, but what about our potentially large library of subroutines?

(Remember OURS.LB?)

In the case of my client, the size of his local subroutine library far overshadowed the size of the individual main programs. So what could we do to allow these routines to be shared among similar, but distinct, programs?

In theory, we could make OURS.SL instead of OURS.LB and write ourselves an OURS.SLI.OB to initialize it (i.e., allocate shared space and read in OURS.SL). Possible, but messy.

A better method would be to take advantage of the inner ring approach and load OURS.LB (in the form of OURS6.PR) into ring 6 (reserving rings 4 and 5 for INFOS and DBMS). Then all our main programs would have to do is ring-load OURS.PR into ring 6—definitely more straightforward for non-technical types.

So now we have to do two things: build an OURS6.PR for ring 6, and write a small chunk of COBOL to ring-load OURS6.PR.

Let's take the easy part first: writing the ring-load code. A copy of the actual COBOL program to ring-load

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Figure 1: QRNGLD.COB

```
* NOTE: Compile with /OCTAL
IDENTIFICATION DIVISION.
PROGRAM-ID.        QRNGLD.
ENVIRONMENT DIVISION.
DATA DIVISION.
WORKING-STORAGE SECTION.
77 OURS6-PR-NAME PIC X(09) VALUE 'OURS6.PR<0>'.
77 ACO           PIC S9(9) COMP.
77 AC1          PIC S9(9) COMP.
77 AC2          PIC S9(9) COMP.
77 COB-RINGLD   PIC S9(4) COMP VALUE 180.
LINKAGE SECTION.
77 IER          PIC S9(9) COMP.
PROCEDURE DIVISION USING IER.
CALL '?CBBADDR' USING OURS6-PR-NAME, ACO.
MOVE ZERO TO AC1, AC2.
CALL '?CBSYS'
      USING COB-RINGLD, ACO, AC1, AC2, IER.
EXIT PROGRAM.
```

OURS6.PR into ring 6 is shown in Figure 1. The only change required to your main program is to insert the following COBOL statements at the very beginning of your procedure division:

```
CALL 'QRNGLD' USING IER.
IF IER NOT = ZERO THEN
    DISPLAY "QRNGLD failed, IER ",IER
STOP RUN.
```

The next part involves building something called a gate array definition file, which will be fed to GATEM.PR (a DG supplied utility) to produce some files used both to build the ring 6 .PR file, and as input to the ring 7 CLINK, so that it knows how to resolve references to the inner ring subroutines. The definition file in this case is called OURS6.GAT and can be found in Figure 2.

The command to feed this file to GATEM and produce the two files needed by the LINKER is:

```
) XEQ GATEM/RING=6 OURS6
```

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This produces OURS6_GAR.OB and OURS6_GTS.OB as output.

Now we're ready to produce OURS6.PR using this command:

```
) CLINK/DBMS=DUMMY/INFOS/SHARED/&
&)RING=6/O=OURS6.PR
)SUBRA SUBRB . . . SUBRZ OUR6_GAR &
&)ROOT_INNER.LB
```

ROOT_INNER.LB is supplied with LANG_RT. Don't worry about it now.

Finally, it's time to reCLINK our two main programs:

```
) CLINK/DBMS=DUMMY/INFOS/SHARED &
&)PROGA QRNGLD OURS6_GTS
) CLINK/DBMS=DUMMY/INFOS/SHARED &
&)PROGB QRNGLD OURS6_GTS
```

That's all there is to it. The resulting PROGA.PR and PROGB.PR are shadows of their former selves in terms of disk space. Even more wonderful is the dramatic reduction in total memory required to run these two programs. As the total number of programs using this

scheme increases, so does the per-PID memory savings. Even a handful of programs being run by a boatload of PIDs will experience a reduction in per-PID memory usage.

Figure 2: OURS6.GAT

```
ACCESS 7
GATE 1 SUBRA
GATE 2 SUBRB
GATE 3 SUBRC
etc...
GATE 24 SUBRX
GATE 25 SUBRY
GATE 26 SUBRZ
```

As a freebie side-effect, consider this. Back when OURS6 was an .LB file instead of a .PR file, any change to a routine in OURS6.LB required reCLINKing every main program—a bit tedious, especially during the early stages of development when the routines in OURS6 were being debugged and modified daily.

Now, a change in an OURS6 routine requires only that OURS6.PR be rebuilt (a simple CLINK). Not bad.

Lastly, the time required to CLINK a main program is now seconds instead of minutes. Forget the disk space savings, this alone is worth the effort in a heavy development shop.

:THE_CATCH

So far, the only cost we've seen is the slight complication of adding a few lines of code to the main program, linking it with QRNGLD.OB, and creating OURS6.GAT and OURS6.PR. There must be some other costs, right? Well, there are.

First, it takes slightly longer to start a program because of the overhead of loading the shared libraries and the inner ring program, but this effect is barely noticeable if someone else has already loaded them into their address space.

Second, it takes slightly longer to call a shared routine or an inner ring
(continued on page 62)

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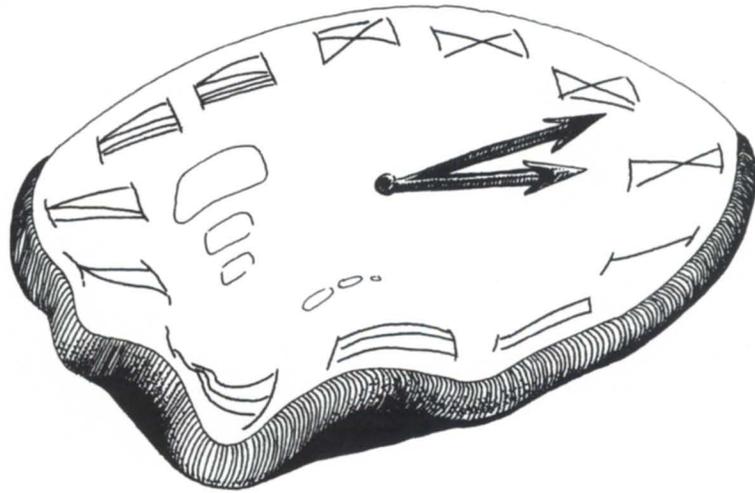
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TIME FOR A CHANGE?

What's your strategy for implementing updates and revisions?



When a new revision of CEO is announced, the first question I usually ask is, "What new features have been added?" However, when a new update is released, my question changes to, "What fixes have been incorporated?"

New revisions (the ones numbered 2.0, 3.0, etc.) are usually major changes to the software. The changes could be major in the sense of menu structure, or they could include entirely new features. Whichever is the case, it usually requires training users before the revision is loaded.

Updates (the ones numbered 2.12, 2.24, etc.) are primarily fixes to problems found with a previous revision or update. They sometimes involve new functions or features, but less often than with a major revision. Training is usually minimal with updates.

Both revisions and updates have been tested by internal DG staff and beta sites. But many users are hesitant to load software without some testing of their own. How do they go about this?

This was one of the areas discussed in a recent CEO workshop hosted by the Office Automation Special Interest Subcommittee (OASIS). Some installations have opted to eliminate any testing of their own and load the software upon receipt. They tend to be smaller organizations that feel that the impact of something happening with a new revision would not be a major concern. Any problem that would arise could be dealt with easily enough and not cause extreme hardship. Their experiences have been relatively successful.

Other installations that have multiple processors have a dedicated "test" system for all new software that is loaded. This system is used for testing only, until a determination is made that the software is stable and ready for loading "live." Users I've talked with are very pleased with this solution because there is no risk involved if something questionable occurs.

What about the large installations that support hundreds of users? What do they do? Some of those sites just "bite the bullet." They load the software "live" when they receive it, then hope for the best. I know I will probably get phone calls from the DG staff as to this statement, but it's not meant to be derogatory. I've talked with many DG development and quality control people and am always assured that thorough testing is done to a product before it is released. I don't doubt that this is true, but things sometimes slip through. Isn't that why we have the Atlanta Support Center?

Problems or "bugs" are reported to the center to be fixed in a later revision. Many of the reports are minor occurrences that can be worked around. But what happens if something occurs that is major to *your* site, but possibly minor to another? If you've already loaded the software and find something that is hindering your productivity in one way or another, what then? It could take days or weeks to come up with a solution. Do you dare take that chance? What choices do you have?

Some sites delay loading of a revision

or update until the monthly newsletter is distributed that outlines any reported problems. This delay could save them from unpredictable happenings, or at least help them to be aware of potential "gotchas." The problem with delaying loading of the software is that by the time the newsletter outlines any reported problems, a new update has arrived and you're in the same boat again.

Another alternative (not supported by DG) is loading a dual copy of CEO within your system. This can be accomplished by changing the process names and all the relationships of disk files that begin with CEO_ to CEO1_. We have approached DG about the possibility of supporting "dualing CEOs," but have been unsuccessful.

So, we're left with making a decision of the above choices. It's a decision that has to be made considering all consequences. It must involve management and support staff input to weigh the factors. Whatever you decide, keep in mind who you will affect and what the consequences will be.

If anyone has any other alternatives, please forward those ideas to this magazine. Δ

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

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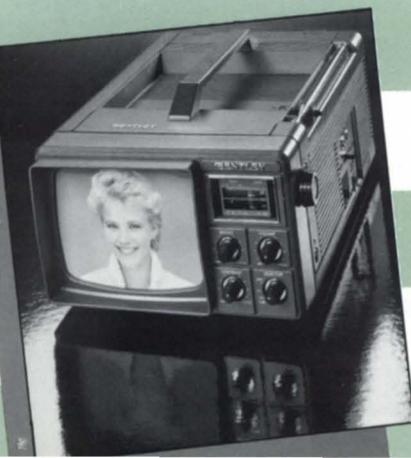
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Apogee announces Prospector telemarketing system

Marlboro, MA—Apogee Systems, Inc. has announced Prospector, a telemarketing software system. Prospector includes several new features, such as integration with Data General's CEO system, broad management monitoring capabilities, interfaces with a range of auto-call facilities, and comprehensive call accounting.

Prospector was designed for DG's 32-bit computers and supports up to 1,000 users. Prices for the software start at \$10,000.

The system handles telemarketing activities including incoming and outgoing calls; autodialing with or without voice sensing; data base development on customers, prospects, and sales patterns; call-back tracking; compilation of target prospect lists; scheduling of mailings and appointments; salesperson monitoring, and order entry.

The system handles multiple sales, display of the appropriate script, and instructions on the salesperson's screen.

Integration with Data General's CEO package significantly extends Prospector's capabilities, according to Apogee. Using a single function key, telemarketing sales representatives can initiate word processing, decision support programs, or electronic mail. For example, the system can generate personalized letters and labels for direct mail campaigns.

Training is enhanced by the system's management monitoring facilities. Prospector allows supervisors to monitor a salesperson's screen while simultaneously listening to the call to assure adherence to proven techniques.

The auto-call capabilities include an automatic call distributor that is said to improve customer service, lower WATS costs, and increase efficiency by as much as 20 percent. An audiodialer feature is available with voice sensing. After automatically dialing a number, the system connects to a salesperson only when the phone is answered,

eliminating wasted time on no-answers and busy signals.

Apogee Systems Inc., 60 Brigham St., Marlboro, MA 01752; 617/481-9339. Δ

IAC-16 compatible controller introduced

Farmington Hills, MI—The Sixteen Line Intelligent Multiplexor (SLIM) is a new communication device from Interface Electronics Inc.

The SLIM is fully plug-compatible with DG models 4368 and 4370, and is said to perform identically to an IAC-16. The controller supports both RS-232 and 20 mA on a port-by-port, switch-selectable basis. The SLIM runs with standard DG diagnostics, and can operate in conjunction with Data General's IAC in the same chassis.

The SLIM is pin-for-pin compatible with the IAC-16. It can be utilized as a viable spare for current systems. Device codes 0-77 are supported and are transparent to DG's FCC-compatible cabling scheme.

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Circle 26 on reader service card.

Interface has designed the SLIM so that it supports clear-to-send (CTS) commands for slower peripherals that are occasionally used in DG system configurations.

The SLIM has a handle-edge connector that can be used in either a memory slot or an I/O only slot. It is compatible with other DG-compatible manufacturer's distribution panels. Interface's distribution panel or TCB is included with every unit shipped at no extra charge. FCC-compatible versions are also available.

Interface Electronics Inc., 37500 Enterprise Court, Farmington Hills, MI 48018; 313/553-9820. Δ

CTI offers S/140 memory

Orange, CA—Computer Technology Inc. has announced the development of EM1 compatible memory for Data General's Eclipse S/140. It requires no hard-

ware or software modifications.

The EM1 is available as a single board from 512 KB up to 2 MB using 256 K RAMs. Addressing can begin on any 128 KB boundary, therefore, the EM1 memory may be used to upgrade the S/140 to its maximum memory capacity by adding only one board. This increases reliability while leaving up to seven open slots available for other I/O upgrades. The EM1 supports the error correction feature that is standard on the S/140.

The design of the EM1 reduces power consumption by limiting the total number of ICs to a maximum of 164 (as opposed to the 2,200 ICs usually necessary to upgrade the S/140 to 2 MB). When operating in backup mode, the EM1 will not exceed the current drawn by comparable Data General memory.

The EM1 is scheduled to begin shipping in May 1987 with delivery 30 days ARO. List price is \$1,248 for ½ MB and \$2,568 for 1 to 2 MB. OEM and volume discounts are available.

EM1 comes with a two-year warranty for workmanship and materials. Computer Technology will also provide a replacement unit within one day after notification for no additional charge.

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

Penta introduces low-cost pagination workstation

Beverly Hills, CA—Penta Systems International, Inc. has introduced a new, self-contained, interactive WYSIWYG make-up and pagination workstation. The workstation offers comprehensive composition and interactive page make-up capabilities on off-the-shelf Data General equipment.

This system, called PageMaster, can be configured as a standalone workstation or as a remote workstation linked

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by telecommunications. In addition, the system can be linked to existing Penta systems (16- and 32-bit) and 16-bit CCI systems.

Equipped with its own 32-bit CPU, PageMaster can support a variety of input terminals including personal computers. PageMaster also supports optional software from Penta including batch pagination, Pin-Point Make-up, and math and data base composition.

All PageMaster products include a dedicated 32-bit processor, 19-inch high resolution monitor, keyboard, and mouse, and full-featured composition and interactive WYSIWYG page make-up software. The PageMaster can be equipped with up to 10 MB of internal memory and with Winchester disk storage.

This workstation with two intelligent input/editing terminals costs \$79,900. Shipment to customers is scheduled to begin in June.

Penta Systems International, Inc., 309 East Federal Street, Baltimore, MD 21202; 301/244-0050. Δ

SPSS graphics to be released for DG MV/ series

Chicago—SPSS Graphics, an interactive system for charting presentation and business graphics, is scheduled for release in the second quarter of 1987 for Data General's MV/ series computers running AOS/VS.

The SPSS Graphics system provides more than 40 different chart types for presentation graphics including several types of maps, pie charts, line charts, regression charts, and multi-format combinations. The formats were designed by a team of graphics designers, cartographers, and statisticians.

The SPSS Graphics interface makes it easier to correct and refine consecutive versions of a graph. Users can make revisions by using a combination of menus, forms, and commands. Once the first chart or graph has been

drawn, a change can be made by altering an entry in a form. A new, corrected chart can be redrawn in as short a time as 15 seconds.

This system can process data before and during the chart-making process. Data manipulations that can be performed include sorting, merging, reordering data, and changing individual values.

SPSS Inc., 444 North Michigan Ave., Chicago, IL 60611; 312/329-3500. Δ

New criminal justice software available for DG computers

Reston, VA—Applied Micro Technology, a Virginia corporation, has announced rev 3.0 of its Criminal Justice Information System (CJIS). The CJIS software will operate on any Data General system, from the Desktop series to the MV/20000.

CJIS is composed of many individual

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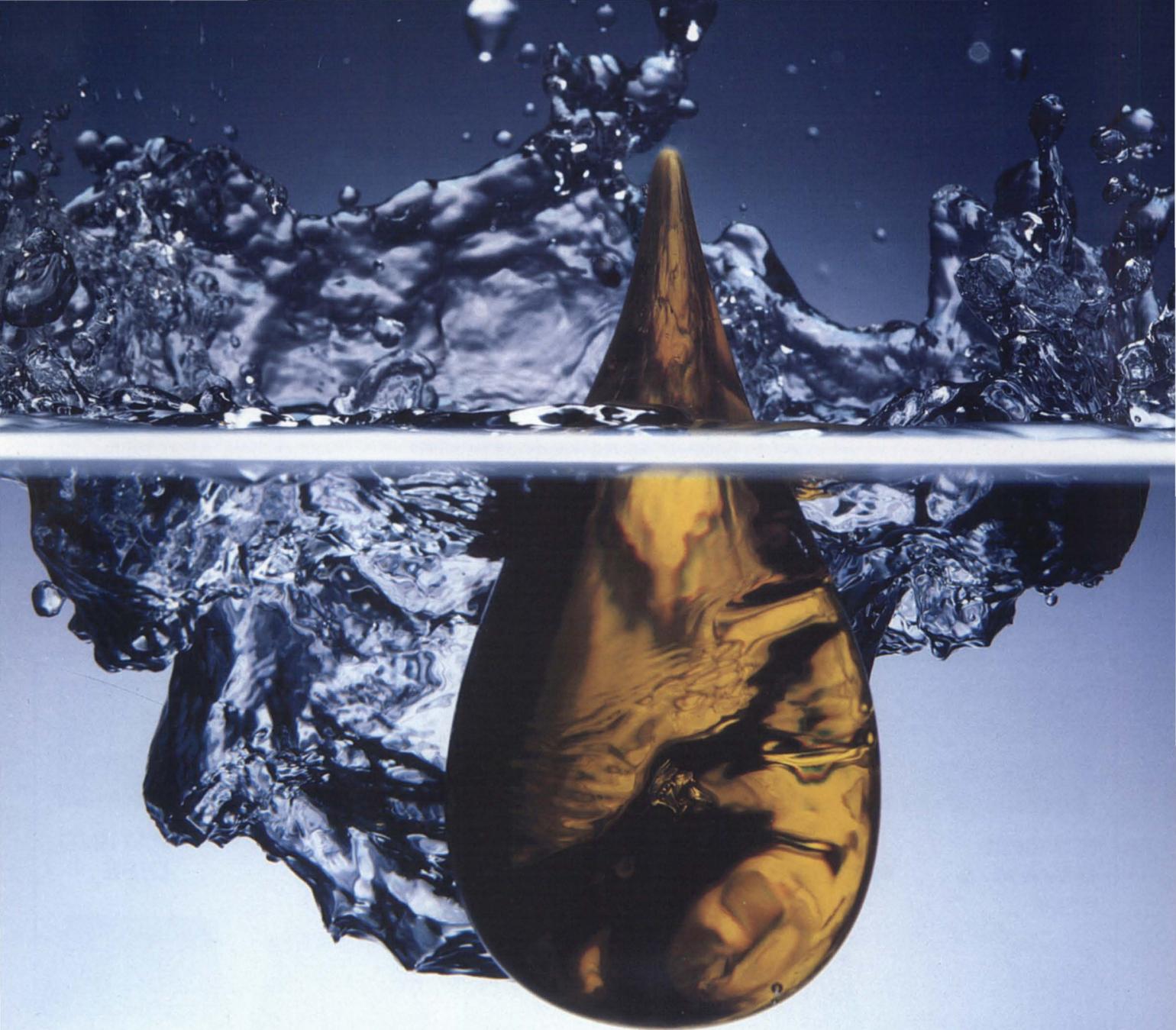
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modules designed to work together as a complete records management software system for law enforcement agencies. The following is a partial list of the modules:

- Master name index—an index of all persons entered in other CJIS modules.
- Call reporting module—a record of all calls for law enforcement services and analyses of these calls.
- Incident reporting module—an automated record of offenses and related property, vehicle, victim/witness/suspect, modus operandi, and case status data.
- Pawned property module—a record of pawned property, including a description of the person pawning the property.
- Arrest records module—a complete record of person arrested by the agency and the related charges.
- Booking/jail management module—a

group of modules to assist in the admittance and daily care of inmates including bonds, property receipts, detainees, medical histories, phone calls, inmate cash accounting, scheduled events, disciplinary actions, and release records.

The CJIS system is a multi-user/multi-tasking system that can support multiple law enforcement agencies on the same system, as well as allowing shared data files.

The CJIS system provides 50 standard report formats, including full UCR reporting. With the use of CJIS search programs, special reports can be generated from the data base.

Advanced Micro Technology has installed the CJIS system in police and sheriff departments in Iowa, Texas, and Virginia.

Applied Micro Technology, Inc., 2507 Penny Royal Lane, Reston, VA 22091; 703/620-5238. Δ

Version 5 of SAS System runs on DG machines

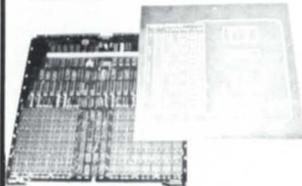
Cary, NC—SAS Institute Inc. has introduced Version 5 of the SAS System for Data General's Eclipse MV/ series under AOS/VS. Version 5 offers DG users five additional products as well as enhancements to the two currently available products, base SAS and SAS/GRAPH software.

"Data analysis, report writing, and graphics can now be integrated with applications development, spreadsheets, operations research, financial modeling and planning, and interactive matrix programming," said Richard Roach, SAS marketing manager for minicomputer systems.

Base SAS software, the foundation

MEMORY EXPANSION I/O PERFORMANCE

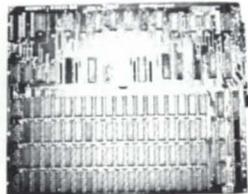
**MV10000
MV4000, &
S280**



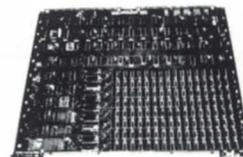
**NOVA 4 &
ECLIPSE S140**



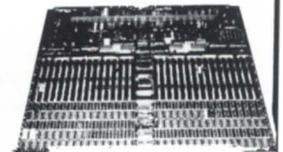
**DESKTOP
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DISK**



**PAGING
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To 16MB**

**MS140-1MB
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SCIP

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of the SAS system and a tool for data management, analysis, and report writing now includes five new macro functions. It also has the ability to select the most efficient data (either by the SAS System or the host). SAS/GRAPH software, a product for information and presentation color graphics, now includes support for 55 additional devices and a new facility that allows users to display multiple graphs on a single page.

The new SAS products for the DG market include: SAS/AF software, for building menu-based front-ends to applications, training, and giving on-line help; SAS/FSP software, for letters, spreadsheets, and interactive, forms-oriented data entry, editing, and query; SAS/ETS software, for planning, forecasting, and financial modeling; SAS/OR software, for project management and decision support; and SAS/IML software, for interactive matrix programming.

SAS licenses all software on an an-

nual basis with fees based upon machine classification. First-year corporate license fees range from \$3,000 to \$8,000 for base SAS software; from \$2,500 to \$6,000 for SAS/GRAPH software; from \$2,500 to \$4,000 each for SAS/AF, SAS/FSP, SAS/ETS, and SAS/OR software; and from \$1,000 to \$2,000 for SAS/IML software. To use any product in the SAS System, sites first need base SAS software.

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

Rev 2 of 20/20 announced for MV/ series

South Natick, MA—Access Technology, Inc., has announced Release 2 of 20/20, the company's spreadsheet software for Data General's MV/ series computers.

Release 2 adds more than 50 en-

hancements to 20/20's spreadsheet, graphics, data base management, and project modeling facilities. It also improves 20/20's interface and gives the software greater compatibility with Lotus 1-2-3.

Enhancements to 20/20 include optional letter/number cell notation, advanced macro capabilities (including worksheet-based macros), new range commands (including Range Name), global and local rounding, an enlarged matrix, and worksheet password protection.

With Release 2, 20/20 can be easily integrated into a multi-user corporate environment. The expanded data import/export facility gives users the ability to access information stored in outside data bases or other application programs. Users can also run other software without leaving 20/20.

Prices range from \$9,800 on an MV/20000 to \$2,800 for an MV/2000 DC.

Access Technology, Inc., 6 Pleasant St., South Natick, MA 01760; 617/655-9191. Δ

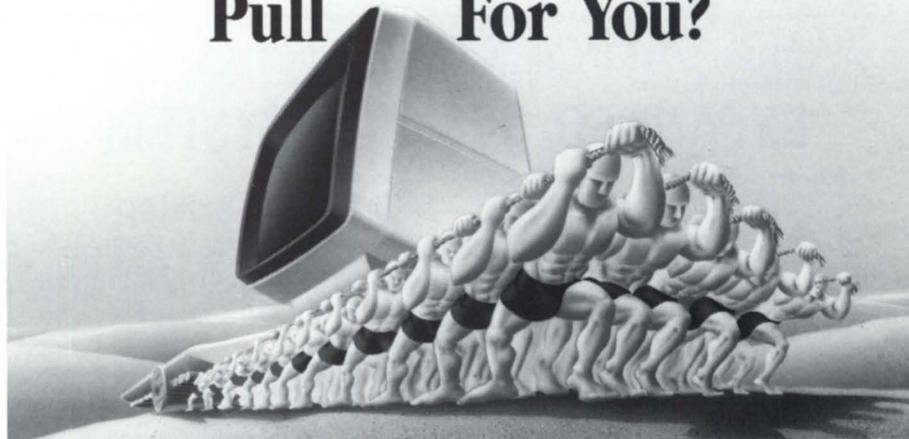
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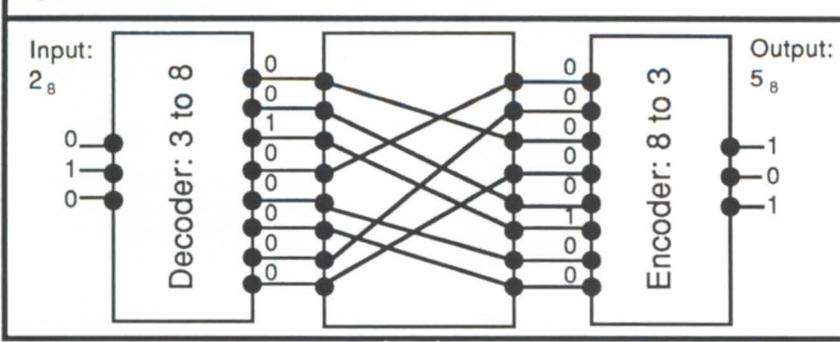
Computer Service, Inc.

263 Cox Street, Roselle, New Jersey 07203

(201) 245-8300

Circle 21 on reader service card.

Figure 5: S-box



(from page 53)

routine than it does to call a routine explicitly LINKed into the same ring. The good news is the difference is measured in microseconds. Look at it this way: the extra cost is about the equivalent of a single ADD 1 TO X statement per subroutine call. Hardly a significant percentage increase in CPU time. In fact, our experience is that it's barely measurable. In any event, look at the CPU time saved by the dramatic reduction in CLINK CPU time.

Third, there is a slight complication

in the case of *common* areas accessed by both the main program and the subroutines. They now have to be passed as arguments instead. In the case of COBOL, this means use of the EXTERNAL phrase has to be eliminated. So far, this has caused no problems, even when the inner ring routines need to access files opened by the outer rings.

Lastly, the use of inner rings introduces some complexities when attempting to debug the inner ring routines. My client's solution was to CLINK the

(from page 32)

Tune in again next month when Captain Video will describe current encryption techniques, and how they can help protect your AOS/VS system. Δ

Tom Gutnick is a Regional Systems Engineering Consultant in Data General's Washington, D.C., commercial branch. He specializes in system security and performance issues. He was the newsletter editor for the AOS and AOS/VS Special Interest Group from 1981 to 1984. He can be reached at 703/827-9600.

routine in with the ring 7 program when it needed to be debugged.

:NET_NET

Why aren't you all doing this? Δ

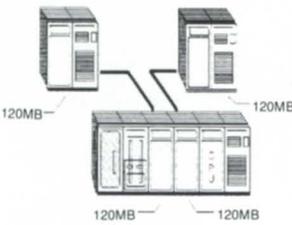
B.J. is the president of B.J. Inc., a San Francisco-based consultancy specializing in system auditing, system management, and performance analysis. He can be reached at 109 Minna St., Suite 215, San Francisco, CA 94105; 415/550-1444, telex 296544.



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Copies of WordPerfect Corporation's Library shipped since the middle of April include an integration toolkit. With it, users can integrate Library's electronic mail and office automation features so they can be called from within other applications. According to a WordPerfect spokesman, the company is supplying the toolkit as a "beta product." Although they don't have the facilities to thoroughly test it with a broad range of languages and applications, they will provide technical support if users have trouble. As of early May, users had successfully integrated Library with applications written in COBOL, ICOBOL, assembler, and Fortran. Information about the integration toolkit is included in the README. INSTALL file provided with Library. Users who purchased Library can get a copy of the toolkit by calling WordPerfect.

Commercial Systems Labs has sold its C/Script application development system to a group of former employees. Mark Painter, Sherie Vandervoort, Bob Head, and Alan Read, who were the technical team that supported C/Script, have formed a company named Threshold, Inc., to continue support and marketing for the product. According to Bob Head, "Those of us who have worked with the product want to make a concerted effort to be true to the market for which it was developed. We expect to maintain the same schedule of one to two new releases a year."

Based on its benchmark tests and in-house use of the MV/7800, Concept Automation, Inc. is telling its customers to expect the MV/7800 to perform pretty much like an MV/4000. "We attribute this lower than expected performance partially to the slower memory placed in the MV/7800 and heavy CPU support of terminal input/output," explains a report from the Sterling, Virginia, DG OEM. Although this may be a disappointment for anybody who expected to get the performance of an MV/8000, CAI points out that the MV/7800 just about matches the performance of an MV/4000 for half the price, and has 75 percent more memory capacity.

The Willamette Valley User Group is planning to start a library of public domain DG software. According to Scott Carr, the library will only be able

to distribute the programs on magnetic tape in the beginning, but they hope to be able to support uploads and downloads with BLAST or XMODEM in the future. Carr has already begun a collection of AOS/VS C code, and is encouraging anybody who would like to contribute programs to call him at 503/659-5880, or write him c/o Brod & McClung—PACE Co., 9800 SE McBrod, Portland, OR 97222.

Dave Clinton, the founder and president of Zetaco, has resigned to pursue personal interests. The new president is Richard D. Clasen, who joined the firm last year as vice president of marketing after a 19-year career with Control Data Corporation. Roger Young was promoted to vice president of sales for the 15-year-old, \$10 million company.

Clasen said Zetaco will continue to develop mass storage products for the DG-compatible marketplace, and is also evaluating new markets. Recently, the company began working with two other subsidiaries of the Carlisle Corporation that manufactures products for the Unisys and NCR markets.

Last month Zetaco named five authorized stocking distributors to supplement its inside sales force. The five are: Design Data Systems of Rockville, Maryland; S & S Electronics of Boston, Massachusetts; Cranel, Inc. located near Columbus, Ohio; System Technology Associates of Houston, Texas; and Interscience Computer Service, located near Los Angeles in Agoura Hill, California.

CSX Corporation, an \$11.5 billion conglomerate with worldwide operations in transportation, energy, real estate, and technology, has installed Data General's 200,000th computer. The milestone machine is an MV/20000 running CEO at the CSX headquarters in Richmond, Virginia.

At a luncheon commemorating the occasion, DG's vice president of North American sales, Frank Keany, said, "We're very pleased to have [CSX] as one of our more than 30,000 customers."

Games are sure to consume a major chunk of that public domain library. A recent check of the NADGUG electronic bulletin board sponsored by Rational Data Systems showed at least a dozen inquiries and offers to share Empire, Conquest, Zork, and Quest. Log

on to the board for details if you're one of those people who thinks that computers shouldn't have to live on a diet of all work and no play. Other hot bulletin board topics in recent months include improvements on DG's mail macro, a free VT52/VT100 emulator, and lots of opinions about various Dasher terminal emulators for all manner of personal computers. Check "On-Line Help" in this issue for information about logging on.

DG Service's Customer Support Center in Norcross, Georgia, wants NADGUG members to know that the CSC welcomes visitors. A visit usually lasts about three hours and includes a personalized overview of the Center's support functions and a guided tour with brief presentations by each department. A question and answer session with the CSC senior staff concludes the formal agenda.

To request a visit, contact your local DG branch office, or write Lee Rice at the CSC (1626 Jeurgens Court, Norcross, GA 30093) at least four weeks before your intended arrival.

Relational Technology Inc. has signed a joint development agreement with DG to make Relational's INGRES SQL Relational Database System available for MV/ processors and DS/7500 engineering workstations running AOS/VS. Relational will also enhance its 4GL and distributed data base products so they can be integrated with other DG products.

INGRES combines open-architecture distributed data base capabilities with integrated fourth generation application tools and a high performance SQL data base. It is available for a wide range of environments including PCs (MS-DOS), workstations, minicomputers, and mainframe systems.

Wild Hare Computer Systems has introduced a software package that can support up to three independent ICOBOL programs on a PC or compatible running MS-DOS. Called Multiple Choice!, the package lets PC users run program and data files developed for DG's interactive COBOL without modifications, translations, or recompilations. In addition to the main PC user, two other users may access the computer via dumb terminals and standard PC serial ports. Based in Boulder, Colorado, Wild Hare has priced the product at \$999.95. Δ

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LRS-10 has a unique, built-in feature called scrub/append that allows limited data changes, giving you a chance to update/finalize your files before they are recorded on the write-once-read-many optical unit.

For the full story on how to get on-line access to your archives, write Zetaco, 6850 Shady Oak Road, Eden Prairie, MN 55344 U.S.A., or call (612) 941-9480. Telex 290975. In Europe, 9 High Street, Tring, Hertfordshire HP23 5AH, England, (44)44282-7011 or telex 827557. Zetaco is a subsidiary of the Carlisle Corporation.

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