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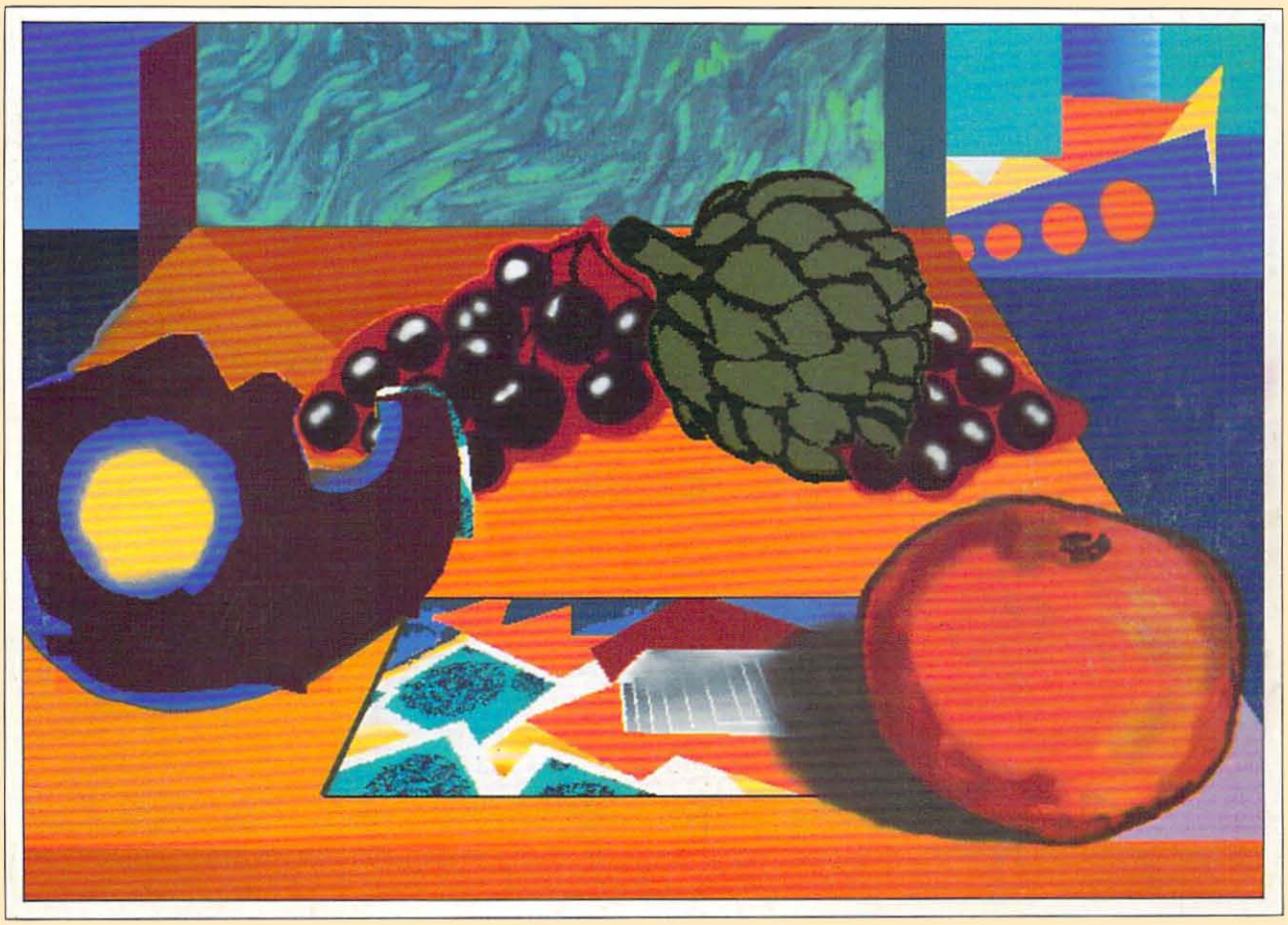

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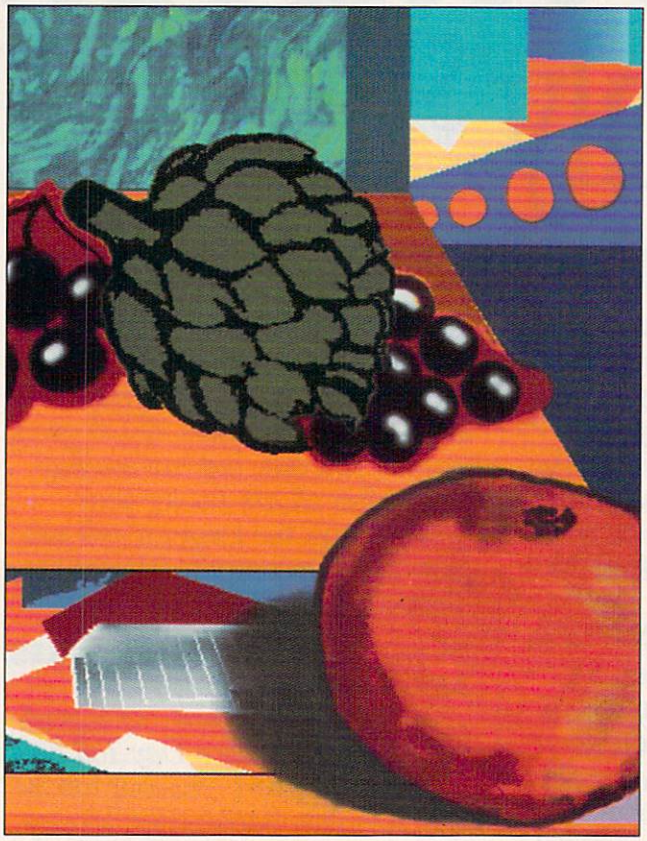

Artist Terry Rosen created Post-Modern Still Life *using* Lightspeed Design *software on a Sun Micro workstation. Recollections of a Cezanne tabletop—but is the table indoors or out? Even the postcard suggests the historically eclectic vocabulary of postmodernism. And what better way to express it than through that most postmodern of appliances, the computer?*

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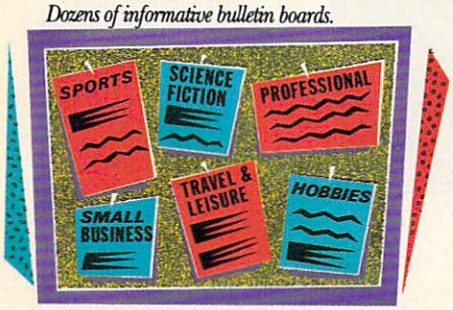

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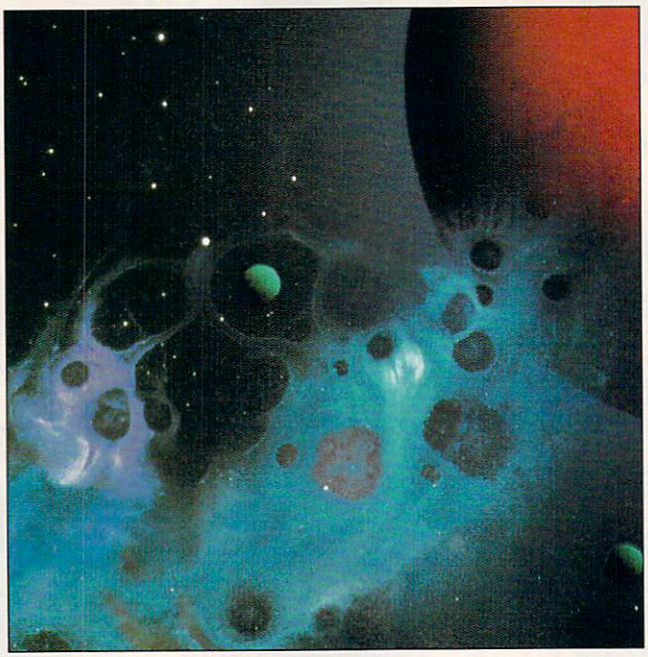

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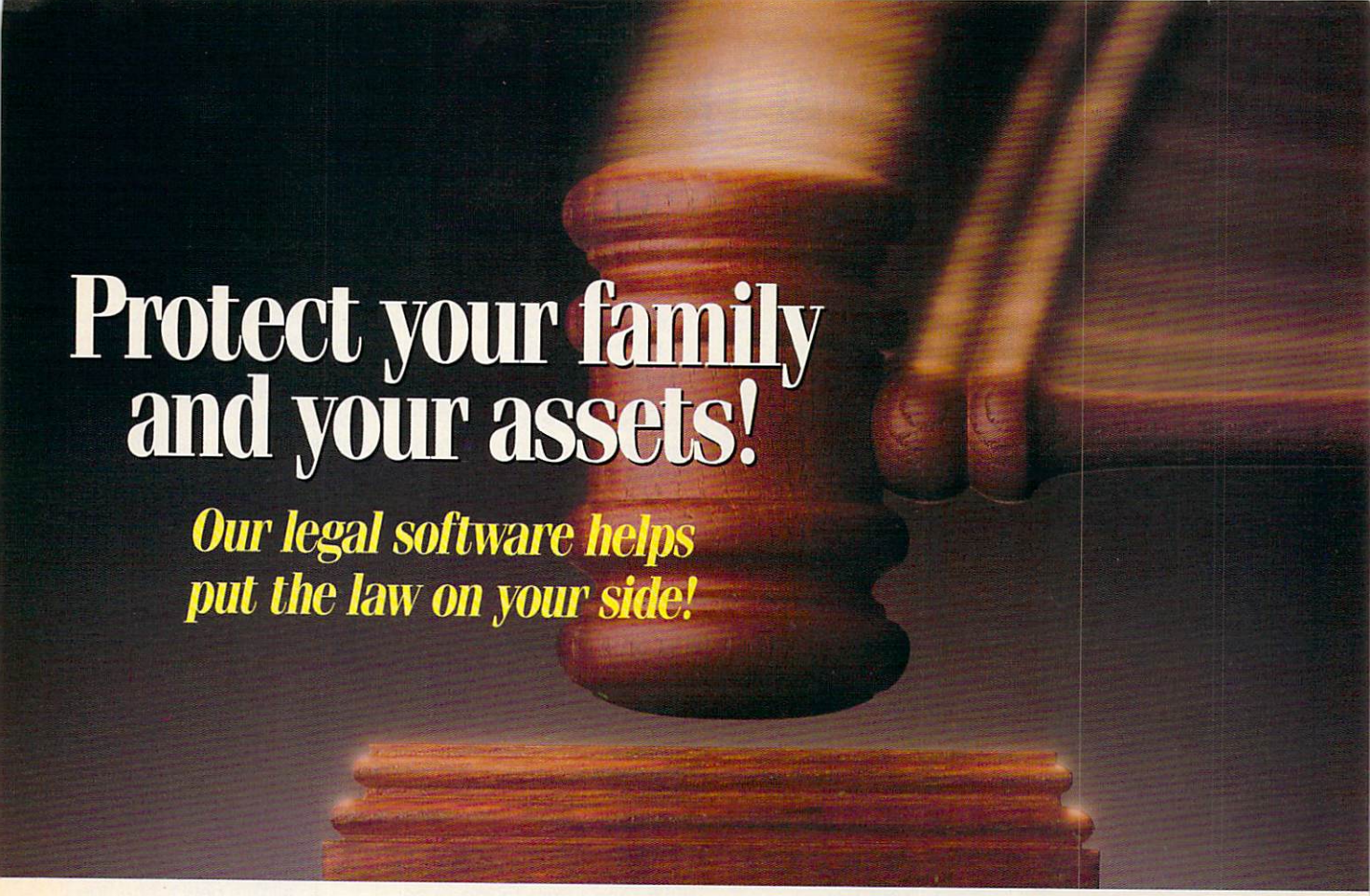

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EDITORIAL LICENSE

Peter Scisco

If you're familiar with Woody Allen, you might remember a scene from *Annie Hall* in which our intrepid but angstridden protagonist compares his current love relationship to a shark. "It has to keep moving forward," he says, "or else it dies." The joke comes when Alvie Singer closes his metaphor: "I think we have a dead shark on our hands."

It's a very funny line, first because of the incongruity of comparing love to a meat-eating fish (who can hear that line and not think of *Jaws?*) and second because of its small glimmer of truth.

Magazines, like sharks and love, also must move forward. (I think only network television reinvents itself faster.)

This issue of *COMPUTE* marks another stage in our evolution toward becoming a computer magazine of the nineties, which promise to be a decade in which value replaces vanity and activism replaces avarice. The personal computer can play an important role in all of this as the tool for people who've chosen to be active participants in the Information Age.

Our new presentation is designed to showcase the people and ideas that make *COMPUTE* the magazine it is.

Employers, coworkers, and neighbors look to *COMPUTE* readers for advice in choosing, evaluating, and buying computers, software, printers, and all the rest of the devices that complement today's sophisticated PCs. Industry analysts and researchers point to the consumer market as the fastest growing segment of the computer market. Just visit your neighborhood electronics store or the office superstore down the highway, and you're likely to see stacks of computer products laid out like so many stereos and typewriters.

The reasons behind this shift range from falling prices to changing social attitudes. Fully equipped 386SX PCs sell for under $1,900; 286-based PCs, low-end Macs, and hard-drive equipped Amigas sell for less than $1,000. Professionals looking for quality family time are choosing to bring work home or telecommute. Other workers, victims of a tight economy, are striking out on their own, using the PC as a support staff for a variety of home-based services and other businesses.

You might be an old hand at blazing trails through the often confusing and contradictory world of computer technology, or you might be new to the silicon jungle. But no matter where you fall in that range, one thing is certain—once you bring that PC home, your world unfolds into an expanding universe of possibilities.

In looking through this issue of *COMPUTE,* you'll see a lot of new images. But you'll also find some old favorites. For example, we've brought our COMPUTE Choice reviews back to the departments where they belong, where we can showcase these worthy products and give them the in-depth treatment they deserve. Our Test Lab section boasts a new design and layout. Inside, you'll still find the information and benchmark testing to guide you toward making the best buying decisions based on your needs, not on manufacturers' spec sheets.

Our Home Office department will continue to examine strategies to make you more productive with your PC, whether you're a home-based entrepreneur or running an extended office and telecommuting to company headquarters. In Discovery, you'll read of creative uses for the computer and learn how to use all this new technology to give your kids an edge in the classroom. In Entertainment, you'll get a close look at the latest in electronic games, from executive play toys to virtual reality.

Along the way, *COMPUTE* will showcase artists who are using computers to create the images, music, and writing that will define for the history books a generation of techno-savvy electronic eclectics.

The way people use computers and the possibilities of computer technology determine the shape of *COMPUTE.*

If you don't own the fastest, most powerful computer in the world, if you've used your computer only for word processing and number crunching, we'll help you upgrade your system and discover new uses like video, multimedia, and desktop publishing. If you use your computer in isolation, as a vessel of technology, we'll help you set sail into the world of telecommunications where you can join an armada of PC users who are exploring a new world of electronic communities. ❐

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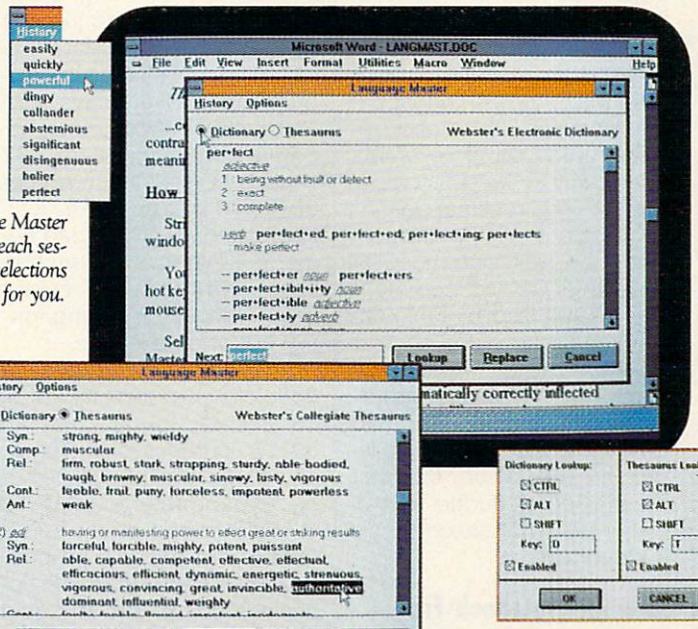

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NEWS & NOTES

Alan R. Bechtold

A Difference of Opinion

The federal judge who at first ruled Ashton-Tate's *dBASE* copyright claim invalid in 1990 has reversed his own decision. According to the *Wall Street Journal,* software publishers and industry legal eagles did a double take because such rapid reversals are a rarity in the U.S. judicial system. The reversal doesn't spell instant relief for Ashton-Tate, however, who must still defend its *dBASE* copyright in a lawsuit filed by Fox Software, publisher of the popular *Foxbase dBASE III*–compatible software packages and utilities. The decision should give Ashton-Tate a bit more legal ground when the suit reaches court. Judge Terry J. Hatter gave no reason for his sudden reversal.

Leading Edge hopes to live up to its name with the introduction of N3/SX and N3/SX20 notebooks.

Into the Notebook Fray

Until now, Leading Edge Products resisted the urge to enter the notebook PC market—but it couldn't resist forever. The company just unveiled the N3/SX and N3/SX20, its first two entries in the notebook market.

The new Leading Edge notebook PCs weigh just 6.9 pounds each. Both feature 9-inch diagonal sidelit triple supertwist LCD displays with 640 × 480 VGA resolution capable of generating 32 shades of gray. Each comes equipped with an 84-key keyboard with an embedded numeric keypad, 12 function keys, and inverted-T cursor keys with key spacing designed for ease of use.

The N3/SX features a 386SX processor running at 16 MHz and support for an 80387 coprocessor. It comes standard with 1MB of memory, expandable to 5MB, a 1.44MB floppy drive, and a 20MB hard drive. A proprietary slot is dedicated for an optional 9600-bps fax and data modem. The unit is powered by either an AC power adapter or ni-cad batteries. The unit retails for $2,595.

The N3/SX20 has the same features as the N3/SX with the exception of a 20-MHz processor and either a 30MB or 60MB hard drive. The 30MB version retails for $2,895; the 60MB version retails for $3,195. For more information, contact Leading Edge Products, 117 Flanders Road, Westborough, Massachusetts 01581; (508) 836-4800.

Apple Suit Broadened

According to Microsoft corporate spokespersons, Apple Computer wants to broaden the scope of its lawsuit against Microsoft and Hewlett-Packard to include Microsoft *Windows* 3.0. The original lawsuit, filed by Apple in March 1988, alleges that *Windows* 2.03, which was the *Windows* version on the market at that time, infringed on Apple's copyrights. *Windows* 3.0 was released in May 1990.

Microsoft claims the intent to amend the complaint was disclosed in a phone call from Apple's general counsel. Since the original filing of the lawsuit, Microsoft maintains that it hasn't infringed on any Apple copyrights and that it will continue to fight these allegations vigorously.

More Troubles for Microsoft?

Lawsuits from Apple aren't the only things Microsoft has to worry about lately. According to Microsoft officials, the staff of the Federal Trade Commission has decided to expand the scope of its nonpublic investigation of the company. The FTC plans to examine third-party allegations that Microsoft "has monopolized or has attempted to monopolize the market for operating systems, operating environments, computer software, and computer peripherals for personal computers."

Until April 10 of this year, the focus was on an alleged horizontal agreement between Microsoft and IBM. The agreement was purportedly reflected in a joint press release issued at Comdex in November 1989. That press release discussed future directions of OS/2 and *Windows.*

Reconcilable Differences

You want to buy a Sharp Electronics Wizard palmtop organizer to help you stay on schedule, but what will that mean for the schedule on your desktop PC? Will you be forced to keep *two* computer schedules updated and reconciled? The answer is *No,* thanks to Borland's *Sidekick* 2.0 and the new Sharp Organizer Link II.

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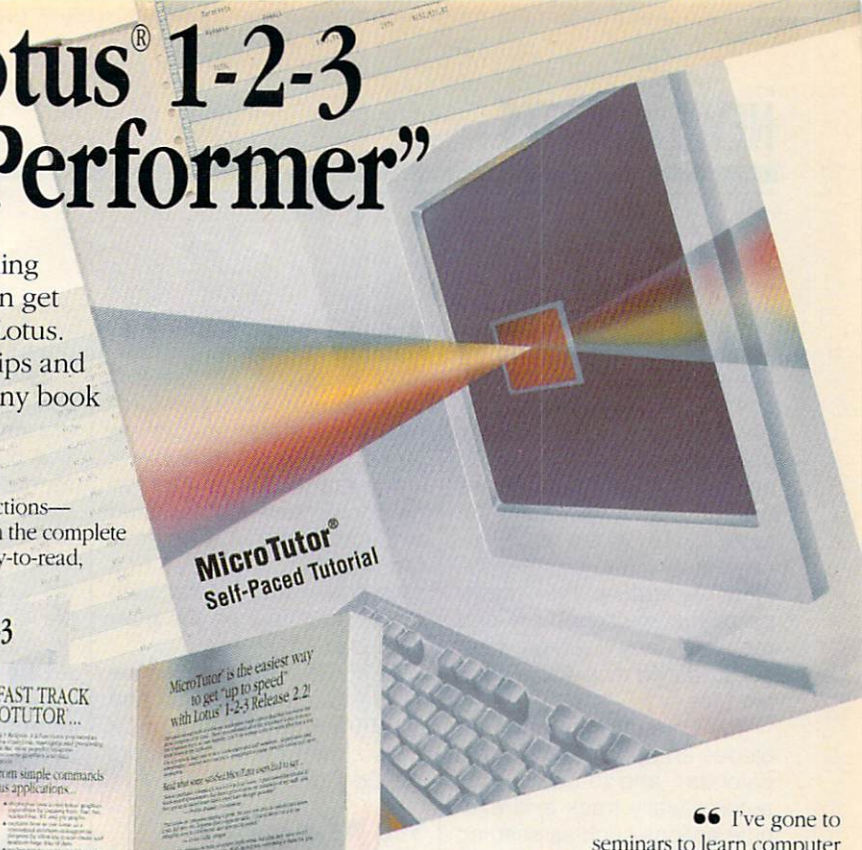

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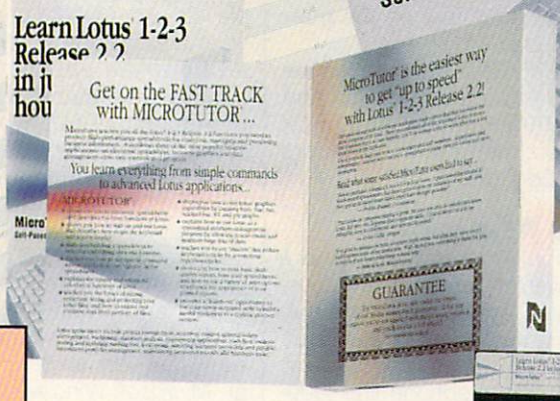

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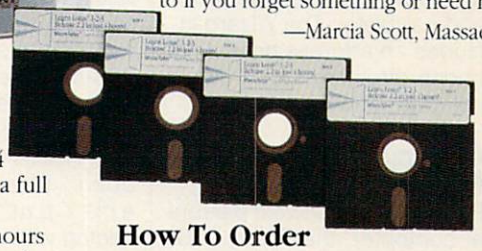

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Circle Reader Service Number 201

with a cable included with the Sharp Organizer Link II package for connecting palmtop organizers to desktop PCs. Special software, which is loaded on the desktop PC, manages the transfer of schedules directly into *Sidekick*'s Time Planner feature. Sidekick's Reconciliation feature then compares the two schedules and reconciles any discrepancies, consolidating them into a common file.

The Time Planner, which includes an appointment book, calendar, and to-do list, can automatically track and execute actions such as sending MCI Mail messages or activating a pager. In addition to the Time Planner, *Sidekick* has an address book, notepad, and calculator. The Wizard includes an address book, telephone directory, world clock, notepad, and calculator.

A Home Computer That Means Business

Radio Shack's newest personal computer, the Tandy 1000 RLX, is a home computer designed to meet the demands of many small businesses. This IBM-compatible PC carries the extra power of a 10-MHz 80286 microprocessor and one 3½-inch 1.44MB floppy drive. A second 3½-inch drive bay accepts either a floppy drive or a 20–40MB hard drive. The system also has one PC-compatible expansion slot.

The 1000 RLX includes Tandy's *DeskMate* and *DeskMate Home Organizer*'s 24 easy-to-use home management applications. Pull-down menus and pop-up dialog boxes, along with the point-and-click convenience of Tandy's mouse, permit quick and easy performance of most tasks. Both the hard and floppy disk configurations include high-resolution VGA graphics, a voice message option in *DeskMate*'s Information Center, a two-button mouse, two joystick connectors, microphone and stereo headphone jacks, and a realtime clock with battery backup. All internal components are designed to function without an internal fan, meaning the 1000 RLX runs cooler and quieter than most computers on the market today.

Suggested retail prices are $799.95 for the 1000 RLX and $1,199.95 for the 1000 RLX hard drive model. Monitors are additional.

900 Ways to Fix It

Epson America has found a convenient way to charge customers for help with the installation, configuration, and operation of their computers. A new 900 telephone line (900-988-4949) supplements the end-user assistance regularly provided by Epson authorized resellers. The 900 line is open Monday–Friday, 10 a.m.–7 p.m. Callers are connected with an Epson support representative after a prerecorded message, which states that after an initial minute of free time, the caller will be billed at a rate of $2 per minute.

End users who need assistance locating the nearest Epson Customer Care Center should call (800) 289-3776.

IBM Goes to Hollywood

The latest Hollywood premiere isn't an action-packed star-studded motion picture. It's IBM's new presentation graphics software. Dubbed *Hollywood,* the package allows business professionals to create high-quality hardcopy, transparencies, slides, and onscreen presentations.

Hollywood runs in *Windows* 3.0. Text- and graphics-based presentations are easily created using the program's integrated outliner, templates, color schemes, fully scalable fonts, and charting, drawing, and painting tools. The program also features a sophisticated screen-show capability. A spreadsheetlike interface makes entering data for presentations easier, and the runtime screen-show module lets users create presentations that include sophisticated transition effects, which can be distributed and displayed without *Hollywood* but still within licensed use.

Hollywood requires an IBM PC, PS/2, or IBM-tested compatible with at least an 80286-based processor (386 or higher is recommended), a hard drive, and 1.6MB of RAM (2MB or more is recommended); DOS version 3.3 or higher; *Microsoft Windows* 3.0; an IBM or Microsoft mouse or compatible; and any *Windows* 3.0–supported color video adapter. Suggested retail price is $495.

For product information and a demonstration disk, call (800) IBM-7699.

Too Much Silicon?

What could be more perfect for the beach than a computer made entirely of sand? World-famous sand sculptor Todd Vander Pluym created the sand computer as a stage for an international awards presentation honoring technical computer solutions. The idea was a natural. "The raw material of the silicon chip—the foundation of the modern computer—is sand," said Vander Pluym. Unfortunately, the computer isn't exactly portable, weighing about 25 tons. The all-sand work of art was also doomed to break down quickly, but fortunately it held up long enough to stage the awards ceremony.

Recipients of the 1991 CSC Technical Excellence

WORDTRIS

Another Eastern block falls.

There's a new 'TRIS on the block. Its name is WORDTRIS. And if you love TETRIS, this latest fast-action, falling block, Soviet game will boggle your mind.

This time the falling pieces are letter blocks. Form them into words and score points. As each block falls, it pushes down the blocks below, producing an ever-changing kaleidoscope of letters where scoring opportunities appear - and vanish - at the blink of an eye.

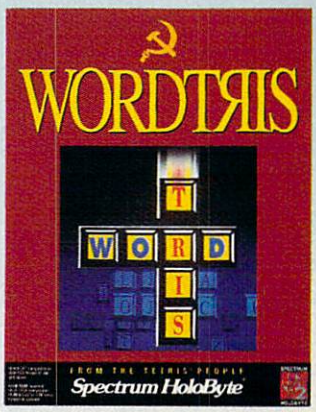
Go for XYLOPHONE if you dare.

Create words horizontally or vertically, but don't put all your E's in one BASKET. Because every time a word lines up, *poof!* those letters disappear, and the blocks below pop up to fill the spaces. So whenever you earn points you stir up the alphabet soup. And suddenly that falling M has no HOME to go to.

WORDTRIS keeps raining vowels and consonants until you've collected enough words to move to the next level, or the well fills up. Of course, each successive round ups the ante as the blocks fall ever faster. But you can choose your difficulty level to match your skills, and select from single player, cooperative, competitive, head-to-head or tournament modes. The built-in 30,000 word dictionary verifies even the most obscure word.

Set the difficulty level at 10 and you'll find WORDTRIS harder to keep up with than the changes in Eastern Europe.

WORDTRIS. Another great game from the TETRIS people.



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Circle Reader Service Number 152

Awards were Robert Heppe of Washington, D.C., who helps the United States keep tabs on satellites—where they are and where they're going; Paul Gustafson of Chicago, Illinois, who helps industries cut costs by increasing workloads on their existing mainframe computers; Luc Mercier of Brussels, Belgium, who helps governments and international industries track down bugs, viruses, and other problems in computer networks; Eric Booth of Lanham, Maryland, who has discovered ways to stretch the life of satellite software through reuse; and Paul Chapman of Belmont, Massachusetts, who employed higher mathematics to reduce the amount of steel used in manufacturing processes.

Travel Agent on a Disk

If you've had it with red-eyes or 500-mile flights that should only take an hour but require four connections and three layovers, don't despair. Now you can figure out your own flight itinerary and then have your travel agent book the flights and make all the other necessary arrangements.

Now you can view more than 250,000 direct and single-connection flights to and from 1200 destination cities right on your own PC, without a modem. *Flight Disk*, from Official Airline Guides (OAG), is a collection of floppy disks featuring information on direct and connecting flights for the most frequently traveled city pairs in the United States, Canada, Mexico, and the Caribbean.

The computer makes all the information—over 700 pages' worth—contained in the *OAG Desktop Flight Guide* for North America available electronically at a glance. Previous editions of *Flight Disk* contained schedules for about 110,000 flights and 600 destinations.

Flight Disk is offered on a subscription basis for a yearly fee of $199 plus $15 for postage and handling, or $99 plus postage and handling for subscribers to the *OAG Desktop Flight Guide*, North American edition. New issues are published monthly.

Anyone interested in a free 30-day trial of *Flight Disk* can call (800) 323-3537.

One Million Served

Borland International's *Quattro Pro* spreadsheet software is selling like hot cakes. Since its introduction nearly two years ago, over 1 million copies of the program have been sold.

The growing worldwide spreadsheet market might account for some of Borland's success with *Quattro Pro.* Winning an unprecedented 37 international industry awards doesn't hurt, either. Since 1989, Borland's share of the worldwide spreadsheet market has grown from 8 percent to 20 percent. In the U.S., its share has doubled, growing from 12 percent to 24 percent in the same time period.

Check Out *This* Palmtop

Just when you thought computers couldn't get any smaller, Hewlett-Packard unveils a new palmtop PC that's about the size of a standard checkbook. Weighing just 11 ounces, the 95LX comes with DOS 3.22, *Lotus 1-2-3*, and an array of organizer tools, all loaded in ROM and ready to use. Other very useful features include an advanced financial calculator and communications capabilities.

The 95LX has a QWERTY keyboard and uses credit-card-size memory cards to store data. A modem port and printer port are also included. It retails for $699.

Credit-card-size memory cards store data in Hewlett-Packard's new palmtop.

For more information, contact Inquiries Manager, Hewlett-Packard Company, 1000 NE Circle Boulevard, Corvallis, Oregon 97330; (503) 752-7736.

TV for Computer Lovers

Serious computer users are often too busy watching their monitors to spend much time watching television. When the subject is computers, however, it's a different matter. The PBS series "Computer Chronicles" is apparently one of the best television programs around with a focus on computers. The program was recently named Best Computer Television Program of 1990 at the Sixth Annual Computer Press Association Awards. The show won out over some tough competition, including ABC's "Business World" and CNN's "Future Bytes."

Alan R. Bechtold is editor of *Info-Mat Magazine*, an electronic news weekly published by BBS Press Service. ❐

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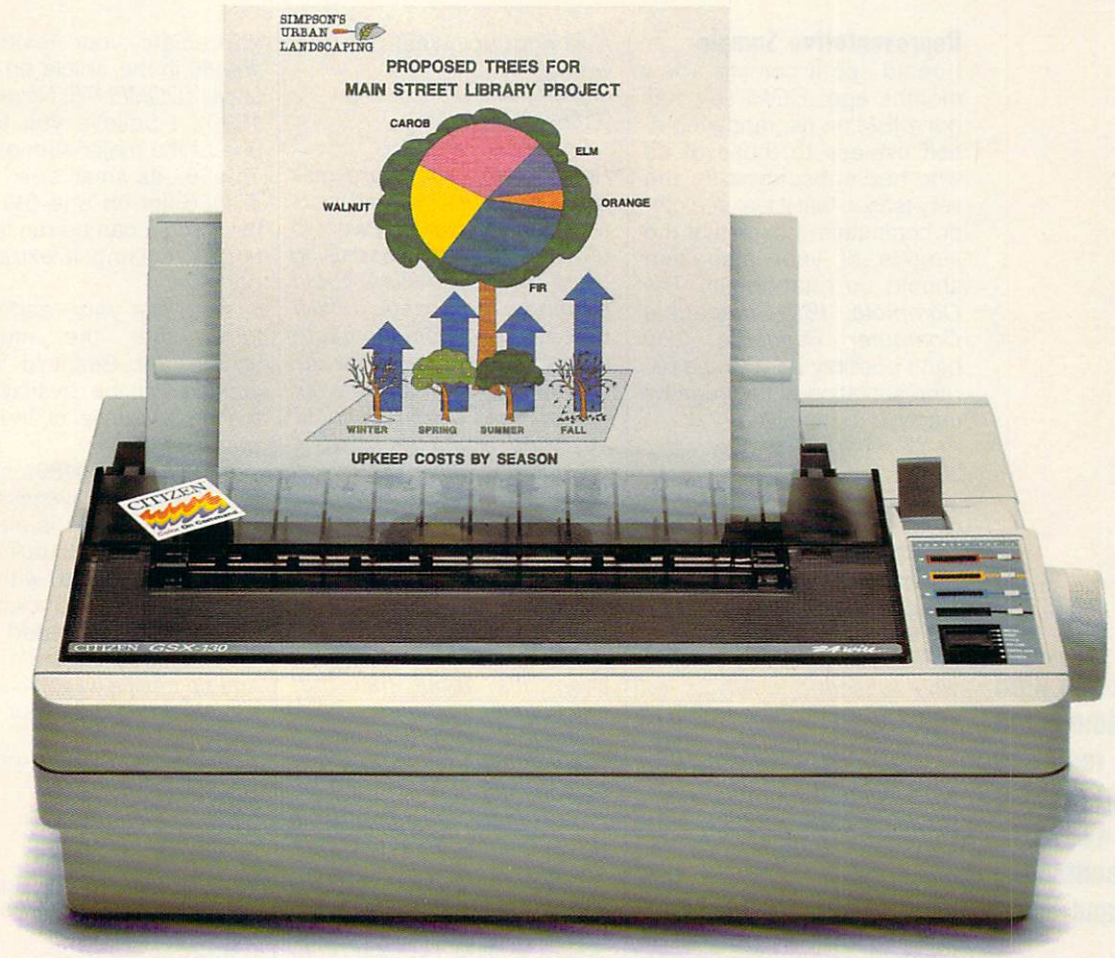

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Circle Reader Service Number 166

FEEDBACK

Amiga and 8-bit Commodore coverage, removing bad sectors, using GETs and PUTs, contacting GeoWorks, and more.

Representative Sample

I could see it coming a few months ago: *COMPUTE* has gone IBM on us, rendering itself useless to those of us who had subscribed for the very reason that it featured other computers. I think that the subtitle of your magazine should be changed to *The Complete IBM-Compatible Computer Resource*. You can't possibly be giving a fair representation of the negative mail you're receiving.

LELAND JONES
DALLAS, TX

COMPUTE *still covers the Amiga and 8-bit Commodore computers. Issues of* COMPUTE *are created for these computers in a very complex binding process and sent to readers who subscribe to Amiga Resource or Gazette. If you're not getting the issues you want to read, write to us, and we'll notify the subscription service that you want your subscription changed. Or for more rapid response, call (800) 727-6937 and request that your subscription be changed to the multiple-subscriber edition. We try to publish a representative sample of mail in "Feedback," as well as letters that will be helpful to other readers. It's true that we receive some letters from Amiga and 8-bit Commodore owners confused by the changes in* COMPUTE. *Thanks for giving us the opportunity to explain how we handle the special sections.*

Hard Disk Headache

When I run CHKDSK on my 20MB hard disk, it shows 98,304 bytes in bad sectors. Will a reformat of the hard drive remove the bad sectors? Also, when I first purchased my computer, it would automatically boot from the C drive. Now it requires a system disk in drive A to boot up. What did I do wrong?

ALFRED M. BELL
ARLINGTON, VA

Reformatting your hard disk won't eliminate the bad sectors, and you wouldn't want to eliminate them because using those marginal sectors could endanger your data. Hard disk manufacturers thoroughly test their products for defects and areas that may not reliably hold data. If defects are found, a bad track map is created and affixed to the top of the drive. During low-level formatting, those marginal areas are roped off so no data can be stored there.

Bad tracks usually comprise less than 1 percent of a disk's total surface—in your case, it's about half that much. In the normal course of operations on a hard disk, a few bad sectors are nothing to worry about.

Your inability to boot from drive C indicates that, for some reason, your system has lost the information that tells it drive C is a boot disk. This is a fairly common problem. The easiest solution is to use a commercial disk-utility program to identify and repair the problem. No hard disk owner should be without such software.

It also may be possible to repair the damage on your own, but first make a backup of the hard disk for safety. Next, boot from a floppy disk and use the command SYS C: to place new copies of the system files on the hard disk. If this fails to get your hard disk back to normal, you'll have to reformat the disk to make it bootable again. Before going ahead, make sure you have backups so you can restore your data.

Up a Tree

We at the Aldridge Company appreciate your review of *Tree86* in the article on DOS shells (*COMPUTE*, November 1990). I believe you found one of the major strengths of *Tree86*—its small size. All of *Tree86* fits on one 5¼-inch disk, and it can be run from a floppy, making it extremely portable.

We'd like your readers to know that the multiple screens Mr. Bechtold found lacking will be available in the next release of the program.

Another of *Tree86*'s strong points is its intuitiveness and ease of use. This is accomplished through its pull-down menus accessed with hot keys. The fact box included in the article indicated that *Tree86* used function keys and no menus, which is an error. We'd like to let your readers know.

VALERIE BURSON, VICE PRESIDENT
THE ALDRIDGE COMPANY
HOUSTON, TX

In Search of Works

I need the phone number and address for GeoWorks.

E. WILLIAMS
HUNTINGTON BEACH, CA

The address is GeoWorks, 2150 Shattuck Avenue, Berkeley, California 94707. The telephone numbers are (800) 772-0001 for orders and (415) 644-0883 for the company's offices.

You Put What You Get

I can't figure out how to use GET and PUT in GW-BASIC. Also, I'd like to create a menu that will pop up and then disappear. How can I do that?

SETH FULMER
PALM, PA

This little program will grab whatever is in the upper left corner of the screen and smear it in various ways across the screen (note that you have to type or draw

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Circle Reader Service Number 181

something in the upper left corner for this program to work). The PSET, XOR, and OR options were used with PUT. You could also use the AND and PRESET options. Note that you have to dim an array variable to use it with GET, but when you use GET and PUT, you leave off the subscript.

The second half of the program creates a menu and services it. Of course, a menu program like this only works while BASIC is running. If you want to create a similar program that would work in DOS, you should create it in C or a compiled BASIC.

```
10 DIM A%(1000)
20 SCREEN 2
30 GET(0,0)-(123,123),A%
40 FOR I = 0 TO 75
50 PUT(I,I),A%,PSET
60 NEXT
70 FOR I = 0 TO 75
80 PUT (75+I,75-I),A%,OR
90 NEXT
100 FOR I = 0 TO 75
110 PUT (150+I,I),A%,XOR
120 NEXT
130 CLS
140 PRINT CHR$(201);:FOR I = 0
   TO 11:PRINT CHR$(205);:
   NEXT:PRINT CHR$(187)
150 PRINT CHR$(186)+"1. Go to
   DOS"+CHR$(186)
160 PRINT CHR$(186)+"2. Exit
   menu"+CHR$(186)
170 PRINT CHR$(200);:FOR I = 0
   TO 11:PRINT CHR$(205);:
   NEXT:PRINT CHR$(188)
180 GET(0,0)-(144,32),A%
190 CLS
200 PRINT"press any key to show
   menu"
210 A$ = INKEY$
220 IF A$="" "THEN 210
230 CLS
240 PUT(0,0),A%,PSET
250 A$=INKEY$
260 IF A$="" "THEN 240
270 IF A$="1"THEN
   CLS:SHELL:CLS
280 IF A$="2"THEN CLS:END
290 GOTO 250
```

PC or Not PC

In the January 1991 issue of *COMPUTE,* in the "Feedback" column, you stated that TSR-management programs called *Mark* and *Release* were published in the January 1990 issue of something called *COMPUTE!'s PC Magazine.* Is that something different from *COMPUTE?* I'm interested in the disk you mentioned. Please get me more information.

THOMAS C. SKIDMORE
SALT LAKE CITY, UT

Up until May 1990, COMPUTE published four separate magazines: COMPUTE!, COMPUTE!'s PC Magazine, COMPUTE!'s Gazette, *and* Amiga Resource. COMPUTE!'s PC Magazine, *along with the others, was "folded into"* COMPUTE *when COMPUTE Publications was purchased by General Media.* COMPUTE!'s PC *was a bimonthly magazine-disk combination.*

For any past issue of COMPUTE!'s PC (including disk), send an $8 check or money order payable to COMPUTE. The address is COMPUTE Single Copy Sales, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Specify that you want the January 1990 COMPUTE!'s PC *and disk.*

Readers whose letters appear in "Feedback" will receive a free COMPUTE's PC clock radio while supplies last. Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to COMPUTE's Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that we cannot provide personal replies to technical questions. ❐

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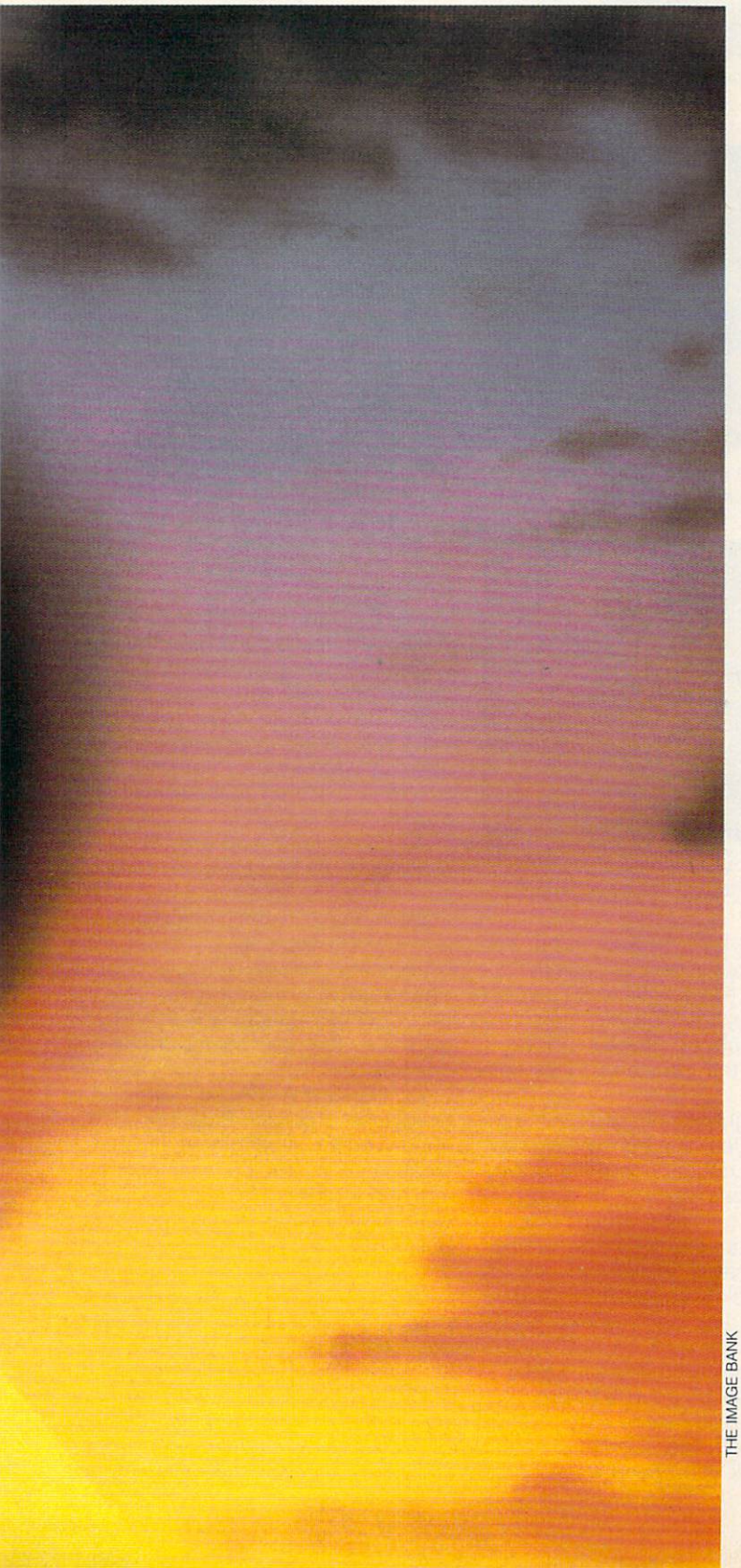


THE IMAGE BANK

BRAIN WAVES

BY SHERRY ROBERTS

We've heard that the computer is an educational tool for so many years that it's almost a cliché. But the next generation of education programs—called *online education* or *computer-based distance learning*—is anything but dull and hackneyed. This is education on the brink—technology tapped and harnessed to bring learning to people who are too busy to attend traditional school or who don't have access to conventional campus environments.

For example, an American soldier enrolled in an online college course at NOVA University in Florida continued to file assignments and attend electronic classrooms via his computer while stationed in the Persian Gulf.

"The whole goal is to reach as many people as possible with quality instruction," says Margaret Morabito, founder of the Computer-Assisted Learning Center (CALC), which offers continuing education, self-enrichment, and college-level courses for long-distance students of all ages on the online service GEnie. "There are so many barriers to learning in the offline world. Online is an excellent medium for overcoming those barriers."

In the offline world, there are businesses with inflexible hours, jobs with strenuous travel demands, and children that require babysitters. For the handicapped, the offline campus may be a chore to navigate. For students living in out-of-the-way locales—a ranch in the Australian outback or a small burg in Alaska—the offline campus may be hundreds of miles away.

Although online education appeals to a broad spectrum of people, from elementary students to senior adults,

the greatest growth in this area has been undergraduate and graduate computer-based degree programs for working men and women.

Now a Fortune 500 executive can finish her doctoral degree without ever setting foot in a classroom; she can do her homework between business meetings or on a flight to Japan; she can attend class from a hotel room half a world away—as long as she packed her computer and modem.

Online education can be as unstructured as someone putting out a call for help with homework on CompuServe's Student Forum or as rigid as one of the curriculum-based degree programs offered by schools such as the University of Phoenix, NOVA University, or the New York Institute of Technology.

The whole concept of computer-based distance learning is so new that everyone involved is a pioneer. No two educational institutions have organized their programs the same way. The only common denominator is the use of computer and modem.

CALC, for example, requires students to attend something called *real-time classrooms.* Unless a student has a medical or technical excuse, the student is expected to meet with the instructor and other students online at an assigned time. The University of Phoenix, on the other hand, does not require online students to log on for a specific class; students log on and off at their convenience to retrieve assignments, turn in homework, and confer with the teacher or other students.

NOVA University teams teleconferencing in the electronic classroom with videotapes of live classrooms and attendance at on-campus institutes.

The cost of CALC courses ranges from free to $40, plus connect time at $6 an hour. Tuition for online courses offered by accredited universities ranges from $100 to $250 per credit hour. Some programs charge an additional communications fee, which covers course and access setup and online hours; others allow students to purchase blocks of online hours.

School supplies are high-tech but basic: a computer (any kind), a modem, and telecommunications software, usually provided by the school. Online courses also require textbooks just like their campus counterparts.

On Your Schedule

Flexibility—the ability to attend class wherever and whenever they wish—is the main reason students enroll in online degree programs.

Lorraine Wright, an internal auditor for AT & T in Atlanta, Georgia, says the online program of the University of Phoenix was the only way to get her master's degree in business administration. "My job requires 50 to 80 percent travel, but now that I have a laptop, I can go to school. There's no way I could make the traditional classroom setting."

Prodigy provides online Weekly Reader *to give younger users news and fun.*

Science is one general interest area that's attractive to both kids and adults.

No mystery: you can always find Carmen Sandiego on Prodigy, teaching geography.

When Wright first heard about computer-based learning from a coworker, she had her doubts about the quality and the serious intention of such programs. She quickly learned, though, that online learning is no easy cruise.

She estimates she spends 15–20 hours a week studying offline—five hours of reading each weekend and 12–13 hours of work on two papers due each week. The first six weeks of class, she downloaded 500 pages of class material and student comments. "Because of the communication mode, I think you spend more hours per week on classwork [than in the traditional classroom course]," Wright says. "But that is the price you pay for flexibility."

Students also choose online courses because of the diversity of their classmates. The computer has facilitated the creation of truly global classrooms where students from Singapore study with students from Seattle and the student in the electronic desk next to you could be an airplane pilot, a CEO, or a retired schoolteacher.

"I like the networking with classmates," Wright says. "I've met people in my class from all over the United States from different companies and backgrounds. If I were in any of their towns, I'd feel comfortable enough to call them up and visit with them."

Students and teachers alike say there is a noticeable lack of shyness in electronic classrooms. "It is a very liberating and democratic environment," explains Tom Bishop, director of marketing for the University of Phoenix Online program. The university, which has 13 campuses throughout the Southwest, began offering computer-based degree programs in 1989.

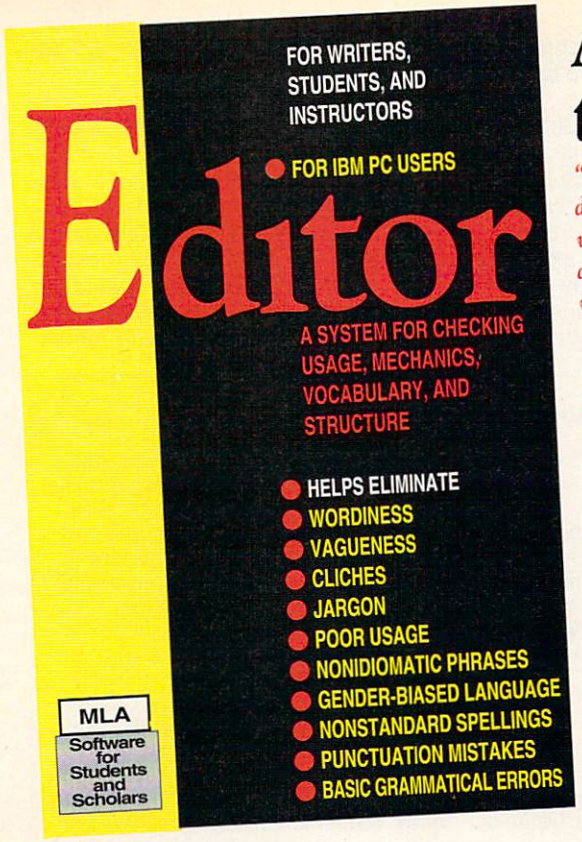
"It is the content of the student's contributions that is important," Bishop says, "not the student's physical characteristics."

CALC's Morabito agrees, "When you're online, you don't have the physical presence, the facade that you must put on. No one knows that you didn't dress up to come to class or that you're handicapped and in a wheelchair or what kind of car you drive. Everyone is treated on the same basis, and it opens people up."

As computer-based education has developed, participants have noticed indirect benefits; students report a dramatic increase in communications and analytical thinking skills. The logistics of attending class via computer discourages rambling monologues (on the part of either student or teacher) and eliminates the potential for off-the-cuff answers.

Dr. Edward A. Becker, director of Graduate Accounting Programs at NOVA University, describes four communication skills: reading, writing, speaking, and listening. He theorizes that today's highly technological and complex work environment requires a fifth communication skill: computer literacy.

Students taking computer-based courses, by necessity, learn how to use a computer. Few of them are hackers. Often they turn to their teacher or fellow students for help when technology is about to get the better of them. Schools provide students with support while they learn the basics of comput-



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A CAI–CMI Journal for Community Colleges

Editor, a new style checker from the Modern Language Association, helps writers eliminate problems such as wordiness, poor usage, and punctuation errors—over 16,000 common writing problems in forty categories. Used for eight years in college writing labs, *Editor* enables both students and experienced writers to improve their composition styles.

Unlike other editing software, *Editor*'s text-analysis system emphasizes thoughtful revision, not quick fixes; *Editor* helps writers improve their research papers, as well as their everyday correspondence.

Users simply exit from their word processors and then run *Editor* from DOS. (Users need only a basic familiarity with DOS commands—e.g., copying and renaming files, formatting disks, creating a subdirectory on a hard disk.)

Writers who use *Editor* learn to avoid problems in their own writing and gain a better understanding of stylistic principles. Among *Editor*'s many convenient features:

- *Editor* is menu-driven, fast, and easy to use.
- Contextualized online reference help is available with a keystroke.
- A 128-page manual offers samples of incorrect and proper usage and mechanics.
- Usage dictionaries can be modified and expanded by the user.
- Users can create and run additional usage dictionaries.

Writing Sample as Formatted by *Editor*

<1> Literature professors are caught up in a historical motion that challenges them to confront ethical questions raised by their teaching practises.

<2> Some writers claim that critical theory's day has past it's zenith; others complain that alot of students have read "more works on theory than works of literature".

<3> Those who teach theory in the classroom claim that each and every student should have a conscious awareness of the ideologies underlying works of literature.

<4> In the case of the universities, this is leading to a situation in which the two sides are becoming more completely polarized, to say the least.

Editor's Analysis of Writing Sample

```
FIX
  <2> has past
      POSSIBLE COMMON PHRASE MISSPELLED; "passed"? [m]
  <2> it's
      POOR USAGE; contraction or misspelled possessive [U]
  <2> alot
      SPELLING ERROR; and note that "a lot" is informal [l] [s]
  <2> ".
      MISPLACED QUOTATION MARKS [q]

TIGHTEN
  <3> each and every
      TAUTOLOGY [T]
  <3> conscious awareness
      TAUTOLOGY [T]
  <4> in the case of
      WORDY PHRASE [W]

POLISH
  <1> practises
      NONSTANDARD SPELLING [n]
  <4> this is
      POSSIBLE VAGUE DICTION; can you clarify "this"? [V]
  <4> to say the least
      OVERWORKED OR TRITE PHRASE [O]

CONSIDER
  <1> historical
      COMMONLY MISUSED TERM; "historic" means notable [M]
  <2> critical
      COMMONLY MISUSED TERM; "crucial"? [M]
  <4> more completely
      POSSIBLE ILLOGICAL EXPRESSION [X]
```

Editor has four usage dictionaries: FIX, TIGHTEN, POLISH, and CONSIDER. Many users run FIX first, since it catches the most egregious errors.

Bracketed codes refer users to online help and to samples in the manual.

Writers who find that Editor *flags a term they always use correctly may delete that term from* Editor*'s usage dictionaries. A scholar who often writes about critical theory, for instance, may want to remove the term "critical" from the CONSIDER dictionary.*

THE AUTHORS

Elaine C. Thiesmeyer
Rochester Institute of Technology
John E. Thiesmeyer
Hobart and William Smith Colleges

EDITOR READS FILES PRODUCED BY MANY WORD PROCESSORS

Editor can read texts produced by

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- MULTIMATE 3.3+
- NORTON TEXTRA WRITER 2+
- NOTA BENE
- PC-WRITE
- WORDPERFECT 4–5+
- WORDSTAR 3–5+
- XYWRITE
- many others

Editor can also read standard ASCII text files.

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er use—from how to log on to the school's system to how to get a transcript of last week's session from the school's library.

The Price for Flexibility

The most commonly heard complaint about online education is the lack of the "warm fuzzy factor" and face-to-face interaction. Participants miss the human touch and sometimes dislike dealing with an inanimate object.

Schools say they make a special effort to maintain contact with students in online programs so that they feel neither stranded nor isolated. When students yearn for the sound of the human voice, they frequently pick up the telephone and call classmates and teachers. Several members of a University of Phoenix study group that live in New England drove to a mutually convenient location for a get-together.

"It is much warmer and more human than most people would expect," Bishop says. "Humor comes through even in the typewritten word."

NOVA University solves the problem by integrating into its programs chances for students to meet their online classmates and mentors in person. NOVA requires master's and doctoral students to attend either week-long institutes or weekend seminars in Fort Lauderdale, Florida. NOVA students and teachers also rub elbows at symposia held every three months at regional sites, such as Phoenix, Cincinnati, Atlantic City, and Jacksonville.

Degrees of Value

The New York Institute of Technology started the American Open University, its computer-based distance learning program, eight years ago. Dr. Ward Deutschman, director of the American Open University, says today the program is "clearly a success."

He says his online programs have only a 10–15 percent attrition rate as compared to the 50–80 percent attrition rate ordinarily found in traditional distance learning programs or correspondence courses.

Interaction is the element that makes online learning more than a modern day correspondence course. "We have found that connectivity between student and faculty, the fact that a student can get a response to his question in a day or two and that he is expected to interact online, makes a difference," Deutschman says.

Even if the computer does help keep some students in school, so to speak, is it all for naught? Are degrees earned via computer considered as valuable as those earned on campus?

Deutschman admits that the traditional world of academia has yet to welcome computer-based education with open arms.

"Some institutions that haven't been involved with distance education look at anything different with a jaundiced eye," Deutschman says. "The plus side of this is that institutions offering distance learning are really attending to the quality of instruction they are giving. They are investing enormous amounts of time and effort into ensuring that their quality of education is scrupulously maintained."

Frequently schools defend the quality of instruction in their online programs by using the same faculty to teach both campus and online courses. Or schools hire experts in their fields to teach particular online courses. NOVA University has the investment director for Travelers Insurance and an expert from the Internal Revenue Service on its accounting faculty.

ONLINE WITH THREE UNIVERSITIES

Working adults make up the majority of online students for a simple reason: They're always working.

The purpose of online education is to improve access to learning for people who can't attend traditional classrooms because of their jobs or other circumstances. Here are three academic institutions whose online programs are all directed to adults.

University of Phoenix

The University of Phoenix Online program not only requires all students to be "working adults" but insists that all members of the faculty be working professionals in their fields of expertise.

Incorporated in 1976 in Arizona, the university has 13 campuses and learning centers in Arizona, California, Colorado, New Mexico, Utah, and Puerto Rico. It is accredited by the North Central Association of Colleges and Schools.

The university started its Online program in 1989 and has 340 students. Degrees that can be earned through Online include a bachelor's degree in business administration, a master's in organizational management, and a master's in business administration.

Online's electronic classroom is open 24 hours a day, seven days a week, allowing students to control the time and place of their individual participation. Students go online at their convenience to retrieve assignments, turn in or upload homework, and participate in class discussions.

Programs are built upon the experiences of the working professional so students can apply what they learn as they learn it. Frequently, papers and projects must relate to the student's own workplace.

"We find that adults demand that the education they are consuming have immediate relevancy," says Tom Bishop, the university's director of marketing. "It's not just a hobby."

American Open University

American Open University is the distance learning arm of the New York Institute of Technology in Central Islip, New York. Six hundred students from throughout the United States, Singapore, Malaysia, and Europe are pursuing degrees at AOU through their computers.

AOU, which is accredited by the Middle States Association of Colleges and Schools, offers Bachelor of Science degrees in general studies, business administration, and behavioral sciences. It also offers a Bachelor of Professional Studies degree in general studies.

Students receive a course learning package which includes a textbook, a detailed syllabus, and assignments. Homework assignments and special projects are sent in by the student through the computer. In computer conferences, a mentor directs the learning activities just as an instructor in a conventional classroom does. Students can read, review, and write messages to the instructor and other students through the computer.

NOVA University

NOVA University began offering online education in 1983. It is a multifaceted program that integrates computer conferencing, videotapes, and the traditional component: the face-to-face classroom environment.

Accredited by the Commission on Colleges of the Southern Association of Colleges and Schools, NOVA has 300 online students. The university offers doctoral degrees in information systems, information science, computer education, and training and learning. It also offers a master's in computer-based learning.

Students also may take some accounting courses online. By the end of 1992, NOVA expects to be able to offer online an entire master's degree in accounting.

NOVA has perhaps the greatest variety in its delivery system. NOVA students not only are expected to spend a great deal of their time on computer, either in realtime electronic class or sending in homework electronically, but they also use videotapes of actual classroom sessions filmed on NOVA's campus in Fort Lauderdale, Florida.

Concerned that students might miss the human contact of classroom-based education, NOVA requires attendance at two week-long institutes or weekend seminars held on campus. The university also offers symposia at four sites throughout the country to share in person the latest research on that term's topic, to encourage students to share their own research, and to provide face-to-face answers to students' questions.

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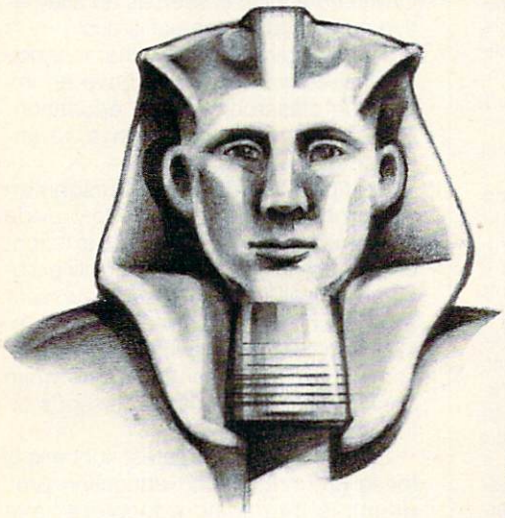

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Circle Reader Service Number 140

FROM HOME SCHOOLING TO HELP WITH HOMEWORK

Every Monday night at 8:00 12-year-old Danny Brumleve switches on his computer and goes to school. This session he is taking a course on C programming from the Computer-Assisted Learning Center (CALC) on GEnie. Last session he aced English 203, also from CALC.

Danny's mother, Dorothy, describes her son as "very bright, severely gifted." Last year she decided to remove Danny from private school and try a year of home schooling while he awaits acceptance into a special high school. She organized tutors, arranged a Latin course for Danny, and browsed through GEnie.

Dorothy Brumleve, a computer programmer, considers the CALC courses a valid part of Danny's curriculum. "I think it's a unique opportunity. He's too young to enter junior college, yet he's taking comparable courses on CALC." CALC offers courses that can earn college credit from Edison State College.

Danny says the courses are fun. And the Urbana, Illinois, ninth grader says, "I learn a lot more this way."

Dorothy Brumleve is quite satisfied with online education and proud of her son. "It attracts a different audience, a student that really wants to learn, a student that's not there for the party. Because there isn't a party. The student has to be motivated to keep up when he doesn't have the daily contact with a teacher."

Home schooling information also is found in one of CompuServe's 240 forums: the Education Forum.

Although CompuServe does not offer curriculum-based online classrooms, it is a source for online students to get help with their homework. The CompuServe Information Service, which was introduced in 1979, offers members access to 1400 databases, including Peterson's College Guide to accredited or approved U.S. and Canadian colleges, as well as Grolier's Academic American Encyclopedia, a reference source updated four times a year.

CompuServe's Science/Math Education Forum has a data library with practice problems to help students study for college board examinations. The Students' Forum is where it's happening for middle schoolers; junior high students exchange ideas with teachers and other students and receive homework assistance.

With 800,000 CompuServe members worldwide, the potential for help is limitless. As Debra Pedersen Young of CompuServe says, "Who knows who is going to answer your question? It could be someone in the U.K. or someone next door."

Homework help is also available, and independent study is encouraged on the Prodigy network. Although it, like CompuServe, doesn't offer curriculum-based programs, Prodigy features online learning situations. Besides gathering information through Prodigy's reference databases and posting calls for help on its bulletin boards, students could supplement their studies with features from old favorites such as *National Geographic* and *Weekly Reader*.

America Online also boasts a number of homework options, including regularly scheduled homework sessions each weeknight, private tutoring, boards on developing study skills, an Exam Prep Center with tips for taking exams, and an exam exchange where students and teachers can upload and download exams to use or practice with. There are many other options currently online or in development intended to assist students and make learning fun.

The University of Phoenix requires that its instructors not only have the appropriate academic accreditation but be currently practicing professionals in their fields.

The other attack on legitimacy comes from critics who question how those who administer online programs know who's doing the homework and, ultimately, earning the degree. Many schools require online students to take midterm and final examinations in the presence of a proctor who has been approved by the school. Or, as in the case of NOVA, they actually require the student to show up on campus for brief but important seminars and institutes.

There is a feeling among those involved with online education that special recognition ought to be given to those who earn a degree via computer. Take a look at the online student, says Deutschman: The person has to be self-disciplined, motivated, and able to work without a support group. "If [people] can be successful in distance learning, then you know they've got something," Deutschman says.

In fact, Bishop predicts online degrees will become increasingly valuable as employers gain experience with online graduates. "The development of analytical skills, as a result of the medium, changes the way people can conduct themselves in the workplace. Employers are going to be very pleased in the kind of results they get with people in this program."

The Quality Goes In

Educators running online programs know that such programs will never replace traditional classroom learning. Online education is seen as an alternative service for a special group.

They predict, however, that technology-based education will have an impact on classroom-based education. They expect it, in some ways, to enhance campus learning.

Campus students, Deutschman says, may pressure schools to provide the same technological access to teachers that online students have. Online students typically can ask their professors a question via modem and get an answer in a day or two, while the campus student with a question is at the whim of his schedule and his professor's office hours.

But perhaps the greatest success of these groundbreaking education programs is that some educators have stopped talking about computers and begun using them. At last, in the case of online education, the computer has become an educational tool as essential as pencil, paper, and textbooks.

As Becker says, "We've been using lecture techniques to teach from the beginning. Then, when Gutenberg invented the printing press, we began using textbooks and lecture. All the studies tell us that there are more ways to teach effectively—one is videotapes, and one is computer.

"Everybody is looking at [online learning], and everybody is talking about it. The future is wide open; we're only limited by our imaginations." ❐

SOURCES

America Online
8619 Westwood Center Dr., Ste. 200
Vienna, VA 22182
(703) 448-8700

American Open University
(New York Institute of Technology)
Colton Ave., Bldg. 66, Rm. 227
Central Islip, NY 11722
(800) 222-6948

CompuServe
5000 Arlington Centre Blvd.
Columbus, OH 43220
(614) 457-8600

NOVA University
3301 College Ave.
Ft. Lauderdale, FL 33314
(800) 541-6682

Prodigy
445 Hamilton Ave.
White Plains, NY 10601
(800) 776-3449

University of Phoenix Online
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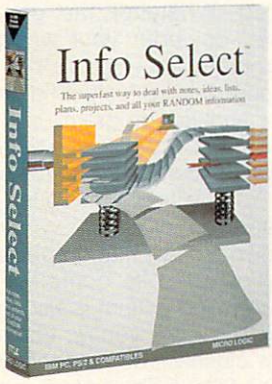

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SHAREPAK

Richard C. Leinecker

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ARGH Version 3.0

ARGH, the first *SharePak* program for September, is a collection of sliding block puzzles. How hard can that be?

Well, playing is actually easy: You just run the game from DOS and type the letter of the block you want to move. When you finish, the program sounds a beep, alerting you that you've successfully completed the puzzle.

Sounds easy, huh? Sure, it's easy to play, but it's not so easy to master. Simple as it sounds, the idea translates into hours of fun.

To play *ARGH* version 3.0, you'll need 256K of RAM, DOS 2.1 or higher, and any type of monitor.

Gapper

Talk about a game that will both captivate and addict its audience, try *Gapper.*

There's nothing fancy about this game—arrow keys move you around while you avoid the blob.

Once you've captured all the rectangles on the screen by traversing their perimeters, you're done with the screen. But count on this: The next screen will be harder, more challenging, and more fun.

Gapper's CGA graphics are simple. The pieces move smoothly, and control is graceful. A high-score feature lets you face the ultimate challenge: Can I beat yesterday's score?

To play, you'll need 256K of RAM, DOS 2.1 or higher, and a color monitor.

PRO Football Picks

Don't you hate losing? Well, it's time to improve your odds. The next time you want to pick the winning team, use this fantastic program.

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The program is well-planned and easy to use. Simple keypresses control the menus, and mouse support is offered for all menus and dialog boxes. And you don't have to be a propeller-head or spend hours reading a manual to use it.

Without knowing anything about it, I made my selections in five minutes. Did I win? With magazine lead times the way they are, it's now early June, but you can be sure I'll find out in September.

For this game you'll need 512K of RAM, DOS 2.1 or higher, and any monitor.

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A graphical chart with your writing statistics lets you see the big picture. It includes an overall summary, a grade level and Flesch index, personal sesquipedalian words (those with many syllables), and statistics on writing style elements. That's plenty of information for you to assess your text and make changes if you desire.

PRO-SCRIBE should be welcome, too, for any professional writer. It's smaller than many similar commercial programs and doesn't require an excessive amount of disk space, yet it's packed with all the features of commercial writing-analysis programs and more.

To run *PRO-SCRIBE,* you'll need 256K of RAM and any type of monitor. ❐

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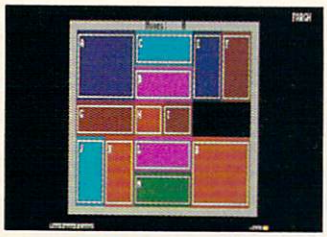
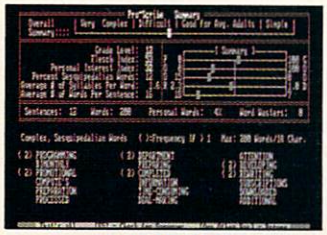


ARGH Version 3.0

PRO Football Picks



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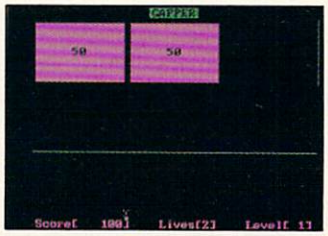

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COMPUTING FOR THE
PHYSICALLY CHALLENGED

BREAKING COMMUNICATIONS BARRIERS

BY GAIL DUTTON

Remember writing term papers? It seemed like a major chore in high school and college. Just imagine writing one blindfolded or without touching your PC, and you'll have an idea of what it's like for blind and quadriplegic students and professionals. Imagine writing it in, say, Chinese, a language foreign to you, and you'll understand the challenge aphasic patients—those who've lost the ability to use and process language—face when trying to communicate even simple requests.

Fortunately, software and hardware solutions are available, although they aren't widely known. Often the solution is simply a matter of locating the right pieces and integrating them into a computer.

Scanning and Voice Synthesis for the Visually Impaired

One system pieced together by two Yale University students relies upon a voice synthesizer and a scanner to let visually impaired students and staff have full access to the information stored in Yale's Sterling Library (where the system is housed) and any other written resources available. Built by Matthew Weed, a blind political science and history major, and Victor Grigorieff, a computer science and psychology major, the system is based on a Macintosh IIfx, although it can run on earlier models, since each Mac program has a similar interface. It uses only commercially available software and hardware.

Because the Macintosh interface has remained consistent, visually impaired users only have to learn one set of concepts to run several different programs. The Mac also has the flexibility Weed and Grigorieff require. With it, they can convert from Mac to IBM text files as needed so users can copy files for use on their own computers.

In addition to the Macintosh IIfx, the system uses the Hewlett-Packard ScanJet Plus, *OmniPage* and *outSPOKEN* software for scanning and voice synthesis, *inLARGE* for magnifying text, a word processing package, and a 19-inch monochrome monitor. With *outSPOKEN,* the visually impaired can use graphical interfaces 95 percent as effectively as sighted users. And system glitches are minor; for example, the ScanJet Plus sees the number 2 as a tilde and the letter *l* as an *n,* but it's about 99.5-percent accurate.

The ScanJet Plus is used to scan books, research reports, journal articles, and other printed documents into the Macintosh at a rate of two side-by-side pages per 40 seconds. The text is then converted to sound using *OmniPage* and *outSPOKEN.* To listen to the file, the user opens the menu with a mouse or keystrokes and selects the options from the choices spoken by the voice synthesizer.

When the file appears, the voice synthesizer reads it aloud either one line at a time or one word at a time as the user cursors from line to line or word to word. Either method can become tiresome, so Weed often instructs the computer to speak faster—up to twice as fast as the average human reads aloud. With *outSPOKEN,* the user can also control type fonts, vocal pitch, and volume, and it offers a word dictionary for user-defined pronunciation, a graphics dictionary for identifying common signs and symbols, and

THE IMAGE BANK

a Find command for locating information on the screen.

By using this system, Weed's need for hundreds of audiotapes and the hours it takes to search them for specific quotes are eliminated. He's cut the time required to write a term paper from four or five hours per page to about 35 minutes per page.

The system is as advantageous for dyslexics as it is for blind users, Grigorieff says. With *inLARGE* software, individual letters, words, and lines can be enlarged up to three inches in height on the system's 19-inch monitor. Words can still be spelled and words or sentences spoken, making it easier to read new words. To help users keep their places, the system speaks the word the cursor is on and presents text with a ragged right edge and a serif typeface. *inLARGE* also offers a full-screen crosshairs cursor to make it easier to locate. Grigorieff says the system's potential is limitless.

Visually impaired users can access networks such as ARPAnet, Internet, and Bitnet—invaluable aids in technical work. Eventually, Weed and Grigorieff hope an interuniversity electronic library will be established so scanned versions of references can be loaned just like printed versions of documents. Right now, though, Weed says copyright laws are a problem. At Yale, there are only about a dozen potential users, and the possibility that any one book that's scanned will be used again is slim, he says. So to save computer memory, he's spending part of his summer erasing the books that have already been scanned into the system.

Yale's system was built last fall with a $15,000 grant from Yale University. Because costs are dropping, Weed estimates the same system could be built today for a little more than $10,000.

Design by Voice and Movement

All the way across the country, Jeff Burnett, an architecture professor at Washington State University, and Technical Applications Group colleagues have built a system that allows quadriplegics to work on electronic CAD projects with the same levels of expertise as their able-bodied colleagues. This system, Burnett says, also works with anything graphically oriented, including spreadsheets.

The project, as yet unnamed, transparently links a DOS machine to the powerful UNIX systems that are needed for CAD and to a telephone. That configuration can then be booted automatically and controlled by speech recognition technology and an infrared headpointer. The system is "glued" together with custom software.

Users can boot up the machine by triggering a sensor—either a pressure pad or a special reflector—that can only be triggered by their wheelchairs when they roll up to the PC. Once the machine is booted, the menu comes up and can be used either by issuing voice commands or by using a headpointer as a mouse.

The software was written specifically for a headpointer made by Millennium Stride Computers, although others can be used. Because the headpointer uses infrared sensors, users don't have to be tethered to their computers with electronic cables.

The pointer is actually a reflective tape mounted on eyeglasses or even on a pencil tucked behind one ear. It's tracked with an infrared device mounted atop the computer—just the opposite of a TV remote control.

To select a menu function, users move their heads so the tape's reflection hits the desired icon; then a word is spoken that's the equivalent of clicking a mouse button. The adaptive interface allows users to move the window around rather than moving their heads in awkward positions.

The system has a small vocabulary, oriented toward CAD work, that isn't context sensitive. Individual users can load a personal vocabulary or label documents by spelling the needed words with the phonetic alphabet. To load the word *angle,* for example, the user would say, "Alpha, November, golf, Lima, echo." Burnett's system uses a Votan voice recognition board, one of the most functional available.

When the phone rings, an answering machine or the computer picks up the call, stopping the CAD program in its place. The user can converse using either a microphone and speaker combination or, for more privacy, a headset. To hang up the phone, the computer's voice recognition system listens for the words *hang up* and a confirming utterance. Upon hang-up, the user can resume CAD work instantly.

"If users are familiar with CAD, they can be functional on this system within one day, and in only a few weeks, after creating macros and editing the vocabulary, can compete in the same arena and at the same level as their able-bodied colleagues," Burnett says. In practice, success can depend very much upon the user's personal motivation.

Users are now being trained on this system at the University of Washington Center for the Handicapped in Seattle. After the training, they leave with hardware and software tailored specifically to their own work environment.

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Images Instead of Alphabet

Researchers at Tufts University School of Medicine in Boston are using computers to tackle a different problem: how to help patients who have lost the ability to use language—usually as the result of a stroke. The type of brain damage called *aphasia* affects the portion of the brain where words and speech are processed, leaving patients with the ability to comprehend much of what others say but unable to reply. They can't formulate thoughts into coherent phrases or sentences. Roughly one-fourth of the half-million people who suffer strokes each year also develop aphasia, according to Cheryl Goodenough-Trepagnier, associate professor of rehabilitation medicine at Tufts.

Aphasic patients can, however, learn to organize symbols into a coherent order to form thoughts and sentences. In the 1970s, patients learned to use cards with symbols to express their thoughts. Now those symbols have been expanded and loaded onto an Apple computer, simplifying their use.

Trepagnier's system, called *NewVic*, features hundreds of symbols—still called *cards* and *decks*—arranged in categories of people, actions, objects, modifiers, and prepositions. Eight symbols are displayed per computer screen. Patients use a mouse to select cards, scroll through the screens, and move from screen to screen. Decks are flexible enough that they can be designed to allow speed and vocabulary size to match a patient's abilities.

Some people pick up the system almost immediately, while others take a few weeks and still do very well with it. Although they don't know what the limits are, Trepagnier says the patients most likely to benefit are those who take to the system immediately and who are functionally impaired. "We're just beginning to be able to develop an appropriate communication medium for people with severe aphasia. The big problem is slowness," she says, "because people are trying to lay out messages through very impaired motor abilities. I haven't clocked it, but it's faster than three words per minute [for patients who are fluent with *NewVic*]. One of our major concerns is finding a way to communicate at a rate other people can tolerate, so users actually get to engage in conversation."

Another difficulty is in designing symbols to match verbs since aphasics often have more trouble conceptualizing verbs than nouns. Trepagnier currently uses pictures to suggest verbs but wants to develop an approach where patients can animate a figure throughout an action, actually setting the images in motion. For example, eating an apple could be shown by choosing a hand, apple, and head; putting the hand and apple together; dragging them to the head; and clicking a mouse key. To say, "The girl is running," a user could choose a picture of a girl, click the mouse at her feet, and move the mouse rapidly across the pad. The computer would show it as a girl running across the screen.

Of course, aphasics can only use *NewVic* if they have it with them. Hopefully someday a true portable machine with a touchscreen will be available, similar to some of the lightweight portables that have surfaced in recent months.

Trepagnier plans to make her system and basic documentation available to the public this year. It uses the *NewVic* software she developed and runs on a Macintosh SE or SE30, or any other Macintosh machine with at least 512K of RAM.

What About Tomorrow?

Great strides have been made in recent years to bring the challenges of the physically impaired to the forefront of the American consciousness. In fact, many other products geared toward the disabled, in addition to the ones mentioned in this article, are actually on the market now, but most are known only within small circles.

Computer technology promises to make life easier for the disabled. Personal fulfillment and overcoming stumbling blocks have always been the key goals of the personal computer. Now the technology that has leveraged our productivity and filled our leisure hours is helping the silent to speak, the blind to see, and the paralyzed to manipulate their worlds, and it's enabling technicians and research laboratories to perform computer-aided miracles.

Perhaps tomorrow, finding special hardware and software for the physically challenged will be as simple as checking out a disk at the local library or heading to the nearest electronics store for the latest equipment. ❐

Gail Dutton is an independent writer specializing in science and technology. Her articles have appeared in Science, Sea Frontiers, The World & I, IEEE Software, *and other publications. She is based in southern California.*

PRODUCT LISTING

For more information on the products discussed in this article, contact the manufacturers and publishers at the addresses listed below.

Software

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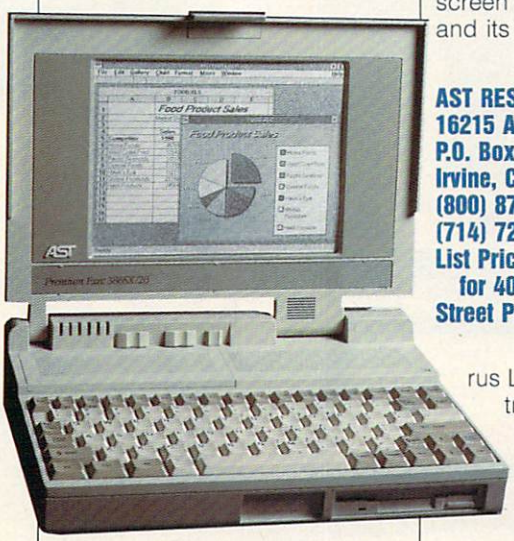
AST PREMIUM EXEC 386SX/20

Have you ever loved something so much that you were willing to overlook its flaws? That's how I feel about the AST Premium Exec 386SX/20. Despite the problems with early production models, this is the best overall notebook computer I've seen.

For one thing, it speeds along at a full 20 MHz, which is fast enough to run most *Windows* programs at a comfortable clip. In addition, you can order the Premium Exec with a 20MB, 40MB, or 60MB hard drive that's rated an impressive 23 milliseconds (20MB drive) or even faster 19 milliseconds (40MB and 60MB drives). I'm using the 60MB version, and it's a real joy to have so many of my favorite programs with me—no matter where I go.



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(800) 876-4278
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List Price: $2,995 for 20MB; $3,395 for 40MB; $3,795 for 60MB
Street Price: $2,337*

AST Research has made upgradability a major feature of its desktop computers and has carried that philosophy to its new line of notebook computers. You can buy the 12-MHz 286 version of the Premium Exec notebook and upgrade the microprocessor later to a 20-MHz 386SX—for not much more than the price difference between the two machines ($400 as opposed to $499).

While the 386SX comes with 2MB of RAM and the 286 comes with 1MB, you can expand the memory of either machine to a total of 8MB. Even though the Premium Exec is relatively new, you can already buy memory upgrades from discount mail-order houses at a substantial discount. (AST charges $995 for 4MB, while one mail-order company charges $388 for the same amount of memory. As for the notebook itself, you can buy the various models by mail order at a discount of about 20–25 percent.)

The Premium Exec's LCD screen is the sharpest I've seen, and its VGA controller, from Cirrus Logic, does a great job of translating colors into 32 shades of gray. For those times when you absolutely must have color, you can hook up a color VGA monitor through the external VGA port.

In addition to the VGA port and the usual parallel and serial ports, the Premium Exec includes a PS/2 port that lets you add an external keyboard, mouse, or numeric keypad. You can also add an internal 2400-baud data modem ($249) or an internal 2400-baud fax modem ($349). The fax modem is send-only (9600 baud) and uses the Sierra chip—so it works fine with *WinFax*. Even though you can hook up an external keyboard, you'll probably use the built-in keyboard most of the time. The AST's keyboard stands out as one of the best I've seen on a notebook computer. It has a good feel and a slight audio click when you press a key. Unlike some other notebook computers, this one doesn't make you press a special option key to access the Home, End, PageUp, and PageDown keys. My only criticism is that the right Shift and Backspace keys are too small.

As for the case itself, it's solidly built and looks great. The small battery is relatively lightweight and easy to remove. The screen feels firm when you move it into place and locks tight when you close it for travel.

Many notebook computers offer power-saving features to extend the life of the battery. The Premium Exec tops them all with three ways to save power: programmable timeouts that can shut down the hard drive and LCD screen when they're not being used, a suspend/resume mode that can shut down the entire system while preserving your data (unfortunately, this feature doesn't work with protected-mode programs, such as *Windows* 3.0), and a BIOS-level clock-speed control feature that can automatically slow down the processor when it isn't processing data or redrawing the screen. With the power-saving features switched on, you can expect over three hours of battery life with each charge. Until notebook computers are available with Intel's new power-saving 386SL chip, the Premium Exec is the state of the art in power management.

So what were the problems with the early production models? The screen flickered slightly when the Premium Exec was running on the battery, and *Windows* programs wouldn't recognize the modem. I also couldn't get one of the units to recognize the PS/2 port. All three problems were fixed with BIOS updates, so be sure to get a BIOS with a version number of 1.06.04 or higher.

Notebook technology moves so fast that a recommendation

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can be outdated by the time you read a review. With that disclaimer out of the way, I can safely say that the AST Premium Exec offers the best speed, expandability, and power-management features of any notebook computer. And all for a very attractive price.

DAVID ENGLISH

DELL 320N

Given a notebook computer's design constraints, Dell has done a superb job with the 320N. As with any laptop, this machine certainly makes compromises, but each one is well thought out and carefully engineered. In almost every area, Dell has done a little more and gone a little farther to make this machine smaller, faster, and easier to use than the competition.

If you look at the dimensions and weight of this computer, for example, you'll notice that it's just a bit smaller and a bit lighter than most of the other laptops reviewed here. And if you place the 320N beside almost any other notebook, this machine's sleek black body and carefully sculpted features will make the other machine look clunky. But the 320N is much more than just small size and high style.

The standard VGA screen (640 × 480) is exceptionally bright. When you're looking at LCD VGA displays, one of the most important features to consider is the finesse with which the video controller maps colors to gray levels. In this respect the Dell is exceptional. In *Windows' Solitaire,* for example, you can tell the red cards from the black ones by their shading.

As far as video speed goes, this machine's scrolling and refresh rate are quite fast. One of the best ways to judge video speed is to use a mouse in graphics mode. Most LCD displays simply can't keep up with the mouse cursor, but the 320N does a very good job.

DELL COMPUTER
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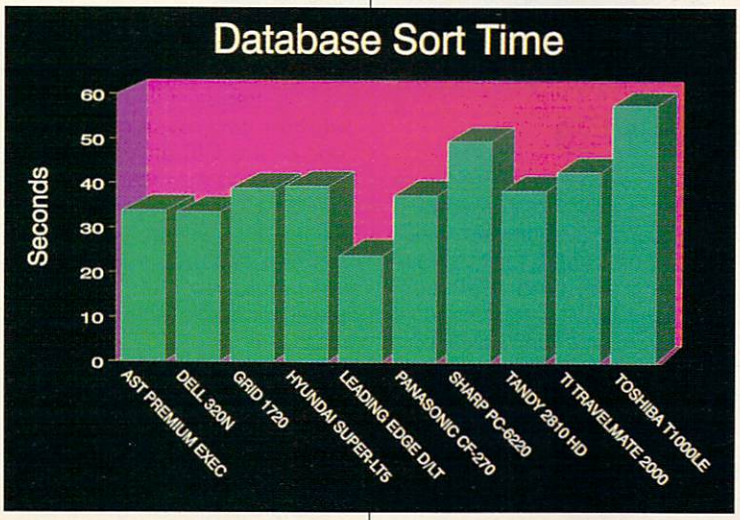
Austin, TX 78759
(800) 426-5150
List Price: $3,399 for 40MB; $3,699 for 60MB
Street Price: n/a

My only complaint with the screen is that it's compressed when DOS programs run. This happens because the video's vertical resolution in DOS is actually 400 pixels of vertical resolution instead of the VGA's possible 480, a common compromise in notebooks. *Laptop UltraVision* from Personics fixed this problem and allowed DOS to use the full 480 pixels for a *much* improved display, but I'd prefer that the machine's video controller do this itself.

The 320N's keyboard is certainly a compromise compared with most desktop keyboards, but its 85-key layout is very well thought out and offers a 3-mm key travel (most notebooks have a shorter 2-mm key travel). The cursor



COMPUTE APPLICATION INDEXES

Since the Test Lab section is designed to give you the best information about how systems will perform when you take them home or to your office, we performed a set of tests involving commonly used applications.

The timings indicate how long it took a particular computer to sort a database, perform a search and replace in a word processor, and recalculate a spreadsheet.

—RICHARD C. LEINECKER

keys assume an inverted T formation and the Home, PgUp, PgDn, and End keys line up along the right side of the keyboard. None require you to press a special Fn key to access them.

There are also 12 function keys, which are smaller than the other keys. But you don't have to press the dreaded Fn key to use them.

The Dell sports a 20-MHz 386SX CPU that provided more than enough power for everything I wanted to do on the road, including running *Microsoft Windows* in 386-enhanced mode.

As for memory, the 320N comes with 1MB, expandable to 5MB. The unit I reviewed was maxed out with the full 5MB, which I certainly recommend, if you can afford it.

The machine comes with either a 30- or 60MB 19-ms IDE hard disk. The unit I reviewed was equipped with a 60, and it *sizzled*. I never felt I was waiting for the hard disk, even when using virtual memory (using the disk as if it were RAM) in *Windows*.

The 320N's ni-cad battery gave me a bit of a scare. It's supposed to last for three hours, but the low battery light came on after about ten minutes of use. The machine continued to chug along happily, however, for nearly three hours. The warning light kept me worried, however.

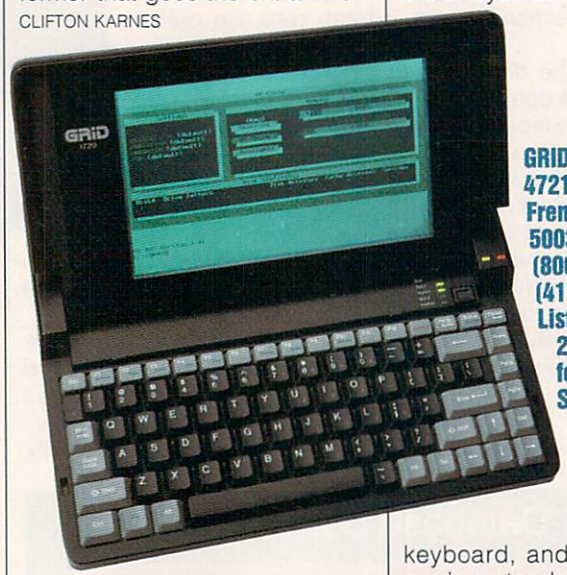
To help conserve the battery, you can employ several power-saving features built into the 320N. You can set timeout values for the hard disk, the display, and the system. In addition, there's a convenient standby button that places the machine in a special battery-saving mode.

When it comes to talking to the outside world, the Dell 320N has a full complement of ports. There is one serial and one parallel port, an external VGA port, and PS/2 mouse and keyboard ports. An internal modem is available as an option.

You've probably gathered that I'm enthusiastic about this machine. It's beautifully designed and exceptionally fast and powerful. But is it worth the price? At $3,399 for the standard configuration, it's not cheap, but if you look at similarly equipped competition, it's almost a bargain.

If you're thinking about buying a notebook, the next question to ask about the 320N is whether you need this much power. If you're primarily doing word processing, for example, then a notebook in the 320N's class is overkill. But you need a powerhouse like the 320N if it's your primary machine. And for running *Windows*, a computer in the 320N's league is a must. For state-of-the-art computing in a very small package, the 320N is a world-class performer that goes the extra mile.

CLIFTON KARNES



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Street Price: n/a

GRID 1720

Laptops are great, but it's rare that you would choose one over a comparably equipped desktop computer. That's exactly, however, what the Grid 1720 convinced me to do. Ever since I've had my review unit, I've only turned on my 386SX desktop to play *Lexi-Cross*. This sleek, black, 6.9-pound Grid packs enough power to run all but the most demanding applications. Its 80C286 microprocessor runs at 16 MHz, and my review unit was packed with 3MB of memory. Only the 20MB hard disk left me feeling a bit cramped for space.

The two most important parts of any laptop, arguably, are the screen and the keyboard. These are the parts that you have to interact directly with, and the Grid has the best-feeling keyboard and the nicest screen I've ever used, laptop or desktop. Keyboard springs are used in the Grid to provide excellent tactile feedback without annoying clicking sounds. The keyboard spacing is the same as you'd find on a stand-alone PC keyboard, so your fingers aren't cramped as you type. The 12 function keys are arrayed across the top of the keyboard, and the cursor keys are in a standard inverted-T layout. You can reverse the positions of the Ctrl and CapsLock keys by simply switching the key caps and flipping a switch on the bottom of the computer. Only the lack of a separate numeric keypad would ever tempt you to take advantage of an external keyboard.

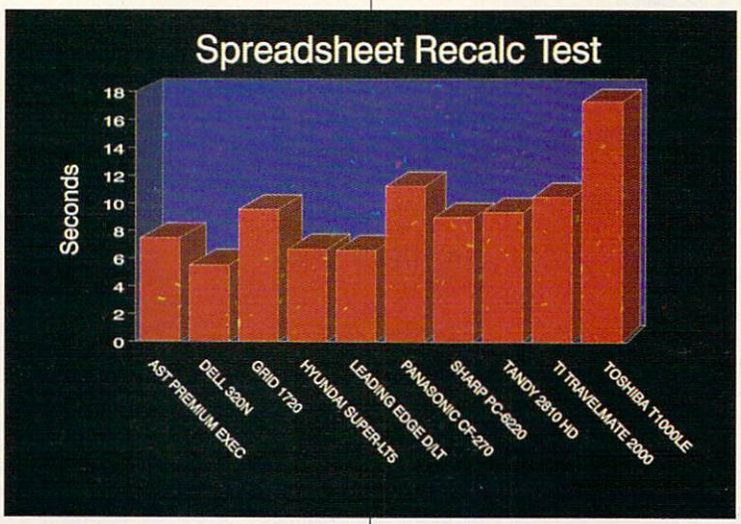
You owe it to your eyes to check out the Grid's LCD VGA screen. Easier to look at for long periods of time than even the sharpest Super VGA monitors, the Grid's screen produces

crisp, solid black characters on a gray background. Best of all, you won't notice any of the ghosting common to VGA-resolution LCD screens. (The monitor was noticeably sharper than that of Tandy's similar 2810 notebook PC.) I felt the desire to use an external VGA color monitor only when I played games.

The Grid 1720 has most of the amenities you'd expect on a modern laptop. Along with VGA and keyboard ports, it comes with serial and parallel ports, a 1.44MB floppy drive, and an internal Hayes-compatible modem. Grid chose a 20MB hard disk to save space and weight—it's one of the new 2½-inch models. Despite the limited capacity, it's quiet and uses very little power compared to larger drives.

Normally I find *Windows* too sluggish on a 286 system, but the extra zip provided by the Grid's 16-MHz clock speed makes all the difference. The 3MB of memory in the system I tested allowed me to set up a large disk cache, speeding operations even more. Add one of the new clip-on trackballs, and you've got a nice, portable, no-compromise *Windows* system for the road.

While the 1720 can handle up to 5MB of memory, each additional megabyte increases power drain and decreases battery life. With 3MB I was able to use the 1720 for about 3 hours. Removing the 2MB of expansion memory increased that duration to a little over 3½ hours. Unless you absolutely require 5MB of memory, the 3MB-configuration compromise between battery life and performance will serve you well. Adding memory or an 80287 math coprocessor won't cause you much trouble—just remove a panel from the bottom of the computer and plug in the SIMMs or math chip.



The Grid has above-average power-management capabilities. The hard drive and screen will automatically power down after a user-selectable period. You can also selectively disable the speaker, serial port, LCD display, and hard drive in order to save power. For non-speed-sensitive software applications, such as word processing, toggling the system down to 8 MHz will extend battery life even further. A key combination will put the computer in standby mode, turning off the hard disk, LCD, backlight, and floppy disk controller. The program in memory resumes upon the first keypress.

The concise 97-page owner's manual covers all the computer's features and provides a brief introduction to MS-DOS. While other computer packages may include larger, more detailed manuals, average users will probably find all the information that they need here. And this manual is small enough to slip into your laptop carry case.

The Grid 1720 is speedy, well-constructed, and an ergonomic marvel. And it's certainly one of the most attractive MS-DOS computers I've ever used, desktop or laptop. Now I understand why NASA has flown Grid laptops on the space shuttle.

DENNY ATKIN

HYUNDAI SUPER-LT5

The Hyundai Super-LT5 makes the machines I once toted under my arm seem terribly limited—and wonderfully light. At 11-plus pounds, it's a load at the end of your arm or on your lap, with a bulky AC adapter when you're not running it on battery power—but then, that's true of any laptop in this class. The Super-LT5 is also a fast, efficient laptop with a roomy hard drive, a sharp screen, and a nice-size keyboard.

Weight aside, it's a well-made machine with the advantages of a desktop model compressed into a box smaller than a briefcase. With a built-in handle and a screen that folds down and locks readily into place, the Super-LT5 is its own case.

The keyboard, though understandably cramped, features full-size, fully responsive keys. It's laid out in a familiar manner, with the function keys arrayed horizontally along the top. The number keyboard overlaps some of the letters, meaning that it's separated from the familiar overlay with the cursor-movement keys. Given that the Hyundai Super-LT5 is a laptop, it's a perfectly suitable layout, although the NumLock key's proximity to the right Shift, Ctrl, and Alt keys caused me to activate it inadvertently more than once.

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2. All LIM 4.0 expansion boards are not created equal. Make sure the board you wish to purchase can run your applications and has the capacity you need.

3. If your short on expansion slots, you should consider a board that has I/O ports to allow future external expansion.

4. If you plan on upgrading to a more powerful computer in the future, you may wish to purchase chips fast enough so they can be used in your new system when you upgrade at a later date.

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The machine's floppy drive and expansion ports are readily accessible, as is the motherboard. I had no trouble hooking up my VGA monitor to get full color, though the Super-LT5's screen proved marvelously well lighted, well defined, and easy to adjust—just right for my writing. Brightness and contrast were adjustable via two smoothly sliding controls adjacent to the screen, a more convenient location than I'm accustomed to seeing even on full-size desktop monitors.

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San Jose, CA 95134
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List Price: $3,995
Street Price: $2,329

You'll find expansion jacks around the laptop's sides. Besides the port for the external monitor, there are ports for a keyboard, a 5¼-inch floppy disk drive to supplement the built-in 3½-inch drive, and a printer. I tried hooking up my desktop IBM-compatible's keyboard to the Hyundai Super-LT5, but its recessed external keyboard jack proved too deep for my angled plug. You can, however, plug in an internal modem.

The laptop operates very quietly, emitting just enough squawks to let you know when it's reading a disk. I found the internal speaker to be adequate, perhaps just a little too quiet.

The user's guide provides clear, basic guidance, with a particularly helpful chapter of troubleshooting tips; however, it should have an index.

There are no cables to install and no screws to screw, and getting the machine up and running takes no more or less time or effort than with a comparable desktop model. Included with the Hyundai Super-LT5 are DOS disks and a reference disk that includes *Windows* and OS/2 drivers.

The Hyundai Super-LT5 has a built-in MS-DOS shell program, which is a nice feature. It's too bad this particular shell program is unnecessarily complicated, requiring unnatural key combinations when a simpler menu probably would've done the trick. Again, it's a nice feature to have; it just doesn't make getting around in DOS as easy as it could.

Though not astoundingly fast, the Hyundai Super-LT5 generally works quickly and efficiently. Installing software onto the hard drive takes relatively little time.

The battery for the Hyundai Super-LT5 takes four to six hours to charge and lasts for one to three hours. Given the machine's power, that seems reasonable, even though it would be nice if it could hold out longer on a charge. One problem I encountered using the laptop on both electrical and battery power was that after a while it got uncomfortably hot underneath, especially when I was using it while wearing shorts.

Fortunately, I never subjected the Hyundai Super-LT5 to the toughest test I ever gave a laptop during my days as a newspaper reporter: skidding it across a concrete parking lot after accidentally tripping in the dark during a late-night run for police news. Even so, it appears to be a solidly built, durable tool, capable of performing almost as well as a pricey desktop computer but without the usual constraints; it's powerful and portable.

EDDIE HUFFMAN

LEADING EDGE D/LT386SX PLUS

Nothing makes the time go by on a long plane ride like a good laptop, and whether you use yours for spreadsheets or *Star Control*, the Leading Edge D/LT386SX Plus certainly beats a talkative stranger when it comes to airborne companionship. Whatever your reason for carrying a laptop, you'll want to balance weight, display readability, and price against its usefulness. A close look at this laptop reveals a perplexing mix of fine and somewhat below-average features.

On the plus side, the D/LT does run a 16-MHz 386 processor, providing the necessary micro horsepower to make *Windows* run at a usable speed, and the 40MB hard drive provides more than ample storage space for on-the-road applications and their data files. The 3½-inch 1.44MB floppy drive port faces you, so you can keep an eye on disk activity. All the standard ports—serial, parallel, and PS/2 mouse—further enhance the D/LT's versatility. For you avid telecommunicators, the roomy modem bay looks as if it should easily accommodate the Leading Edge $199 proprietary modem. Should you have the chance to plug the D/LT into a color monitor, you won't be disappointed by

the graphics; this laptop's crisp-VGA 640 × 480 pixel output does justice to your games as well as your chart generators.

A winner all around, the D/LT's keyboard doesn't complicate typing by shrinking its keys; they're the same size as those of larger, stay-at-home machines. While the keyboard won't detach from the D/LT entirely, it does have the surprising ability to sled forward away from the rest of the machine, putting just enough distance between you and the LCD screen for a comfortable working relationship at your hotel room desk. Well, maybe not quite far enough for some; the glare from this laptop's 8 × 6 inch backlit display can quickly tire your eyes. Compared to many other laptop displays, this one's downright fatiguing. And despite a purported antiglare feature, text on the D/LT display, like text on many laptop displays I've looked at, is best read in indirect light. The brightness and contrast sliders do little to improve the situation. Also problematic is the screen's tendency to fall forward at the slightest disturbance and to resist proper positioning. Setting the display in place often requires multiple attempts. Practice patience here; the manufacturer warns against bending the screen back too far, though it remains a constant temptation. A more effective locking and tilting mechanism is definitely in order.

Those traveling computerphiles who remember the heyday of the KayPro luggable won't

HOW THE POWER GOES

There's more to testing the life of a laptop battery than turning it on and letting the unit run until the power gives out. To truly test a manufacturer's claim of battery-powered operating time, you have to test the battery as if it were in normal use.

Almost all laptops use rechargeable ni-cad (nickel-cadmium) batteries, with a flat voltage discharge. That simply means that voltage discharges constantly until the battery runs dry. For example, a six-volt ni-cad battery will give a constant six-volt discharge up until the moment it dies, unlike, say, flashlight batteries that gradually lose power. Ni-cad batteries also operate well in low temperatures, unlike their acid-based automobile counterparts that tend to be sluggish on very cold mornings.

Our test lab charges the ni-cad battery according to the manufacturer's exact instructions. Once the battery is fully charged, the laptop is put to use, and its between-charge lifespan is tested using COMPUTE's battery-testing program. The program monitors the laptop constantly until it completely gives out, so the exact power-up and power-down times can be recorded.

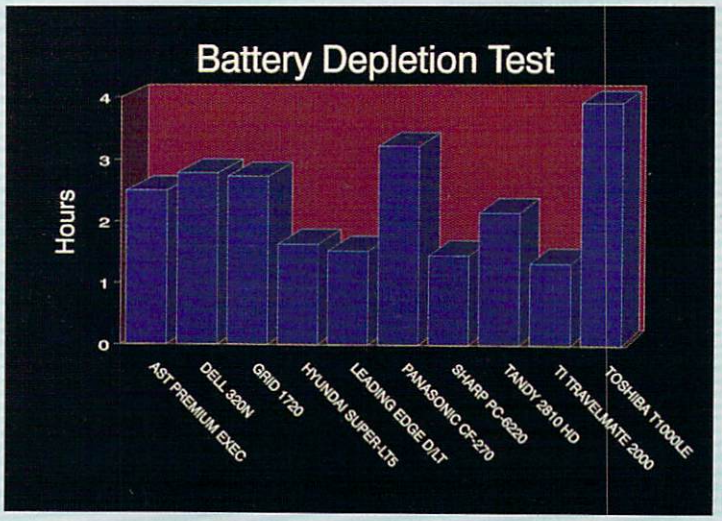
But there's more to it than that. To realistically simulate laptop use, our testing program runs the laptop disk drive in a selected duty cycle. For instance, in a 40-percent duty cycle, the drive runs for four minutes of continuous disk access and then rests for six minutes. The cycle is repeated constantly until the battery dies. The test program's timer constantly saves to disk, so when the system is booted up again after recharging or plugging in, the time has been recorded for reference. A stopwatch serves as backup.

If a laptop has an automatic rest mode or screen blanker, someone physically monitors the computer, tapping it every screen cycle to return the screen to normal mode.

Once the battery dies, the lab repeats the test two more times in its entirety, beginning with a battery recharge. After testing each laptop three times, the lab uses a spreadsheet to calculate mean times for each battery.

Most batteries are going to yield about the same amount of running time because they're essentially the same product—rechargeable ni-cad cells. The real difference is in how you use your laptop, what type of microchip runs it, and the machine's built-in power-saving features.

—JILL CHAMPION



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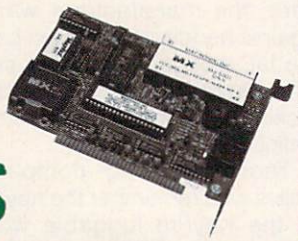

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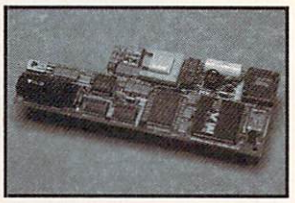

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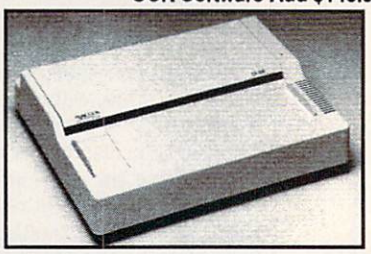

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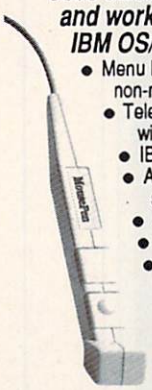

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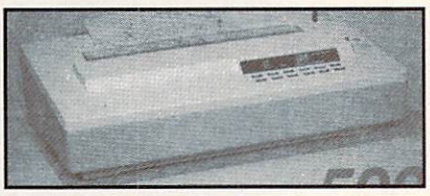

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H33474B	1MB	HPLaser Jet IIP,III, IIID	99.95
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H33477B	4MB	HPLaser Jet IIP,III, IIID	214.95
H33443B	1MB	HPLaser Jet II & IID	99.95
H33444B	2MB	HPLaser Jet II & IID	139.95
H33445B	4MB	HPLaser Jet II & IID	214.95
EP1000	1MB	Epson EPL-6000	129.00
EP2000	2MB	Epson EPL-6000	169.00
EP4000	4MB	Epson EPL-6000	249.00
T11000	1MB	Texas Instrument MicroLaser PS	129.00
TB1000	1MB	Toshiba Page Laser 6	118.00
TB2000	2MB	Toshiba Page Laser 6	164.00
TB3000	3MB	Toshiba Page Laser 6	208.00
TB4000	4MB	Toshiba Page Laser 6	248.00
1039136	1MB	IBM Laser 4019;4019E	129.00
1039137	2MB	IBM Laser 4019;14019E	169.00
1038675	3.5MB	IBM Laser 4019;4019E	229.00
M6005	1MB	Apple LaserWriter II/NTX	85.00
M6006	4MB	Apple LaserWriter II/NTX	319.00
S63-1300	1MB	Canon LBP-8II	119.00
S63-1880	2MB	Canon LBP-8II	189.00
N/A	4MB	Canon LBP-8II	269.00
PA1000	1MB	Panasonic KXP4420; KXP4450i	118.00
PA2000	2MB	Panasonic KXP4420; KXP4450i	164.00
PA3000	3MB	Panasonic KXP4420; KXP4450i	208.00
PA4000	4MB	Panasonic KXP4420; KXP4450i	248.00

NEC MEMORY

Cat. #	DESCRIPTION	NSI
APCH655X	2MB Mod Powermate 386/25	458.00
APCH656X	8MB Expansion Board Powermate 386/25	1,190.00
APCH657X	3MB Base Board Powermate 386/25	1,250.00
APCH850E	1MB Expansion Board Powermate SX Plus	240.00
APCH852E	4MB Expansion Board Powermate SX Plus	690.00
PC21-21	1MB CD ProSpeed 286;386SX	245.00
PC21-22	4MB CD ProSpeed 286;386SX	569.00
PC21-26	2MB CD ProSpeed 286;386SX	309.00
PC31-21	2MB CD ProSpeed 386	319.00
PC31-22	8MB CD ProSpeed 386	1,190.00
KTN2000 /SX	2MB Expansion Board Powermate SX Plus	440.00
KTN8000 /SX	8MB Expansion Board Powermate SX Plus	1,190.00

HP MEMORY

Cat. #	DESCRIPTION	NSI
D1354A	2MB Up-Kit Vectra QS/16S &ES12 PC	114.00
D1640A	1MB Up-Kit VECTRA QS/20PC; RS25PC & 20C	62.00
D1642A	1MB Up-Kit VECTRA QS/20PC; RS25PC & 20C	234.00
D1540A	1MB Up-Kit VECTRA QS/16S	62.00
D1540A	1MB Up-Kit VECTRA QS/16S	62.00
D2150A	1MB Mod VECTRA 486 PC	78.00
D2151A	4MB Mod VECTRA 486 PC	282.00
D2152A	8MB Mod VECTRA 386/25;486PC	930.00
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BOCARAM/AT-I/O PLUS—Provides up to 4MB of Xtended, Xpanded or backfill memory. For 16 bit bus. Operates up to 33 MHz and is set thru software. has serial and parallel port. Uses 1MB D-RAM—
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with 2MB 249.00

BOCARAM 30—Provides up to 2MB of expanded memory for IBM PS/2 model 25, 30 and 8-bit bus utilizing 3.5" floppy disks. Uses 256K D-RAM—
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with 2MB 249.00

BOCARAM 50/60—Provides up to 4MB expanded, extended or backfill memory for PS/2 model 50, 60. Uses 1MB D-RAM—
with 0K $149.00
with 2MB 249.00
with 4MB 349.00

BOCARAM 50Z—Provides up to 2MB, 0 wait state, expanded or extended memory for IBM, PS/2 model 50, 50Z, 60. Uses 11MB D-RAM—
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NSI Computer Products

Circle Reader Service Number 147

much mind carrying the hefty D/LT for short distances. After all, this computer's 13 pounds doesn't compare to the weight and bulk of most earlier portables. More contemporary users, though, might not want the burden of this much weight, especially in this age of 386 notebooks. The D/LT thankfully balances on its edge quite well. Even if the D/LT should fall over, I wouldn't worry much about damage—this machine's case could stop bullets.

This laptop doesn't spare you the cold reality of mysterious battery charges. You should expect about two hours of use per full recharge of the ni-cad battery. Expect less if you access your hard drive and floppy frequently. Leading Edge has built in some features to help you conserve power and keep track of the D/LT's battery life. Left unattended, the D/LT dims its screen to conserve power. A battery check light flashes when power's low, and if you don't soon save and shut down, you might damage your hard drive and will certainly lose your work.

Alarm software, such as *Battery Watch,* warns you when battery failure will occur, but you'll need to buy such software separately. The D/LT comes bundled with DOS 4.01, *Windows* 3.0, and *Microsoft Works.*

LEADING EDGE PRODUCTS
117 Flanders Rd.
Westborough, MA 01581
(800) 874-3340
List Price: $2,199.00 for 40MB; $2,599.00 for 100MB
Street Price: $1,846.33

You might think that a laptop with a VGA port makes the perfect go-between for home computing and computing in your hotel room, but think again. Most laptops just don't offer the expandability that full-size PCs do, and even the larger-than-average D/LT won't adequately serve as a substitute. With a 2MB RAM limit and no card slots, the D/LT won't replace your versatile desktop PC. And for true portability, you'll want to try the Leading Edge NB 300S notebook computer. The standard unit packs less RAM and hard drive space than the D/LT, but its reduced weight and increased operating time per battery charge probably bring it closer to your idea of what constitutes a laptop these days. At only about $400 more than its larger cousin, the notebook warrants a frequent traveler's attention.

So, who needs the D/LT? Well, for shoppers who appreciate a bargain, the D/LT could turn out to be a surprise hit. To compete with other manufacturers in this market of increasingly smaller and lighter portable computers, Leading Edge lowered the suggested retail price of the D/LT laptop by about $1,000. Any further price cuts could carve out quite a niche for this machine, especially with computer users who travel only from time to time but want to make sure they can work out of town if they need to.

DAVID SEARS

PANASONIC CF-270 BUSINESS PARTNER

Can a seven-pound notebook computer measure up to the needs of someone accustomed to using a well-equipped desktop machine? Panasonic's CF-270 Business Partner comes mighty close and offers many of the important features that we've now come to expect in notebook computers.

At a mere seven pounds, the CF-270 is a lightweight whose approximate dimensions are 12 inches by 10 inches by 2 inches—small enough to fit into most attaché cases. The CF-270 compares well with other notebooks currently available, offering a 16-MHz 80C286 CPU, 20MB hard drive, 1.44MB 3½-inch floppy drive, 640 × 480 backlit black-and-white LCD display with 16-level gray-scale VGA, and 1MB standard memory (expandable to 5MB).

The CF-270 comes with two 3½-inch floppies, which include everything you would expect, including MS-DOS 4.01 and GW-BASIC. The floppies also include some programs that add important features: a setup program, a power-management program, FDISK to set up the hard drive, and a diagnostic program that tests each component of the system.

How long the battery holds a charge and how long it takes to recharge can often be the determining factors when you're deciding which notebook to purchase. The CF-270 comes equipped with a quick-charge battery that will fully recharge in about two hours when the computer is turned off and in four hours if you use the computer while charging. The battery charge lasts about two hours but will vary depending on how often the drives are accessed and which power-conservation options you've selected.

The CF-270 software (called *Power Management Setup Utility*) allows you to select power-reducing options including slowing or shutting off the CPU when the computer is not busy, turning off the hard drive motor when it's not in use, placing the floppy drive on standby, and automatically turning off the screen or the entire unit if there's no keyboard input after a certain time interval. Each of the power-saving features operates only when the CF-270 is running on battery power.

Using the *Power Management Setup Utility* is simple enough. The manual briefly explains each of the options, and the utility includes online help screens—a handy convenience, especially if you want to change an option at 31,000 feet and haven't brought the manual.

I set the system to maximum power savings and found that the system functioned satisfactorily. The only time I could detect a slowdown in performance was when I accessed the hard drive after the motor had shut off. Usually the delay was only a few seconds while the drive got up to speed again, a small price to pay to extend the life of a battery charge.

I especially liked the keyboard and its layout; a touch typist would have little trouble adjusting. If you're a heavy spreadsheet user, you'll enjoy being able to convert the keyboard to a numeric keypad. Although not as convenient as a separate keypad, this compromise proves quite workable.

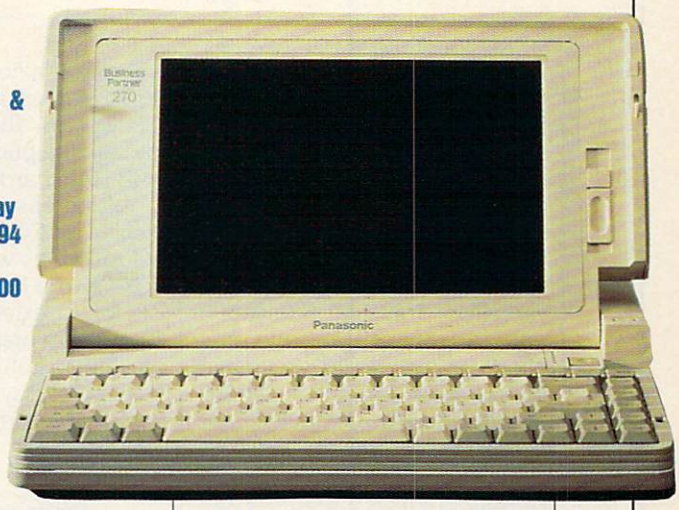
The CF-270 comes with several external ports and jacks. With the serial and parallel ports, you can connect to your favorite printer, external modem, or serial mouse. And with its VGA port and keyboard jack, you can use your CF-270 as if it were a desktop computer.

The CF-270 comes with several manuals. Less than 100 pages long, the basic User's Guide covers all the basics clearly and concisely. Also included are a very short Getting Started Guide, a User's Reference Guide, an MS-DOS Shell User's Guide, and a Quick Reference Guide to MS-DOS and GW-BASIC. Anyone with any experience with MS-DOS computers should find this documentation satisfactory, albeit a bit skimpy. If you've never set up a new system before, you might find the process a bit intimidating, as you would with most computers. And if you have limited experience with DOS, you'll not learn much from these guides.

Panasonic has designed a respectable notebook computer that includes most of the features we've come to expect. If you're in the market for a small, lightweight computer that will fit easily into your carry-on luggage and on an airplane's table tray, you would do well to consider the Panasonic CF-270 Business Partner.

STEPHEN LEVY

PANASONIC COMMUNICATIONS & SYSTEMS
Office Automation Group
Two Panasonic Way
Secaucus, NJ 07094
(800) 742-8086
List Price: $2,299.00 for 20MB, $2,799.00 for 60MB
Street Price: $1,995.33



SHARP PC-6220

Sharp's PC-6220 is a compact and, on the whole, well-designed computer for its small size (11 × 8 × 1.5 inches). This 80C286 notebook computer runs at 12MHz and comes equipped with a full megabyte of memory. Its durable exterior and light weight (4.4 pounds without the optional floppy drive) should make this machine an attractive option in the world of portable computing.

THE POWER-SAVING SL CHIP

Intel has introduced a new 20-MHz SL chip, exclusively for laptops, that's supposed to add significant power-saving features. Zenith claims its MastersPort 386SL (currently the only laptop with an SL chip) will preserve an application for two weeks and then resume at the push of a button.

Since most of the recent laptops carry the SX chip—and will for some time to come—your best bet for extended laptop battery use is to buy a laptop with an array of power-saving features. An automatic screen timeout blanks the screen after a period of time passes without mouse or keyboard input, a sleep or rest mode will actually slow down the computer's processing time while the machine is still running but not in use, and standby mode is designed to conserve power while allowing instant access to what you were working on with the press of a key.

—JILL CHAMPION

Frequent travelers will appreciate not having to carry around any more pounds than necessary. Once you've loaded your hard drive with the software you use, you don't really need to lug the optional 3½-inch plug-in floppy drive. If you don't care to invest in the external drive, a ROM version of Traveling Software's *LapLink* software and the supplied cables will let you make transfers between this notebook and your desktop computer. *LapLink* works fine, though, and in no time I was transferring my favorite word processor, graphics, entertainment, and other software to the 6220's hard drive.

The system's port covers must be detached and stand a good chance of getting lost (a storage hatch for these little guys would be a nice feature). And the screen/cover is stiff and difficult to place at just the right angle. It would've helped if a demonstration program or at least some modest utilities had been included either in ROM or on the 20MB hard drive. When you consider the power that has been packed into such a small package, however, a lot can be forgiven.

Though the 6220 is as powerful as a desktop AT, it shares with many other notebooks the limitations of a 20MB hard drive. There are limitations on the number of powerful applications you can use. For instance, *Microsoft C* 6.0 with all the associated utilities takes up at least 3MB of storage, as does *GeoWorks Ensemble,* while *WordPerfect* 5.1 and *Windows* 3.0 take at least 6MB each.

An informal test of processing speed, using a few of my own calculation-intensive routines and comparing completion time with the completion time on other AT-compatibles, showed that the 6220 compared remarkably well. If you add a coprocessor in the notebook's 80C287 socket, you can expect even better performance. You have the option of increasing the system memory, which will also boost performance. Memory can be increased to two or three megabytes through the purchase of optional 1MB RAM cards.

You can set the liquid crystal display for CGA, EGA, and MDA emulation, as well as the default VGA. And a Hercules option exists for an external monitor. The 6220 does a pretty good job of displaying graphic images in 16 shades of gray. I tested several compatible images with the same resolution and found reasonable faithfulness. The next test involved running a few graphic-intensive games. Games, as programmers and game players were early to discover, challenge computer abilities like no other software. In fact, the games I tried worked surprisingly well. The persistent problem with any LCD screen continues to be the slow liquid crystal response times—if the image on the screen is changing rapidly, there's a blurred, shadowy effect because liquid crystals, rather than being strictly on or off, show an obvious range of activation. An optional adapter for CRT output, to either a multisync or VGA monitor, makes the 6220 more convenient for desktop use. The same is true of the separately sold numeric keypad and expansion unit. The expansion box will provide power and peripheral connectivity while furnishing two expansion slots.

SHARP ELECTRONICS
Sharp Plaza
Mahwah, NJ 07430-2135
(800) 237-4277
List Price: $3,199.00
Street Price: $1,987.32

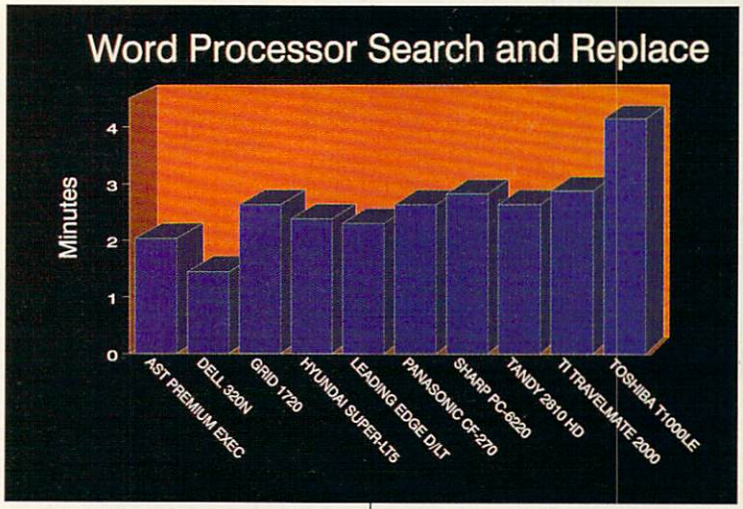
The nickel-cadmium battery supplied with the 6220, after its initial two-hour charge and with only limited hard drive access, goes for about an hour and a half before a warning beeper informs you that there's only about ten minutes of power remaining. If you don't save what must be saved within that ten minutes, it will be lost. The AC adapter, included, either doesn't recharge the battery when the computer is being used or does so very slowly. Either way, if you need to get the 6220 back on the road again soon, you must switch it off and wait for the battery to recharge. An optional battery pack, which plugs into the back of the unit, is available, and according to the manufacturer, it will extend battery-usage time an additional three hours.

I also experienced difficulty installing the battery pack, a problem which I attribute to the machine's overall compact design—sometimes a little extra space is welcome. Because the battery slot is barely larger than the battery, the connector wires can easily get in the way during battery insertion. I worked and worked to

get the battery pack neatly seated without deforming the case or mashing the wires; every possible permutation was (gingerly) tried. At last I had the battery and the wires in place, but the battery cover remained misshapen on the underside of the unit throughout the review process.

Except for its hefty price tag, I would not hesitate to recommend Sharp's PC-6220 notebook computer. In two weeks of heavy use, it performed flawlessly. And what liberty when your AT is no more difficult to lug about than a common book!

BRUCE M. BOWDEN

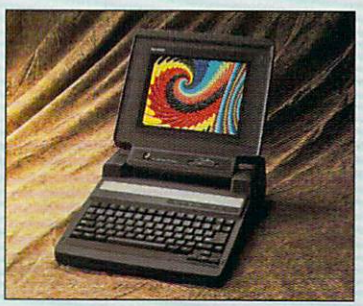


VGA COLOR FOR LAPTOPS

What's next for the laptop computer? Just a few years ago, color displays for portables seemed wishful thinking, but with the Sharp Colorstar, wishes can come true. No washed-out gray-scale images here; this machine delivers a stunning 256 vivid VGA colors, chosen from a palette of 262,144 possible hues. Combine brilliant color generation with the inherent sharpness that comes with smaller screens, and you have a remarkable picture, whatever you choose to display.

Using Sharp's innovative thin-film transistor (TFT) active-matrix LCD (Liquid Crystal Display) technology, the Colorstar stands head and shoulders above the competition in terms of visual impact. Each pixel has its own silicon thin-film transistor to allow precise color control. Not surprisingly, color LCDs aren't easy to produce; even a single pixel error stands out, so production standards call for perfection, not approximation. In part because of this difficulty, the Colorstar will initially sell for $10,000 to $15,000, but you can expect prices to fall as burgeoning consumer demand for color LCD microtelevisions encourages the improvement of factory methods.

The Colorstar comes with a 20-MHz 386DX processor, 2MB RAM (expandable to 10MB), a 1.44MB floppy drive, and a 100MB hard drive. Want expandability? The Colorstar has a half-size expansion slot (AT-bus, for networking, among other things), the standard parallel port, two RS-232C ports, a keypad port, and a CRT output. And best of all, the Colorstar



could have been a set piece for an episode of "The Jetsons." Sleek, ergonomic, and the very picture of high-tech, the Colorstar should turn heads on the basis of its style alone. And while this high-end machine may not wind up in your stocking this Christmas, move it up your wish list anyway.

—DAVID SEARS

TANDY 2810 HD

Versatile and packed with features, the Tandy 2810 HD laptop computer offers enough features to meet most of your computing needs, even if you're accustomed to working with a desktop. You get 1MB of RAM (expandable to 5MB), a 20MB hard drive, and a 3½-inch 1.44MB floppy drive. The computer operates at 16 MHz and has a socket for an optional math coprocessor.

The 2810's 84-key keyboard has full 101-key emulation and allows for some customization. If you don't like where the Ctrl and CapsLock keys are located, you have the option of physically reversing their positions. Smartly laid out, the keys have a good solid feel to them.

Other keys on the 2810 initiate battery power conservation. These place the computer in standby mode, toggle the speed between 16 MHz and 8 MHz, disable the speaker, switch from the internal screen to an external monitor, turn off the serial ports, and more.

In most working environments, I never noticed the small amount of noise generated by the 2810's disk drive. On the rare occasions I was able to use the laptop at home in my library-quiet den, I found the noise distracting. No

TANDY
1800 One Tandy Center
Ft. Worth, TX 76102
(817) 390-3300
List Price: $2,499
Street Price: n/a

problem; press a key, and the drive shuts off until needed. You can also configure the computer to shut off the drive and/or display after a certain period of inactivity. This saves battery power, too.

The 2810 warns you when the batteries need recharging, giving you ample time to save any work in progress. If they should fail while you're working, however, the Resume feature remembers what's in memory when the machine runs out of power. When you turn the power on again, the program reappears, and you continue where you left off.

To add a printer and a mouse to the 2810, just plug the appropriate cables into the computer's parallel and serial ports. You can just as easily connect a VGA monitor and a full-size external keyboard via the built-in monitor and keyboard ports. This makes the 2810 a convenient backup for your desktop computer.

The 2810's VGA LCD screen with fluorescent backlighting has a three-position brightness switch and a sliding contrast control bar allowing for readability in a wide range of lighting conditions. A key combination lets you further vary the contrast of characters and background; you can even reverse the display entirely.

As with all Tandy computers, the 2810 comes equipped with the *DeskMate* graphics-oriented interface and application software. These applications include a word processor, drawing program, spreadsheet, calendar, address book, filer, and telecommunications program.

Other manuals should emulate Tandy's User's Guide. Written for the 2810, it isn't meant to cover 57 other models or configurations. The introduction guides you through the basics, explains the different keys and setup options, and explains many useful MS-DOS commands. A separate manual guides you through *DeskMate* and its applications.

Setting up a new computer is always challenging, but Tandy's manual removes much of the confusion that comes from working with a new system. The manual explains the different parameters and what they do; then it explains your options. For example, the time and date functions are fairly simple to understand, but do you know if you want to enable or disable the serial ports, FDC Standby, Standby Timeout, or VRAM Timeout? After a quick glance through the slim but thorough manual, you'll have no doubt about what these functions do and how you want them configured.

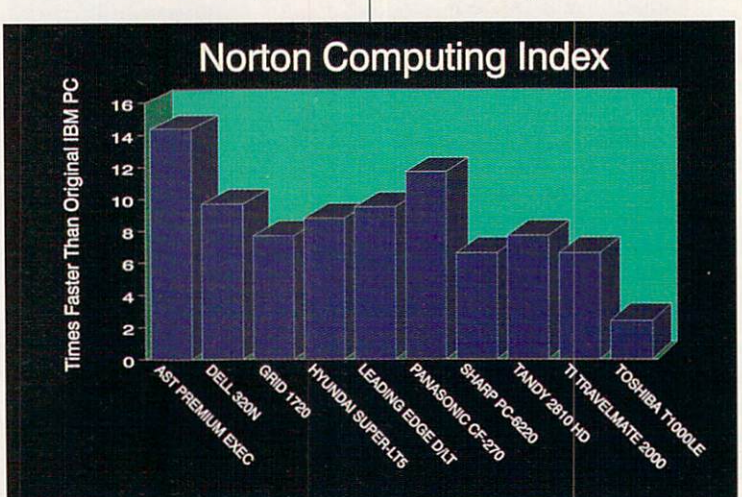
Adding extra memory cards and allocating memory are also

NORTON INDEXES

The Norton computing, disk, and overall indexes show you how well a computer performs when compared to a 4.77-MHz XT (the original IBM PC). In the Norton index, such an XT has a value of 1.0. If a computer is twice as fast, it will have a value of 2.0. The greater the index value, the faster the computer—and the faster your applications will run.

The CPU (Central Processing Unit) speed test rates the computer's microprocessor performance. The disk index rates the performance of a system's hard drive. The overall performance index factors in the CPU and disk indexes among other things.

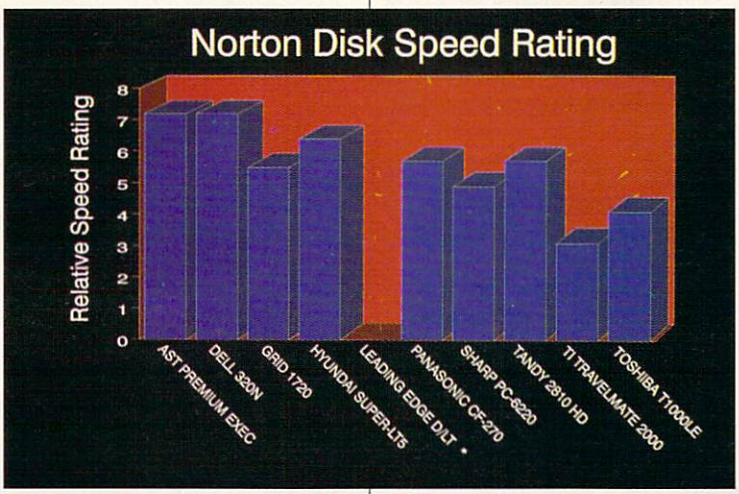
—RICHARD C. LEINECKER



carefully explained. The 2810 has 1MB installed with 640K of conventional memory and 384K of extended or shadow RAM. Available slots leave room for an additional 4MB of RAM. Depending on the requirements of the operating system and the software you run, you can configure additional memory either as expanded or extended. Some configurations require minimum allocations for shadow RAM and a software driver installed in a CONFIG.SYS file. Once again, you'll find this information clearly spelled out in the manual.

A solid performer, the Tandy 2810 HD will keep pace with advanced users but, thanks to clear documentation, won't overwhelm a beginner. With 1MB of RAM, a high-density disk drive, a 20MB hard drive, a VGA display, bundled software, and solid workmanship in an attractive package, this laptop is ready to go to work for you in a big way.

TOM NETSEL



TEXAS INSTRUMENTS TRAVELMATE 2000

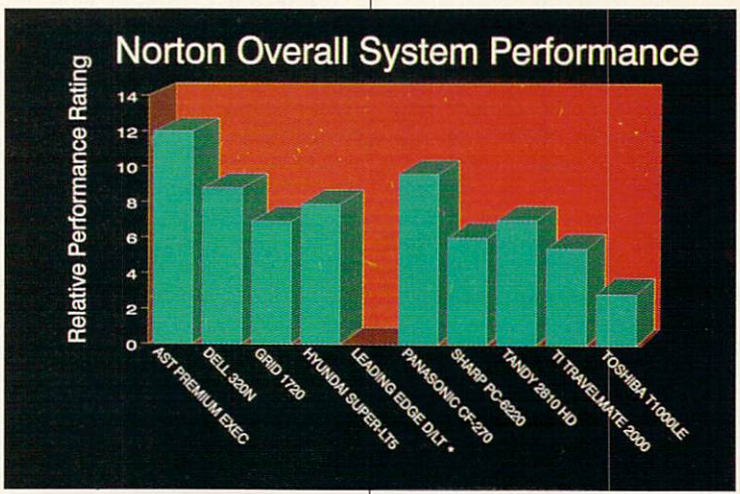
If you're ready to take your computing on the road, then the Texas Instruments (TI) TravelMate 2000 notebook just may be your ticket.

It's an amazingly small 286 notebook computer, measuring only 11 inches wide × 8.5 inches deep × 1.4 inches thick and weighing in at a meager 4.4 pounds. It comes standard with 1MB of RAM, a 20MB hard disk, and a backlit LCD VGA display. The TravelMate has an attractively styled case and a comfortable, solid-feeling keyboard.

The unit I reviewed came with the optional external 3½-inch disk drive and 2400-baud modem/fax card. All of the optional accessories can be quickly installed or detached, which means you don't have to lug them around when you don't need them. The drive plugs directly into an expansion port located on the back of the computer. To install it, simply pop off the rear cover and plug in the drive. Two thumbscrews hold the drive in place, so you don't have to fuss with cables. It's pretty slick.

The modem/fax card plugs into a small compartment located just above the keyboard. The card is held in place by a single screw and the plug. I assumed that this screw would be a thumbscrew like those on the disk drive, but it's not. However, if you have a small screwdriver, you can swap cards in a matter of minutes.

I was impressed with the software that came with the system: *BatteryPro* and *LapLink,* a file transfer program that serves as your gateway to the outside world if you don't purchase the optional 3½-inch disk drive. Connected by the *LapLink* cable and running the *LapLink* software, two computers have complete access to each other's disk files. *BatteryPro* is perhaps the more valuable piece of software. It's a utility package that functions as a power-conservation system for the computer. The *BatteryWatch* feature of the package monitors battery consumption, and *BatteryPro* provides only the power necessary



*Unable to run test.

to do your work. This combination saves valuable battery power that's usually wasted by other portables.

The battery test results for the TravelMate were acceptable. With the *BatteryPro* utilities installed, it's possible to get about an hour and a half of use from each charge, with moderate disk activity. The battery pack consists of a candy bar–shaped nicad battery that's about 11½ inches long. It fits into a very tight compartment on the back of the computer. The process of removing and replacing this piece of hardware is, at best, difficult. However, that's an extremely small price to pay when you consider the small, lightweight design of the TravelMate.

Included with the modem is a well-rounded set of communications programs, *BitCom* and *BitFax*. *BitCom* is a full-featured terminal program, and *BitFax* takes advantage of the card's fax capabilities. Both are extremely easy to use; in fact, I successfully used both without reading a single page from the manuals. I'd never sent a fax before doing this review, but *BitFax* walked me right through the whole process of sending files to a fax machine here in the office.

I thoroughly enjoyed using the TravelMate 2000. I thought the computer was well designed and attractive. In addition, it seems to be very sturdy and solid, which is a big plus in a portable computer. The only thing I didn't like about the computer was the small plastic covers that protect the external ports. They just didn't want to stay in place for me. I simply removed them and placed them in the box for safekeeping. (Most portables don't even have protective covers, so it's not really a problem.)

TEXAS INSTRUMENTS
Information Technology Group
P.O. Box 202230
Austin, TX 78714-2230
(800) 527-3500
List Price: $2,369.00 for 20MB; $2,799.00 for 40MB
Street Price: $1,926.70

If you're thinking about purchasing a high-quality notebook computer, then you owe it to yourself to check out the TravelMate 2000. It's a very powerful tool that comes with good software, has room for expansion, and offers you a wide range of optional equipment.

TROY TUCKER

COPROCESSOR SPEED

COMPUTE's benchmark statistics allow you to compare how our Test Lab computers handle *COMPUTE*'s proprietary benchmark tests. But there's another kind of comparison you should consider—the speed of a computer with a math coprocessor versus the speed of a computer without one.

When one of our review computers arrived at the lab with a coprocessor, we decided to run our benchmarks first with the coprocessor and then without it. The differences in performance were quite dramatic in some tests.

In the computer-aided design (CAD) tests, for example, the coprocessor enabled the computer to load a drawing in just under 14 seconds rather than the minute and 8 seconds the computer required without the coprocessor. Rescaling a drawing required a minute and 12 seconds without the coprocessor, 16 seconds with it. In the floating point math calculation comparisons, the differences are similarly dramatic. With the coprocessor, floating-point addition required 35 microseconds, 306 microseconds without it.

However, when our lab ran speed comparisons in applications—including a database sort, a database reindex, a text search and replace, and a spreadsheet recalculation—the differences were decidedly less significant.

Any kind of application that requires the plotting of curves or other geometric shapes or any type of vector-based graphic will benefit significantly from a math coprocessor. Anything, in other words, that's math intensive will benefit.

—MIKE HUDNALL

TOSHIBA T1000LE

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At first glance you might pass over this laptop for other more powerful models. But that could be a big mistake. I ran this 8086-based machine under some of the most demanding conditions for months, and it performed with flying colors.

Let's start with the important stuff. It's lightweight and rugged, and it has a good battery life. You can't love one of these babies after lugging it to three trade shows in two weeks unless it's really light—and this one is. Using a canvas case to carry it, I traversed several airports, a hotel lobby, and several sidewalks without any hint of soreness in my tender shoulder. On our semiofficial scale here at COMPUTE, it weighed in at seven pounds. With the carrying case, the power supply, and an assortment of backup floppies, the total is around eight pounds. Not bad, considering everything I needed to do my work was in the package.

And none of that banging around broke anything. Sure, I'm careful. But when fighting jet lag, I, like most other people, get a bit careless. You won't find any flimsy breakaway doors on this unit. Just good, honest, substantial covers that stand up to almost anything you can dish out.

If you've ever flown from one side of the continental U.S. to the other, you know it's a long trip. Not being one for the in-flight movie, I counted on having something to work on for the entire 5½ hours. No, I didn't get that far. But I did work for almost 4 hours with heavy disk access. For most people that's plenty.

What about performance? As an 8086-based machine, it was good, though not as fast as a 286 or a 386. When you're on the road, though, how often do you reindex your database files or recalculate your spreadsheet? Most of us run a simple database program, contact manager, or word processor, and for those applications, my Toshiba filled the bill. When I did compile a program with my *Microsoft C* compiler and stepped through the program with the *Codeview* debugger, I was pleasantly surprised at how well it performed. These two programs separate the men from the boys real fast. They both squeeze every available ounce of performance out of a system. And on this computer the performance was adequate.

I'm not fond of laptop keyboards, but this was one of the best I've experienced. Positive key movement with definite contact points let me know that I was working on something solid. There isn't a separate numeric keypad, but the most important functions, such as PageUp and PageDown, have their own separate keys.

Reading the display is easy if you've adjusted it properly. The controls are right there on the side—no fumbling around to get the right setting. In a wide variety of situations, this Toshiba's display was crisp and clear. One nice addition that helps adjust for different uses is the ability to change system fonts with a hot key. If you're having trouble reading what's on the screen, you can toggle between the fonts and decide which is best. I found myself changing fonts several times each day as I went from setting to setting.

I had an internal modem that was a lifesaver when I had to send files to the office. It's one convenience I wouldn't want to be without. With the phone cord that arrived in the box, I was able to connect in all of my hotel rooms.

There's an indispensable feature built in that's as close as a hot key away. It's a pop-up display showing you how much power is left in your batteries and letting you set various switches so that the computer is tuned for maximum performance. You can turn the speaker and modem on or off, set the display to reverse, and toggle the auto power off features of the hard drive and display.

A single internal floppy drive was all I needed: Once all of my files were copied to the 20MB hard drive, I rarely needed it. Disk access for both drives was good—on par with any desktop model with an 8086 processor running at 9.5 MHz.

If you have to be the first on your block with the latest computer technology at any price, you'll probably look elsewhere. But if you're interested in a great value on a workhorse unit, this laptop is for you. It's not fancy or overwhelmingly fast, but dollar for dollar, you'll get your money's worth.

RICHARD C. LEINECKER

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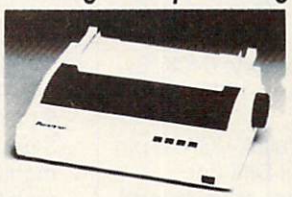

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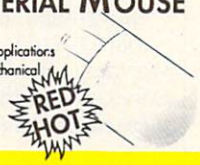

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FURTHER INFORMATION

AST PREMIUM EXEC 386SX/20

CPU: 80386SX, CPU Speed: 20 MHz
Conventional Memory: 640K, Extended Memory: 1MB, up to 8MB
Ports: serial, parallel, VGA, 6-pin PS/2-style mini-DIN (for mouse, keypad, or keyboard)
Drives: 3½-inch 1.44MB floppy, 20MB, 40MB, or 60MB hard
Video Modes: VGA paper white with 32 shades of gray
Screen Type: backlit CCFT supertwist film LCD
Standard Accessories: MS-DOS 3.3, *LapLink* 3, serial interface cable, *BatteryWatch,* tilt stand/battery pack, 110/220-volt autosensing AC adapter, carrying case with handle, AST utilities, complete documentation
Optional Accessories: 2400-baud modem—$249, 9600-baud fax/send—$349, numeric keypad—$119, leather accessory case—$299, nylon accessory case—$129, car adapter/battery charger with built-in quick charger—$129, lightweight small trickle battery charger—$29, secondary battery pack—$99, 4MB memory expansion (SIMMs)—$999, external charger for use with AC and auto adapters to charge secondary battery pack—$119
Warranty: one year (extended warranty available)
Service Plan: through dealer or third-party maintenance company

Circle Reader Service Number 301

DELL 320N

CPU: 80386, CPU Speed: 20 MHz
Conventional Memory: 640K, Extended Memory: 1MB, expandable to 5MB
Ports: serial, parallel/external drive, VGA, keyboard/keypad, mouse
Drives: 3½-inch 1.44MB floppy, 40MB or 60MB hard
Video Modes: VGA
Screen Type: triple supertwist LCD
Standard Accessories: battery pack, nylon case, AC power adapter
Optional Accessories: 1MB memory—$149.00, 2MB memory—$249.00, 4MB memory—$498.00, monochrome VGA monitor—$149.00, color VGA monitor—$399.00, Super VGA color monitor—$499.00, 2400-bps data/fax modem (price unavailable), extra battery—$79.95, DOS 3.3—$99.95, DOS 4.01 or 5.0—$119.00, pocket network adapter cards—$279.00–$659.00, 9600-bps fax—$399.00, 8387 SX coprocessor—$349.00, external 5¼-inch 1.2MB drive—$349.00, 40/120MB external tape backup unit—$449.00, numeric keypad—$149.00, automobile adapter—$129.00, additional AC adapter—$69.95, pseudoleather case—$99.95, replacement slip case—$17.95
Warranty: one year parts and labor, 30-day satisfaction guarantee
Service Plan: automatic one-year contract with next-day on-site replacement, can be extended for additional fee; offered by Dell, performed by Xerox

Circle Reader Service Number 302

GRID 1720

CPU: 80C286, CPU Speed: 16 MHz
Conventional Memory: 640K, Extended Memory: 1MB, up to 5MB
Ports: serial, parallel, VGA, external PS/2-compatible keyboard, modular phone jack
Drives: 3½-inch 1.44MB floppy, 20MB or 60MB hard
Video Modes: CGA, EGA, VGA
Screen Type: backlit triple twist LCD
Standard Accessories: internal rechargeable/removable battery pack, DOS 4.01, AC power supply, 2400-baud modem, real-time clock
Optional Accessories: leather carrying case, corduroy carrying case, enhanced battery, Xircom token ring adapter, ethernet adapters (prices unavailable)
Warranty: one year
Service Plan: information available by calling Grid

Circle Reader Service Number 303

HYUNDAI SUPER-LT5

CPU: 80386SX, CPU Speed: 8/16 MHz switchable
Conventional Memory: 640K, Extended Memory: 2MB, expandable to 6MB
Ports: serial, parallel, VGA, external floppy drive, external keyboard
Drives: 3½-inch 1.44MB floppy, 40MB hard
Video Modes: VGA
Screen Type: backlit supertwist LCD
Standard Accessories: AC adapter, ni-cad battery, MS-DOS 4.01, GW-BASIC
Optional Accessories: 2400-bps modem—$395, soft black carrying case with shoulder strap—$95, extra battery pack—$145
Warranty: 18 months
Service Plan: through dealer

Circle Reader Service Number 304

LEADING EDGE D/LT386SX PLUS

CPU: 80386, CPU Speed: 16 MHz
Conventional Memory: 640K, Extended Memory: 2MB
Ports: serial, parallel, VGA, mouse
Drives: 3½-inch 1.44MB floppy, 40MB or 100MB hard
Video Modes: VGA
Screen Type: backlit supertwist LCD
Standard Accessories: battery, MS-DOS, GW-BASIC, and *Windows* 3.0
Optional Accessories: modem—$199, extra battery pack—$70, cigarette-lighter adapter—$6, carrying case—$70
Warranty: 12 months on all equipment

Service Plan: no on-site for laptops; carry-in to dealers; number listed above

Circle Reader Service Number 305

PANASONIC CF-270 BUSINESS PARTNER

CPU: 80C286, CPU Speed: 16 MHz
Conventional Memory: 640K, Extended Memory: 1MB, expandable to 5MB
Ports: serial, parallel, VGA, external keyboard
Drives: 3½-inch 1.44MB floppy, 20MB hard
Video Modes: VGA
Screen Type: backlit supertwist LCD
Standard Accessories: MS-DOS, GW-BASIC, diagnostic utilities, AC adapter
Optional Accessories: 1MB RAM card—$369, rechargeable ni-cad battery—$99, internal 2400-baud modem—$199
Warranty: one year parts and labor
Service Plan: through Panasonic

Circle Reader Service Number 306

SHARP PC-6220

CPU: 80286, CPU Speed: 12 MHz
Conventional Memory: 640K, Extended Memory: 1MB, expandable to 3MB
Ports: serial, parallel, numeric keypad, bus for expansion unit
Drives: 20MB hard
Video Modes: CGA, EGA, VGA, MDA
Screen Type: backlit triple supertwist LCD
Standard Accessories: AC adapter, MS-DOS, *LapLink*
Optional Accessories: CRT cord—$149, 1MB memory—$499, add-on battery—$249, 3½-inch 1.44MB floppy drive—$299, fax/modem—$499, numeric keypad—$99, expansion unit—$699
Warranty: one year for service and parts
Service Plan: through Sharp Electronics

Circle Reader Service Number 307

TANDY 2810 HD

CPU: 80286, CPU Speed: 16 MHz
Conventional Memory: 640K, Extended Memory: 384K, expandable to 5MB
Ports: serial, parallel, VGA, external keyboard, external disk drive
Drives: 3½-inch 1.44MB floppy, 20MB hard
Video Modes: VGA
Screen Type: backlit triple supertwist LCD
Standard Accessories: MS-DOS 4.01, battery, *DeskMate 3*, LIM 4.0, AC adapter, charger
Optional Accessories: 2400-baud internal modem—$199.95, replacement battery—$99.95, 1MB memory—$399.95, carrying cases—$39.95–$49.95
Warranty: one year
Service Plan: optional extended plan with Radio Shack

Circle Reader Service Number 308

TEXAS INSTRUMENTS TRAVELMATE 2000

CPU: 80286, CPU Speed: 12 MHz
Conventional Memory: 640K, Extended Memory: 1MB, expandable to 3MB
Ports: serial, parallel, numeric keypad, expansion station
Drives: 20MB hard (standard), 40MB hard (optional)
Video Modes: VGA
Screen Type: sidelit triple supertwist LCD
Standard Accessories: DOS 4.01, *BatteryWatch, Laptop and File Manager, LapLink*
Optional Accessories: modem—$299, extra RAM module—$399, optional floppy drive—$219, math coprocessor—$589, CRT interface—$109, extra battery pack—$89, external battery pack—$179, numeric keypad—$69, deluxe carrying case—$69, leather portfolio—$49, expansion station—$799
Warranty: one year
Service Plan: optional, varies by location

Circle Reader Service Number 309

TOSHIBA T1000LE

CPU: 8086, CPU Speed: 9.54 MHz
Conventional Memory: 640K, Extended Memory: 1MB, expandable to 9MB
Ports: serial, parallel
Drives: 3½-inch 1.44MB floppy, 20MB hard
Video Modes: CGA
Screen Type: sidelit supertwist LCD
Standard Accessories: DOS 3.3, Reference Guide, Portable Companion, MS-DOS Manual, FirstTime Guide
Optional Accessories: 1MB memory—$269, 2MB memory—$479, 4MB memory—$889, 8MB memory—$1,779, universal AC adapter—$75, battery pack recharger—$279, battery pack 2200 milliamps—$105, battery pack 1700 milliamps—$65, modem-slot battery pack—$65, fabric carrying case—$79, leather carrying case—$105, automobile adapter—$59, 2400-bps Hayes-compatible modem for dedicated slot—$279, 2400-bps Hayes-compatible modem (cellular modem)—$359, external 5¼-inch 360K floppy—$399, Toshiba BASIC 3.0—$99, MS-DOS 4.01—$99, *Desk Station II*—$1,199
Warranty: one year parts and labor
Service Plan: Exceptional Care (Toshiba), first year free

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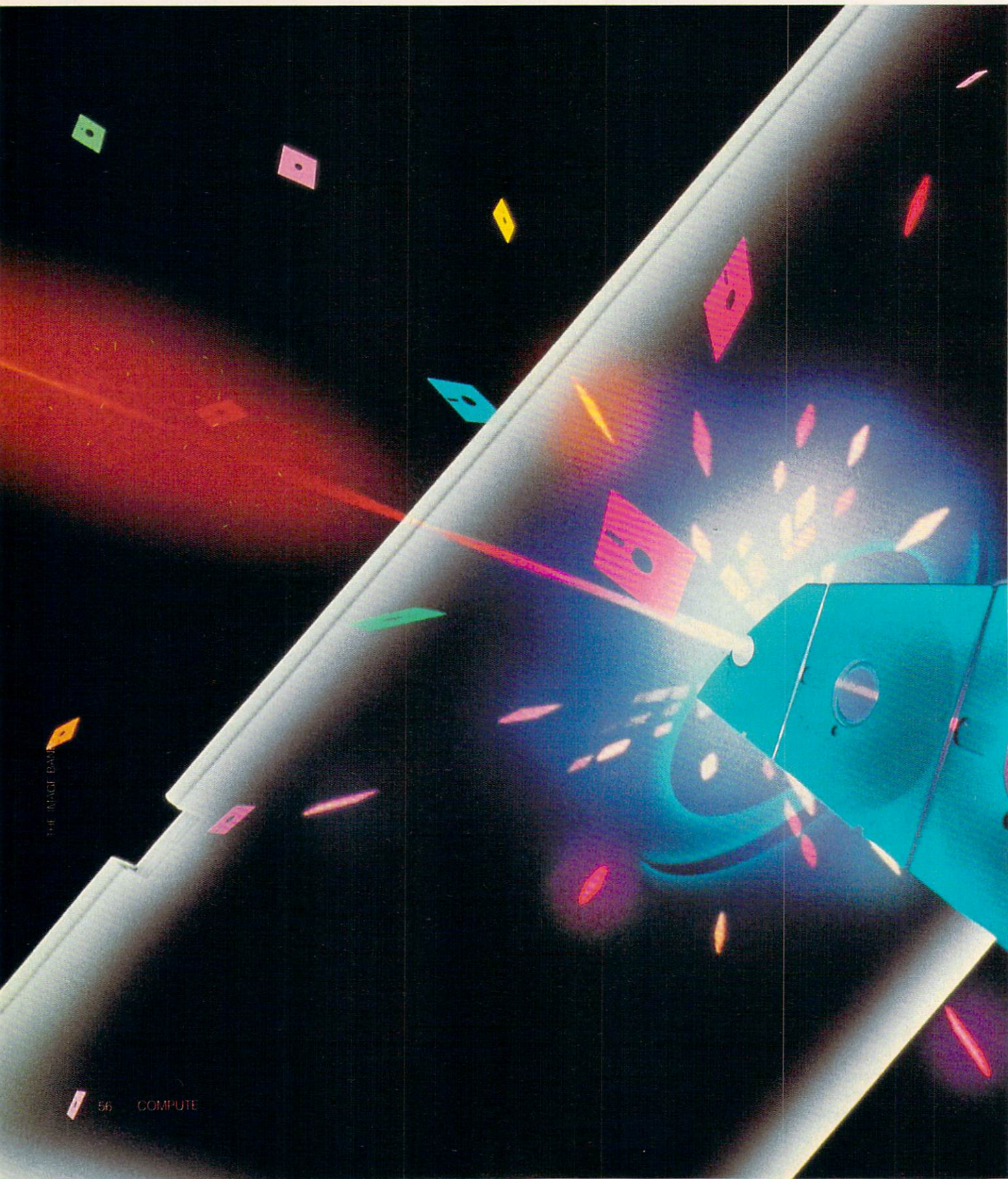
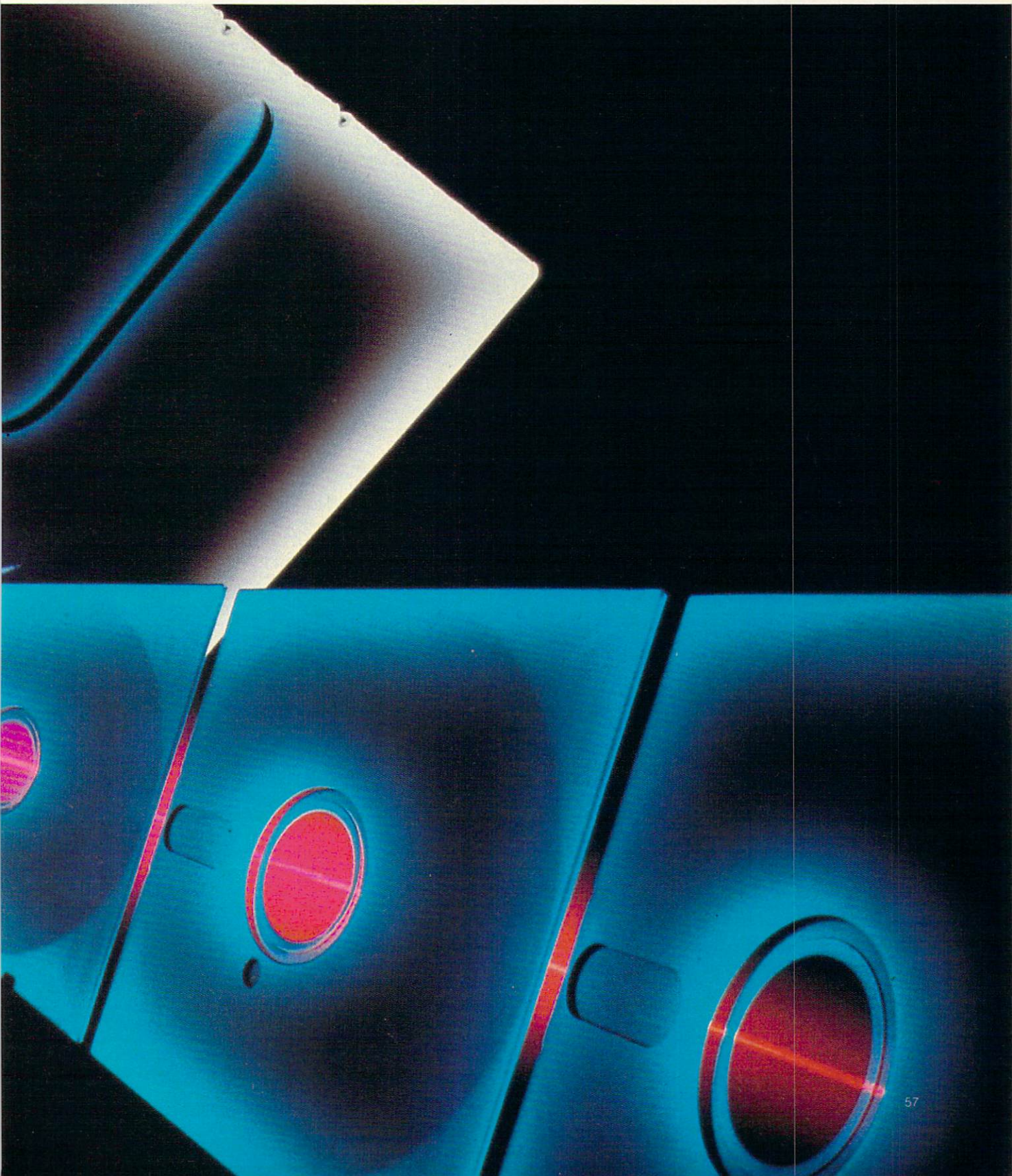
DOS 5.0
A PERFECT 10



THE SOFTWARE BARGAIN OF THE YEAR

BY MARK MINASI



Since its introduction ten years ago, DOS has seen a lot of changes, not all for the better. People with long PC experience and good memories know that new versions of DOS are often mixed blessings, so the news that there's a new version may not bring a smile to everyone's face.

But this version is different, and it *ought* to make you smile. With version 5.0, DOS has emerged from its stormy adolescence and developed into a mature, well-rounded operating system.

What's so special about this DOS? Well, it uses less memory than previous versions and includes commands that allow you to unerase files and, more amazing, unformat disks.

It comes with a shell that lets you run multiple programs at the same time, and it remembers your last 20 or so commands, allowing you to recall, edit, and reissue them, saving countless keystrokes.

With the new DIR command, you can sort files by name, size, date, or extension; show hidden files; *only* show hidden files or files that haven't been backed up; and a multitude of other possibilities.

If I sound breathless, I am. I've worked with enough so-called new-and-improved software products to know what to expect of a new operating system. I figured that 5.0 either wouldn't work with my Novell network, would clash with my *OnTrack Disk Manager,* or wouldn't run with *Windows,* and on and on.

Imagine my surprise when I saw that 5.0 ships with a Novell driver, a 5.0-compatible version of the *OnTrack* software, and new and cleaner versions of EMM386.EXE and HIMEM.SYS, the critical memory-organizing device drivers used by *Windows* 3.0!

Microsoft has really put some thought into this system, and I'm sure it's going to pay off. I wouldn't be surprised if virtually everyone in the PC world hasn't switched to DOS 5.0 within a year.

More Memory

At a recent press conference, a Microsoft PR person asked, "What is Microsoft best known for?" A member of the audience shouted, "The 640K limitation!"

That wasn't the answer the flack was looking for, but it addressed perhaps the best-known and most annoying limitation of MS-DOS. The operating system is restricted to using the lowest part of your computer's memory potential, called *conventional memory.*

Some vendors have responded to this problem with clever programs called *memory managers.* The best-selling of these are *QEMM,* from Quarterdeck Systems, and *386MAX,* from Qualitas. These programs allow you to make some use of the extended memory that often goes unused on a 386, 386SX, or 486 system. These 386-type systems can theoretically have more than 4000 megabytes of extended memory, so any program that lets you use some extended memory is obviously valuable.

These memory managers perform two main functions. First, they allow you to load device drivers and memory-resident TSR programs above the 640K of conventional memory, freeing up conventional memory that was once used by these helpers.

Second, they temporarily translate some of that otherwise-unused extended memory into a third kind of memory called *expanded memory,* memory used by programs like *1-2-3* version 2 or *WordPerfect* version 5.1.

Both of these functions are valuable, and that's why both Qualitas and Quarterdeck sales are doing well at the moment.

But now, they have competition from DOS itself. The new HIMEM.SYS included with 5.0 does more than simply serve *Windows;* it provides the real magic behind one of 5.0's most eye-catching features.

Is There Really 614K Free?

I just ran CHKDSK, and it told me that, despite having loaded a pile of memory-hungry device drivers and TSRs, I have 614K of my 640K free. Under DOS 3.3, that number would've been somewhere around 520K; under 4.01, it would be about 508K.

HIMEM, in concert with a new CONFIG.SYS command DOS=HIGH, actually loads as much as 64K of DOS into your computer's extended memory! Another 5.0 program, EMM386.EXE, allows you to load device drivers and TSRs above 640K, just like *QEMM* and *386MAX,* and again, it works without a hitch with *Windows.*

Once you get a copy of 5.0, don't miss out on these memory benefits. You'll need to focus on the HIMEM.SYS and EMM386.EXE device drivers, the new DOS=HIGH,UMB command, the DEVICEHIGH CONFIG.SYS command, and the LOADHIGH AUTOEXEC.BAT command.

You'll have to noodle around with these a bit to make them work well, but it's worth the time. One final caution: In order to load DOS above the 640K addresses, you need an 80286 or better computer; to load device drivers and TSRs above 640K, you need an 80386 or better.

DOS 5.0'S TOP TEN FEATURES

- New memory manager that loads DOS, device drivers, and TSRs into high memory (DOS, HIMEM.SYS, and EMM386.EXE)
- New unerase, unformat, and file-system tracking commands (UNERASE, UNFORMAT, and MIRROR)
- New text editor with full mouse support and pull-down menus (EDIT)
- New QuickBASIC interpreter (QBASIC)
- New command-history retriever (DOSKEY)
- Improved SYS command (SYS)
- Improved shell with built-in task switcher (DOSSHELL)
- Improved directory command (DIR)
- Improved disk checking (CHKDSK)
- Improved memory viewing (MEM)

A Kinder, Gentler File System

You've done it. I've done it. Everyone's done it at some point or another: accidentally erased a file. If you're like millions of PC users, you've gone out and purchased *The Norton Utilities, PC Tools,* or *The Mace Utilities.* But 5.0 now includes the utilities UNDELETE, UNFORMAT, and MIRROR from Central Point Software's *PC Tools Deluxe.* UNDELETE reverses a file erasure—within limits. If you wait too long between when you've erased the file and when you try to undelete it, it may no longer be recoverable.

How does UNDELETE work this minor miracle? Simple. When DOS erases a file, it doesn't go to the actual trouble of overwriting the area on disk where the file resides. Instead, it just marks that area as usable for creating new files.

As long as you don't create any new files, there's no demand to actually utilize this available area. Create a new file, however, and there's the chance that your "erased" file will actually be irrevocably overwritten. UNDELETE sniffs out the waiting-to-be-overwritten file and reconstructs its old directory entry.

You can make life easier for UNDELETE, however, with another of the Central Point tools now in 5.0: MIRROR. MIRROR makes a copy of your system's table of contents—two areas you may have heard of, called the *File Allocation Table* (FAT) and the *root directory.*

Both UNDELETE and UNFORMAT

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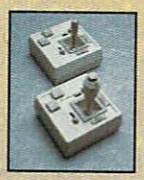

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USING DOS 5.0'S MEMORY MANAGER

To get the most from 5.0's new memory management skills, you need to follow a few simple rules.

The first two lines in your CONFIG.SYS file should install HIMEM.SYS and EMM386.EXE in that order. If you're running EMM386 just to load device drivers and TSRs high and aren't using its ability to emulate expanded memory, you'll need to add the parameter NOEMS. Also, if your system includes hardware that uses addresses between 640K and 1024K, you'll need to add the exclude switch (X) to tell EMM386 not to use those addresses. Here's an example of those first two lines:

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS
  X=CC00-D000
```

Make sure you use DOS 5.0's HIMEM and EMM386 commands. You may have several copies of these on your hard disk. Find the old ones and delete them.

Now you're ready to load device drivers and TSRs high.

To load a device driver high, instead of using DEVICE=, you use DEVICEHIGH=. For example, to load ANSI.SYS high, you'd use the command DEVICEHIGH=ANSI.SYS. It's important to note that you can't use DEVICEHIGH with HIMEM.SYS and EMM386.EXE.

As a rule, it's best to load programs in order by size, starting with larger programs.

To load DOS itself high, you'll want to add the command DOS=HIGH,UMB.

Here's a sample CONFIG.SYS for DOS 5.0:

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS
DEVICEHIGH=C:\DOS\SMARTDRV.SYS
  2048 1024
DEVICEHIGH=C:\DOS\SETVER.EXE
DEVICEHIGH=C:\DOS\ANSI.SYS
DEVICEHIGH=C:\MOUSE.SYS /S50
SHELL=C:\DOS\COMMAND.COM C:\
  DOS\/E:512 /P
BUFFERS=10
FILES=40
STACKS=0,0
DOS=HIGH,UMB
```

To load TSRs high, you simply precede the command in your AUTOEXEC.BAT with LOADHIGH. For example, to load DOS's new DOSKEY command-history retriever into conventional memory, you'd put the command DOSKEY in your AUTOEXEC.BAT file. To load this program into high memory, you use the line LOADHIGH DOSKEY.

Here's a sample AUTOEXEC.BAT:

```
@ECHO OFF
VERIFY OFF
PATH C:\DOS;C:\WINDOWS;C:\WINDOWS\
  UT;C:\BA;C:\UT;C:\UT\NU;C:\UT\XY
C:\DOS\MIRROR C: /1
SET DIRCMD=/W/P/ON
PROMPT $D$_$P$G
LOADHIGH C:\DOS\DOSKEY /INSERT
CD \WINDOWS
WIN
```

There's one more command that's essential for memory management—MEM. MEM's been around since DOS 4.0, but it has a new feature that displays how much memory your device drivers and TSRs are using and where in conventional or upper memory they're loading.

To get the big picture, type MEM/C IMORE at the DOS prompt. If some of the programs you tried to load into high memory actually loaded into conventional memory, change the order in which they load. You'll probably need to experiment a little to get the most from 5.0's excellent new memory management features.

—CLIFTON KARNES

use this copy as a starting point when reconstructing files after damage or erasure. The MIRROR backup isn't essential, but it greatly increases your chances of data recovery. And running it regularly is painless—just include it in your AUTOEXEC.BAT.

The third command of this group is the most amazing: UNFORMAT. Accidentally format a floppy disk or a hard disk, and in a twinkling you can undo the damage. This seems to violate the laws of physics, but again, there's no real magic involved. It's already been said that erasure operations don't actually overwrite files. Instead they tell DOS to forget that the files exist and treat the areas in which they reside as available. As it turns out, the FORMAT command just does the same thing on a grand scale.

UNFORMAT reconstructs the FAT and root directory, effectively nullifying the accidental FORMAT operation—again, this only works if you run UNFORMAT before you create any new files.

Along the lines of data recovery, there are two minor revisions of old DOS programs that are worth mentioning. FORMAT itself is smarter and can now format a disk in just 16 seconds, provided that the disk has already been formatted at some time in the past.

And SYS, the DOS utility that makes disks or hard drives bootable, used to be very picky about which disks it would work with. Its criteria for bootability were so stringent that it was nearly useless.

SYS's limitations really showed when trying to upgrade the DOS on your hard disk. More than once, I gave up trying to get SYS to play ball and just reformatted the disk to get the new DOS on the hard disk.

SYS is now much more accommodating. So much so, in fact, that it seems amenable to making *any* disk bootable, so long as there's about 85K of free space on the disk for the system files.

The UNDELETE and UNFORMAT programs, and others like them, have certainly been available through third parties for years. But it's nice to finally see them included with DOS. These tools are too good for just power users to know about. And the fact that SYS is finally useful (after a mere ten years) is quite welcome.

The Old Shell Game

More and more PC users prefer a program-launching, file-managing shell program to the arid charms of the C prompt, so word of DOS 4.01's shell program was greeted enthusiastically in the user community—at least until the community actually *saw* the shell.

You could say that the DOS 4.01 shell was to shells what EDLIN is to editors. DOS 5.0's DOSSHELL improves on the previous shell to a point where it's actually not bad, as shells go. Even veteran command line jocks may find a use for the shell's newest feature—task switching.

With task switching, any computer, even an XT, can load multiple programs and switch among them. Now, be sure to read that correctly. This isn't full-fledged multitasking. Load *1-2-3* and *WordPerfect,* and only one of them is actually running at any time—the program that you're working with.

But when you want to switch from *1-2-3* to *WordPerfect,* you don't need to exit *1-2-3* and start *WordPerfect.* Rather, you just type Alt-Esc, a key combination familiar to *Windows* users.

The main benefit is quick switches from one program to another, which could be quite a welcome benefit for a user with an older 8088-based system or someone who doesn't want to have to fool with *Windows* just to load multiple programs.

Each DOS session, by the way, gets 582K of RAM (on my system, at least)—not bad for a task switcher that comes free with the operating system.

Other than task switching, the shell has the usual shell features—mouse support for selecting files for copying and deleting, a visual representation of your disk's tree structure, and point-and-click program launching.

There are a couple of little extras, too: a 50-line screen mode and the an-

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❑ **Dark Ages (1964)** A brilliant arcade/adventure game with superb graphics and animation. 400K, EGA, 286 or faster machine.

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swer to an old DOS question, How do I rename a directory? The customary way to rename a directory has been to create a new one with the desired name, copy the files to the new directory, and erase the old one. But with the DOS shell, you just click on the directory and select Rename under the File menu.

Teaching an Old DOS New Tricks

Finally, there's a group of items for which 5.0's designers can be justly proud. DOS 5.0 eradicates bugs (some ancient, some arising as recently as DOS 4.01), and it adds many long-awaited features.

Perhaps the most significant of these is much smoother support for large drives. DOS 4.01 supported drives larger than 32 MB—that was almost its sole saving grace—but it had a catch. In addition to the extra 10K of RAM that DOS 4.01 needed, you also had to load SHARE, a memory-resident program that burned up a few more K all by itself.

Setting up drives is a bit easier with the new FDISK. FDISK, for those who've avoided it, is one of the programs that you (or someone) must run when setting up a new hard disk.

Part of the setup process divides a hard drive into sections used by different operating systems—some for DOS and some for UNIX, for example. Most of us give 100 percent of the disk to DOS, but whoever sets up the disk must still make the explicit step of allocating the entire disk to DOS. DOS is not the primary partition by default.

Under previous versions of DOS, a setup person occasionally ran into a blockade. If there's already a partition from an operating system other than DOS (such as UNIX), FDISK couldn't delete it. This put installers in a difficult position if they didn't have the FDISK for the originating operating system. Only the UNIX FDISK could delete a UNIX-created partition. With 5.0's FDISK, however, you can now delete any kind of partition.

Since DOS 2.0, CHKDSK has done an odd thing when it encounters a disk problem called *lost clusters*. It tells you that you've got lost clusters—a relatively minor problem indicating some confusion in DOS's disk housekeeping—and offers to fix them. You give it the go-ahead, but it doesn't actually fix the problem.

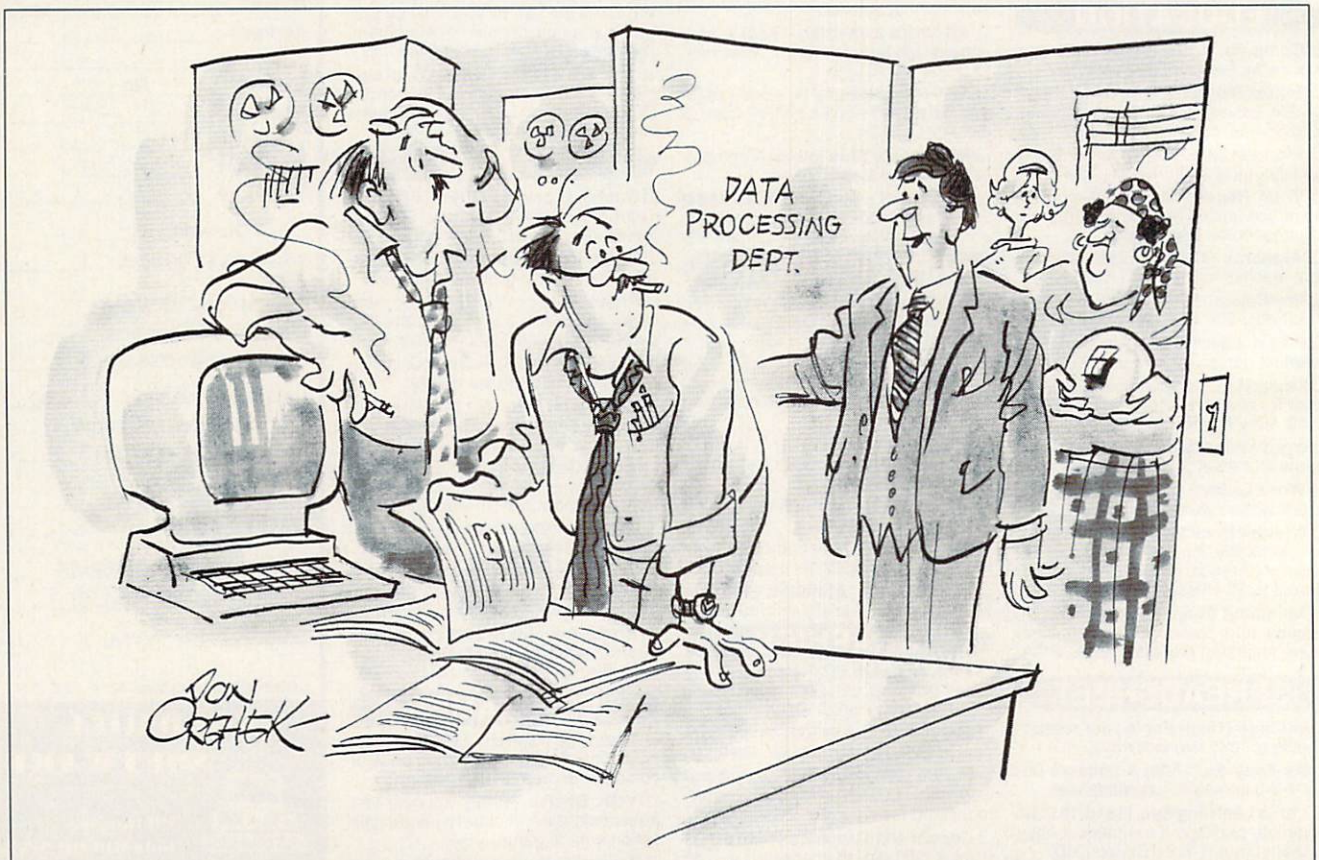
Then you look more closely at the screen. Before it told you about the lost clusters, it warned you that the /F option wasn't activated, so changes would not be written to disk. What it was trying to tell you was that something was wrong, but that CHKDSK wasn't started with the /F option and that CHKDSK isn't allowed to make any changes to the disk, even much-needed fixes, without the /F option.

That doesn't keep CHKDSK, however, from leading you to believe that it is going to do something useful with the next few lines. It has confused more than one user, but no longer. Now CHKDSK is much more direct, telling you that you have a problem and that you must rerun CHKDSK with the /F option in order for it to fix the problem.

EDIT, DIR, and More

A few paragraphs back, I did a little left-handed EDLIN bashing. EDLIN's still around—for the purists—but now there's EDIT, a fairly complete full-screen text editor. It supports the mouse and has search and block operations, word-wrap, and printing—all supported by a pull-down menu system. It's easy to use, it boasts good help, and it's fast.

Ever wanted to sort the output from a DIR command? The new DIR command can sort files by size, extension, name, or date of creation. When cleaning out a directory to make space, you can sort the files by size (DIR /OS) so that you can figure out which files will yield the most space once deleted.



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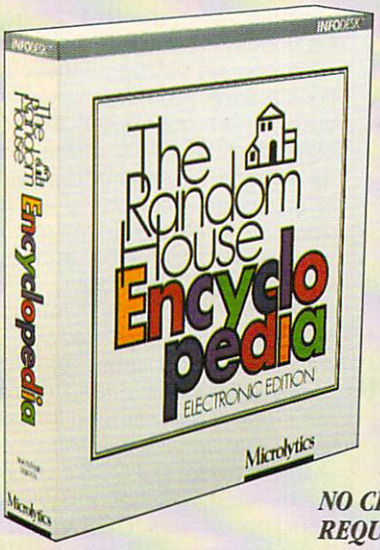

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THE CHANGING FACE OF DOS

DOS has had an almost human life cycle. At birth, ten years ago, it was a promising new baby of an operating system. It couldn't support hard disks or serial printers, but it could do basic things fairly well, certainly as well as other operating systems on microcomputers at the time.

PC-DOS 1.0 included the COPY, ERASE, and TYPE commands; it even included a version of CHKDSK. DOS 1.1 followed a bit later, offering a few bug fixes as well as support for the then-new 360K double-sided drives. (Remember that for years, the driving force for new versions of DOS was support for new IBM hardware.)

Meanwhile, Microsoft began a tradition of offering roughly parallel, slightly tardier, but more stable versions of DOS called *MS-DOS*. In truth, it never really mattered all that much whether you used MS- or PC-DOS, since they both ran on almost all machines. The first release of MS-DOS was version 1.25.

DOS left toddlerhood with 2.0, which saw the beginning of hard disk support, device drivers, and a few notions stolen from an older operating system typically seen then on minicomputers—UNIX. DOS 2.0's quantum leap from 1.1 was the kind of development that would make any parent proud.

Somewhere after version 2, however, DOS entered a stormy adolescence. PC-DOS 2.1 (MS-DOS 2.11) was just a slightly more memory-hungry version of 2.0 that IBM released mainly to support the substandard floppy drives it put on the late and unlamented PCjr and the now-forgotten PC Portable.

DOS 3.0 was an example of more growing pains. IBM released it to support the new 1.2MB drives shipped with the AT, but inside it was very different. The file system was cleaned up a bit, and the entire operating system's source code was converted from assembly language to C.

None of these changes were apparent to users, but people certainly noticed the conversion's unpleasant side effect: DOS 3.0 took up 50 percent more memory than 2.1.

DOS 3.1 was written to support an IBM LAN product, 3.2 added support for the 720K floppies on the IBM Convertible and added a few commands (XCOPY is the most prominent), but it was really 3.3 that convinced people to upgrade to version 3.

DOS 3.3 was a bit more stable (although it wouldn't run with some compatibles' hard disk controllers) and provided a way to support hard drives larger than 32MB through logical drives. Instead of telling DOS that you had a hard drive of the unpalatable size of, say, 60MB, you'd tell it that you had two hard drives—one the maximum size of 32MB, the other 28MB.

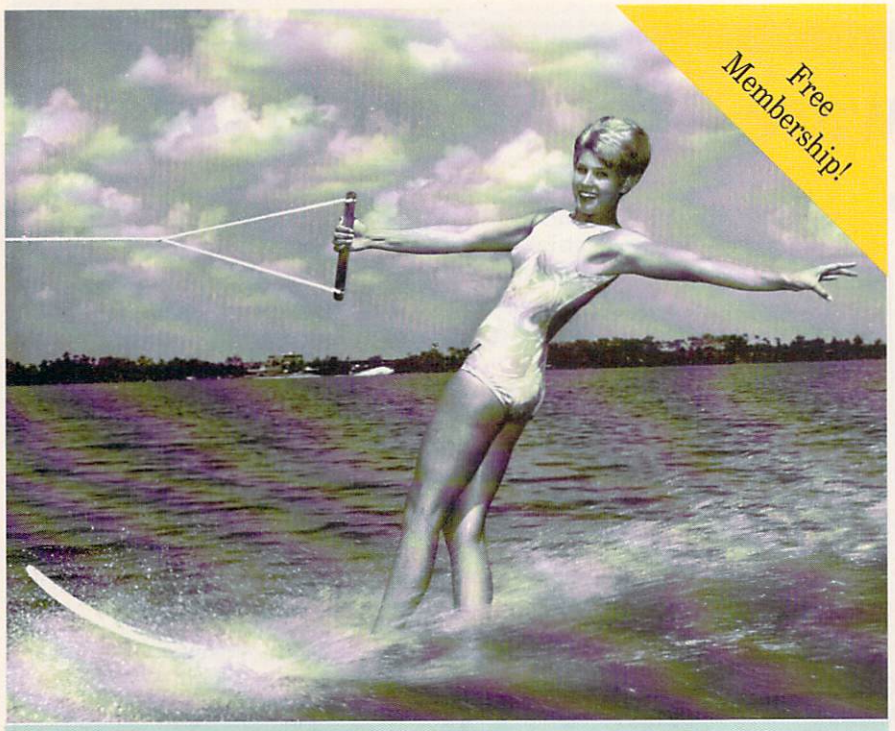
DOS 4.0 tried to present a better face to the world in the form of the original DOS shell, but that face suffered from near-terminal acne. The quickly patched 4.01 tamed the obvious bugs, but 4.0 is still far outsold by its older brother, version 3.3.

Now, with DOS 5.0, it seems that DOS has gone to college, lost a little weight, learned a few manners, and gotten a bit of polish. It even gets along better with its relatives, OS/2 and *Windows*.

Memory Munching

To get an idea of how DOS's appetite for memory has changed over the years, here's a comparison of DOS versions with the memory requirements for each.

Version	Memory Requirement (K)
1.0	11
1.1	12
2.0	24
2.1	26
3.0	37
3.1	38
3.2	53
3.3	54
4.01	65
5.0	61 (without memory manager)
5.0	29 (with memory manager)



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You can finally display hidden files (DIR /AH), or for that matter, you can display only those files that have their archive bits set (DIR /AA)—that is, files that haven't been backed up yet. And now there's a feature wherein DIR will search more than just the current directory. Can't remember where you put RESUME? It's easy to find; DIR \RESUME /S/B does the trick.

And once you've decided on the DIR switches you'd like to use, instead of typing them each time you issue the DIR command, you can set an environment variable. For example, to always sort on filename, you'd put SET DIRCMD=/ON in your AUTOEXEC.BAT.

Now DIR not only shows you how much free space is on the disk but also computes the total amount of space taken by the files whose names it has just shown you. For example, type DIR *.BAT and it will, as always, show you all the files with the BAT extension, but it will also tell you how much space is taken up in total by those files.

And once you've found all of those BAT files, perhaps you'd like to erase some, but not all, of them. Just type ERASE *.BAT /P. The /P means pause and verify for each file. One by one, it examines all of the files, asking if that file should be erased.

Of course, having all these new options means you may miskey now and then, which makes yet another new command, DOSKEY, all the more useful. DOSKEY remembers your last 20 or so commands. Using the up- and down-arrow keys, you can recall a previous command, edit it, and reissue it, saving tons of keystrokes.

You can even write macros and assign them to keys, the way you do with *1-2-3* and other applications. There have been public domain versions of this utility around for years, but it's nice to see it's finally part of DOS.

If you've cursed DOS's BASIC interpreter, either BASICA or GW-BASIC depending on your DOS version, DOS 5.0 has a surprise for you. The new DOS comes with a reduced-function version of Microsoft's *QuickBASIC* compiler. It even ships with a few sample programs that are a bit more interesting than the old mortgage calculator.

Space is running out, so let's see what's left. The ATTRIB command can now modify hidden and system attributes, in addition to the archive and read-only bits, which it could modify before.

MODE CO80,50 shows a 50-line screen on VGA; there's a 43-line mode for EGA. MODE will also speed up your keyboard.

And all these neat new features cried out for another new feature: built-in help. Can't remember the new syntax for DIR? No problem. Just type DIR /?, and you'll get a complete listing of the options and syntax for the command.

So there you have it. Not only is MS-DOS 5.0 a stable replacement for its older brother 4.01, but it reduces the need for file recovery tools like *The Norton Utilities* (around $100), task switchers like *Software Carousel* (around $80), 386 memory managers (around $100), hobby-level BASIC compilers (around $70), and full-screen text editors ($50 to $400). Not a bad deal. I'd say DOS 5.0 is the software bargain of the year.

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ONLINE

Denny Atkin

A NEW MEANING FOR ONLINE HELP

It's 9:45 on Friday night, and you can't get your new *Windows* spreadsheet to print sideways on your ink-jet printer. The software company's offices won't open again until Monday morning, so you can't call the technical support line. What will you do?

You could try calling local bulletin board systems and posting a plea for help there, but the odds are pretty slim that someone else in Hattiesburg, Mississippi, is using the same hardware and software combination that's troubling you now. You'd better call a national service, where you're more likely to find someone familiar with your problem.

No matter when problems arise, the help you need can be found online.

The first place to check is in the technical support chapter of your program's manual. If the company has an online support round table, chances are good you'll find it listed there. If not, log on to your favorite network, open your terminal program's capture buffer, and get a list of all of the special interest groups (SIGs) on the network. Log off and peruse the list offline, looking for SIGs that cover topics related to your problem. Since you won't feel the "time is money" pressure checking the list offline, you might find more areas appropriate to your problem.

Once you find a SIG that might help with your problem, all you can do is upload your problem and hope that someone answers you in time, right? Wrong! Why wait for an answer that might already be there?

Many online services will let you search message categories for occurrences of a specific word or phrase. If your service of choice has such a feature, use it to search for an appropriate word—in this case, perhaps *sideways* or *printing*. If not, then open your capture buffer and invoke a nonstop read command of the messages in that particular category. Close the buffer, log off, and load the capture file into a text editor.

You can now use your text editor's search command to hunt quickly through the file for words that might flag a message that relates to your problem. With any luck, one of these methods will find a message relating to your problem and how to solve it.

If not, though, don't despair. Chances are you can leave a message online and still get some helpful advice before your deadline.

Check for a support area for the publisher of your spreadsheet program. If that turns up nothing online, check for a *Windows* support area. If you're on BIX, you'll find IBM.WINDOWS. On CompuServe, there's the MS Windows Advanced Forum (WINADV), the Windows New Users Forum (WINNEW), and three *Windows* third-party forums (WINAPA, WINAPB, WINAPC).

If you don't have any luck there, find the general forum for your computer platform, in this case an IBM compatible. On BIX, check IBM.PC; on GEnie, go to the IBMPC Roundtable at page 615; on CompuServe, check the IBM Applications forum (IBMAPP); and on People/Link, GO IBM. You might also want to see if there's a SIG run by your printer manufacturer, since you're having a printing problem.

Hooray! You've found a topic discussing your spreadsheet program. The next thing to do is to compose a message describing your problem and asking for help. It's smart to leave messages in more than one area, in the hope that more people will see your message and you'll be likely to get an answer faster.

When you type your message, make sure you provide all the necessary details. Include your hardware configuration, DOS version, software versions, and any TSRs or other applications you may be running at the time. Explain exactly what's happening when the problem occurs. The more detail you provide, the more likely someone will come up with a solution for your problem.

If you post your message in more than one SIG, though, don't leave the same long, detailed message in each one. That would be costly to you and to the people who have to read your message over and over again. In the other areas, post something along these lines: "I'm having problems printing to my Howitzer BJ-220 printer using the *Aileron for Windows* spreadsheet. If you think you can help, please see message 42 in the Windows/Spreadsheets conference."

You could ask that any helpful hints be sent via electronic mail, which would be easier to check the next day, but then you'd be depriving others of information that could potentially help them later.

Next, you log off and go to bed. The following morning you log on, and someone has referred you to a new printer driver that you can download on that service. You grab the driver and install it, and your spreadsheet prints beautifully. Even if somebody didn't leave a solution to your problem, chances are good that you'll find some hints that will help you isolate the problem.

The next time your work comes to a grinding halt due to a technical problem at a weird hour, don't get ticked off; log on instead.

Send comments and suggestions to DENNYA on BIX and GEnie, DENNY on Plink, or 75500,3602 on CIS. ❐

Really Wild Cards

Sometimes you want to be able to use wildcard specifications on programs or DOS commands that don't support them. It might be convenient to enter the command TYPE *.TXT to read a directory full of text files. But it doesn't work that way.

However, STAR.BAT does that—and one better. It allows you to use *lists* of file specifications! For example, enter the command STAR TYPE *.TXT *.BAS TEST.C to run the TYPE command on all text files, all BASIC files, and the C program TEST. The STAR program does its magic with the sorely neglected FOR command in batch:

When I teach PC seminars the most controversial advice in the whole class is to leave the PC on all the time.

```
ECHO OFF
CLS
REM Check for at least 2 para-
   meters.
IF "%1" == " " GOTO Syntax
IF "%2" == " " GOTO Syntax
REM %%1 is the command or
REM program. Everything else
REM is matched by the file
REM specification.
FOR %%r IN (%2 %3 %4 %5 %6
   %7 %8 %9) DO %1 %%r
GOTO Bottom
:Syntax
ECHO Need a program or com-
   mand name and one or more
   file specifications.
ECHO For example:
ECHO STAR TYPE *.DOC
ECHO STAR QB S.BAS
   TIMER.BAS
:Bottom
```

The heart of the program is its FOR loop. %1 is the name of the program or command. %2 through %9 are the command line parameters. Note that the program will quit if it doesn't find at least a pair of parameters: the program or command name, and at least one file specification. The %%r gets replaced by each file matching each file specification; in the TYPE example above, all files ending in TXT are matched and copied into %%r file by file in directory order.

You could improve this program even further by using a SHIFT. That would give you even more than the eight file specifications offered by this version of STAR, although I've never used more than three or four.

TOM CAMPBELL
IRVINE, CA

Always On

When I teach PC troubleshooting seminars, the most controversial advice in the whole three-day class is to leave the PC on all the time. Why? Here are a few short reasons:

- Turning electronic devices on and off subjects them to a power-on or ballistic surge. Light bulbs burn out mainly when you turn them on, right? The same principle is involved with your computer.
- The small motors on hard disks have a hard time starting up in the morning. Granted, leaving them on all the time will shorten their lives due to the greater demands on the motor bearings, but generally the bearings aren't the things that die. What kills hard drives is that one day they can't get started. Leave them on and avoid the start-up problem.
- Think of all the things that you use every day whose circuits are active all the time: electronic clocks, thermostats, TVs with the instant-on feature. These are all fairly reliable, right?

There *is* a catch to leaving your PC on all the time: You have to make sure that you've got good surge protection and a good fan. With a good fan, your PC can operate in the desert at 105 degrees and be perfectly happy.

MARK MINASI
ARLINGTON, VA

Reet Delete

Sometimes it's nice to have DOS ask whether I'm sure I want to delete all the files in a subdirectory, but most of the time I know what I'm doing, and I'd just as soon not have to answer any questions from the operating system.

Use DOS redirection to solve this problem. Create a file called YES.TXT with a text editor or with COPY CON. In this file put the letter *Y* followed by a carriage return. Save it as an ASCII file.

Next, enter the following line in a batch file and save it as EMPTY.BAT.

```
ERASE *.* < YES.TXT
```

Now, when you give the command EMPTY, the batch file runs and gets its input from the file YES.TXT. The *Y* answers the *Are you sure?* prompt for you. You can put the YES.TXT file anywhere on your system (I keep mine in the BATCH subdirectory) as long as you include its full path when you use it in batch files.

The following command deletes everything in a subdirectory, but this method lets you see what's going on while the files are being deleted:

```
FOR %%F IN (*.*) DO ERASE
   %%F
```

This deletes every file in the directory, but it does so by executing the ERASE command for each file, giving you a chance to double-check the files as they are being eliminated. If you have second thoughts about tossing a certain file, use an UNERASE utility to bring it back.

TONY ROBERTS
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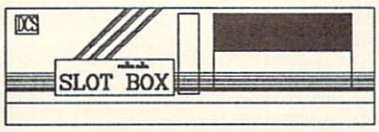

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Graphics Batching

You might assume that, like most utilities, batch files won't work in graphics mode. Not true—they work just fine. Showing remarkable foresight, the designers of the PC wrote the BIOS so that all text services work equally well in either mode, and DOS displays text with the help of BIOS services. So batch files will work. To try it out, create a file called TEST.BAT:

```
REM TEST.BAT
PAUSE Note that text displays just
   fine in graphics mode.
```

Then fire up BASIC or GW-BASIC and run this short program:

```
100 REM Go to graphics mode.
110 SCREEN 2
120 REM Drop to DOS and run the
130 REM TEST.BAT program.
140 SHELL "TEST"
150 REM Wait for the user to
160 REM press Enter.
170 INPUT
```

TOM CAMPBELL
IRVINE, CA

Blank Echo

Here is yet another look at echoing a blank line in a batch file. You can't just type ECHO all by itself on a line, because you'll get a message like *ECHO is off.*

ECHO is a three-part command:

- With no arguments, it reports status: ECHO is on, or ECHO is off.
- With arguments ON or OFF, it enables or disables command echoing.
- With any other argument, it just repeats back what you tell it: ECHO Hello will just make the PC say *Hello* on the screen.

How, then, to create a blank line on the screen?

There are three approaches. The first is to use the ANSI.SYS escape codes to move the cursor around, creating blank lines by skipping lines. It's too much work. And if ANSI.SYS wasn't loaded by the user's CONFIG.SYS file, this approach won't work.

An easier way is just to use the ECHO command with a period (.) after it. Try it out:

```
@ECHO OFF
ECHO The following is a blank
   line:
ECHO.
ECHO See?
```

(Editor's note: This technique won't work consistently in all versions of DOS.)

The third way is to hold down the Alt key and type 255 on the numeric keypad after the ECHO command. This enters a blank character after the ECHO command, which will print to the screen.

MARK MINASI
ARLINGTON, VA

The Straight and Narrow

Sometimes you need to employ DOS utilities in a batch file, but you can't ensure that they are available on the target machine. For example, this handy line displays a sorted directory:

```
DIR | SORT
```

However, it requires that SORT.EXE appear someplace on the path. IF EXIST won't do it, because in order to use it, you must know the full pathname of the file.

FOR comes to the rescue, thanks to the fact that DOS treats the semicolon as a separator. Try this program twice. The first time, use the name of a program you know is on the path; for example, SORT.EXE. Next, try a name you know doesn't exist; for example, LUNKHEAD.TMP. In both cases you should remember the extension; SORT won't work, but SORT.EXE will.

```
ECHO OFF
CLS
IF "%1" == " " GOTO END
SET TMP=N
FOR %%f IN (%PATH%) DO IF
   EXIST %%f\%1 SET TMP=Y
IF %TMP% == Y ECHO %1 is
   on the path.
IF %TMP% == N ECHO %1 is not
   on the path.
SET TMP=
:END
```

The SET TMP=N line means *Make the value of the environment variable TMP the letter* N. This is short for *No,* because we assume the file doesn't exist. (If you are already using TMP as an environment variable, use some other variable name in place of TMP in the example.) The next line is the heart of the program. The FOR loop searches the path directory by directory doing an IF EXIST search in each one. If the file is found, the value in TMP changes to *Y.* You can now query this value anytime you want in the program. The program then displays the results of the search and removes the TMP environment variable, since it's no longer needed by your environment.

TOM CAMPBELL
IRVINE, CA

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PROGRAMMING POWER

Tom Campbell

GLOBAL WARNINGS

If you're a regular reader of this column, you're familiar with my diatribes against global variables: They make code harder to maintain and reuse, they can be dangerous, and so on. But globals offer an important feature that local variables don't: They retain their values between subroutine calls.

Global variables are tempting, but like spicy food, they can come back to haunt you.

Of course, this can be a trap. You may find yourself dealing with an unexpected bug (then again, how many of them are expected?) in which the value of a global is supposed to change but doesn't. It can be a long time before you discover that you've created a local variable in one of your routines with the same name as the global.

Another example: In some multitasking environments, where several copies of the same program can be running at the same time, the global variable space, like the code, is a shared resource. So if you've written a word processor and user A adjusts the tab settings while user B is painstakingly editing a complex table, user B's work might suddenly take a nasty turn for the worse the next time the display is reformatted, because you've put the tab settings in a global variable.

Closer to home is *Microsoft C,* which relied on globals to such an extent that a huge number of its library routines, including common ones like scanf(), didn't work under *Windows* or OS/2 because they multitask. The list of verboten routines dwindles with each release of the compiler, but the lesson remains—not even the biggest developers are immune to questionable programming practices.

Disregarding for the moment that you probably program on a PC and don't have to worry about multiple users, there's a third kind of variable called *static* that gives you the best of both worlds. It has the same scope as a local variable, yet it saves the value of that variable between subroutine calls. Statics may be initialized when declared, but the initialization is performed only once—not each time the routine is called. The name *static* is a *C* term; *Turbo Pascal* gives these variables the confusing moniker *typed constants.* They're declared in the CONST section, yet, unlike normal constants, their values may be altered.

How can statics coexist with the apparently exclusive global and local types? By trickery in the compiler.

Local variables are kept on the stack, which on many machines (80*x*86 machines among them) can be just about anywhere in memory. Even between invocations of the same routine, that routine's stack can be in a different place, and it's tracked by a variable on the CPU called the *stack pointer.* Since the same local variable could be stored in a hundred different places inside of a second, you can't rely on its value.

Globals, on the other hand, sit placidly in the same place all the time. The compiler itself is therefore written to "remember" the name of a global variable during the entire compilation. It remembers a local variable only while it's generating code for the routine in which that variable was declared (as well as any nested routines, in the case of Pascal) and lets the stack pointer track its physical location in memory at runtime. As you've probably guessed, a static is stored in the same area of memory as global data, but its name is only meaningful to the compiler while the routine it was declared in is being compiled.

This month's program is ONPATH.EXE, which lets you find all files on the path that meet the file specification you give it. To use it, enter ONPATH *filespec* at the command line. Here are some examples:

```
ONPATH TLINK
ONPATH COMMAND.COM
ONPATH README.TXT > LPT1:
```

Don't give it a leading directory name, as in ONPATH C:\DOS\LINK.*. It won't work right, and if you want to restrict your search to a directory, you might as well use DIR.

The first example finds all files starting with TLINK and ending with any extension. For example, my path is PATH=E:\BAT;E:\BIN;C:\DOS;E:\WORD5;C:\WINDOWS;E:\BORLANDC\BIN;E:\GEO and the search for TLINK on my machine turned up this disquieting result:

```
E:\BIN\TLINK.EXE
53414 05-07-90 02:00a
E:\BORLANDC\BIN\TLINK.EXE
72585 02-13-91 02:00a
E:\BORLANDC\BIN\TLINK.CFG
19 03-24-91 01:52a

3 File(s) found.
```

When dozens of strange errors popped up in a program after I installed a new compiler, I discovered I needed ONPATH. The same program had compiled just fine before. You can't see the culprit above. Two different versions of the linker. Since E:\BIN came before E:\BORLANDC\BIN on the path, the older linker was being run first.

The second example, using the filespec COMMAND.COM, will find all copies of COMMAND.COM on your path. I found three versions of COMMAND, from

DOS versions 2.0, 3.2, and 3, on the path of one machine (not mine!). Note that, like DIR, ONPATH appends ".*" as the extension if you don't provide one. ONPATH's output is redirectable, as you can see in the third example.

A static variable is used in the routine NextDirOnPath, which is passed a string to which it writes the name of the next directory on the path. If you have the very short path C:\DOS;E:\BIN, the first call will write C:\DOS to its Result parameter.

Note that NextDirOnPath thoughtfully removes trailing semicolons and backslashes. The second call writes E:\BIN to Result, and the last call returns an empty string. NextDirOnPath must obviously save the ever-shrinking path somewhere, yet ONPATH.PAS sports no global variables.

NextDirOnPath works its magic by storing the path in a typed constant, *Turbo Pascal*'s confusing name for static variables. The first time NextDirOnPath is called, the input variable Result is empty, so *Turbo*'s GetEnv function is used to extract the PATH variable from your DOS environment, whereupon it's written to the static variable (or typed constant) SavedPath.

On later calls to NextDirOnPath, Result will be a nonempty value, so GetEnv is only called the first time. A search now commences for the first semicolon. When it's found, the path up to that point is copied into Result, it's amputated from the beginning of SavedPath, and the surviving path is automatically available for the next call to NextDirOnPath. You could have a global named SavedPath and variables named SavedPath in every routine, yet the static variable SavedPath would retain its value and be visible to this routine and this one only. ❐

```
USES CRT, DOS; { ONPATH shows files matching %1 on the path.        }
PROCEDURE Pause;  { Pause on any key except Esc, which quits to DOS.}
VAR
  ch : CHAR;
BEGIN
  IF KeyPressed THEN                { If a key was pressed, pull it  }
    BEGIN                           { off the keyboard buffer. Then  }
      ch := ReadKey;                { check to see if it's Esc.      }
      IF ch = #27 THEN              { If it is, quit to DOS, setting }
        halt(1);                    { ERRORLEVEL to 1.               }
      REPEAT                        { If it's not Esc, wait around   }
      UNTIL KeyPressed;             { for another keypress; then     }
      ch := ReadKey;                { toss that one into the bit     }
    END;                            { bucket as well.                }
END; { PROCEDURE Pause}

PROCEDURE NextDirOnPath(VAR Result : STRING); { Writes the name of  }
VAR                                 { the next dir on the path to    }
  SemiColon : INTEGER;              { Result, saving the remaining   }
CONST                               { path in a local static variable}
  SavedPath : STRING = '';          { (which Turbo Pascal calls      }
BEGIN                               { "typed" constant.              }
  IF Result = '' THEN               { If the input is empty, it's the}
    SavedPath := GetEnv('PATH');    { first time. Save PATH= here.    }
  SemiColon := Pos(';', SavedPath);{ Trim off any semicolon, if need}
  Result := Copy(SavedPath, 1, Pos(';', SavedPath));          { be.}
  IF SemiColon > 0 THEN             { Delete trailing semicolons.    }
    Delete(Result, SemiColon, 1)
  ELSE                              { Delete trailing backslashes.   }
    BEGIN Result := SavedPath; SavedPath := ''; END;
  IF Pos('\', Result) = Length(Result) THEN
    Delete(Result, Length(Result), 1);
  Delete(SavedPath, 1, SemiColon); { Remove this dir name from the  }
END; { PROCEDURE NextDir }         { locally preserved pathname.    }

FUNCTION LeadingZero(Value : INTEGER) : STRING;
VAR                                 { Stolen straight out of the TP  }
  tmp : STRING;                     { online help, this formats Value}
BEGIN                               { in a way similar to DIR's--with}
  Str(Value:0,tmp);                 { a leading 0 if the number is   }
  IF Length(tmp) = 1 THEN           { only one digit wide.           }
    tmp := '0' + tmp;
  LeadingZero := tmp;
END;

PROCEDURE WriteFilename(InsertPath : STRING; DirInfo : SearchRec);
VAR                                 { This routine displays a        }
  Display : STRING;                 { filename in a manner similar   }
  Index, Len : INTEGER;             { to that of DIR, except that it }
  ParsedTime : DateTime;            { precedes it with the path. That}
BEGIN                               { makes it easier to see matches.}
  Display := InsertPath + DirInfo.Name;   { Create a 40-character    }
  Len := Length(Display);                 { width pathname. Truncate}
  IF Len > 40 THEN Len := 40;             { if it's over 40.        }
  Write(Display);                         { Display the filename;   }
  FOR Index := Len TO 40 DO Write(' ');   { then pad with spaces    }
  Write(DirInfo.Size:8);                  { Right-justify the size. }
  Write(' ');
  UnpackTime(DirInfo.Time, ParsedTime);   { Parse the time into three}
  WITH ParsedTime DO                      { fields, then display it }
    BEGIN                                 { with leading 0s.        }
      Year := Year - 1900;
      Write(LeadingZero(Month),'-',LeadingZero(Day),'-',Year, '  ');
      IF hour = 12 THEN Hour := 24;       { Tricky handling for noon}
      IF Hour = 0 THEN Hour := 12;        { and midnight.           }
        IF hour < 13 THEN
          WriteLn(LeadingZero(hour), ':', LeadingZero(min), 'a')
        ELSE
          WriteLn(LeadingZero(hour-12), ':', LeadingZero(min), 'p');
    END;
END; { PROCEDURE WriteFilename }

VAR
  DirInfo : SearchRec;
  FilesFound, Index : INTEGER;
  FileSpec, NextDir, NextName : STRING;
BEGIN
  Assign(Output, ''); Rewrite(Output); { Make output redirectable. }
  FilesFound := 0;
  FileSpec := '';
  NextDir := '';
  IF ParamCount > 0 THEN FileSpec := ParamStr(1)
  ELSE
    BEGIN
      Write('File or file specification to search for? Enter to quit.');
      ReadLn(FileSpec);
      IF FileSpec = '' THEN
        Halt(1);
    END;
  IF Pos('.', FileSpec) = 0 THEN { Add an implied '.*', the way }
    FileSpec := FileSpec + '.*'; { DIR does, if no extension.    }
  NextDirOnPath(NextDir);        { Get next dir name from path.  }
  WHILE NextDir <> '' DO         { For each directory on the path:}
    BEGIN
      NextName := NextDir + '\' + FileSpec; { Get full file spec.}
      FindFirst(NextName, Archive, DirInfo);{ Find first match.  }
      IF DOSError = 0 THEN       { If match is found, display it. }
        BEGIN
          WriteFilename(NextDir + '\', DirInfo);
          INC(FilesFound);       { Track number of files found.    }
        END;
      WHILE DosError = 0 DO      { As long as matching files can  }
        BEGIN                    { be found in this directory,    }
          Pause;                 { allow user to press Esc to quit}
          FindNext(DirInfo);     { or space to pause. Then print  }
          IF DosError = 0 THEN   { the filename in question with  }
            BEGIN                { its location on the path.      }
              WriteFilename(NextDir + '\', DirInfo);
              INC(FilesFound);
            END;
        END;
      NextDirOnPath(NextDir);    { Repeat this process for each   }
    END;                         { directory on the path.         }
  WriteLn('          ', FilesFound, ' File(s) found.');
END.
```

POINT & CLICK

Clifton Karnes

COLD HARD CACHE FOR YOUR GUI

Where your GUI is a tortoise, a cache will bring it up to speed.

Whether you're running *Windows, GeoWorks Ensemble,* or a more exotic graphical user interface, one thing's for sure: You need a disk cache. Why? Because all GUIs are disk-intensive. They simply can't keep everything they offer in the computer's memory, so they routinely swap program code and data from disk to memory and back. Every time your computer reads from the disk, your system slows down. Just how much depends on how fast your hard disk is.

By far, the most cost-effective way to speed up your hard disk is to use a disk cache. This is such an important tool that *Windows* actually includes a cache as standard equipment, and it automatically installs it for you.

GEOS doesn't come bundled with a cache, probably because its programs run so fast without one. You pay the price for speed, however, when you run a DOS program or shell to DOS. Here *GEOS* is a tortoise; a cache will dramatically improve its speed.

So, you need a cache. But which one? *Windows* users get the latest version of *SMARTDrive* free (it comes with most versions of MS-DOS, too), but there are other programs that claim to be better. This month I looked at two: *HyperDisk* (HyperWare, Route Box 91, Pall Mall, Tennesee 38577; 615-864-6868; $69.00) and *Power Cache Plus* (Intelligent Devices, 112 Harvard Avenue, Suite 295, Claremont, California 91711; 714-920-9551; $99.95). Both high-performance programs work with *Windows, GEOS,* and DOS, and both claim to be faster than *SMARTDrive.*

HyperDisk comes with special versions for conventional memory, 286 systems, and 386 systems. As with most modern caches, it can cache in conventional, expanded, or extended memory, but if you're running *Windows,* you'll almost certainly want to use extended memory.

Power Cache Plus comes in two versions: *PCPFAST* offers faster performance, and *PCPSMALL* is slower but optimized to use less memory. As with *HyperDisk,* it can cache in conventional, expanded, or extended memory.

Power Cache Plus has one incompatibility with *Windows:* It can't coexist with a permanent swap file. If you run *Windows* in 386-enhanced mode and use a permanent swap file, you'll take a performance hit by switching to a temporary swap file, as we'll see.

To test these caches, I ran a series of benchmarks in *Windows,* DOS, and *GEOS* and found some surprising results.

For the *Windows* test, I created a macro using PubTech's *BatchWorks* that opens four applications along with typical documents. I loaded *Word for Windows* with a 34K document, *Microsoft Excel* with a 15K spreadsheet, *Q+E* with a 190K database, and *Crosstalk.* After each was loaded, its window was resized (with *BatchWorks*), and then each was closed.

I ran the tests on a Gateway 25-MHz 386 with 4MB of RAM and a 17-ms 110MB hard drive. I set each cache for 1024K using extended memory. In 386-enhanced mode, the suite of *Windows* programs produced the following times:

No cache	2.08 minutes
HyperDisk	1.03 minutes
Power Cache Plus	1.68 minutes
SMARTDrive	1.13 minutes

Both *HyperDisk* and *SMARTDrive* were able to work with a permanent swap file with which *Power Cache Plus* is incompatible. Because of this, its time suffered. When I tested *HyperDisk* and *SMARTDrive* without a permanent swap file, their times were closer to that of *Power Cache Plus.* Next I tested all three caches in DOS, using the database cache test supplied with *Power Cache Plus.* Here, the results were amazing. *Power Cache Plus* averaged more than twice as fast as *HyperDisk,* and in reading and writing random records, it was more than three times as fast. *SMARTDrive* and *HyperDisk* were neck and neck. Average times were:

No cache	6.79 minutes
HyperDisk	4.61 minutes
Power Cache Plus	2.14 minutes
SMARTDrive	4.69 minutes

For *GEOS,* I tested each cache with a variety of operations: loading *GEOS* from DOS, running *GeoDraw* and *GeoWrite,* and shelling to DOS—one of *GEOS*'s slowest operations. Since *GEOS* is less disk-intensive than *Windows,* neither cache significantly improved the performance of *GEOS* applications. But the time it took to shell to DOS and return was more than doubled with both caches. Cache times for these operations were almost identical for *HyperDisk, SMARTDrive,* and *Power Cache Plus.*

What does all this mean? If you're using lots of DOS applications and you don't mind not being able to use a permanent swap file in *Windows,* then *Power Cache Plus* is the choice. If you're not into DOS apps in a big way, then *HyperDisk* is the winner by a hair. For most of us, *SMARTDrive* will do just fine, especially if you can afford to give it 1024K of memory. ❐

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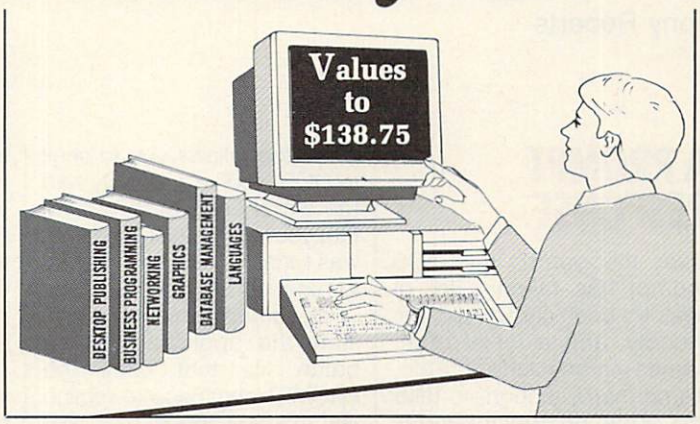

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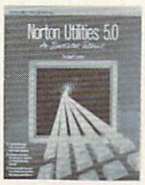

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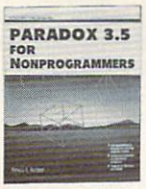

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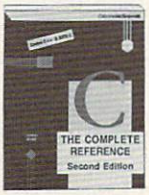

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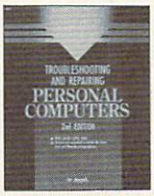

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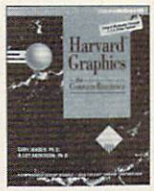

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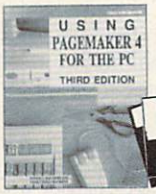

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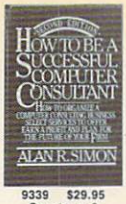

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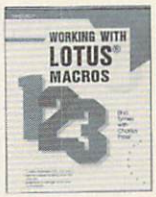

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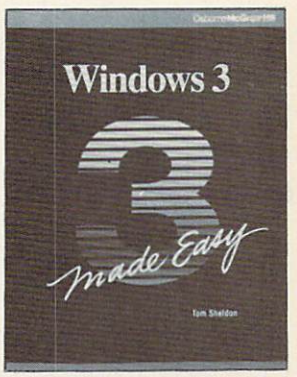

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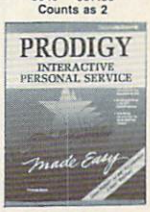

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INTRODOS

Tony Roberts

A PROMPT RESPONSE

Tired of that same old DOS prompt? Here's how to add a little life to your PC's command line.

Over the years, the DOS prompt has taken a lot of heat. It's been called cold, unfriendly, and a lot of other names—many unprintable. It's not hard, though, to take the edge off the infamous prompt. In fact, fooling with the DOS prompt has provided many an evening of recreation for computer users.

DOS provides the PROMPT command so you can customize the prompt to your liking. In many cases, this command is either ignored or placed in the AUTOEXEC.BAT file and forgotten. A common example is the command PROMPT PG, which is found on most hard disk systems.

Although it doesn't look like much, the above command instructs the computer to print the current directory path followed by a greater than sign. It might come out looking something like C:\ DOS\ UTILITIES>.

But how did the cryptic command PROMPT PG turn into something helpful and useful? The answer is metastrings. Metastrings are groups of characters (strings) that the program changes into something else. In the case of the PROMPT command, the dollar sign is a signal that tells the program to apply a special interpretation to whatever character follows.

The metastring $P is transformed into the current path, and $G is transformed into the greater than character. Your DOS manual includes a table that lists the PROMPT metastrings. Among them are codes to display the current time or date, as well as characters to move the cursor to the next line or to erase the previous character.

If you use a program such as a word processor or spreadsheet that allows you to shell to DOS, you've probably had the experience of forgetting that your application program was running, and you've tried to run it again.

To remedy this problem, start the application via a batch file that uses the PROMPT command to remind you that you should exit back to your application. Here's how I do it for Borland's *Quattro Pro:*

```
@echo off
PROMPT Spreadsheet program active. Type EXIT to return.$_$P$G
cd \QPRO
q
cd\
PROMPT $P$G
```

The metastring $_ is translated into a carriage return–linefeed, so this prompt ends up being displayed on two lines. At the end of the batch file, the prompt is restored to its normal state.

Some users like to create elaborate prompts using some of the graphics characters that are available in the upper half of the ASCII set. To use these characters, first look them up in an ASCII chart so you'll know the ASCII number of each character you want to use.

Then, to include the character in your prompt command, hold down the Alt key and punch in the ASCII code on the numeric keypad. When you release the Alt key, the character will appear onscreen.

If creating the perfect prompt has caught your fancy, you'll want to take the next step and include some ANSI escape sequences in your prompt, allowing you to add color to your creation.

To do this, you'll need to have the ANSI.SYS device driver or an equivalent (NANSI.SYS, GANSI.SYS, or TANSI.SYS) installed on your system. If it's not installed, you can add the line DEVICE=ANSI.SYS to your CONFIG.SYS file. If the ANSI.SYS file is in a directory other than the root directory, be sure to include the complete path to it in the DEVICE statement.

With ANSI.SYS installed, you can make your prompts include boldface, flashing, or reverse type, and you can select foreground and background colors as well.

ANSI commands involve the use of another set of metastrings called escape sequences. These sequences combine an escape character (ASCII 27), a left bracket ([), an optional parameter, and a one-letter command code.

This gets pretty involved, and there isn't room here to list all the codes and parameters for colors and video modes, so I'll provide an example to get you started.

Let's take the usual PG prompt and spice it up by displaying the prompt itself in reverse video.

```
PROMPT $E[7M$P$G$E[M
```

Notice the metastring $E in the command above. This is the PROMPT command's way of sending the escape character. When ANSI.SYS detects the escape character followed by a left bracket character, it knows that it should interpret the characters that follow. The code 7M is the ANSI code for reverse mode. ANSI.SYS switches the display to reverse mode, and then the PROMPT metastrings PG are expanded and printed. Finally, another escape sequence changes the video back to normal mode.

As I said, you can have a lot of fun playing with prompts. Send me your best creation in care of COMPUTE, and I'll print a selection in a future column. ❐

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HARDWARE CLINIC

Mark Minasi

DON'T CATCH THE WRONG BUS

Which computer bus is best for you—ISA, MCA, or EISA?

In the past four years, there's been plenty of smoke (and mirrors) about computer buses. If you're like most people, you've heard of IBM's Micro Channel, and you may know of the clone-meisters' response, EISA. They're supposed to be better somehow—aren't they?

Here's the straight and skinny on what these new buses offer and why you should care. In the process, I'll explain a whole bunch of things, including the horrifying DMA Speed Scandal.

First things first: What's a bus? Basically, a bus is the set of connectors—the slots—on your motherboard. It's the point from which your system can be expanded.

Fortunately, the buses in the PC are well documented. That means that anyone can design and sell an add-in circuit card, and that's got a lot to do with why the PC is so popular in the first place. The entirely open nature of the PC—its bus slots, its third-party operating system (you had a choice of buying DOS, CP/M, or the p-System from IBM in 1981)—and its fully documented BIOS are the reasons why the PC is the market leader.

Ticket to Ride

The original PC had the bus that's still found on XT clones. If you count all the metal fingers in a PC bus slot, you'll find 62—and each of the 62 wires has a specific job. Some transmit data, while some communicate address information. Some warn the CPU of upcoming activity or ask the CPU to yield control of the PC, as when one circuit board talks directly to another (that's called *DMA* or *bus mastering,* and I'll discuss it soon).

On the original PC, 8 of the 62 wires transferred data. That's why the PC bus is called an *8-bit bus.* The advent of the AT in 1984 saw a modification of the PC bus to double the width of the data path, leading to the so-called *AT bus.* This bus has a 16-bit data path, allowing it to transfer 16 bits in the time that the PC bus would take to transmit 8 bits. Data paths on computer buses are like lanes on highways; the more lanes you have, the more that can be transported (bits on buses, cars on highways). The AT bus became the standard for most clones and has been redubbed the *Industry Standard Architecture,* or *ISA* (pronounced *ice-ah*).

ISA has served us well to date, but it's limited in several ways. First, the 16-bit data path was nice in 1984, but it's less than optimal for 386DX and 486 computers. Both of those chips have the potential to do 32-bit data transfers, so a 32-bit bus would create a market for add-in boards that could more fully exploit the full power of those chips. Virtually all ISA machines run the bus slots at a mere 8 MHz, so even the fastest ISA machines must slow down to 8 MHz whenever communicating with an expansion board. Second, ISA uses edge-triggered interrupts. The alternative would be level-triggered interrupts. Edge-triggered interrupts are more noise-prone and so restrict how fast a PC's CPU can communicate with its expansion boards.

The DMA Scandal

IBM decided to scrap ISA altogether with its post-1987 PS/2 line of computers. The PS/2s use an entirely new bus called *Micro Channel Architecture* (MCA).

Working from a clean slate, IBM was free to add some nifty features to MCA. First, there's a 32-bit version of MCA as well as a 16-bit version, allowing greater speed in 386DX and 486 PS/2s than would be possible if they were ISA machines. Unfortunately, it's not much faster—the maximum clock rate for MCA slots is only 10 MHz. It also uses the cleaner level-triggered interrupts.

But it doesn't stop there. DMA is faster under MCA than under ISA, and MCA offers bus mastering. *DMA* is short for *Direct Memory Access,* an interface method that allows peripheral devices (such as disk controllers or LAN boards) to transfer data to and from memory without having to first pass the data through the CPU.

Why's that good? Consider what happens when you ask your floppy disk to read a file. The CPU tells a board called the *floppy disk controller* to read a block of data from the floppy; that block is 512 bytes long. Once the data has been read by the floppy controller, that 512 bytes must be moved into memory so that the floppy controller can get ready to read (or write) more data to (or from) the floppy. How does it get moved? The basic way is for the CPU to take each byte from the controller (one at a time), figure out where in memory to put that byte, and go on to the next byte. The buzzword for this kind of transfer is *PIO,* or *Programmed Input/Output.* PIO's fine, except for the fact that it's slow.

Enter DMA. With DMA, we eliminate the middleman. The floppy disk controller is temporarily empowered to talk directly to the CPU's memory—hence the name *Direct Memory Access.* DMA is solely intended for speed.

Which brings us to what I call the *DMA Scandal.* For pur-

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poses of total backward compatibility, IBM ran the DMA on its 8-MHz AT at 4.77 MHz—the speed of the PC! Following IBM's lead, the makers of virtually all ISA machines to this day run their DMAs at 4.77 MHz. That means that when your 33-MHz ISA 386 is doing DMA, it slows down to the speed of the original IBM PC. A few no-name cloners run DMA at 10 MHz, but they're few and far between. Incredible, ain't it?

Micro Channel improves on ISA by running DMA at half the processor speed, so a 10-MHz PS/2 runs DMA at 5 MHz—basically the same as an ISA machine, but a 20-MHz PS/2 runs DMA at a more acceptable 10 MHz.

Switch Flipping

Perhaps the nicest feature of MCA is Programmable Option Select (POS). Anyone who's ever had to flip switches and move jumpers on an expansion board will appreciate this feature. When installing an expansion board, you often have to configure the board. For example, when installing an internal modem, you must set it as either COM1 or COM2. You set it by moving a jumper or flipping a DIP switch. That's annoying because it means that every time you want to reconfigure a board, you've got to pop the top on your computer, remove the circuit board, make the change, and replace it. MCA (and EISA, for that matter) allow all of these choices to be made with software—a real timesaver.

Even better, an expansion board whose configuration is software adjustable means automatic configuration. Rather than your setting the modem to COM2 because you have a mouse on COM1, why not just let the MCA configuration software sense the conflict and resolve it automatically? That's just what the PS/2 Reference Disk does (or tries to do, but that's for another column). EISA, again, shares this capability.

The Empire Strikes Back

Nice as these MCA features are, they come at a terrible price: ISA-compatible boards don't work in MCA machines, and MCA boards don't work in ISA machines. Further, IBM wrapped up MCA in enough legal red tape that it became quite unattractive for third-party PC vendors to clone the new bus. To legally offer an MCA clone, vendors must pay IBM a royalty equal to 5 percent of their gross sales on the machines. Five percent is usually the total profit for most makers of compatibles—as Big Blue well knows.

So Compaq and a number of other vendors (Wyse, AST, Tandy, Hewlett-Packard, Zenith, Olivetti, NEC, and Epson—the initials spell *watchzone* when you include Compaq) designed an alternative bus with features similar to MCA's: software-setup bus mastering, faster DMA, and 32-bit width. They call it *EISA* (pronounced *ease-ah*), for *Extended Industry Standard Architecture*.

Then they went IBM a hair better. They designed EISA to be backward compatible with ISA. Every EISA slot has a double-decker connector. The top part is the ISA circuitry, and the bottom part has the EISA lines. Only EISA boards have connectors that can extend down to the EISA part. (I wonder if that's where the *Extended* in *Extended Industry Standard Architecture* came from.)

EISA has a few other leads on MCA. An EISA machine can have up to 16 slots; MCA, 8. EISA can allow an existing ISA board to run its DMA at twice normal speed with no hardware changes to the ISA board (there must be some new software, however). The speed of EISA itself is, unfortunately, stuck at 8 MHz.

The EISA specification allows boards to be physically larger and draw more power than MCA. That's important because it means that EISA boards are cheaper and easier to design, and so presumably will cost less.

All Aboard

So what's the right bus for you? Well, the vast majority of the boards out there are ISA compatible, despite the fact that the PS/2 has been around for four years. EISA boards are as scarce as hen's teeth, so even if you did buy an EISA machine, you'd have to wait for boards that exploit EISA's capabilities.

Further, 90 percent of the expansion boards wouldn't benefit from the improved throughput of MCA or EISA—talking to my printer or 9600-bps modem at 8 MHz is hardly what I'd call useful. The boards that really would benefit from better throughput are VGA boards, hard disk controllers, and LAN cards. EISA and MCA versions of these are appearing, but slowly.

So buying an ISA machine today still isn't a bad idea, particularly when you consider the cost.

On the other hand, an EISA machine has ISA compatibility. And when the EISA boards do appear, you'll be ready. And just to make things complicated, one vendor even sells a reasonably priced EISA machine—the ALR Business VEISA. It won't be the only low-price EISA seller for long.

Heck, maybe it *is* time to upgrade . . . ❐

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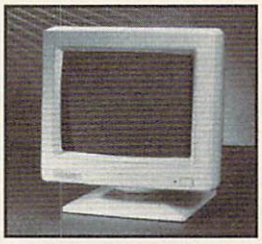

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DISK UPDATE

Richard C. Leinecker

END MACROS THE RIGHT WAY

We've streamlined *COMPUTE's Menu Operating System* to make it simpler to use. In the past, we've offered the option of running some of the programs directly from the menu. The menu program decompresses the files (or loads them straight off the disk if it's a 3½-inch disk) and then executes the code. MS-DOS has some inherent problems, however, that make this impractical in most cases, so we've decided to eliminate this feature—at least for now.

If you try to run memory-resident programs, such as *SCROLOCK* from the April 1991 disk, your computer will crash after quitting the menu program. That's because the system can't keep track of where everything is in memory after the menu program is terminated.

If you've had problems with *SuperMAC*, you may not be formatting your files correctly. Here's help.

Some programs may look for a configuration file or other files they need to run. That's the case with *ASIC* from the February disk. It attempts to run but aborts because it can't find its support files.

There's one last problem related to running programs from the menu program. We used to use a file called LAUNCH.EXE to help us run programs from the menu. If you typed LAUNCH from the command line, though, it tried to execute code that didn't exist. You won't find it on disk from this point on, but if you see it on old disks, don't run it. If you do, your computer will probably lock up, and you'll have to reboot.

Ending Macros Gracefully

SuperMAC (April 1991) loads a macro file that you create with your text editor or word processor. When the program runs, it loads the file and converts it to a format that its internal routines understand. The conversion routines are designed to alert you to any problems in the macro file. If problems are found, the program quits with an error message. We've gotten calls from several people who've received these error messages, and we have some suggestions for avoiding them.

The most common problem is leaving off the carriage return at the end of the last macro. Your text editor will place a carriage return at the end if you press Enter. You can even add extra blank lines at the end of the file to make sure that at least one is there.

A second problem can occur when your editor places non-ASCII characters in the file. You have to make sure that your word processor saves the file as straight ASCII text. Make sure, too, that your editor saves the file with hard carriage returns and not just linefeeds.

If you're still having trouble, you might have to resort to more thorough measures. Make sure that the DOS program called DEBUG is in your path or in the current directory. At the DOS prompt, type DEBUG *filename*.MAC and press Enter. You'll see a prompt that looks like a dash. Press D and then Enter. DEBUG will show you the first several lines of the text file as hex data. Disregard the numbers in the left column; what you're looking for is to the right.

When your editor inserts a carriage return, it's actually inserting two characters—a 13 and then a 10. You'll see these in the DEBUG dump as a consecutive 0D 0A pair. If you don't see several of these pairs, your editor isn't saving in the proper format. If you don't see one of these pairs after the last macro, you haven't ended with a carriage return.

There's one more thing you can look for in the hex dump. Any character that's less than 20 hex or greater than 7F hex doesn't belong in there. If you see characters in these ranges, then your editor has inserted its own special formatting characters, and *SuperMAC* is reporting an error when it runs into these.

Getting the Best Support

If you call COMPUTE's office for technical support, you'll want to be prepared so you can get the best possible response. Here are some suggestions that will help our technical staff solve your problems.

Be ready to list your computer's equipment. Many programs require certain equipment configurations to operate properly. These programs may also need you to configure the program for the equipment on which it's running.

It's especially important to know your graphics configuration for programs that run in graphics modes and your disk drive types for programs that are disk utilities or that access the drives often. Being able to accurately identify your system and its components will help give the technical support person the information needed to identify your problem.

Know the version of DOS under which your computer runs. You can get this by typing VER at the DOS prompt.

Although not always possible, the most important factor is to be right at your computer when you call so the technical representative can talk you through any problems while you're on the telephone. That may save you from having to call again because something wasn't clear. ❐

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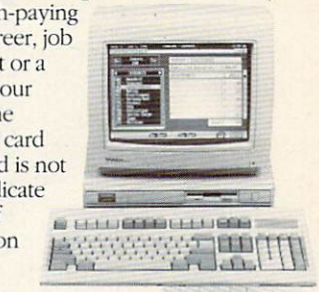

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STACKER

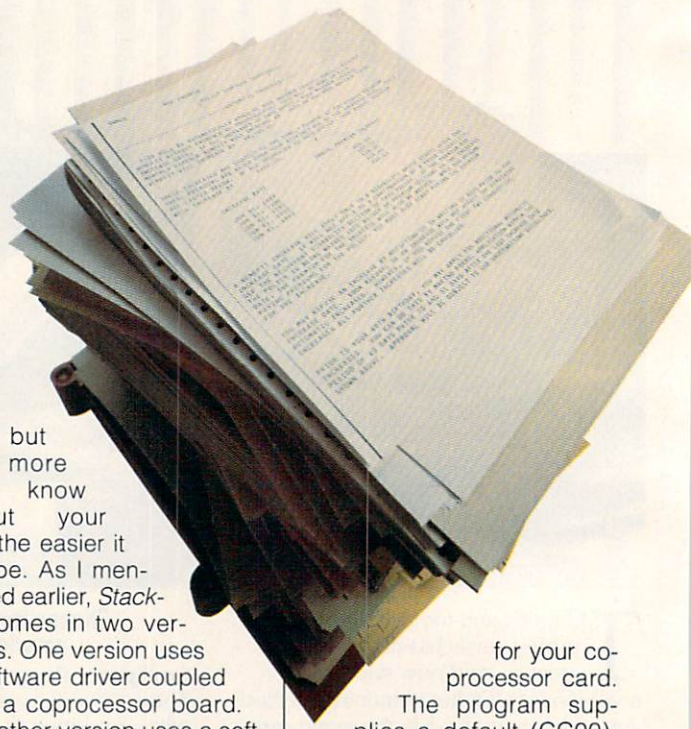
Face it: Your hard disk is too small. If you have a 40MB drive, you need a 60. If you're spinning a 60, you'd be better off with an 80. And on and on, ad infinitum.

As a case in point, I recently acquired a new computer with a 60MB drive, but before a month was out, I was spending every free moment trying to decide what to kick off the disk to make room for something else. This is no way to live, I told myself.

Until recently, a larger hard disk was the only way to garner more magnetic real estate. But *Stacker,* a hardware-software combo from Stac Electronics, changes all that. With it, you can literally double the capacity of your hard disk without paying a performance penalty. How is this possible? In a word, *compression.*

Stacker is a device driver with an optional coprocessor board that stores data on your hard disk in a compressed form. When you want to write something to disk, *Stacker* compresses the data before it's written. When you need to access the data again, *Stacker* decompresses the information and sends it to you.

Compression may sound complicated and dangerous, but *Stacker* works flawlessly and nearly transparently. In fact, if you're using an RLL controller (and almost everyone with a 40MB or larger drive is), your data is being compressed at the bit level already. Mainframes have been using RLL compression technology for years with no ill effects. So compression is OK as long as it is 100-percent reliable, and *Stacker* is.



Installing *Stacker* isn't difficult, but the more you know about your PC, the easier it will be. As I mentioned earlier, *Stacker* comes in two versions. One version uses a software driver coupled with a coprocessor board. The other version uses a software driver alone. The coprocessor board offers faster performance and much better compression, so it's the choice if you have a machine with an open slot. The coprocessor version also uses less conventional memory—21K RAM as opposed to 30K for the software-only *Stacker.*

To install the coprocessor version, you place the board in any available slot and run *Install.* For the software version, you simply run *Install.* The installation program creates a *Stacker* volume on your current hard disk that will hold your compressed files. For example, if you have one hard disk labeled drive C, *Stacker* will create a drive D to store its compressed files. Your system will see drive D as another hard disk, but in reality, drive D is a single large file on your C drive.

Getting back to the installation, the first thing the setup program asks you for is a base address in upper memory to use for your coprocessor card. The program supplies a default (CC00), which should work in most cases. Next, the program asks you for a size to use for *Stacker*'s disk cache. If you want to use your own cache, you can specify a size of 0. Next, *Stacker* asks how much space you want to dedicate to your new *Stacker* volume. After that, you can exercise the option to have the program transfer all the files on your current disk to the *Stacker* disk, compressing them in the process. By default, *Stacker* leaves 1MB of disk space on the non-*Stacker* volume. You can specify more if you choose.

On a 60MB disk, *Stacker* took about 25 minutes to compress 50MB of files. When the installation was finished, I had a 120MB hard disk with about 70MB free. Not bad.

If you're running *Microsoft Windows, Stacker* will work without a hitch, but you do need to go through a few extra steps to install it correctly. First, if you're using a permanent swap file, you'll need to

delete it before you run the installation program. Then, when you're asked how much space to leave on your non-*Stacker* volume, leave enough room to re-create your swap file later. If you normally use a 4MB swap file, for example, you'll want to leave 4MB plus an extra megabyte on the drive: 5MB in all. After the *Stacker* installation is finished, you can rebuild your swap file on the non-*Stacker* volume. The only other thing you need to do is tell *Windows* about your *Stacker* coprocessor. You do this by adding the line emmexclude=cc00-cfff in the 386Enh section of your SYSTEM.INI file.

One thing that may worry you a little about this whole business is the fact that you're depending on this coprocessor board to access all your data. What happens if it goes bad? Here, there's nothing to worry about. If for any reason the board stops working, the program defaults to the software-only version, which handles everything itself. I tested this by removing the coprocessor card and found that my system worked fine, though a little more slowly.

You can use all your usual disk utilities on the *Stacker* volume. If you accidentally delete a file, your undelete program should work fine. If you use *Spinrite* or another low-level disk diagnostic program, *Stacker* won't give it a moment's pause. And programs like *The Norton Disk Doctor* will examine your *Stacker* volume and treat it just like any other hard disk.

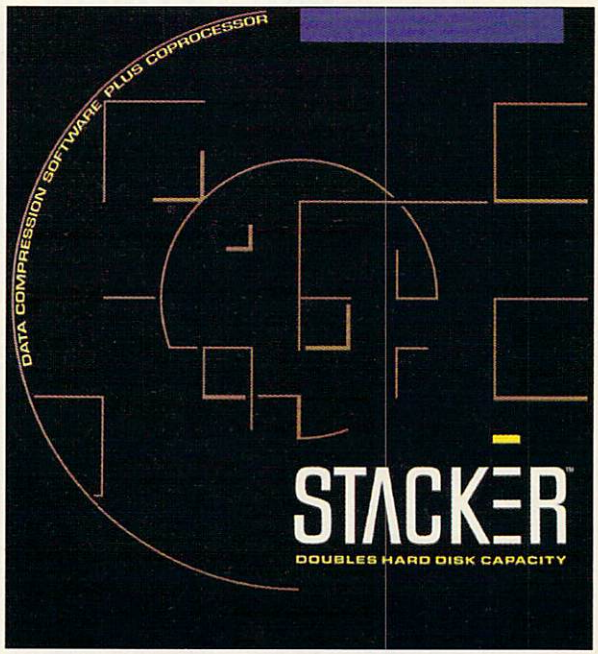
The only exception is that you can't run a defragmenting program on a *Stacker* volume. Because of the way *Stacker* organizes files, you could actually increase the volume's fragmentation. This means there's no way to defragment your *Stacker* volume, except by backing everything up and restoring it. Stac realizes that this is a weakness with the system, and it is planning to include its own defragmenting program with future versions.

Now we're at the bottom line, and the two bottom-line questions are, How much compression will I get? and How much will my system slow down? On my 60MB hard disk, I received an overall compression ratio of 2:1 using the coprocessor version. This means I doubled the capacity of my hard disk, from 60MB to 120MB.

As far as performance goes, I ran a large number of benchmarks comparing my *Stacker* and non-*Stacker* volumes and found some surprising results. Using a set of database benchmarks that read and write sequential and random records, I found overall performance of *Stacker* and non-*Stacker* volumes using the coprocessor to be nearly identical. When reading and writing sequential information, *Stacker* is faster than my native hard disk. When reading and writing random information, it is slower. As I mentioned, this all averages out.

I also tested *Stacker* and non-*Stacker* volumes without the coprocessor card, and here, the non-*Stacker* volume was about 18-percent faster than the software-only version of *Stacker*.

With *Stacker* and its coprocessor board, my system feels the same as it did before I installed *Stacker*. Even with *Windows*, which is probably the most disk-intensive program on the planet, I haven't noticed any performance degradation.



If you're thinking about buying *Stacker*, there isn't much to decide. The system is so fast and transparent, you'll immediately reap the reward of a much larger hard disk and soon forget you're using it. You do need to take into account, however, the size of your current hard disk and how much you'll gain by installing *Stacker*.

The larger your current hard disk, the more you'll get from *Stacker*. If you have a 20MB disk, *Stacker* can turn it into a 40, but for what *Stacker* costs, you could buy a new 40MB hard drive. With a 40MB disk, however, *Stacker* will pay for itself, and with anything larger than 40MB, *Stacker* will give you the most cost-effective increase in disk capacity you'll find anywhere. To increase your hard drive's capacity, you just can't go wrong with *Stacker*. ❐

IBM PC and compatibles, 512K RAM, hard drive—$229 for coprocessor version, $149 for software-only version

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WORKPLACE

Daniel Janal

HOW DO I THANK THEE? WITH A NOTE, OF COURSE.

When I was growing up, sending thank-you notes for gifts was considered a sign of good taste. But like most adolescents, for me, writing them took a back seat to watching ball games. Maybe *that's* why relatives stopped sending me birthday and holiday presents. Maybe if I'd thanked them, the presents would still be coming.

Hmm, what a concept. Maybe it works for businesses as well. You send business prospects thank-you notes, and they send more business your way. After all, a proper thank-you note serves many functions.

A computer-generated thank-you note doesn't have to look like the most recent clearinghouse sweepstakes form.

For one, you can keep your name in front of prospects and clients by honestly thanking them for their time, effort, and interest. Your note will stand out while a direct-mail piece might not even register.

One editor has a tremendously positive view of me simply because I sent him a thank-you note early in our business relationship. Even though our paths rarely cross, he still tells people I'm a gentleman—all because I took the time to thank him.

MARK WAGONER © 1991

Why don't people bother with thank-you notes anymore? Let me count the excuses: sloppy penmanship, spelling, and grammar; lost addresses; too lazy.

Fortunately, your computer can solve these problems and more. You can use a word processor to write the letter, check the spelling, and correct the grammar. If you have horrible handwriting, you can use a font that mimics handwriting like Script or Architect. (Check with large font libraries from Adobe or with shareware sources.) If you're truly lazy, you can scan your signature into the computer and paste it onto thank-you notes.

Your note should contain certain key components: It should thank the recipient and refer to a specific incident the two of you shared. That way you avoid the look and feel of a form letter, while prompting the recipient to remember you. You then have permission to conduct business, addressing the person's requests and questions. Finally, you should end with a specific promise to follow up.

How do you remember enough about all the people you meet to follow up without getting them confused? When I meet people at trade shows and seminars, I ask for business cards and then make a note of the person's interests, my promises, and what we talked about. You don't have to write *The Great American Novel.*

How does all this save time if you have to write 50 different notes to people you met at the Gargantuan Convention? Not to worry. You'll find that 90 percent of your letters fall into three categories: I'll call you to follow up, I'm sending you the product now, and I'll be sending you the product in the future. If you create three separate notes (or letters, if you have a lot to say) with such sentiments on your word processor, you'll have covered the majority of your thank-you-note recipients. Then, you can use the time you've saved to correspond even more personally with the other 10 percent.

Sort your business cards into three piles to correspond with the three note categories so you can "batch-process" the letters and virtually automate the system. Write the three basic notes, call up the first one, and either type the person's name and personal references or use the mail-merge feature of your word processor.

By storing the information in a file, you can retrieve it for reference and reprinting whenever you want. If you find mail merge confusing, you can make a copy of the master letter and manually type the information onto the copy, print it immediately, and save it for the future. Laser printing will allow you to send nicely printed letters and notes—even on fancy letterhead and odd paper sizes, such as note cards. Try printing a few sample sheets before investing in a load of paper, though. You also should print a few practice sheets until you get the margin spacing just right.

Taking the time to send thank-you notes to your clients and prospects is smart business. You'll be remembered for remembering them. By the way, thank you for reading this far. I wish I could send a note to thank each of you individually. ❐

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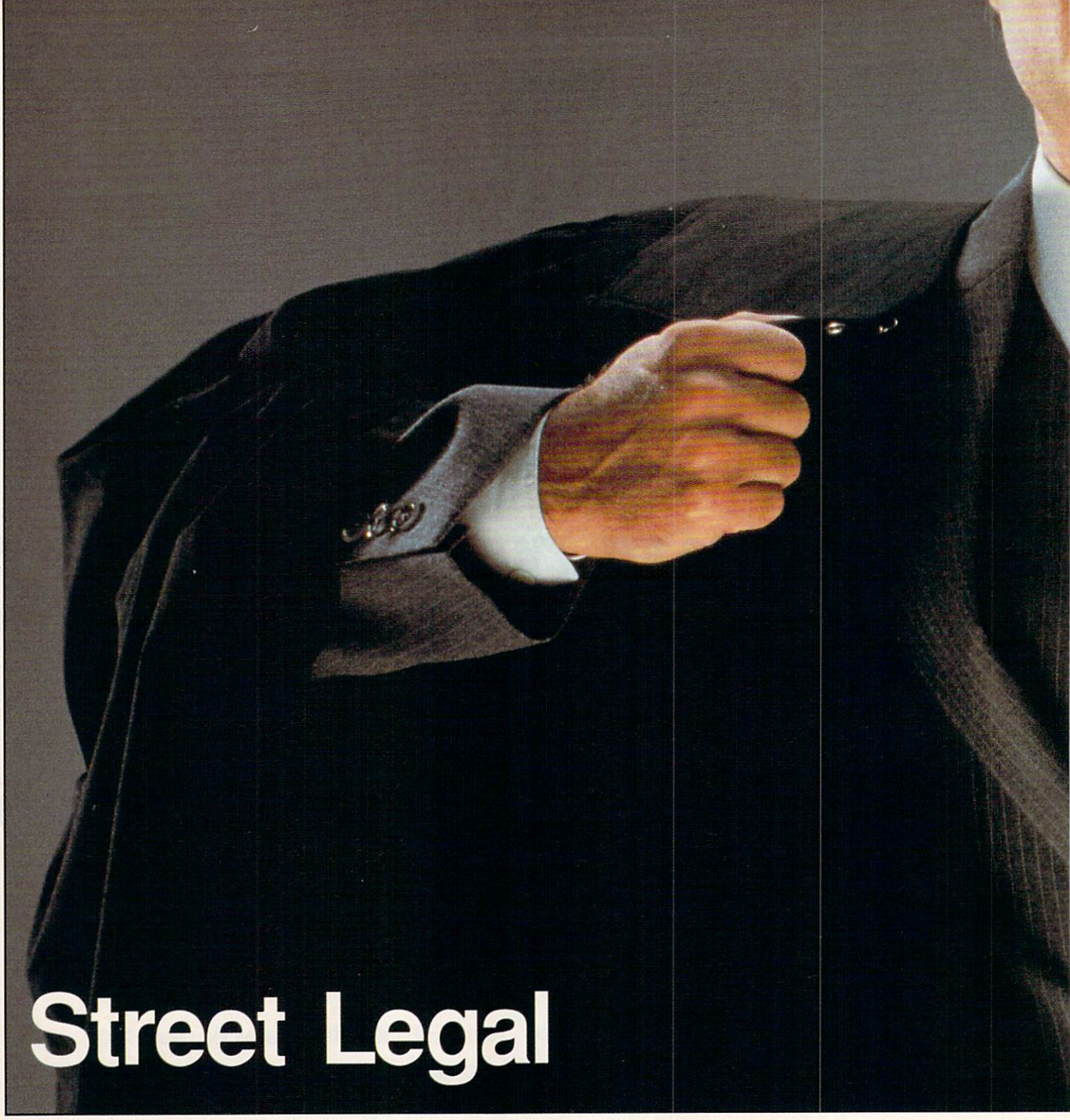

Street Legal

Keep your home office running on the straight and narrow.

By Rosalind Resnick and Susie Archer

People who run home offices typically spend half their time worrying about getting business in the door—and the other half worrying that they've taken on too much. With all the attention paid to sales and marketing, the legal aspects of setting up and maintaining a home office are often overlooked. And yet there are many legal questions that ought to give you pause: What if you need a contract drawn up? Which legal software gives you the biggest bang for the buck? And, most basic of all, does your community even *permit* you to work from home?

Legal questions often defy easy answers, but that doesn't mean that you should rush out and hire a lawyer. Your PC, a modem, and a couple of self-help law books may be what you need to cut through all but the thorniest of legal problems. Here's a beginner's guide to Home Office Law 101.

Zoning

The first legal issue many home office users must confront is whether they can legally open a home office at all. Some cities and states are very strict while others take a more tolerant view

of people running businesses in residential areas. Many communities don't allow businesses to operate from a home but make exceptions for professionals such as doctors, lawyers, writers, and artists. Illegally operating a home office can result in a court order to cease all business activity, fines, and even jail. The reality, however, is that in most places home business bans are unenforced. (That doesn't mean you should break the law.)

The best way to avoid zoning hassles is to maintain good relationships with your neighbors, find out what kinds of businesses you can and can't run from home, and obtain all necessary permits and variances. To find out which home businesses are permitted, simply go to city hall and leaf through the local zoning ordinances or ask a city or county zoning official for help.

If it turns out that your business is not allowed, you can always petition the local zoning or planning board for a variance. You should try to show that what you are doing is similar to a permitted occupation, that enforcing the ordinance would strip you of your livelihood, and that your business would not disrupt the neighborhood. It's not a bad idea to take a few neighbors with you—as long as they're on your side. Getting a building permit may require another trip to city hall.

Permits

Thinking about turning your spare bedroom, garage, or toolshed into a cozy home office? If you're planning to do more than slap on a fresh coat of paint, you may need a building permit. You may also need to obtain an occupational license, register your business, gain permission to collect sales

tax, get an employer's tax ID number from the Internal Revenue Service, and file articles of incorporation.

Insurance

Many people who work at home don't realize that their homeowner's policy may not fully insure computer equipment used for business.

Depending on the replacement value of your home office equipment, you may want to buy an additional policy from a specialty insurer such as Safeware, the Insurance Agency via CompuServe (type GO MALL) or by calling (800) 848-3469.

Incorporation

If you're like most home business owners and your company consists of you alone or you and your spouse, you probably don't need to incorporate. As a sole proprietor, you and the business are one and the same. What the business earns is yours to keep; what the business borrows is money you owe.

As your business grows, you may want to consider a more formal company structure. But beware: A partnership can burden you with somebody else's debts. Incorporating your business may lend it an air of permanence but can also saddle you with unwanted paperwork and legal bills.

Taxes

It's tempting to write off home office expenses on your 1040, but unless you want to risk an audit, you've got to know the rules. The IRS uses this two-part test: Is your home office used exclusively and regularly for business? And if it is, is your home office either your principal place of work or a place where you meet with customers or clients in the normal course of business?

If the answer to both questions is *Yes,* your tax savings may be substantial. But remember that you can only deduct the portion of your expenses directly attributable to your home office.

Lawyers

It's wise to comparison-shop when looking for legal assistance. Depending on the lawyer's expertise, reputation, and the size and location of his or her law firm, rates can range from $50 to over $200 per hour. Savvy legal consumers typically shop around—visiting, or at least calling, three or four lawyers and interviewing them about fees, strategy, and past experience in handling their particular type of case. Once you've decided which lawyer to hire, be sure to get a written contract. Run, don't walk, from any lawyer who promises to win your case or tries to bowl you over with legal mumbo jumbo.

Prepaid Legal Plans

One way to keep your legal bills low is to join a prepaid legal plan that offers discounts on lawyers' hourly rates plus unlimited consultations by phone or letter. LawPhone Advisory Communication Systems, a 50-state network of private attorneys, charges $60 for a three-month membership plus a $15-a-month continuation fee or $180 for an entire year. Members get free telephone consultations with a plan attorney; letters written on their behalf; reviews of contracts, leases, and other legal documents; and a 25-percent break on legal fees.

Legal Software

For those home office professionals who want to brave the legal jungle alone, there's plenty of software available. Only a handful of programs are capable of generating documents other than wills. *It's Legal* (Parsons Technology), *Personal Lawyer* (BLOC Publishing), and *Hyatt Legal Services Home Lawyer* (MECA Ventures) are general-purpose legal programs that spit out commonly used legal documents.

Online Advice

A lot of law-related information can be gleaned online at minimal cost. America Online and PC-Link offer information in their Small Business Resource area on topics such as "Obtaining Good Legal Advice and Controlling Legal Costs" and "Keeping Your Business Out of Legal Hot Water." CompuServe offers law-related information in its Legal (LAWSIG) and Work at Home (WORK) forums. Forum members who log on to LAWSIG can browse through such libraries as Computer Law and Software and Lawyer-to-Lawyer, an information exchange for attorneys.

How-To Books

Since online searches can be expensive, it's a good idea to invest in a few self-help legal guides. Three we recommend are listed in the List of Products and Services box. ❐

LIST OF PRODUCTS AND SERVICES

America Online
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***Everybody's Guide to the Law,* $11.95**
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New York, NY 10022
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Hyatt Legal Services Home Lawyer, $119.95
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327 Riverside Ave.
Westport, CT 06880
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***It's Legal,* $49.00**
Parsons Technology
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***Using a Lawyer,* $8.95**
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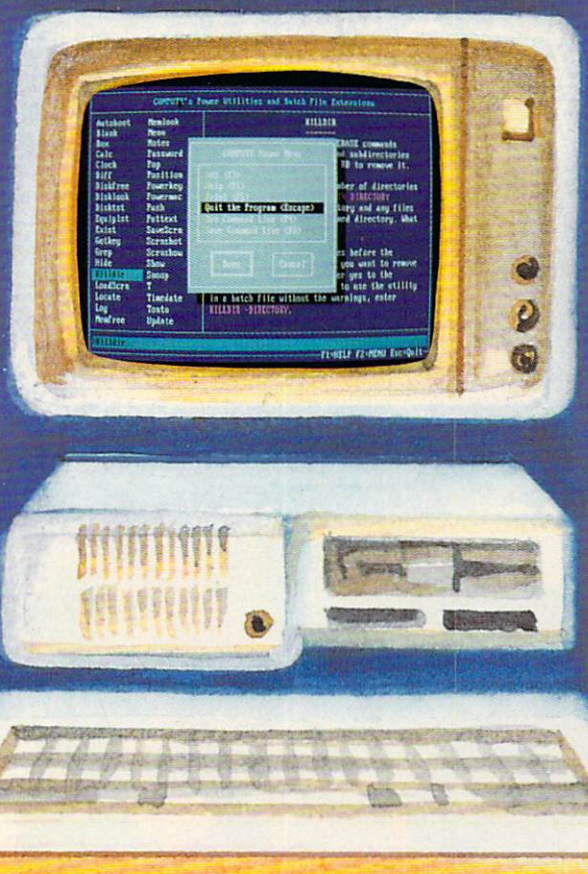

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ARTS & LETTERS

Robert Bixby

SHOWDOWN AT THE OK COREL

It's little wonder that *CorelDRAW!* so dominates its market, claiming over two-thirds of high-end illustrator sales, while its nearest competitor has less than a tenth.

Four major factors account for this dominance: It's easier to learn and use; it uses wire-frame representation, vastly speeding the screen-refresh process; it features associated tools for converting raster graphics to vector and for importing, exporting, and editing fonts; and it subscribes to the popular Pantone color-matching system, making it very attractive to professionals.

A fifth item is special effects. *CorelDRAW!* can now create blends as quickly and easily as *Arts & Letters,* which it surpassed by bringing out envelope distortion first. Text and graphics can also be extruded (extended into the third dimension) with the option of adding perspective. Speaking of which, you can now use an automatic routine to make your drawn objects appear to be on a plane oblique to the screen.

CorelDRAW!'s documentation has always been good. Its onscreen tool box adds to the speed of learning, and nearly all of its processes are completely logical. The only ones that might throw a newcomer off are determining how to edit existing text and how to draw with Bezier curves. Both are fully covered in the documentation.

CorelDRAW! gives you the option of viewing a wire-frame representation or a wire frame and a preview side by side. This almost completely eliminates the waiting encountered while *Arts & Letters* or *Micrografx Designer* recomposes the screen.

MOSAIC, CorelTRACE, and *WFNBOSS* are programs shipped with *CorelDRAW!. MOSAIC* changes the way you load graphics and clip art via disk. It changes the Open Drawing dialog box to a picture gallery containing thumbnail bitmaps of the *CorelDRAW!* drawings. Instead of depending on hastily conceived names to identify files, you can locate the file in the *MOSAIC* gallery and double-click on it, and it's loaded.

CorelTRACE is an autotracing utility that traces black-and-white, color, or gray-scale images into an EPS format *CorelDRAW!* can import. It's not as fast or sensitive as *Micrografx Designer*'s, and you have to leave the drawing program to use it. Still, it's better than many, and it's free with *CorelDRAW!. WFNBOSS* can convert various font types for use in your *CorelDRAW!* renderings, and it allows you to export *Corel*'s fine stable of fonts for use as downloadable fonts.

The Adobe Type 1 fonts exported by *WFNBOSS* don't work with *Adobe Type Manager* programs shipped through late spring 1991, but a phone call to Corel Systems yielded assurances that registered users should have received an updated version as early as last June, fixing this problem.

As I mentioned, *CorelDRAW!* subscribes to the Pantone color-matching system. You can specify a spot color by number, and your printer will be able to come up with the exact color ink to match. You can also freely mix process colors using several different mixing schemes and save your palette.

With the latest version of *CorelDRAW!,* you can now create bitmap and vector fills of your own or import any TIF or PCX file as a new pattern.

Envelope distortion is a new topic that may seem strange to first-time users. Essentially, it creates an enveloping rectangle around a selected object. This rectangle can then be distorted by dragging its handles. There are three set forms of distortion and a free-hand tool. The feature makes your drawing flexible—as though it were on a piece of Silly Putty. By stretching and bending, you can distort it almost infinitely.

CorelDRAW! is a treasure chest of powerful tools. It's so powerful, in fact, a printer manufacturer told me it makes PostScript printers look bad because artists can easily overwhelm the PostScript interpreters in so many printers.

Next month I'll talk about more powerful add-ons and tools for making graphic arts and desktop publishing pursuits even more fun. ❐

***Horse,* created by Steve Lyons of Fairfax, California, winner of the Grand Prize World in the *CorelDRAW!* International Design Contest, demonstrates the versatility of *CorelDRAW!*.**

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Anthony Moses

TRANSPARENT LANGUAGE

To paraphrase Mark Twain, everyone wants to know a foreign language, but nobody wants to learn one. When you consider how languages are usually taught, it's no wonder. Most of us encounter a second language in a high school class with lots of tedious rote memorization but few rewards. And all that many of us can do with that language in our postacademic days is to tell someone where the pen of our aunt is, as long as it's on the table. Years later, we may toy with the idea of going back and refreshing our knowledge of the language, but we've forgotten too much. Besides, with our schedules, it would be years before we'd ever be able to read anything worthwhile: Balzac, Cervantes, Virgil, Maupassant, Flaubert, Ovid—all closed books to us until we can do significantly more than successfully locate our aunt's Bic.

Transparent Language creator Michael Quinlan had a similar problem: How could he relearn the German he had lost years ago—and relearn it well enough to read what he wanted? And then, while he and his wife, Lynn, were teaching their four-year-old son to read, he had the chance to watch how a mind first learns a language. He concluded that perhaps the best way to acquire language skills is to accommodate the way the brain naturally works—not by memorizing an abstract grammatical system first, but by actually using the language in an environment that provides the support of specific knowledge whenever needed. Quinlan realized that the computer was uniquely empowered to be that environment. He began to design *Transparent Language.*

The philosophy of *Transparent Language* is that you can learn to read a language by actually reading something in that language—preferably, something enjoyable. One thing that makes learning to read a foreign language so difficult is that, for a long while, you probably won't be dealing with anything worth reading. The common instructional approach begins with a simple core vocabulary and grammar upon which you gradually build. The textbook reading samples reflect this, remaining at a cautious, low-vocabulary (and high-tedium) level. Few people can long bear reading denatured stories about where Marie or Gaius or Esteban place their writing implements. Worse, a graded reading sample can limit your progress by making no demands upon you. The normal linguistic environment of a child is rich and challenging; the child is aware that there's a lot of interesting stuff going on over his or her head and is motivated to learn the language in order to get the goodies. Quinlan's idea was, simply, to provide some goodies worth getting by immersing the reader in an interesting work as soon as possible and making reading it practicable.

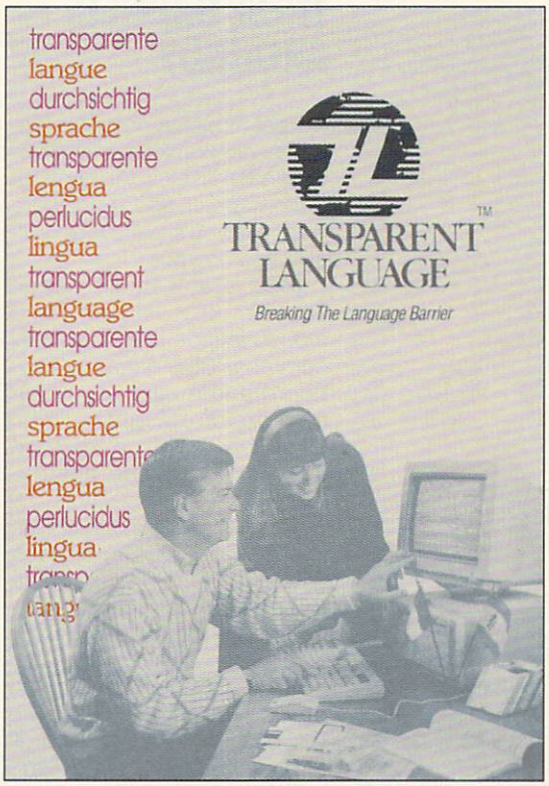
On the surface, the *Transparent Language* program seems quite simple; the top half of the screen displays the text of an actual literary work in German, French, Latin, or Spanish, supported by five ancillary windows at the bottom. As you scroll through the text, moving the highlight from word to word (or, in the case of idiomatic constructions, phrase to phrase), the windows provide a literal equivalent for the highlighted item, a translation of each sentence or clause into idiomatic English, and additional commentary (such as tracing words to their roots or commenting up-

on their grammatical or syntactic functions). If you prefer to read the text without these helps, you can opaque the help windows; but if, while reading, you don't recognize a word, you can glance at the definition window. If a phrase or an entire sentence is incomprehensible, check the idiomatic translation—and then go on reading. Just as you'll improve your tennis game only if you keep playing tennis, no matter how badly at first, your reading comprehension will advance only if you stick to reading. The odds are that you'll remember the words the next time you encounter them because you're learning them in the context of natural language usage.

If this process somehow seems familiar, perhaps it's because this is how you learned to read in the first place. You got the information you needed as you needed it, from an experienced reader, without necessarily understanding its place in a comprehensive grammatical scheme. And while such a knowledge of grammar is, of course, useful, it's not essential. As any language instructor could tell you, a good writer or reader may have trouble dealing with grammar exercises, while a student who breezes through grammar drills may have no intuitive feel for the language—and in language, the feel is the important thing. Language use is a right-brain activity; unfortunately, most language instruction comes in a left-brain format that, though easily memorized, cannot be as easily applied in concrete language-use situations. Quinlan intends *Transparent Language* to operate more on the right-brain model, supplying connotation (or felt meaning) as well as denotation (or dictionary meaning) for the words you read—and therefore making it more likely that you will incorporate the words into a living vocabulary.

This is *Transparent Language's* advantage over some other forms of computer-assisted language acquisition. While there are already a number of programs that purport to help you improve your foreign language skills, most of these, as Quinlan observes, "are still mired in the textbook model." They provide drills, such as multiple-choice or true-false exercises, or operate as foreign-language phrase books. While these certainly have their legitimate uses—fine-tuning your language skills or serving as stopgaps until you can actually learn the language, for example—they are of little help in developing a fluent linguistic ability. They also fail to take full advantage of the computer's power to consolidate and present a lot of information instantaneously, a weakness that *Transparent Language* seems to have overcome.

The *Transparent Language* starter set includes the master program and four sample stories in German, Spanish, Latin, and French, along with an audio cassette of the stories and an easy-to-read User's Guide. The accompanying catalog of other titles currently available from the Transparent Language company includes such worthies as short stories by Guy de Maupassant, "The Windmill Adventure" from Cervantes' *Don Quixote,* a portion of Hoffmann's *The Nutcracker and the Mouse King* (the source for Tchaikovsky's popular ballet), excerpts from



Ovid's *Metamorphoses,* and a number of other works you probably never imagined yourself reading in their original languages. The works are available in both 5¼- and 3½-inch disks, as well as audio cassette versions to help you with hearing and pronouncing the language.

As a complement to the classroom, *Transparent Language* has a lot to offer in extending the student's reading skills and building his or her self-confidence. For self-motivated former foreign language students, *Transparent Language* is the best available alternative to digging out the grammar books and dictionaries. Don't fret over the locations of relatives' fountain pens; read a work of literature in a foreign tongue instead.❐

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PATHWAYS

Steven Anzovin

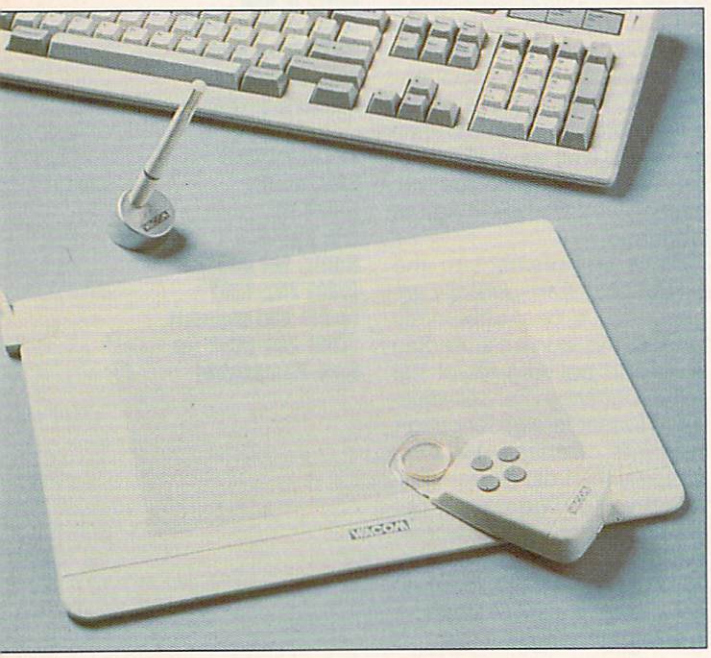
WHO NEEDS A KEYBOARD WITH THESE GADGETS AROUND?

Carpal tunnel syndrome. Typist's neck. Weak back and abdominal muscles. Ailments of the computer age. And there in front of you sits the main culprit: your keyboard.

Mice aren't much better. They're often clumsy, and mouse fatigue is increasingly common. So I gave my keyboard and mouse to my 18-month-old daughter, who loves to type, and then checked out some alternatives.

The Wacom SD-510c graphics tablet for PCs and Macs (Wacom, Park 80 West, Plaza 2, Saddle Brook, New Jersey 07662; 201-265-4226; $695) is receiving a lot of press as a breakthrough tool for graphic artists. What's new about the Wacom is that the pen is cordless and pressure sensitive.

The Wacom graphics tablet. Will this device make the mouse obsolete?



With the right paint software, such as *Oasis* from Time Arts (1425 Corporate Center Parkway, Santa Rosa, California 95407; 707-576-7722; $795; Macs only), you can get the look and feel of traditional media like acrylics, pastels, and watercolors. For example, you can emulate a watercolor brush stroke, with the color lightening and brush width thinning as you reduce pen pressure.

The PC version of the tablet works with any software that accepts a mouse, making it an excellent alternative for people more comfortable with a pen. It's small enough for your lap, and the pen only weighs a few grams.

As a drawing tool, the Wacom tablet has no peer, but pressure-sensitive input devices have real potential for use in a *Windows*-style GUI. For example, little gadgets at the corners of windows could let you page through a document faster or slower by varying the pen pressure or let you send a window to the back, bring it to the front, or even park it in the middle.

And why not adapt the Wacom pressure-sensitive technology for foot control of a computer? I'd like to see a "gas pedal" to increase my computer's speed when I'm in a hurry and a "brake" to keep the machine from outrunning my thoughts.

The Mac world offers more alternative input devices PC users should ask for. One gee-whiz tool is the Voice Navigator II from Articulate Systems (600 West Cummings Park, Suite 4500, Woburn, Massachusetts 01801; 617-876-5236; $795). Once you've trained it, you can speak any command or menu option into its microphone, and your Mac will obey instantly. The Voice Navigator has real potential as a mouse replacement, especially for people who need free hands. With this in mind, can verbal text entry be far behind?

If your Mac isn't powerful enough, you can really "play with power" with Transfinite System's Gold Brick (P.O. Box N, MIT Branch Post Office, Cambridge, Massachusetts 02139-0903; 617-969-9570; $169–$245). This tiny interface lets you connect any Nintendo controller to a Mac through the ADB port. It works just like a mouse and even emulates some keyboard actions.

Hooking up a Nintendo to your Mac may sound odd, but keep in mind that toys like the Power Glove, Brøderbund's UFORCE, and Nintendo's Power Pad are inexpensive and built like tanks, perfect for applications where ruggedness and replaceability are important.

The Gold Brick already has some unusual applications. At the Speech-Language Pathology Lab at Northeastern University, experimenters Linda Farrier and Harriet Fell are using a Mac, a Gold Brick, and a Power Pad to develop a system called the Baby Babble Blanket, which allows speech-disabled babies to make meaningful sounds and initiate verbal interactions. The Mac issues digitized sounds—babbling or any other noise, including words—according to how and where the baby moves around on the Power Pad. Farrier says the system could also be used as a biofeedback device for adults in physical therapy.

Wacom pen in left hand, Power Glove on right, and barking commands into the Voice Navigator, I tried to write this column but found that none of these gadgets could do the job sufficiently. I managed to rescue my keyboard and mouse from my daughter, but I'll never feel quite the same about them again. ❐

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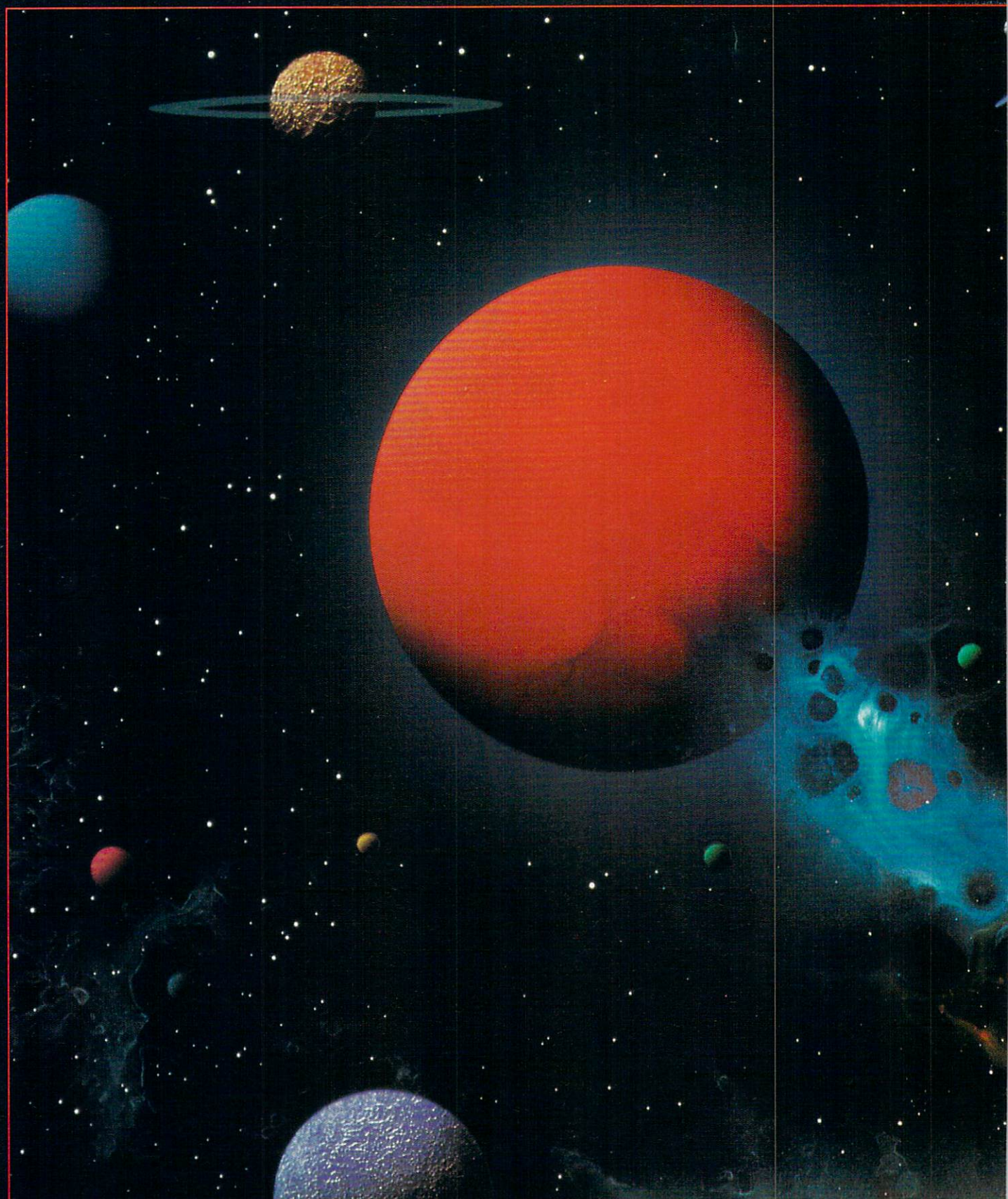
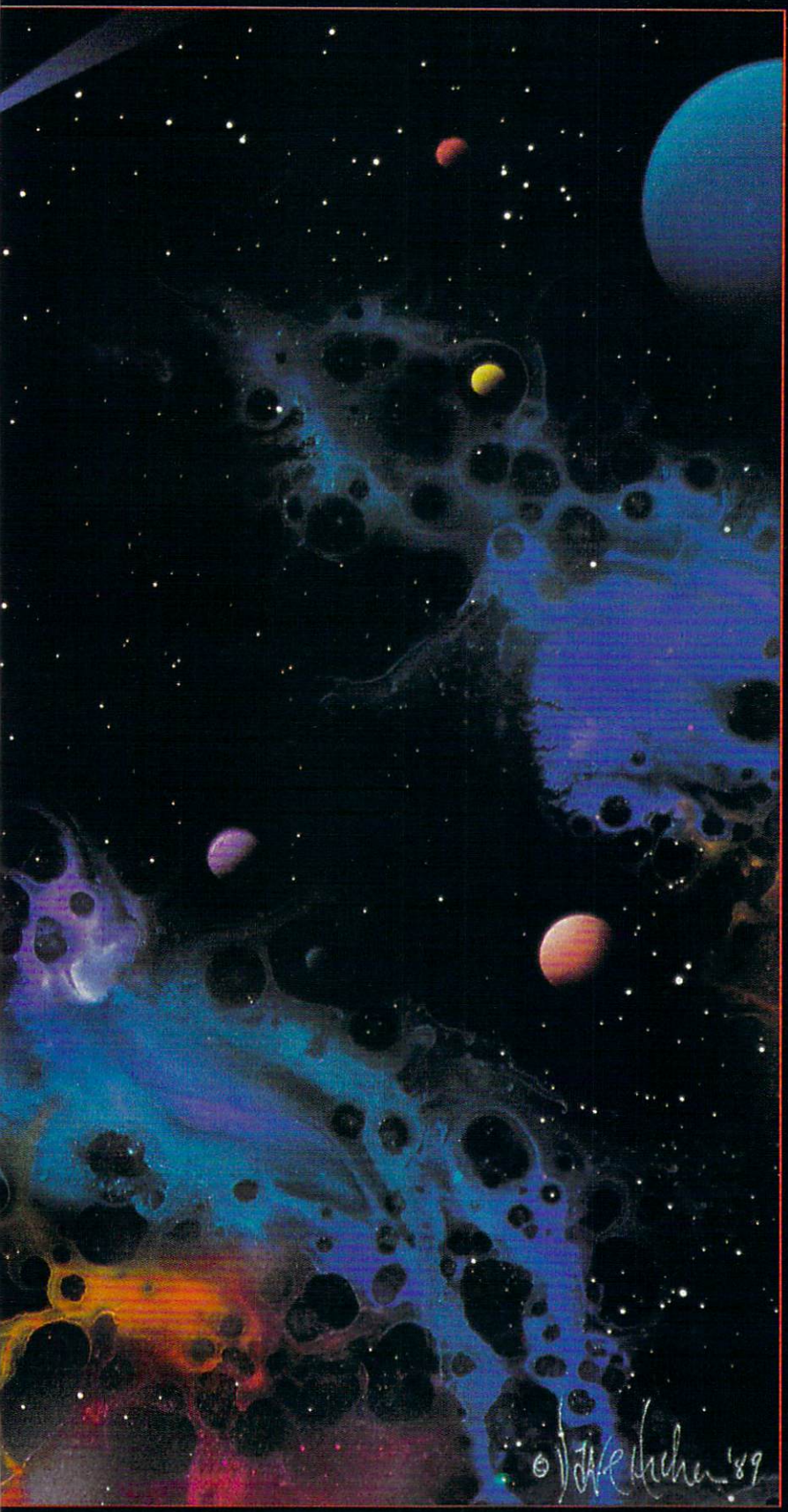


THE IMAGE BANK



Reach for the stars with your personal computer.

Great Heavens Above

BY LAMONT WOOD

Galileo probably would have been the first person to suggest a software program for tracking the heavenly bodies had he only been born a few centuries later. As Galileo, Copernicus, and the rest of the stargazing pioneers knew, you can easily get lost in the night sky. The random spread of stars can defeat any attempt to learn the ever-shifting planetary positions and dozens of star patterns that at first glance look nothing like the constellations they're supposed to form.

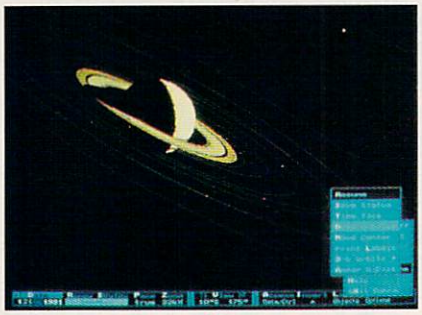
In the old days, the undaunted could venture into the night with star-chart wheels showing the stars' nightly positions, usually for the wrong latitude and with confusing orientations. And then there were clouds, mosquitoes, jiggling telescopes, and eventually, an urban sky glow to drown out all but the brightest stars.

Now there's a better way—astronomy software that literally lets you explore the sky during the day—even indoors. You can learn the sky and solar system as if they were your own neighborhood, which in a way, they are.

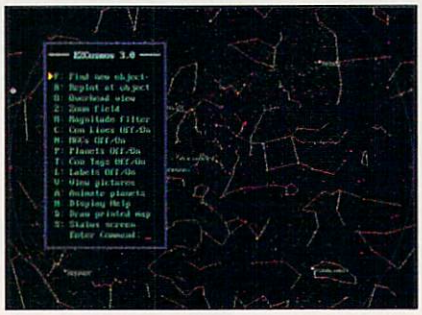
Here we'll take a look at several leading astronomy packages for the PC. Each package was examined on a 16-MHz 386 machine with a VGA monitor. No coprocessor was used. First let's

go over some basic terminology.

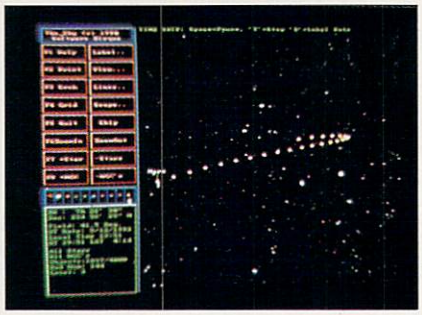
Positions and sizes in the sky are measured in degrees, where a degree is about the width (not length) of your index finger at arm's length. Brightness is measured on a magnitude scale, where 1 is about as bright as any star gets and 6 is about as faint a star as you can see on a very dark night without a telescope. The programs ask for your location in longitude and latitude, not only to figure rising and setting times, but also to calculate the appearance of solar and lunar eclipses. You're also urged to use a coprocessor to speed up orbital calculations.



Dance of the Planets *allows you to view the solar system from outer space, as in this view of Saturn, January 1991.*



EZCosmos *lets you search the constellations as if you were on your back with your feet facing north.*



The_Sky *is meant to be used outdoors. The retrograde motion of Mars is shown with the program's time-skip feature.*

For the beginner, *EZCosmos* from Future Trends seems like the best bet at $69.95. The screen shows the sky as it would look if you were on your back with your feet to the north. Placing the cursor on an object and pressing Enter will bring up identifying information about the object. Additionally, there are screen graphics (in the CompuServe GIF format) of 41 objects, including the planets and prominent galaxies and nebula you can call up. (Alas, for the beginner who might be misled, these are time-lapse photos taken through a big telescope—more colorful and detailed than what you would see through a backyard telescope.)

EZCosmos finds and displays named objects and allows you to speed up the pace of time and watch the planets move against the stars. (At intervals, Mars actually stops and moves backward.) Also, you can focus on the sun and watch for eclipses.

While this program does make it easy to take a grand tour of the universe, it isn't for the serious backyard astronomer. It doesn't offer stars dimmer than sixth magnitude, and it can't zoom in to a field narrower than one degree—a field twice the diameter of the full moon.

LodeStar Plus II from Zephyr Services ($199.95) at first seemed like the same thing, only it's slower (taking more than a minute to draw the full sky), has a clumsier menu-driven interface, and provides no screen shots of celestial objects. According to Zephyr, it runs slower because things are calculated with more precision. The basic version comes with stars to magnitude 6.5, and there's an expanded version, for about $30 more and 8MB more of disk space, which has an SAO (Smithsonian Astrophysical Observatory) star catalog of 270,000 stars that reach all the way to 12th magnitude.

As with *EZCosmos,* you can place the cursor on an object, have the system identify it, and then zoom in to a specific magnification—this time up to 999.9 powers, covering a field barely one-tenth of a degree in diameter. The only way to get a printout is by pressing PrintScreen, and you need a CGA monitor for that to work.

LodeStar—especially the expanded version—would seem to be best for the serious amateur who wants to plan an observation session or perhaps identify the contents of an astrophoto, cases in which precision matters more than speed.

Meanwhile, *The_Sky* 4.1, from Software Bisque, is meant to be used outdoors. Its control menus are shown in red so using the computer won't wreck your night vision. You can point and click your input from an onscreen keyboard chart without having to fumble at the keyboard in the darkness.

The star field is painted almost instantly on the screen—no tedious waits. You can zoom in on anything within view by moving the mouse cursor to the field you want to see and drawing a box and clicking. It was quite a thrill to zoom in on clusters like Pleiades.

The_Sky will take you down to two-tenths of a degree, where the moon or sun takes up most of the screen. However, only an outline disk is shown; no attempt is made to show the actual solar bodies. You're supposed to look for those yourself through your telescope.

In addition to showing the planets, *The_Sky* has a special display to show the positions of the four Galilean moons, a favorite of many backyard astronomers. (Io, Ganymede, Castillo, and Europa, lined up with Jupiter's equator and changing positions nightly, can be seen with a small telescope.) There's even an overhead view so you can identify each moon and its actual location in orbit, which isn't evident from the edge-on view you get from Earth. You can also watch this miniature solar system in action by speeding up the pace—orbital movement is evident even with five-minute increments.

There's also a special eclipse display that shows lunar and solar eclipses for your location. You see the way the moon and sun will move across each other with the times of first and last contact and the times of maximum coverage. Earth's umbra during a lunar eclipse is seen in red—the color the moon actually appears during a total lunar eclipse.

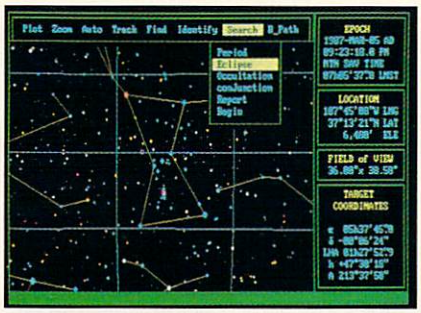
The_Sky comes in three different packages: At $75 for Level I, you'll see up to 10,000 stars and deep-sky objects at magnitude 5.5; for $99 you can get the Level II version and see up to 45,000 stars and other celestial objects at magnitude 7.9; Level III, for $175, shows 272,000 stars and objects to magnitude 9.

A telescope-link kit is also available for $699. You mount sensors on the two axes of your telescope, and after you calibrate your telescope's setting on two selected stars, your cursor will point in exactly the direction of your telescope. It's pricey, but with the link kit, you can look at scores of objects in one evening with no time lost due to endless blind searches.

If *The_Sky* is intended for the serious amateur astronomer, *Dance of the Planets* from A.R.C. Science Simulation is intended for the serious amateur astrophysicist. Priced at $195, it shows the celestial globe and stars therein, but that's incidental.

The opening screen shows a

starfield with an unfamiliar bright star in the middle, near the constellation Orion. That's the sun, seen from your viewing position of about 2.5 billion miles out in space. You can zoom in to a maximum magnification of 32,000 and look at individual planets and, with an accelerated time frame, watch them ro-



LodeStar Plus II *offers precision over speed. The expanded version has an SAO star catalog of over 270,000 stars.*

tate. The software also includes maps of the planetary surfaces. Although Earth and Mars are hardly more than large dots with crude features, Jupiter is big enough for you to watch the Great Red Spot slide by.

You can also switch to an Earth-based view to watch eclipses and events like the apparent merging of Jupiter and Venus on June 17, 2 B.C. The point of *Dance,* however, is to pull back into space, arrange the viewing position you like (you can change the angle from which you're looking into the solar system), invoke the command that outlines the orbits, and start the dance of the planets. Everything is visual and obvious, and by the time you're finished with the manual, Kepler's Laws and the geometry of elliptical orbits ought to be second nature. The five parameters it takes to define an orbit will no longer be mathematical gibberish, but self-evident statements.

Dance comes with orbital data not only for our nine planets, but for their 61 satellites (including Pluto's) and for 4650 asteroids and 1300 comets. Pick out a particular comet, track it into the future, and see if Jupiter ever swallows it or vectors it into the sun. You can track 20 orbits simultaneously, although for results anytime soon, you'll want to get a coprocessor.

Dance will even give you a 3-D view of the orbits. The package comes with red-and-blue goggles like the ones used for watching 3-D movies. They work best for examining comet orbits, which are often rotated away from the plane of the planets' orbits. You can make up your own comets, input their orbit parameters, and watch what happens. The only thing *Dance* left out is a spaceship option so you can figure in the results of acceleration and fuel consumption.

For those of you who wonder what it's all about, there's also astrological software on the market. We looked at *Chartwheels II* ($150 from Astrolabe) and found that it does indeed track the positions of the planets. You won't learn astronomy, though, since it's only concerned with the zodiac for casting astrological charts and showing the influence of the planets at a particular moment.

Planets do, in fact, exert influence—gravitationally on each other anyway. Gazing at the results with the help of astronomy software could help open up the heavens for you, if that's what you're after. At the very least, you'll no longe fumble your way through the night sky.

Galileo would approve. ❐

PRODUCT BOX

Chartwheels II
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Astrolabe
350 Underpass Rd.
Brewster, MA 02631
(508) 896-5081

Dance of the Planets
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A.R.C. Software
P.O. Box 1955
Loveland, CO 80539-1955
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$69.95
Future Trends Software
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LodeStar Plus II
$199.95
$229.95 with SAO Database
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Pitsburgh, PA 15217
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(412) 422-6600

***The_Sky* 4.1**
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Golden, CO 80401
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"I thought computers took care of all this."

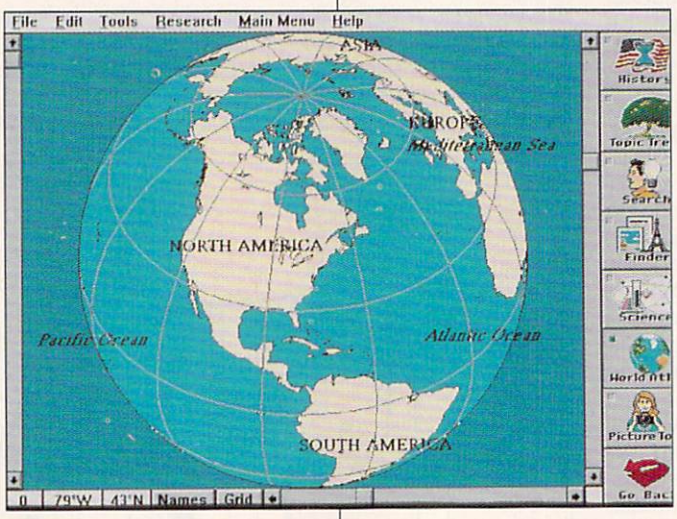
FAST FORWARD

David English

YOU CAN MIX MULTIMEDIA AND LAPTOPS

Laptop innovation is moving so fast that the last thing most manufacturers want to see is a set of standards that will lock them into yesterday's technology. Perhaps in a few years, when the size of the laptop has stabilized, manufacturers will agree on standards that will allow you to add various peripherals and upgrade your LCD screen or hard drive. But that's the future—none of the laptop manufacturers I've talked to see that scenario unfolding anytime soon.

Today you can have a sound card and a SCSI interface without the need for a bus slot, which allows you to run CD-ROM applications such as *Compton's MultiMedia Encyclopedia* from any laptop computer.



With today's models, once you buy your laptop, you lock yourself into today's technology with little chance to change with the times.

What's the answer? Your parallel port. Peripheral manufacturers have discovered how to tap into your parallel port and still let you use your printer. Plug a small box into your parallel port, plug your printer cable into the box, and it's instant expansion.

How would you like to add digital stereo sound to your laptop or desktop PC? Msound Stereo (Msound International, 1965 West 4th Avenue, Vancouver, British Columbia, Canada V6J 1M8; 604-732-4849; $249.95) is a sound-card-in-a-box that plugs into your parallel port and includes a built-in amplifier and stereo headphones. Msound can emulate present sound card standards and can be upgraded to emulate future standards. Currently, Msound ships with drivers for the Ad Lib sound card and the Covox Speech Thing, as well as utilities that can convert Macintosh and Tandy sounds to Msound's native format. The company is working on drivers for the Sound Blaster and *Multimedia Windows*.

Msound provides high-quality sound. Msound has a dynamic range of 96 dB and a signal-to-noise ratio of 60 dB, and can handle sounds with frequencies of 20 Hz to 20 kHz. Unlike the Sound Blaster, Msound doesn't offer sound-in (just sound-out), but it does offer a built-in expansion bus for add-on modules.

The package also includes a sample disk of sounds. There was a bit of distortion in some of them, but the stereo effect was terrific. Unfortunately, the Ad Lib driver doesn't work with all Ad Lib–compatible games. (I couldn't get *Red Baron* or *Stellar 7* to recognize Msound's Ad Lib driver.) The company is working to line up support for Msound's own sound format.

Msound is well worth looking into, whether for a laptop or desktop computer. And when Msound releases its *Multimedia Windows* drivers, you'll be able to use your computer to hear a flood of new multimedia titles.

What's that you say? How can you run the new multimedia software without a CD-ROM player? And how in the world are you going to hook a CD-ROM player to a laptop computer? Glad you asked. For just $179, you can buy the T338 MiniSCSI Parallel-to-SCSI Host Adapter (Trantor Systems, 5415 Randall Place, Fremont, California 94538; 415-770-1400). The MiniSCSI plugs into your parallel port and instantly adds a SCSI port to your computer. It's small and lightweight (just 2.5 ounces) and works with most SCSI-based CD-ROM players and hard drives. You can daisychain as many as seven SCSI devices together with a single MiniSCSI. The MiniSCSI draws all of the power it needs from the first device in your SCSI chain.

There's a downside. The MiniSCSI is rated only about half the speed of a high-end multimedia CD-ROM player. According to Jim Switz, marketing manager at Trantor, that's not as bad as it sounds. Because it's difficult for any CD-ROM player to sustain a high speed, the MiniSCSI is generally able to keep up. At the worst, you'll see about a 30-percent reduction in speed.

With these two new devices, even if you have a laptop or slotless desktop, you can still participate in the multimedia revolution. ❐

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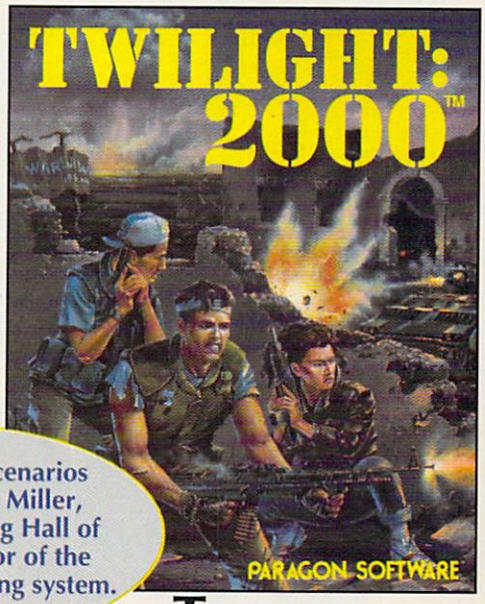


Both featuring scenarios written by Marc Miller, Adventure Gaming Hall of Famer and creator of the Traveller role-playing system.

Based on the role-playing classic from Game Designers' Workshop, **MegaTraveller 2: Quest For The Ancients** contains state-of-the-art innovations, including a completely re-designed, icon-driven interface, combat system and role-playing engine.

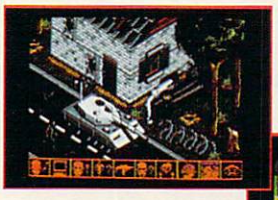
- The sequel to the hit MegaTraveller 1: The Zhodani Conspiracy with over 100 of named, detailed worlds to explore
- New PAL role-playing engine lets you control one character while commanding four others; advanced character generator guarantees variety with each game
- Weapons and starship classes of all kinds; a dazzling array of characters with whom to interact

Your mission: save a world threatened by a mysterious artifact built by the Ancients, a legendary super-race thought dead for 300,000 years.

Twilight: 2000 places you in the aftermath of World War III, travelling through terrain devastated by high-tech weaponry and nuclear radiation.

- Create your character with the skills and abilities you want
- Command three other party members who respond to your orders based on *their* personalities and objectives
- State-of-the-art graphics include 3-D simulation and 2-D scaled overhead sequences
- Hundreds of weapons and vehicles make each encounter unique

Your mission: rebuild and defend the city of Krakow, Poland against an onslaught of marauders and military madmen determined to win a war the world lost.



IBM screens shown.
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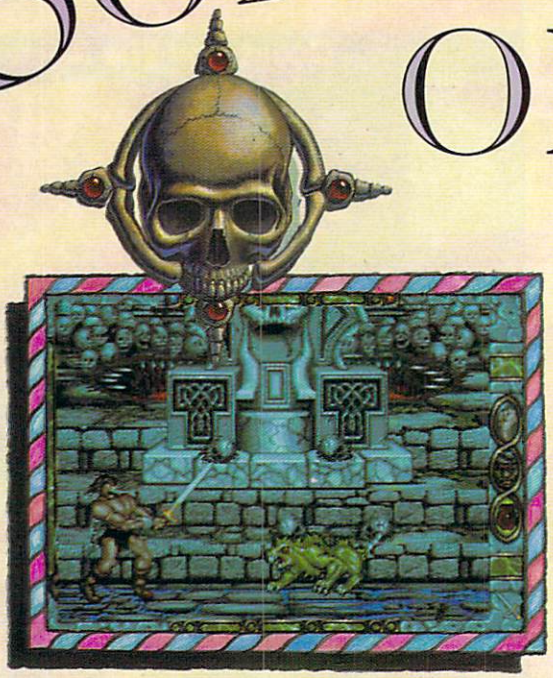

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In your search for vengeance, you as Conan, will explore Hyborea to seek out its hidden secrets and learn of its powers. Visit over 200 locations – taverns and inns, crypts and dungeons, temples and tombs, lavish homes and poor hovels – to learn the mysteries of Hyborea's sorceries to help Conan overcome its many natural and supernatural perils.

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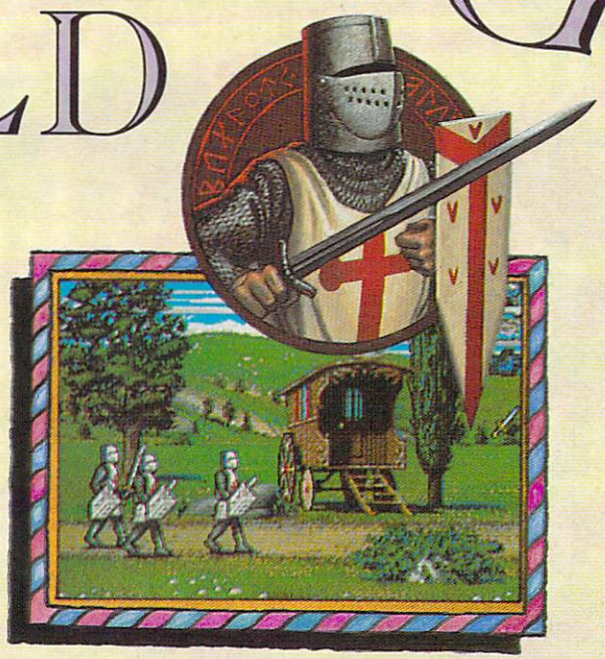

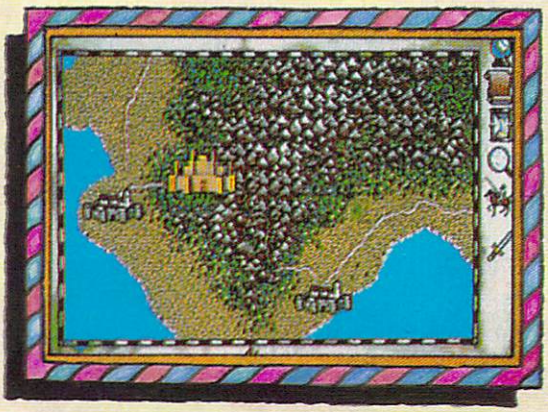

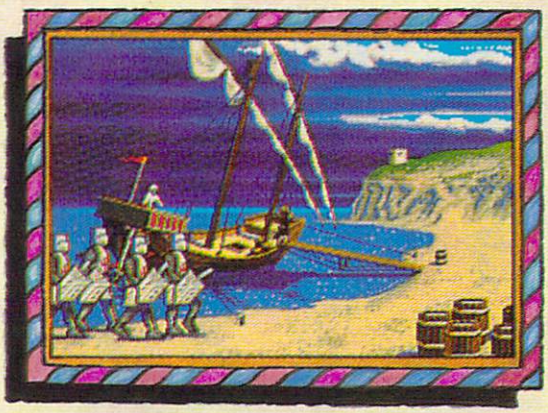

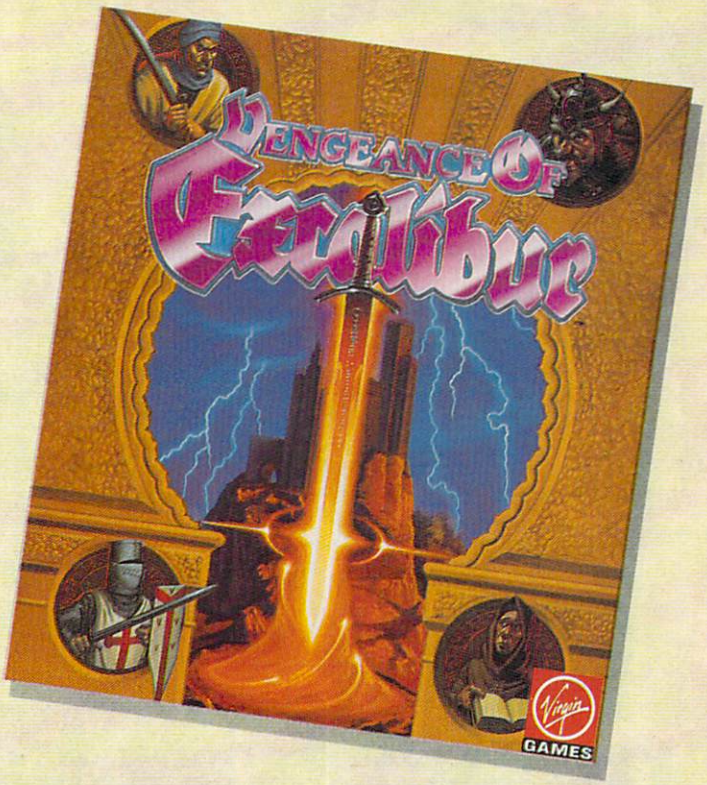

In Spirit of Excalibur, the Knights of the Round Table fought to defend medieval Britain from the evil sorceress, Morgan Le Fay. Morgan, dabbling in dark arts beyond even her ability to control, had summoned a great Lord of Demons, the Shadowmaster.

With Morgan's death, the Shadowmaster was freed to work his evil will against the unprepared folk of Britain. Striking in the night, he imprisoned the King with a spell, stole the greatest treasures of the realm and kidnapped Nineve, the court enchantress. With the loss of the sword Excalibur and the newly recovered Holy Grail, Britain begins to sicken and die. The Shadowmaster must be stopped!

Command knights and whatever followers they are able to recruit to track the Shadowmaster through hazardous, beautiful and mysterious medieval Spain. Explore the hundreds of villages and cities, fortresses and castles, dungeons and palaces and all the secret places where the Shadowmaster may dwell.

Seek what aid you can as you acquire and learn the use of the sorceries of Moorish Spain, for only with the aid of enchantments and the loyalty of strong allies will you stand a chance of ridding the world of the demonic Shadowmaster once and for all.

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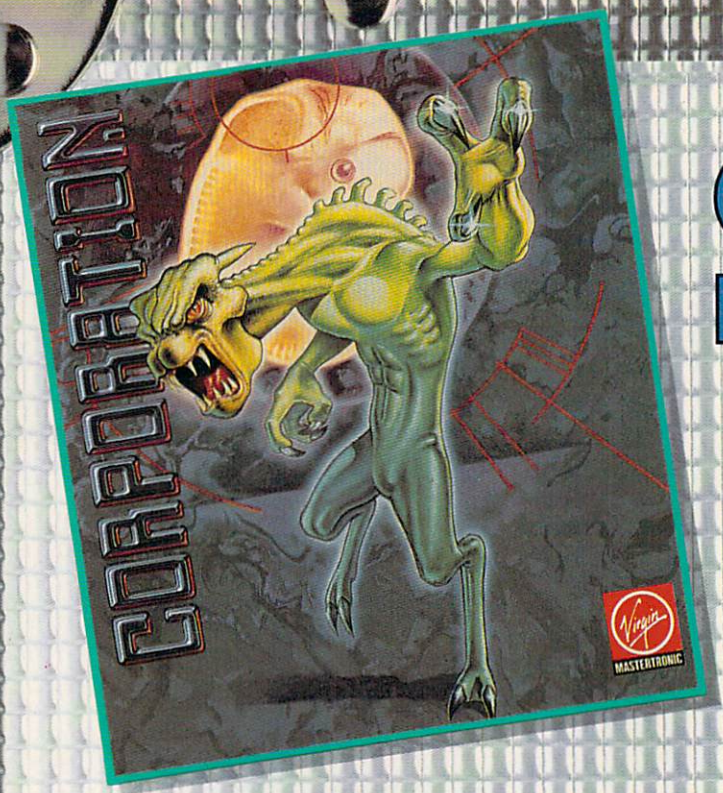

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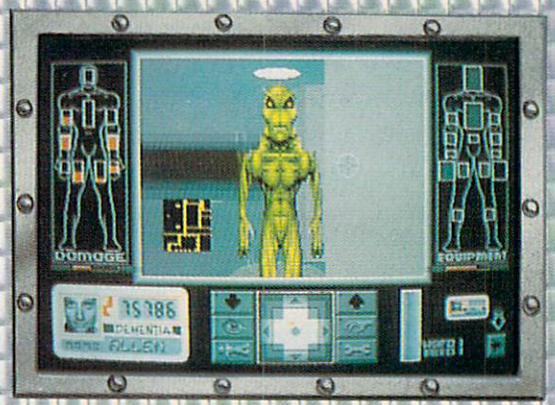

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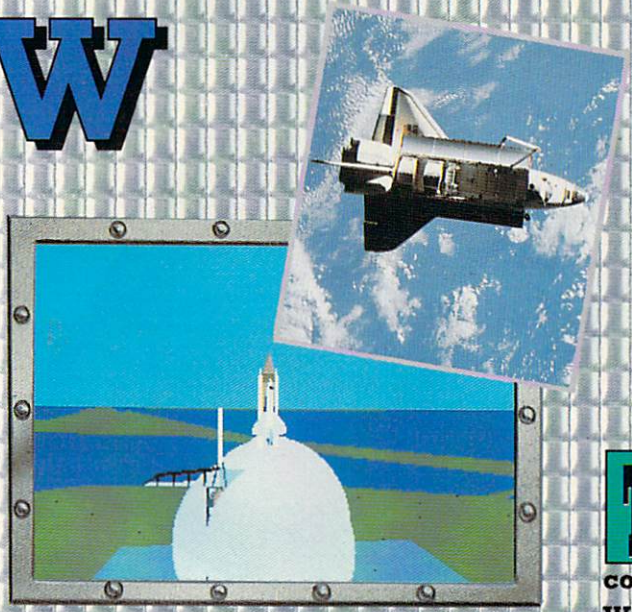

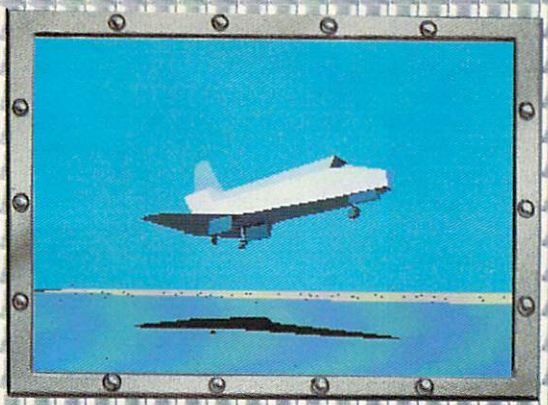

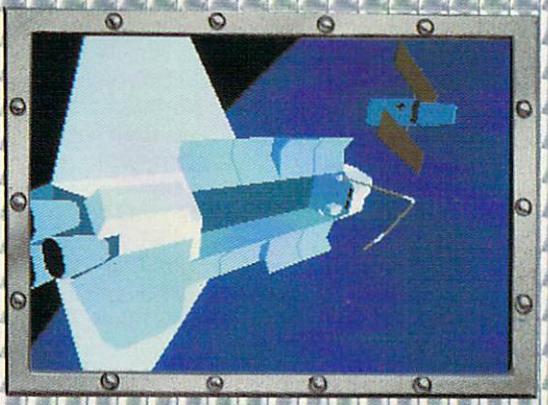

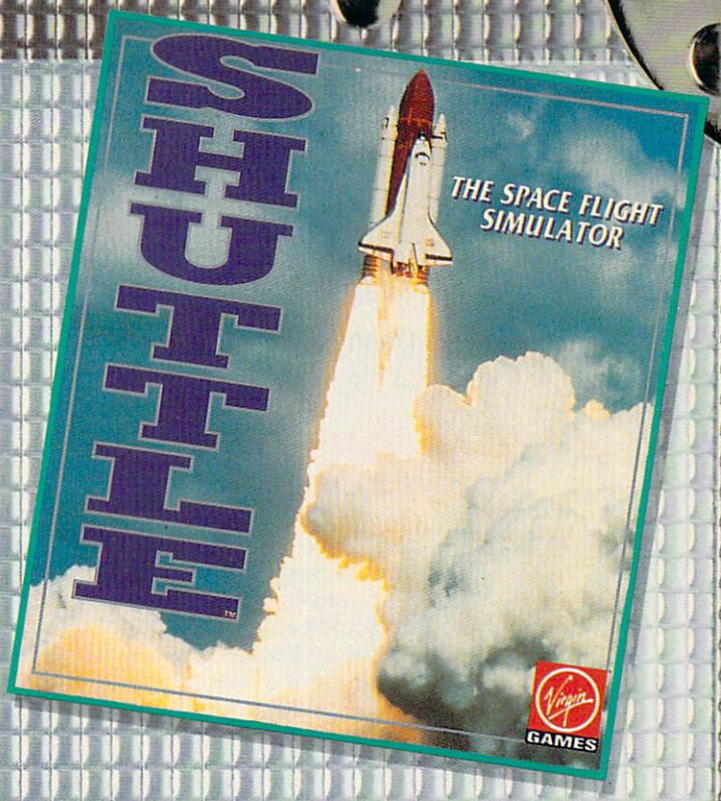

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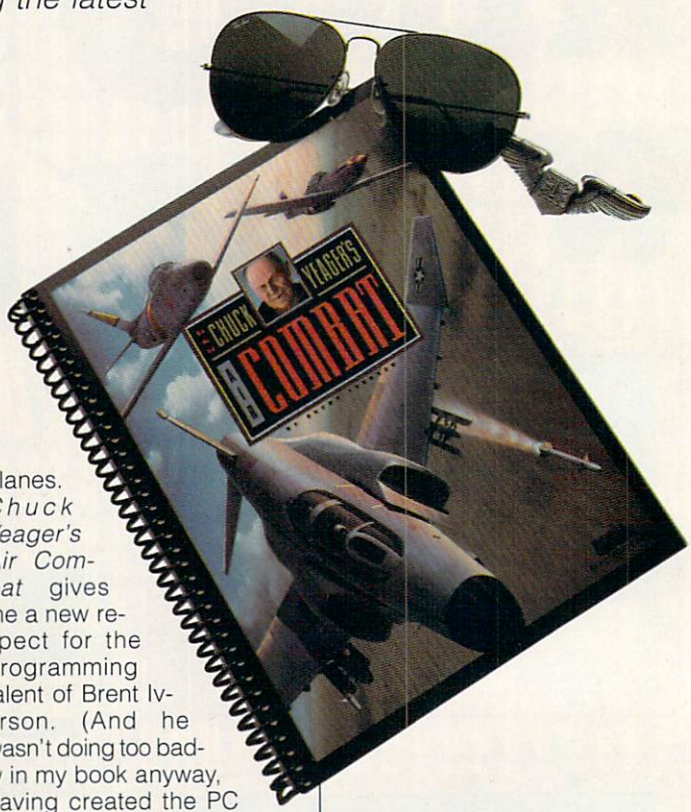
Denny Atkin

CHUCK YEAGER'S AIR COMBAT



"Bandit on your six! Break!" the navigator yelled from the rear seat. As tracers shot past the cockpit window, I did a vector roll and pulled away from the attacker. I leveled out my F-4E Phantom, wondering if every raid against the Vietcong would see this much action. I'd just taken damage from the MiG-21 I shot down over Hanoi, and now I had to deal with more bogeys?

I scanned the horizon looking for the enemy aircraft. I spotted him, locked on a Sidewinder heat seeker, and moved in for the kill. Wait, there was something strange about this plane. It appeared to be . . . a piston-engined WWII fighter! "That's a Focke-Wulf 190," my navigator exclaimed incredulously. I glanced around . . . three, no four FW-190 fighters and a formation of Me-262s, the first German jet fighters!

Humming the "Twilight Zone" theme, I closed in on the bogey and let go of the Sidewinder; it shot right past him. I guess a heat seeker isn't the best weapon to use against an old prop job. I did a low yo-yo to reposition when suddenly a group of tracers ripped into my wing. Looking over, I saw an Me-163 rocket plane! I jinked to the left and lit into him with my 20-mm Gatling gun. He blew up with a spectacular explosion. Surveying my plane, I realized I'd taken some pretty heavy damage. One nice thing about WWII planes—they were pretty slow compared to my Phantom. I lit the afterburners and headed for home with growing appreciation of antique warplanes.

Chuck Yeager's Air Combat gives me a new respect for the programming talent of Brent Iverson. (And he wasn't doing too badly in my book anyway, having created the PC version of *DeluxePaint*.) When I saw the spec sheet for this program, I thought it might be a fun arcade game, but I didn't believe there was any way a program could realistically simulate aircraft from three different wars without making any compromises. I was wrong. The original Yeager simulation, *Chuck Yeager's Advanced Flight Trainer,* is one of the best-selling entertainment programs for the PC. This program lives up to its predecessor's flight-model realism and surpasses it in speed, sound, and graphics quality. And it provides much more challenging gameplay.

Yeager offers three gameplay options. You can choose to fly a historic mission over World War II Europe, Korea, or Vietnam; create your own mission; or test-fly a plane. Fans of historical air combat will enjoy the first option, which allows you to fly 16 accurate air-combat missions over Korea and 17 each over Europe and Vietnam. The Create Mission option allows you to design your own combat scenario, either a realistic encounter between planes of the same era or a fantasy combat between aircraft of different eras. Test Flight lets you simply take to the skies in your choice of aircraft and practice your flying skills without having to worry about enemy aircraft.

The program simulates a total of 17 different aircraft types. You can fly 6 of these models, and enemy aircraft can be any of the 17. The planes available from World War II are the North American P-51D Mustang and the Focke-Wulf 190A-8; from Korea, the North American F-86E and the Mikoyan-Gurevich MiG-15 Fagot; and from Vietnam, the McDonnell Douglas F-4E Phantom II and the Mikoyan-Gurevich MiG-21MF Fishbed. Other planes featured in the simulation, which you may have to defend as allies or face as enemies, are the P-47D Thunder-

bolt, the Messerschmitt Me-109E, the Me-110 twin-prop fighter, the Me-163 rocket plane, the Me-262 jet, the B-17 Flying Fortress, the B-29 Superfortress, the Yakelov Yak-9, the MiG-17F Fresco, the F-105D Thunderchief, and the B-52 Stratofortress (known as the BUFF to its pilots.)

As you'd expect from a simulation bearing the Yeager name, each of these planes is simulated very accurately. When you choose which plane you're going to fly, you aren't forced to use a generic cockpit; the program displays an instrument panel accurate to that type of plane. The more modern the plane you're flying, the more sophisticated the instrument panel. Each plane is realistic from a performance standpoint as well. For instance, the Me-163 Komet rocket plane will run out of fuel after a few minutes of combat and have to glide back to base, making it a sitting duck, just like the actual aircraft. You'll find that different fighters have different climb rates, turning radii, and maximum altitudes. No more of the "every plane flies about the same" syndrome you've encountered in too many other simulations. If you're used to less realistic simulators, you might find yourself in trouble after trying to do maneuvers that aren't actually possible in some planes at certain altitudes.

The game presents you with an incredible variety of historical missions. Many are of the fighter-escort and ground-attack genres, as you'd expect, but many others are unique and unexpected. In Korea, for instance, one mission puts you in the role of Lt. Kim Sok Ho, the North Korean pilot who defected with his MiG-15 in order to collect a $100,000 reward. You've got to avoid both Korean and American pilots in that scenario. Other scenarios bring their own surprises—you may spend most of your time in what's supposed to be a ground-attack mission engaging in air-to-air combat. Make sure you pay attention to the mission's goals, though. I shot down three German planes in one mission, only to be chided by General Yeager for not destroying enough ground targets.

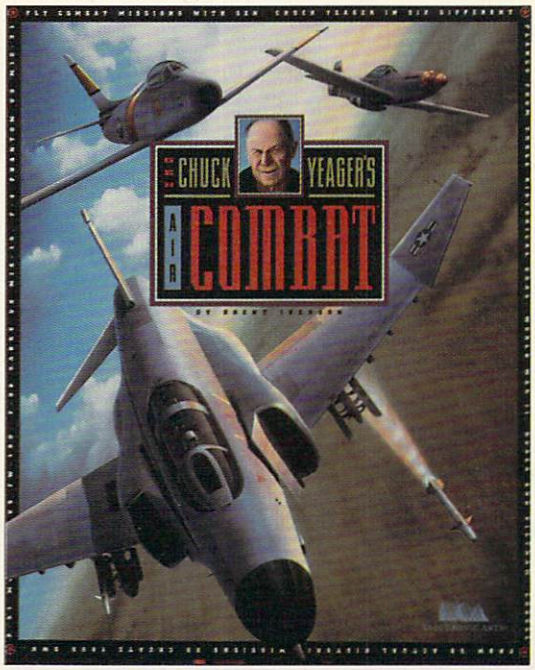
General Yeager offers helpful hints and warnings during combat. If you seek further assistance, a tutorial videotape narrated by Yeager is available from EA.

Each mission stands alone; the program doesn't let you fly a campaign or save your pilot to disk so you can keep a running total of your kills.

The historical missions are thoroughly enjoyable, but I had the most fun using the Create Mission option. If you've had a bad day, take a Vietnam-era MiG-21 up against four or five WWII B-17 Bombers—it's a piece of cake. If you're up for a challenge, try to shoot down a Mach-2 F-4E Phantom in a 500-mph P-51 Mustang. It can be done, but it's not easy.

The game has a nice replay option. You can pause the combat and watch what just happened, or you can save the entire mission to disk and watch it later. There are variable playback speeds, and you can have the camera follow any of the aircraft.

Yeager's VGA graphics are beautiful. Each cockpit is a nicely rendered VGA bitmap, while the world and other aircraft are done using fast filled-polygon graphics. Down to the ejection seat and canopy that fall away from your plane after you punch out, *Yeager* misses no detail. A digitized Chuck Yeager voice congratulating you or chiding you after each mission crowns a complement of well-done sound effects. One truly neat feature is that the game will actually run under *Windows* on a 386SX or higher machine; other than a scrambled digitized voice, all features work fine under *Windows* 3.0. With realistic flying characteristics, fast-action combat, an infinite variety of possible missions, and top-notch graphics and sound, it's hard to find anything to complain about. The terrain could be a little more detailed and less flat, and it would be nice if you could keep a running total of your pilot's kills. Even without these features, though, *Chuck Yeager's Air Combat* is the most enjoyable combat flight simulator I've ever played. ❐



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GAMEPLAY

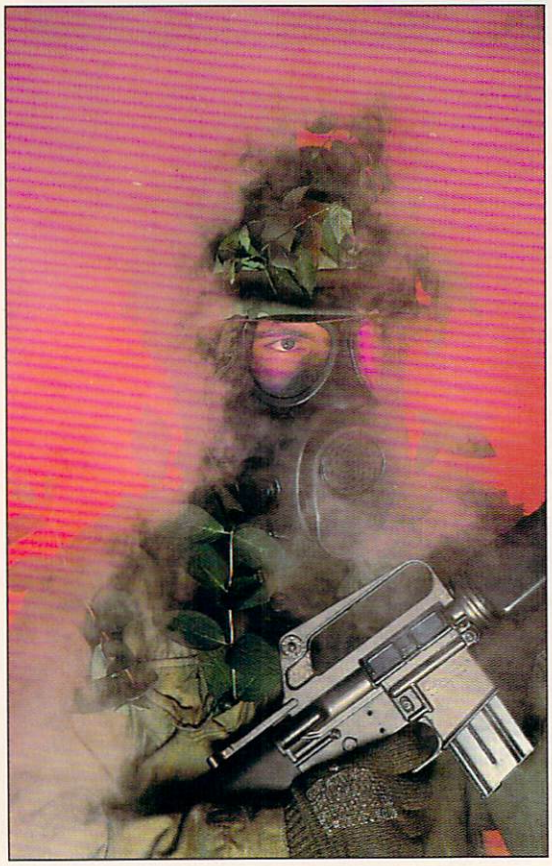
Orson Scott Card

ABSTRACT WAR GAMES

You don't have to approve of war to enjoy playing war games. Besides, there are different kinds of war games. Some are combat games—those arcade games where you kick or blast your way through an endless onslaught of enemies in order to reach a higher level where you have to kick or blast your way through even *more* enemies. Victory depends on the reflexes and skills the player develops—by playing, you train yourself into a perfect "soldier" for that game.

Combat ability, tactics, and strategy—every step along the continuum is important. But there's another continuum, too . . . abstraction versus simulation.

Some war games are strategic, like the excellent *Command H.Q.* (Microplay), in which you play on a large map, manipulating nations and armies. The whole war is your responsibility.



THE IMAGE BANK

Some war games are tactical, a sort of middle ground in which you maneuver the individual units of a larger force. Your game is usually a single battle consisting of many engagements and firefights. Your units may be as large as divisions or as small as tanks or individual soldiers—but you, as the player, control many of them, not just one or two.

The boundaries between these kinds of war games are never firmly fixed. Insofar as the Ultima games are war games, are they combat games because you control the individual combat decisions of a very small team? Or tactical, because you maneuver and control several players?

Does it matter? Well, it does if you're playing war games for real. When, at the Marine University in Quantico, I sat in on a war game session led by Captain John Schmitt (author of what may be the most concisely brilliant book of strategy ever written), it really mattered whether you thought strategically as well as tactically—because someday what you did in the game might show up on the battlefield.

Likewise, the best of the officers playing the game took into account the individual abilities of soldiers in their made-up squads. "I'd put my two best marksmen here and have them move very slowly into position *there* during the night. I know they could get there because I trained them to do it." Combat ability, tactics, and strategy—every step along the continuum is important.

But there's another continuum, too, when it comes to war games: abstraction versus simulation. Chess, for instance, is a highly abstracted war game. Sure, we speak of "knights" and "castling," but there's no sense in which our use of bishops and queens reflects real warfare! And as for moving castles . . . well, enough said.

So when I tell you that *Full Metal Planet* (Infogrames, copyrighted and distributed in the U.S. by Data East) is a fairly abstract tactical game, that doesn't mean that it isn't a good war game. It does mean that you won't get the thrill of kicking your way through a whole bunch of enemies—combat is only scarcely more graphic than seeing one piece take another in chess. Yet you get another kind of thrill—the excitement of maneuvering your forces defensively and offensively against very tough computer opponents or other human players, under a very tight time limit of no more than 25 moves.

Unrealistic? No, just abstract. The graphics are gorgeous, somewhat impressionistic and yet grittily real. It's a bleak alien landscape, where your corporation and up to four computer opponents and three other humans are trying to gather as much ore as possible, all the while blasting or capturing the other corporations' equipage and trying to keep its men from doing the same to you.

The rules of movement are quite abstract, and the battles themselves are simple. The playing field is a hex grid with a sea whose unpredictable tides can drastically alter your movement capability. It sounds simple, but the complications are as intricate as chess.

Whether you prefer twitch games or games like *Full Metal Planet* is just a matter of whether you want your reflexes to play the game for you or you sometimes want the game to reach your brain. ❐

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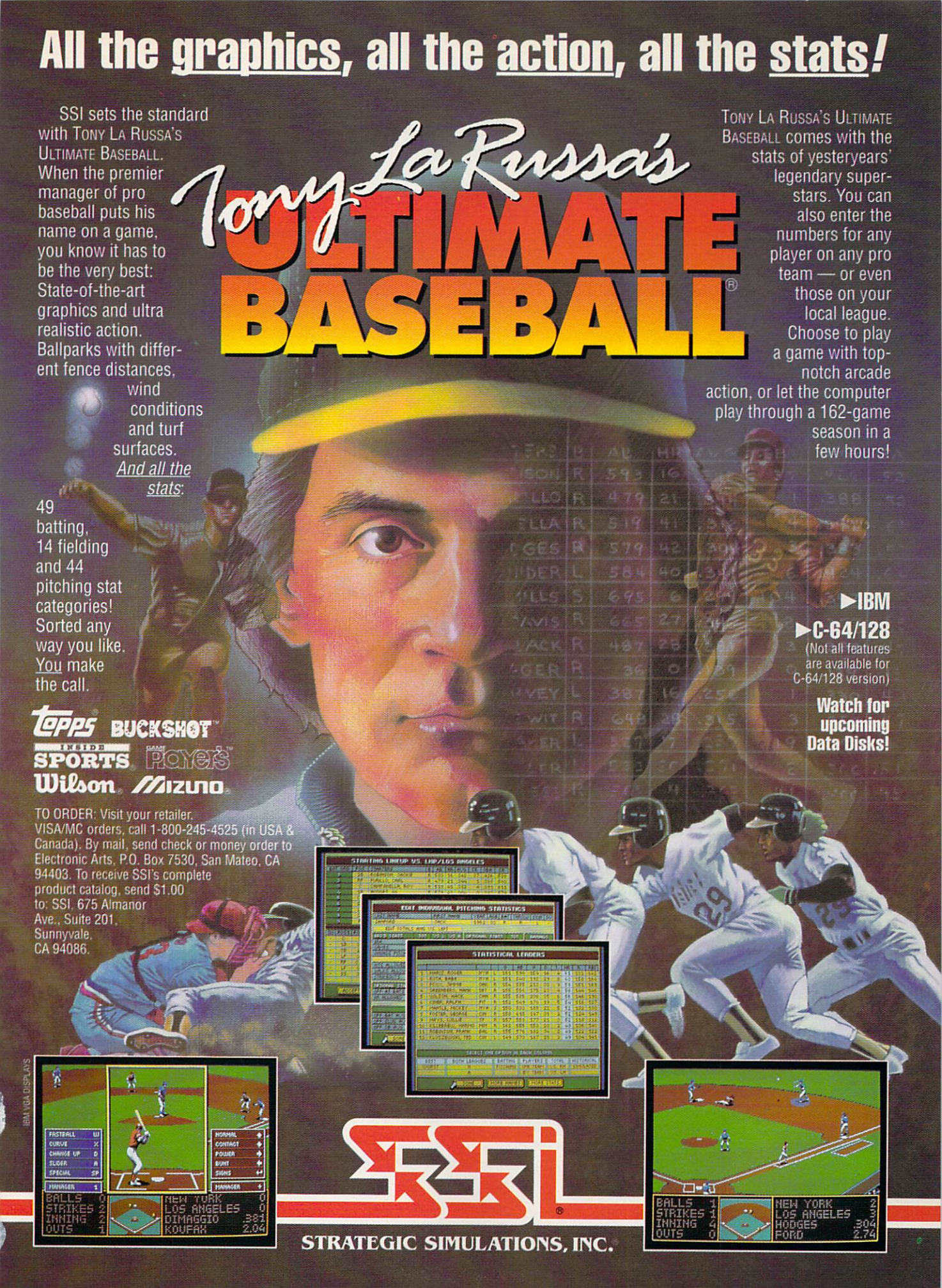

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IBM VGA DISPLAYS

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The Making of a Com

When Access Software introduced the award-winning *Mean Streets* two years ago, its exciting movie sequences were state-of-the-art technology. Now, the Access geniuses are taking game technology another quantum leap forward with *Martian Memorandum.*

This time, in what is rightfully called *full-motion video,* Access gives us movie sequences with synchronized sound. When you play the game, the twelve speaking characters talk directly to you as you conduct your interviews, even if you don't have a sound board. They move as they speak and roll their eyes with disgust, shrugging, laughing, and blazing with anger. They're not animated cartoons or photos with dialog boxes; they're people you have to deal with to get anywhere in the game.

You won't believe your eyes and ears. It's a breakthrough that parallels the development of "talkies," when soundtracks were added to movies.

But aside from the programming artistry that represents a giant step for the technology, this is a computer game good enough to deserve being the first computer talkie.

Martian Memorandum's setting is A.D. 2039. You take the role of Tex Murphy, a San Francisco gumshoe in the Sam Spade tradition (complete with the trench coat and 1940-style theme music), who is hired by wealthy Marshall Alexander to find his beautiful daughter, Alexis, who is missing and may have been abducted.

The faint trail eventually leads through her boyfriend's incredible South American jungle fortress to the seedy back alleys of a casino district on Mars. As you meet more people and unravel the web of intrigue, you find there is much more involved than just a missing heiress. If you are successful, you may save humanity from self-destruction.

It's a gritty, hard-boiled private eye yarn in a futuristic, science fiction setting. As the macho hero, you mix it up with mutant villains, sexy secretaries, gamblers, hired muscle, and an eclectic variety of characters, each of whom is trying in his or her own way to influence the fate of the universe.

There's also a healthy dose of humor, particularly in the descriptions of the various objects you'll examine as you search for clues.

The story line is unusually deep for a game. The game's electronic wizardry—after the awe wears off—allows you to get caught up with the people, their motivations, and the scope of the problem you're desperately trying to solve.

The designers weren't content, however, with presenting this richly detailed story in graphics and sound that no one else can match. They had one more innovation in mind; they guarantee you can finish the game. You'll be able to uncover the final solution without a hint book and without frantic phone calls to customer service.

How can they guarantee this? They've developed a new system to give you context-sensitive help at just the level you want. If you want minor hints at the tough spots, you can get them onscreen. But if you aren't playing for the thrill of outsmarting the programmers, persist in asking for help, and the game will eventually spell out for you exactly what to do.

This may be the first adventure/mystery game some of us have *ever* finished. If you enjoy simple mysteries and puzzles but have given up on adventure games in frustration with their seeming impossibility, you'll want to try *Martian Memorandum.* You only have to endure as much frustration as you choose to accept.

The Making of *Martian Memorandum*

Like its predecessors, *Countdown* and *Mean Streets, Martian Memorandum* is the product of a talented team of creative technical geniuses hidden away in an industrial park near the Salt Lake City International Airport. Although they're unquestionably brilliant computer people, they work, talk, and think more like moviemakers.

Martian Memorandum's story and con-

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puter Movie

How virtual can it get before it's real? Access brings together RealSound and live action for an unprecedented adventure experience.

By Richard O. Mann

cept are the joint creation of financial vice president Chris Jones and programmer Brent Erickson. Jones directs the game's movie sequences and acts several parts.

The visuals are born when the designers explain the story to their artist, who creates a storyboard with a rough sketch for each game screen. The results of this intensely creative process are pinned on the wall of a long hallway, and production begins.

Videotaping is much like a standard movie or television shoot, with makeup and sound people, a videographer (cameraman), the director, and actors shooting multiple takes directly onto videotape. The difference is one additional person: Erickson lurks in the background, mentally digitizing the scene and fitting it into his program, making sure the degree of detail, motion, and position of the actors will work within computer memory and program constraints.

Ninety-five percent of what you see onscreen in *Martian Memorandum* is digitized video or still photos. Every move that Tex Murphy and the other characters make was created from digitized video of actors. The derelict train in the rail yard murder scene is a photo of an abandoned string of rail cars a few hundred yards from the Access office. Wherever the appropriate image exists, they'll find a way to capture it and fit it into the game.

Like moviemakers, they create futuristic sets in miniature. After lighting the model set just as carefully as stage directors light a sound stage, they videotape it. Jon Clark, a multitalented artist with 15 years of experience in theater set design, creates the models using a surprising variety of toys, balsa wood, scraps of plastic models, wires, and anything else that comes to hand. Jon also runs the studio's professional sound equipment.

The digitized images of the sets then go to Doug Vandegrift, a cartoonist with a theater background known for his work on "The Muppet Babies" cartoon series. Vandegrift's PC tool chest lets him blend in other images, including his own drawings. He works with the lighting, backgrounds, and whatever else may need touch-up in the original image.

The detailed exterior scene of the Martian casino row, for example, started as a colorful, detailed model built by Clark. Vandegrift blended in a stark Martian mountainscape background and neon signs that came from photos of Las Vegas augmented by his own artwork. The result is a movie scene that looks real without the flat, uniformly colored and lighted look of a cartoon panel.

The live action sequences and characters that talk in full-motion video appear onscreen in three- to four-inch win-

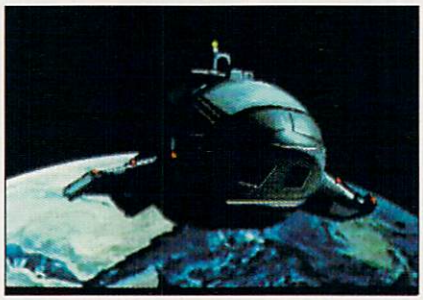
dows over the scene's set. They could do full-screen video, but it takes so much disk space that it isn't practical yet.

In fact, the real technical breakthrough allowing full-motion video with sound is not the video or the sound technology. It's fast disk decompression. Full-motion video is a series of frames projected on the screen, just like motion pictures. Each frame is stored on disk and drawn on the screen at the right speed.

Images take a vast amount of disk storage. To make this game work, Erickson invented a system that compresses the video files by approximately 87 percent and then decompresses them on the fly in a fraction of a second, sending them to the screen as needed, right on time, frame by frame, synchronized with the sound files. Without the lightning-fast decompression routine, this game could not exist.

The RealSound technology that gives us music and voice through ordinary PC speakers is the brainchild of Steve Witzel, vice president of marketing at Access. It's so mature and solid at this point that it's easy to record the soundtrack on the videotape and digitize it using the proven RealSound utility program. If you have expensive MIDI sound equipment, the soundtrack of *Martian Memorandum* will complete the illusion of being in a movie.

All of these diverse elements feed into Erickson's dimly lit, CD-sound–filled office, where the master programmer melds them together into a finished product. Since the game was created in close partnership with Jones from the start, Erickson is qualified to serve as the movie's cutter and editor. His job is a lot harder, though, because he's also writing the computer code that causes everything to happen.



Martian Memorandum *is your ticket to an interplanetary adventure.*

An Entertainment Experience

The designers of *Martian Memorandum* are striving to make it more than a game; they see it as an entertainment experience. The intention is to make the player identify with the hero and feel surprise, anger, delight, and tension as he or she solves the mystery. The only concession to the fact that it's a computer game is your limited ability to question and interact with the people you meet in the game. At each step along the way, you are given three to five possible things to say in these conversations. (Such conversations may go on for ten or more exchanges; they are not perfunctory interviews.) Sometimes off-the-wall questions you'd like to ask aren't among the choices, but such occasions are rare.

As games become more realistic, merging full-motion animation and digitized sound, the gap separating real experience from the game action narrows. *Martian Memorandum* isn't quite virtual reality yet, but it's closer to it than any other computer game. ❐

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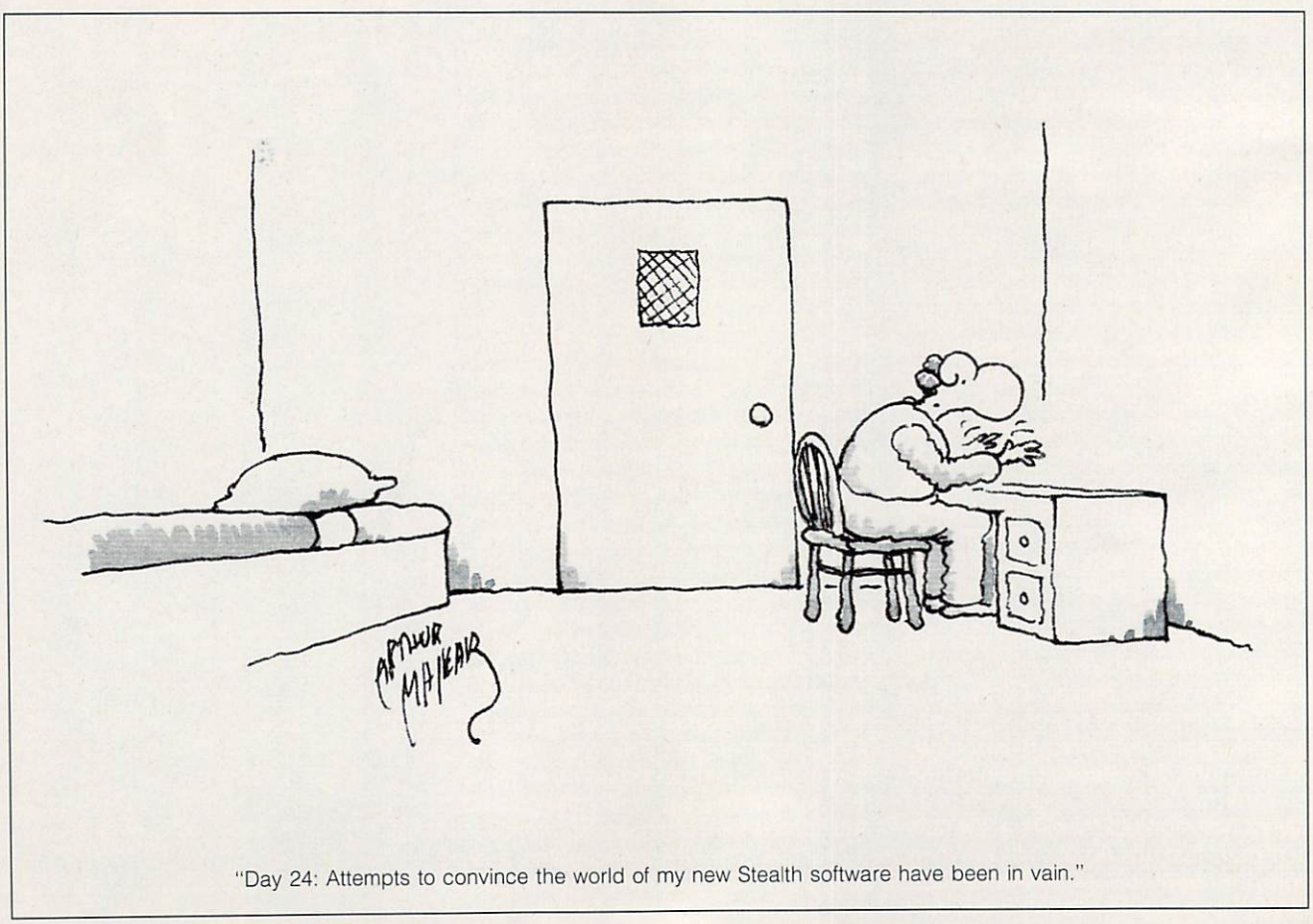

"Day 24: Attempts to convince the world of my new Stealth software have been in vain."

64/128 VIEW

New 64 titles were scarce at the Consumer Electronics Show, but there's still some fun coming our way.

Tom Netsel

The 1991 International Summer Consumer Electronics Show closed its doors recently in Chicago after 55,629 attendees logged many extra miles on their Nike and Reebok Frequent Hiker plans. It took a lot of shoe leather to visit each of the 1,019 exhibits that filled a half-million square feet of exhibit space, and finding new 64 titles in this electronic midway was something of a challenge.

There were plenty of PCs and Amigas displaying new software, but there were no 64s. Many companies say they no longer get enough return on their investment to continue producing products for the 64.

After much asking, probing, and poking around, however, I did manage to locate some new products. ReadySoft says its multidisk *Wrath of the Demon* should be out in September, but look for it on cartridge, too. "With the introduction of the Commodore Game Console in England, cartridge games developed for that system will work just fine on a 64," says ReadySoft Senior Vice President Elizabeth Arnold.

This state-of-the-art game contains more than 3MB of graphics data, 600 screens of action, and 1400 frames of animation. Look for more cartridges and disks coming from the U.K., since ReadySoft has joined Empire Software and will be importing some of its products. Another title due out in late fall is *Guy Spy.*

At Electronic Arts, affiliated labels SSI and Mindcraft have new offerings that should be exciting. Step up to the plate with Strategic Simulations' *Ultimate Baseball.* That's the working title, but whatever it's called, this simulation lets you play, manage, or watch one game or a whole 162-game season.

War game fans haven't been forgotten. Look for an SSI war game coming soon. It's called *Medieval Lords.*

Gateway to the Savage Frontier is the first of a new AD & D series from SSI. It takes place in a mysterious territory in the world of Forgotten Realms. Starting in the town of Yarter, venture over a vast wilderness on a quest for four magical statuettes.

Later this year, look for *The Magic Candle, Vol. 2* from Mindcraft. In this sequel explore the dreaded realm of Gurtex in search of the dark secrets of black candles. A new user interface lets you capture conversations, eliminating the need for constant note taking. Astound friend and foe with new spells, such as Glamour, Courage, and Terrify.

The Electronic Zoo is bundling 20 popular games from Great Britain and sending them to the U.S. as *Star Collection.* These hits should be available now.

Konami is another company supporting the 64—and now one of the more active ones. Over the next few months, look for five new games based on popular movies and hit television programs. Look for such exciting titles as *Bart Simpson's Adventure, Simpsons' Arcade Game, Teenage Mutant Ninja Turtles: The Arcade Game, Back to the Future III,* and *Predator 2.* ❐

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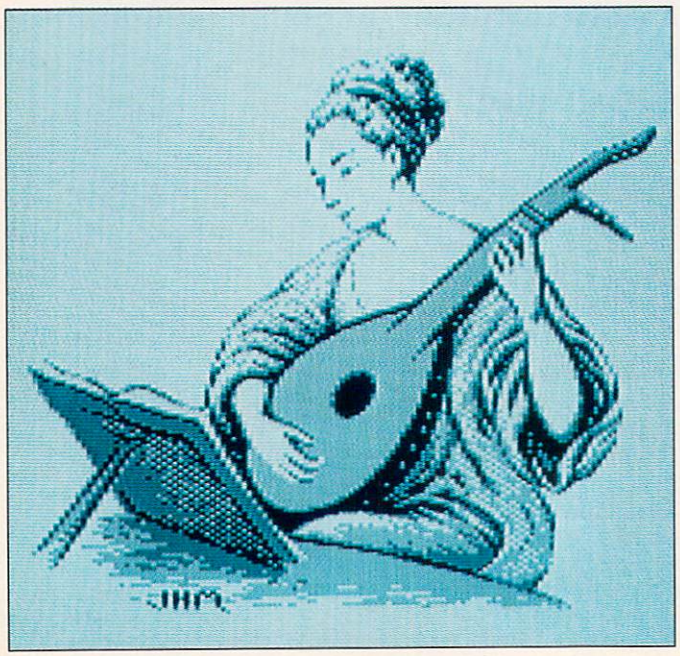
COMMODORE CLIPS

Tom Netsel

GAZETTE GALLERY

Each month *Gazette Disk* features a collection of the best 64/128 artwork submitted by our readers. We pay $50 for each piece of art we accept for "Gazette Gallery" and an extra $50 for the one selected as Picture of the Month and featured on this page. To submit your original artistic creations, send them to Gazette Gallery, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

"Gazette Gallery" presents *Lutanist*, by Jack (DocJM) Modjallal of Encino, California, as this disk's Picture of the Month.



Gazette Goes Online

Two of the biggest names in the Commodore world are joining forces to offer 64 and 128 users an exciting new dimension to their computing activities. COMPUTE's Gazette will soon be online at Quantum-Link (8619 Westwood Center Drive, Vienna, Virginia 22180; 800-827-8444).

You've read Gazette for years; soon you can access Gazette electronically on the only Commodore-specific online service. With your computer, modem, and Q-Link's free terminal software, you'll be able to access many of your favorite Gazette features. Check Gazette and Q-Link as details become available about our upcoming debut.

Check This Out

Sparks Electronics (P.O. Box 0475, St. Joseph, Missouri 64504-0475) has released *S.E.C. Check Register 128* ($16) for the 128 in 80-column mode. Designed to manage personal or small business checking accounts, *S.E.C. Check Register can contain up to 750 entries.*

Special emphasis is given to data entry, recurring payees, check printing, and printing of register data. Recurring payee files can contain up to 54 names and addresses, but users can load others into the current register for an unlimited number of payees.

Earnings Up at Commodore

Commodore International Limited reported $10.6 million in income on sales of $246.3 million for the third fiscal quarter of 1991, which ended March 31. This represents a substantial increase in earnings and a 16-percent increase in sales compared to the year-ago quarter. An extraordinary charge of $9.2 million relating to a previously announced court settlement of litigation was recorded in the quarter, resulting in net income of $1.4 million.

For the nine months that ended March 31, 1991, income increased tenfold to $54.1 million compared with $5.0 million in the prior year. Sales increased 21 percent to $830.7 million, compared with $689.2 million in the year-ago period. Net income for the nine months increased ninefold to $44.9 million, or $1.37 per share.

Every product line contributed to revenue growth in the quarter. Unit sales of Amiga computers increased 30 percent, while the 64 product line registered unit growth of 48 percent, largely due to expanded sales in new markets.

The Krynn Epic Continues

Strategic Simulations announces the release of *Death Knights of Krynn* ($39.95) for the 64. (SSI products are distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, California 94404.) This game is the sequel to the popular Advanced Dungeons & Dragons fantasy role-playing game *Champions of Krynn.*

Death Knights of Krynn begins a year after the conclusion of *Champions of Krynn.* At a victory party on the anniversary of the evil force's defeat, the celebration is interrupted by an unwelcome party crasher. The undead Sir Karl sweeps in on a Death Dragon and steals a revered Dragonlance. The adventure begins as the champions set out to track Sir Karl and recover the stolen item.

Your favorite characters from *Champions of Krynn* can be imported to *Death Knights of Krynn,* along with their accumulated items and wealth. This is a new feature not previously offered in AD & D fantasy role-playing games.

Big Al and Pals

Return to Chicago's golden age of gangsters and take on the Mob in *The Untouchables* ($14.95) from Ocean of America (distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, California 94404).

Guide Eliot Ness's band of mob-busters through five levels of arcade action: the Warehouse Bust, the Border Raid, the Alley Shootouts, the Railway Station Confrontation, and the Rooftop Duels. ❐

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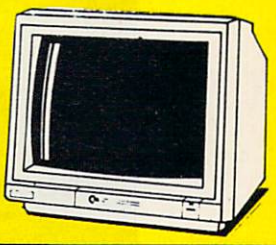

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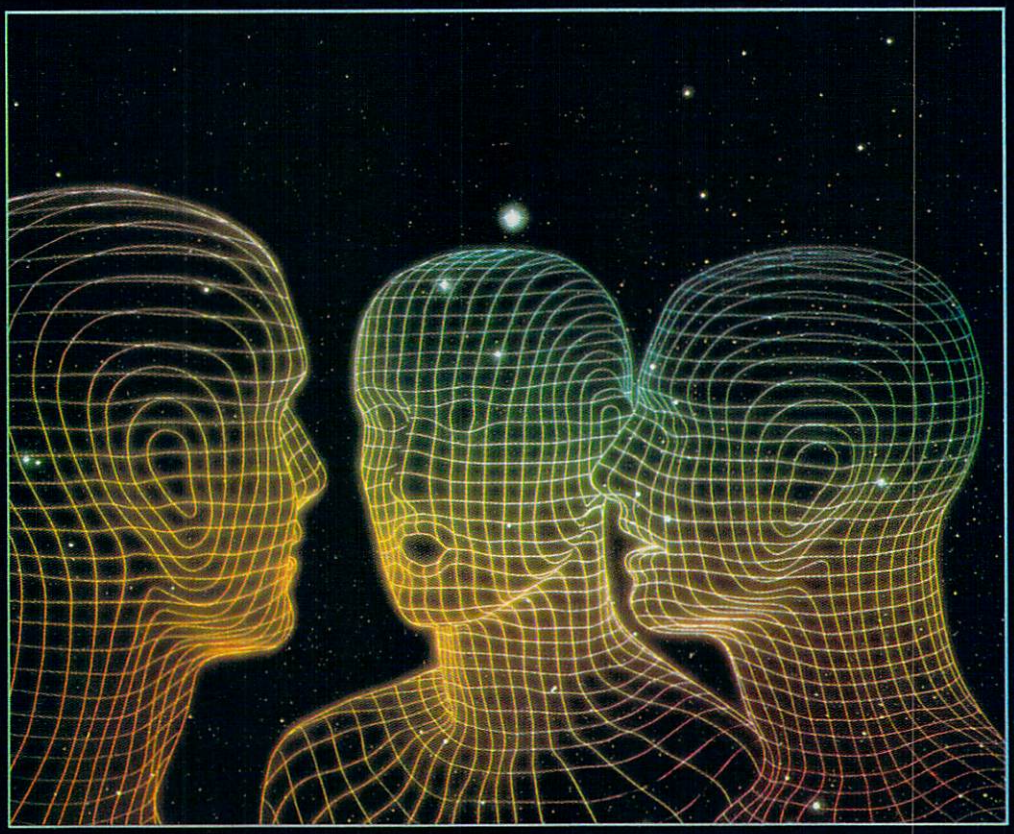

A GUIDE TO COMMODORE USER GROUPS PART TWO

EDITED BY KANDI SYKES AND DANA STOLL

UNIPHOTO/PICTOR

Here's Part 2 of the list of user groups, concluding with those in New Jersey through Wyoming, APOs, and other countries.

NEW JERSEY

Info 64 Commodore User Group, c/o Jerry Fleischer, 186 Delmar Ave., Glen Rock, NJ 07452

Hillsdale Commodore 64 Users Club, 32 Esplanade Lake Dr., Hillsdale, NJ 07642

Garden State Commodore & MS-DOS User's Group, 89 Stratford Rd., Tinton Falls, NJ 07724 (BBS# 201-938-3885)

Commodore User Group of Central New Jersey, 112 Old Bridge Rd., Matawan, NJ 07747

Morris Area Commodore User Group (MACUG), P.O. Box 492, Mt. Tabor, NJ 07878

Rancocas Valley Users Group (RVUG), c/o G. C. Heath, 806 Windsor Dr., Cinnaminson, NJ 08077 (BBS# 609-267-7945)

Data Exchange–Beneficial Users Group 64/128 (D.E.–B.U.G. 64/128), 713 Second St., Dunellen, NJ 08812

Commodore E. Brunswick Users Group (CEBUG), P.O. Box 314, E. Brunswick, NJ 08816

NEW MEXICO

New Mexico Commodore User Group, P.O. Box 37127, Albuquerque, NM 87176 (BBS# 505-268-4662)

Los Alamos Commodore Users Group, 4214-A Arizona St., Los Alamos, NM 87544 (Voice# 505-662-5934)

Taos Area Commodore User's Group, P.O. Box 5686, Taos, NM 87571

The Southern New Mexico Commodore User's Group, P.O. Box 4437, University Park Branch, Las Cruces, NM 88003

Commodore Users Group of Roswell (CUGOR), 1619 N. Kansas, Roswell, NM 88201

NEW YORK

New York Commodore Interest Group (NYC=ig), 115 Essex St., Box #146, New York, NY 10002

Kids' Computer News, St. Hilda's & St. Hugh's School, 619 W. 114th St., New York, NY 10025

Folklife Terminal Club, Box 555-R, Co-op City Station, Bronx, NY 10475

Brooklyn Commodore User's Group, c/o Grodman, 1111 Shore Pkwy., Brooklyn, NY 11228 (Voice# 718-331-3835)

Queens Commodore Users Group (QCUG), P.O. Box 129, Ozone Park, NY 11417 (BBS# 718-366-7445)

Commodore Users Group of Greater New York, 190-25 Woodhull Ave., Hollis, NY 11423

N.C.C.C., P.O. Box 233, Sea Cliff, NY 11579

Commodore Long Island Club, 15 Rochelle Ct., Amityville, NY 11701 (BBS# 516-489-4061)

Brentwood 64/128 Computer Club, Public Library, 2nd Ave. & 4th St., Brentwood, NY 11717

Mohawk Valley Computer User Group, c/o William Nowak, 3818 Stinson Ave., Tribes Hill, NY 12177

Tri-City Commodore User's Group (TCCUG), P.O. Box 12742, Albany, NY 12212-2742

Hudson Valley Commodore Club, P.O. Box 2190, Kingston, NY 12401

The Commodore Computer Club of Syracuse, 233 Williams St., Minoa, NY 13116 (BBS# 315-656-3544)

Oswego Commodore User Group, 402 Mahar Hall, State University College, Oswego, NY 13126

Commodore User Group of Massena (COMA), Star Tech, 280 E. Orvis St., Massena, NY 13662

The Niagara Falls Commodore/IBM Club, 2405 Willow Ave., Niagara Falls, NY 14305

Rainbow Computer Users Group, c/o St. James United Methodist Church, 4661 Porter Rd., Niagara Falls, NY 14305

Geneva Commodore Users' Group, 25 Pine St., Geneva, NY 14456

Commodore Users Group of Rochester (CUGOR), P.O. Box 23463, Rochester, NY 14692 (BBS# 716-621-5908)

NORTH CAROLINA

Triad Commodore Users Group, P.O. 10833, Greensboro, NC 27404

Bailey's User Group (BUG), P.O. Box 70, Holly Springs, NC 27540

Commodore Users Group of Lincolnton, Rte. 3, Box 457, Lincolnton, NC 28092

Salisbury Compute, Charles A. Huffman, 280 Deal Creek Dr., Salisbury, NC 28144

Asheville-Buncombe User Group (A-BUG), P.O. Box 15511, Asheville, NC 28813

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Central Dakota Commodore Club, P.O. Box 1584, Bismarck, ND 58502-1584

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The Commodore Club of Central Ohio (CCCO), P.O. Box 292392, Columbus, OH 43229 (BBS# 614-523-3459)

Ashtabula County Commodore Users Group (ACCUG), 1034 Michigan Ave., Ashtabula, OH 44004

Basic Bits Commodore Group (BBCG), P.O. Box 447, N. Ridgeville, OH 44039

NorthEast Ohio Computer Users Group (NEOCUG), P.O. Box 196, Wickliffe, OH 44092

Portage County Commodore Family User Group (PCCFUG), P.O. Box 901, Ravenna, OH 44266

Akron Area Commodore Users Group (AACUG), P.O. Box 9293, Akron, OH 44305-9293

Trumbull Commodore Users Group (TRUMCUG), P.O. Box 8632, Warren, OH 44484

Mahoning Valley Commodore Club, P.O. Box 1180, Young-

stown, OH 44501

Canton/Alliance/Massillon Users Group (CAMUG), P.O. Box 2423, N. Canton, OH 44720 (BBS# 216-453-3319)

Computer Erie Bay Users Group (CEBUG), P.O. Box 1461, Sandusky, OH 44870

Shelby Computer User Group, P.O. Box 512, Shelby, OH 44875

Western Cincinnati Commodore Club (WESTCOM), P.O. Box 89, Amelia, OH 45102-0089 (Voice# 513-753-7387)

Cincinnati Commodore Computer Club, c/o Cure of Ars School, Berwick and Roe Streets, Cincinnati, OH 45227 (Voice# 513-248-0025)

Southwestern Ohio Commodore Users Group (SWOCUG), P.O. Box 46644, Cincinnati, OH 45246

Dayton Area Commodore Users Group (D.A.C.U.G.), 1117 Lavern Ave., Kettering, OH 45429 (BBS# 513-878-1408)

Chillicothe Commodore Computer Users Group (ChilCUG), P.O. Box 6014, Chillicothe, OH 45601

Hancock User's Group (HUG-64), P.O. Box 632, Findlay, OH 45839-0632 (BBS# 419-423-6648)

OKLAHOMA

Commodore User's Group of Lawton, P.O. Box 3392, Lawton, OK 73502

Commodore Users of Bartlesville, 1920 SW Santa Fe, Bartlesville, OK 74003 (BBS# 918-336-3872)

Tulsa Area Commodore Users Group (TACUG), P.O. Box 52473, Tulsa, OK 74169-1842 (BBS# 918-428-2284)

Osage/Kay Commodore User's Group (OKCOM), 317 Woodbury, Ponca City, OK 74601

OREGON

geoMETRIX, 20224 S. Sprague Rd., Oregon City, OR 97045-9641

Commodore East County (C.E.C.), 1714 SE 35th Ave., Portland, OR 97214-5039

Crash-64 Salem Area's Commodore User's Group, P.O. Box 241, Salem, OR 97308 (BBS# 503-585-3092)

Lane County Commodore User Group (LCCUG), P.O. Box 11316, Eugene, OR 97440

Coos Computer Club, 2175 Everett St., North Bend, OR 97459-2336 (Voice# 503-756-4408)

PENNSYLVANIA

A-K Valley Computer Club, 1762 Fairmont St., New Kensington, PA 15068

Bettis Commodore Users Group, 592 Arbor Ln., Pittsburgh, PA 15236

Castle Commodore Computer Club, P.O. Box 961, New Castle, PA 16103

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Centre Area Commodore Computer Club, c/o Neil Dowlin, 1104 S. Atherton St., State College, PA 16801-6001

Blue Juniata Commodore Users Group, 23 Oakland Ave., Lewistown, PA 17044 (BBS# 717-248-4877)

Huntingdon County Hackers, P.O. Box 132, Mill Creek, PA 17060

Harrisburg Area Computer Group, 721 S. 29th St., Harrisburg, PA 17111 (BBS# 717-558-9080)

White Rose Commodore Users Group, P.O. Box 7501, York, PA 17404-0501

Lehigh Valley Commodore User Group, c/o Fred Knerr, P.O. Box 2, New Tripoli, PA 18066 (Voice# 215-298-2516)

Scranton Commodore Users Group (S.C.U.G.), P.O. Box 244, Scranton, PA 18501-0244 (BBS# 717-489-8001)

EPA Commodore Users Group, Edward H. Cohen, 1712 Aidenn Lair Rd., Dresher, PA 19025

Horsham Amiga/64, 20-A Lumber Jack Cir., Horsham, PA 19044

Main Line Commodore Users Group (MLCUG), 1046 General Allen Ln., West Chester, PA 19382 (BBS# 215-354-9750 and Voice# 215-388-1581)

Worldwide Commodore Users Group (International Headquarters and Shareware Registry), P.O. Box 337, Blue Bell, PA 19422

Buxmont Commodore and IBM Users Group, 1206 Cowpath Rd., Hatfield, PA 19440

Antelope Valley Commodore Users Group, P.O. Box 4436, Lancaster, PA 17603 (BBS# 805-272-9140)

RHODE ISLAND

Narragansett Commodore Users Group, P.O. Box 8707, Cranston, RI 02920 (BBS# 401-737-9774)

SOUTH CAROLINA

Greenville Commodore Users Network (GCUN), P.O. Box 5272, Station B, Greenville, SC 29606

SOUTH DAKOTA

Amiga and Commodore 64 Users Group, P.O. Box 18, Vermillion, SD 57069 (Voice# 605-624-3471)

TENNESSEE

Clarksville Commodore Users Group, P.O. Box 2171, Clarksville, TN 37042-2171

Multi-User Computer Club, 213 Holly Ave., S. Pittsburg, TN 37380-1313 (BBS# 615-837-8352)

Chattanooga Commodore Users, 1406 Blackwell Dr., Chattanooga, TN 37412

East Tennessee Commodore Club, P.O. Box 495, Knoxville, TN 37901

Raleigh-Bartlett Hackers CUG, c/o James Patrick, 3457 Gatewood Dr., Memphis, TN 38134

TEXAS

Society of Computer Owners and P.E.T. Enthusiasts (SCOPE), P.O. Box 833095, Richardson, TX 75083-3095

Texas Commodore User's Group, P.O. Box 623, Royse City, TX 75089

Central Texas Computer Users Group, 902 Carlisle, Killeen, TX 76541-7321

Commodore Houston Users Group (CHUG), c/o Ben Daily, P.O. Box 612, Tomball, TX 77375-0612 BBS# 713-445-2484 and Voice #713-664-2484

Southmost In Texas Commodore User's Group (SITCOM), c/o Charles Duncan, 74 Laura Ln., Brownsville, TX 78521

Amistad Commodore Users Group, P.O. Box 421212, Del Rio, TX 78842

Top of Texas Commodore (TOTCOM), Box 2851, Pampa, TX 79066-2851

Tri-State Commodore Users Group (Tri-CUG), P.O. Box 8971, Amarillo, TX 79114-8971 (BBS# 806-355-3031)

Commodore Users of Texas (CUT), 7007 Memphis Ave., Lubbock, TX 79413 (Voice# 806-792-7121)

El Paso Commodore User Group, P.O. Box 370934, El Paso, TX 79937 (BBS# 915-590-7678)

UTAH

Mountain Computer Society, 3898 Cheryl St., West Valley, UT 84119

Moab Commodore User's Group, 860 S. Antiquity Ln., Moab, UT 84532

VERMONT

Springfield Area Computer Club (SACC), 6 Bellows Rd., Springfield, VT 05156

Maple Valley Commodore Users Group, c/o Dave Swainbank, P.O. Box 106, St. Albans, VT 05478 (BBS# 802-524-9387)

VIRGINIA

Washington Area Commodore User Group (WAC), P.O. Box 3602, Fairfax, VA 22038-3602

Dale City Commodore Users Group, P.O. Box 2675, Dale City, VA 22193-0265 (BBS# 703-361-7565)

Fredericksburg Commodore Club, P.O. Box 8438, Fredericksburg, VA 22404-8438

Middle Peninsula Commodore User Group, P.O. Box 391, Gloucester, VA 23061 (BBS#s 804-642-3697 and 804-642-4293)

CURVE, P.O. Box 28284, Richmond, VA 23228 (BBS#s 804-266-1763 and 804-737-7936)

The Richmond Area Commodore Enthusiasts (TRACE), 2920 Pinehurst Rd., Richmond, VA 23228

Peninsula Commodore User Group of Virginia, 211 Nina Ct., Newport News, VA 23602 (BBS# 804-838-2118)

Henry County Commodore Computer Club, c/o Doug Wilcox, 1047 Graves St., Martinsville, VA 24112

Lynchburg User Group, Rte. 2, Box 180, Lynchburg, VA 24501

Commodore Users of Lynchburg (CUOL), P.O. Box 3386, Rivermont Station, Lynchburg, VA 24503

WASHINGTON

Renton Computer Group, 11308 SE 269th St., Kent, WA 98031

E/T, P.O. Box 1767, Bothell, WA 98041-1767

South King County Commodore User Group (SKCCUG), P.O. Box 5241, Kent, WA 98064-5241

NW Commodore User Group, 2565 Dexter N #203, Seattle, WA 98109 (BBS# 206-281-7661)

PSACE, 1313 5th Ave. W, Seattle, WA 98119-3410

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BACK TO THE FUTURE II

Join Marty McFly as he travels through time again in *Back to the Future II*. The movie tells the comic, disjointed story of time travel in Doc's DeLorean time machine. The software is mostly an arcade game with a couple of puzzles added.

The object of the game is to make your way through five levels of play to retrieve a sports almanac stolen by old Biff in 2015 and given to young Biff in 1955. Three of these five levels are simple arcade games, and two are logic puzzles. While the idea is intriguing, the program promises more enjoyment than it delivers. The documentation, which is brief but well written, ties the game to the movie by describing the film's opening scene and then provides the user with background information about each play level.

The game opens with some elegant graphics sequences. On the first level you must maneuver a hoverboard (a flying skateboard) through the streets of Hill Valley in the year 2015. Your mission is to reach the town hall before running out of time or depleting your energy.

Maneuvering the hoverboard is simple and fun. You can move freely in all directions, accelerate, brake, and jump. It is essential to learn to time these last two maneuvers accurately, since you must sometimes wait for power points as they drop from the sky. Try learning to attach yourself to the back of a passing car for a joyride.

When you reach the pond at the end of the last street, you'll know how to get to the town hall and complete the mission if you've seen the movie. Anyone who hasn't seen the movie will still quickly figure out how to complete the first task. Running out of time never seems to be an obstacle. Your time is extended whenever you reach the end of any of seven streets that lead to the town hall.

Maintaining your energy level, on the other hand, is considerably more difficult. A roving gang on hoverboards, old Biff with his cane, stray dogs, cars, mobile trash cans, and radio-controlled hovercraft harass you along the way. Coming in contact with any of these enemies lowers your energy level. You can punch your opponents on the hoverboards, but it seems better to avoid gang members rather than confront them.

Cars, dogs, and hovercraft are sufficiently powerful to knock you from your hoverboard in one shot if you run into them head-on. Manholes, slick spots, and curbs do limited damage. Along the way you can pick up caps, shoes, soda cans, newspapers, or plutonium for extra points. Perhaps because of the obvious danger, scooping up the plutonium earns you the most points.

To aid you along the way, speed, acceleration, and power bonuses regularly drop from the sky. Do not miss an opportunity to gather power points, as these will restore all lost energy.

Marty McFly can hitch a ride through danger-filled streets.

The best overall strategy is to remain near the middle of the screen, pick up all items in the street, avoid all items on the sidewalks, and use quick, lateral movements to evade obstacles. Background graphics are bright, colorful, and well conceived, but sprites are jagged with muddy colors. It is fascinating, however, to watch the coordination of so many sprites with the smoothly scrolling backgrounds, but the program is not without flaws. Your hoverboard can move faster than the background, so when you reach the edge of the screen, you have to wait for the background to catch up. Occasionally, the action on the screen overwhelms the computer, making the soundtrack and character movement erratic.

The second level is a logic puzzle in which you must get Marty's girlfriend, Jennifer, out of a house without her being detected. You control both Jennifer and the other people in the house by opening doors two at a time. When a door is opened, a room's occupant will move to an adjoining room. At no time should Jenny share a room with anyone.

The house is viewed from above, making it difficult at first to differentiate the characters, but Jenny is the one on the far left. You are expected to race the clock while planning your solution, but the Run/Stop key turns off the clock, so running out of time is never a problem. This level is a nice change of pace because it requires more planning than reflex action. The puzzle, however, is not very challenging. The third level is a return to arcade action with a special emphasis on violence. The object is to reach the end of the street safely, avoiding armed villains, flying barrels, rocks, and Frisbees. Your various karate kicks and punches can eliminate most enemies, but the individual with the semiautomatic weapon is virtually impossible to conquer or pass. This level's use of gratuitous violence is a disappointment, and its connection to the movie's story line is tenuous. The fourth scene also is linked weakly to actual movie action, but it takes a more imaginative turn. Here you are to solve a sliding block puzzle while racing the clock. One added twist is that the block puzzle is animated.

The fifth level is another street race in which you must retrieve the stolen almanac. The toughest part of this level is reaching it. Saving games in progress is not a feature of this program, so you must complete the first

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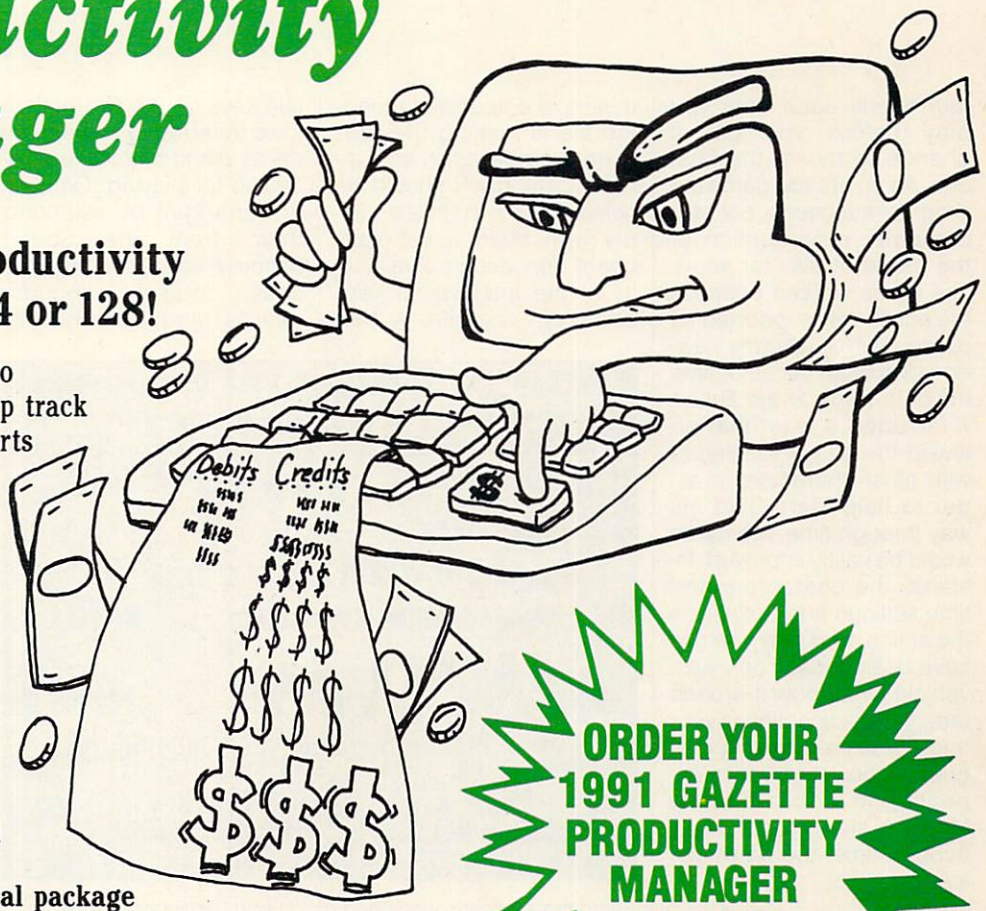

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four levels each time you play before you get a chance to tackle the final one. As an arcade game the program succeeds, but as a computer reproduction of the movie, it falls far short. The movie worked because the action was supported by dialogue which gave the viewer a disjointed sense of time travel. If *Back to the Future II* included a level that allowed the player to interact with other characters in order to help Marty find his way through time, the game would be vastly improved. Instead, the characters and time settings add nothing to the action, and they seem to have been chosen only as a vehicle for standard arcade fare. If joystick action is your thing, you'll enjoy this program. If, however, you're expecting to step into Marty McFly's shoes and warp through time, the game will leave you flat.

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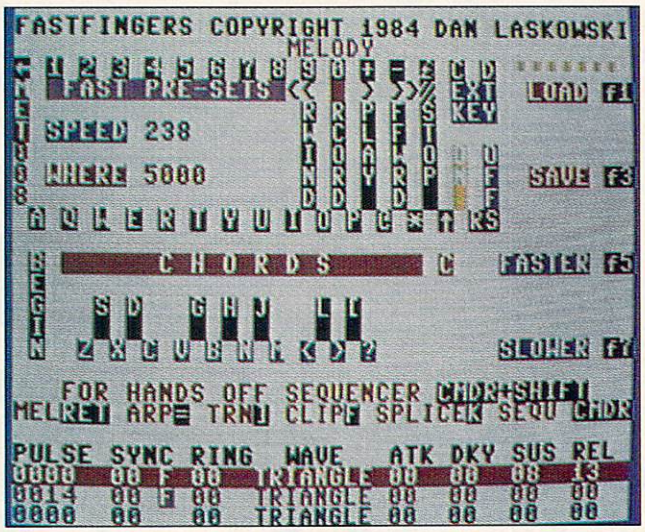
FASTFINGERS

Students of sound, take note: If you're interested in shaping sounds or learning about synthesis and if you have access to a Mattel Intellivision keyboard, check out *Fastfingers.*

Dan Laskowski developed this program (originally in 1984) with two basic thoughts in mind: to explore the sound synthesis abilities of the 64 SID chip and to allow the 64 to act as a lead synthesizer when attached to a full-size external keyboard by means of a special connector. He is making the program available again on a direct basis, but it should be noted that it is in limited supply with even fewer keyboard connectors. Availability of the Intellivision keyboard is uncertain. At this writing, Laskowski has three of them and will sell an entire package for $119. With an eye (or is it ear?) toward reaching student musicians, he offers special rates to music educators.



Learn more about sounds and music with Fastfingers.

Because it is somewhat dated, *Fastfingers'* presentation is not as slick as those of some other programs. Its four menus are a bit crowded and clunky-looking, but you get used to them. The sounds, which are the important part, are amazing. *Fastfingers* was written before the MIDI explosion, yet Laskowski programmed it for 256 sounds and even coaxed an extra suboctave out of the SID chip.

While developing sounds and recording a track on disk are clearly easier with an external keyboard (not tested here), the computer keyboard is sufficient. Certain keys on the two bottom rows (referred to in the manual as *piano buttons*) are reserved for playing. Octaves are changed by selecting them from the Sound Shaper menu. Other keys access preset sounds, chords, and a sound sequencer; permit loading and saving sounds from disk; and allow you to record, play back, and control sounds you've created.

This first menu, Play Mode, is the default when no control keys are pressed. Pressing (and holding) Shift pulls down the Sound Shaper and Effects menu, the Control key pulls down the Sound Banks, and Control/Shift accesses the Sound Shaper.

The preset sounds are simply eight sounds taken from the sound bank for easy access. You can use these, replace them with others from the bank, or create your own and install them. One-finger chords are available: three major chords, three minor ones, and six others. The chords can be canceled at the press of a key, which causes all three voices to play the same note in unison. The sound sequencer allows you to trigger arpeggios to play automatically.

To simplify things, Laskowski makes use of the familiar style of a cassette recorder's buttons to record, rewind, fast-forward, and play your works. On playback, adjustments can be made to speed and sound. With this you can create melodies, arpeggios, and even record a "walking bass line" by means of the transposer function. Once you have laid out your sounds the way you want them, recorded your melody, and arranged your transposer and arpeggio, you can save the whole arrangement to disk. This Save is an old-fashioned save which dumps everything onto a disk under the lump title Sounds. This limits you to one file per disk, and the manual recommends dedicating the disk to Sounds only, although you could probably use it to save something not connected with *Fastfingers.*

If this is sounding too technical for you, it gets more so. Now we come to the heart of this program: building sounds. While not sophisticated enough to include an on-disk tutorial (this is only a one-disk program), the *Fastfingers* manual guides you through modifying existing sounds and creating new ones. One chapter shows you how to play with such effects as Flang, Pulse Width Kick, Glide, Thicken, Weow, Swirl, Wah (1&2), Tremolo, Pswirl, Vibrato, Phase Shifter, and Digital Distortion. Effects are software effects used to simulate or replace hardware effects, and they work on all three voices.

Another chapter teaches you about building sounds,

beginning with the selection of voice 1, 2, or 3. You learn about adjusting the oscillators up and down in semitone increments, selecting waveforms, using harmonics, using (or bypassing) filters, and adjusting the ADSR (Attack, Decay, Sustain, and Release). Students of sound with the patience to check out each minor adjustment will have a wealth of sound to explore.

The dearth of new software for the 64 has sent developers back to their closets to have another look at older programs to see if there's something to dust off and reissue. *Fastfingers* is one such program, and the question arises, does it still stand up? We are compelled to give a qualified *Yes*.

There are musical programs with far slicker presentations. The tutorial and animation in the Sight and Sound 3001 series leap to mind. *Fastfingers* lacks feedback in that it doesn't tell you what sound (preset or sound bank) or even what octave is in current use. It seems to us, particularly if you are using this setup in performance as Laskowski says you can, you ought to have an onscreen reminder of what you've selected. On the other hand, the range of sounds is almost mind-boggling. Providing for the use of a 48-key external keyboard is a unique touch that may send some young musicians hunting through the classified ads to pick up a used one.

Laskowski is first a musician, a fact that becomes obvious when talking with him or reading his manual. Although certainly not the only person to envision the 64 as a synthesizer, he is the only one to take it to this degree. In *Fastfingers* he has taken an unusual slant on the 64 and developed a 64 oddity, a program that's certainly not for everybody, but will certainly intrigue those with an interest in music.

DAVE and ROBIN MINNICK

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NIGHTBREED

From out of the dark shadows of your mind came the mystical thriller *Nightbreed*, a movie that had people holding tightly onto their seats. Now, it's your joystick that you'll want to grab tightly because *Nightbreed* is now an arcade game on your 64.

You assume the role of Boone, a guy with some psychiatric problems, and begin your journey at the gates of Necropolis, a local graveyard. The object of the game is to save the Nightbreed from an evil organization that calls itself *Sons of the Free*. Who are, or what is, Nightbreed? Nightbreed is a race of beings older than mankind, who possess the power to change shape and form.

Once the game begins, you'll constantly be challenged with different objectives. Even though it's an arcade-type game, you must complete many different tasks before progressing to a different level of play.

At the bottom of the screen is the game's status panel. Here you'll find valuable information to help you during play. There's a list of objects in Boone's possession, as well as a power level that indicates his injuries, life number, and status as either monster or man.

You control Boone with a joystick to punch, kick, or shoot your way past the many different creatures that pursue you. Each confrontation with a monster will have different challenges for you to overcome. For example, I found the Fatman fairly simple to overcome, yet the Sons of the Free were challenging, using everything from rocket launchers to grenades in an attempt to stop me. Also, you'll find each enemy has a unique power that makes it dangerous. The Fatman moves slowly, but he vomits, and the vomit is poisonous to the touch. Since this is an arcade-type

Should Boone defeat the grenade tosser, he still must defuse the time bomb before he can continue his quest to save the Nightbreed.

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thriller, you can expect other gross experiences throughout the game.

In your path you'll encounter such graveyard charmers as the Snakeman, the Hopper, Flying Teeth, a Head Monster, and a Roof Crawler. This last fellow delights in dropping rocks on you.

One unique feature you will find is the passkey which allows you to skip certain parts of the game. The key is a password-type system that uses graphics instead of text. You create a passkey from various pieces displayed on the game's background scenes. Using the correct key allows you to skip to certain points in the game.

Making a map of the game is also useful. The game can be confusing if you don't know where you've been or where you need to go. As with many games of this type, you can move in a variety of directions and encounter a number of foes as your hero attempts to complete his quest. A map helps you avoid many blind alleys.

At first glance I thought that *Nightbreed* was going to be a simple arcade game and that completing it would be an easy task. I was wrong. It provides plenty of nonstop action that should have you grasping your joystick for quite a few hours of nerve-wracking play.

The graphics are very well done, and the game remains true to the movie's theme. If you're looking for a good action-packed game, then turn down the lights, grab some popcorn, and boot up a copy of *Nightbreed!*

JEFFERY SCOTT HALL

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be able to maintain top speed throughout the entire course. Just watch for other drivers.

As you progress around the course, your time, speed, position, and lap number are posted at the top of the screen. To advance to the next round, you must place in the top three finishers. Racing in the higher rounds is more difficult and there's a greater possibility of ramming other drivers. When this happens, the result is a dramatic spin-out with you hurtling across the course. When your car finally comes to a halt back on the road, try to make up lost time. Don't overdo it or you'll end up in another spin-out.

As long as you keep placing within the top three, you'll continue advancing to higher levels. Finish back in the pack and the race is over. One of the best features of this game is that it restarts very quickly. You don't have to sit and wait for it to reload every time. At the end of a game you can try another course and change drivers if you want.

Power Drift's graphics are colorful and interesting, but if you have any intention of placing in the top three, you won't have time to notice your surroundings or the scenery as it flies by. One interesting effect is the road; it seems to be suspended in air. There are no guard rails and on hills the road often drops like a rollercoaster. Watch out for those blind drops though. A car could be just over the crest and if you bump one at high speeds, you could go crashing off the road.

There is a steady, pounding pulse to the background music that keeps you racing through the turns and hills. Even when you're adding your name to the list of high scorers, the powerful beat continues. It complements the action as you move through the courses.

The player's guide is easy to understand. It explains how to load the program and how to use the joystick. All you have to know is which direction to push or pull the joystick and how to change gears. It's all clearly explained in the manual.

In all, *Power Drift* is not a game to play for hours on end, but it is fun. There's plenty of white-knuckle action as you speed around each course and drift through the corners. Tension builds as you progress. The first few races are fairly easy and the courses somewhat forgiving, but accidents become more frequent and the amount of driving skill needed increases as you advance to higher levels.

So, wait for the green light, happy racing, and don't forget to buckle up!

ALISON CHRISTENSON

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FEEDBACK

Questions and answers about converting programs from Commodore format to IBM, KoalaPads, calendars, BBSs, and more

Three Questions

Is it possible to convert Commodore type-in programs to IBM-compatible format in a relatively easy way for those with limited knowledge of GW-BASIC or machine language programming?

As I am changing over to a PC, am I right in assuming that an alternative version of *COMPUTE* that is PC specific and excludes the Gazette section will be available?

From my current address label on my magazine, do I surmise correctly that my subscription is current through June 1991?

C. W. M. ANDERSON
SANDTON, SOUTH AFRICA

Commodore BASIC and GW-BASIC are similar in many respects, and some elementary programs entered in one language will run if entered into the other. Simple print statements, mathematical formulas, and commands such as GOSUB, GOTO, IF-THEN, and FOR-NEXT pose few problems when making the change from one version to the other. Problems arise, however, when it comes to colors, machine language routines, PEEKs and POKEs, and other commands that are machine specific. Some commands in BASIC 7.0 for the 128, for example, would cause a 64 to crash. There are ways around many of these problems, but it usually takes a good working knowledge of BASIC to make the conversion work.

If you are subscribing to COMPUTE*'s Gazette edition, you already are receiving all the PC-related material that we publish each month. There's no reason to change your subscription unless you want to drop the 64/128 coverage; the price is the same. Some* COMPUTE *subscribers, however, do not get the 64/128 material.*

The month and year printed on address labels indicate the final edition of your current subscription. Since the June issue was the last one you were scheduled to receive, I hope you renewed your subscription in time to read this reply.

What's a Koala?

I subscribe to *Gazette Disk*, and I enjoy your "Gallery," but, forgive me, what is a Koala? I gather that it is more than a marsupial. Do you need light pens or a mouse to create graphics with it?

One more comment. Could you explain why your new GOS (Gazette Operating System) menu on *Gazette Disk* will not allow me to directly load any previous *Gazette Disk* programs? It gives the disk information, but the selection turns blue and sits there.

JOSEPH RUFFINI
NORANDA, PQ
CANADA

A KoalaPad is a graphics tablet that connects by cable to a 64's joystick port. With its accompanying software, you can create colorful pictures on-screen by moving your finger or a stylus across the pad's surface just as if you were drawing a picture with pencil and paper. The pad is no longer in production, but used units can often be found. Its multicolor format is a popular one with Commodore artists.

The new Gazette Operating System is compatible with pre-GOS disks, so you should be able to run programs from them. Load and run the menu program that contains GOS; then swap disks. Now click on the disk icon. When the disk menu appears, click on Directory. GOS will read the current disk's directory and print it in a window. Scroll through the titles and click on the program you wish to run. The red band highlighting your selection will turn blue. Click again on the disk icon and select Run Program when this window opens. GOS has been streamlined to make it operate faster than it did originally, but you should still be able to access and run other disks. It also lets you copy disks and files, delete and rename files, obtain disk and program information, print files, and perform numerous other applications with joystick or cursor keys.

Wide Open Spaces

I have recently started typing in a few Gazette programs with *The Automatic Proofreader*. Since I am not a programmer, my understanding of what I am typing is rather limited. Because the listings in your magazine are printed in columns, it is not always clear when to leave spaces.

HANS SPARREBOOM
TOFIELD, AB
CANADA

When entering programs in Commodore BASIC, spaces are usually optional. Programmers may put spaces between words, variables, or commands in their listings to make them more readable, but the computer doesn't require them. Most programmers do not include spaces simply because it saves space, computer memory, and typing time. If they leave them in and a column line begins with a space, our listing program will usually print the word SPACE *within brackets. Since most spaces are optional,* The Automatic Proofreader *ignores them also unless they fall between quotation marks. To illustrate, load and run* Proofreader; *then enter the following statement.*

```
100 IF A$ <> "Y" THEN 100
```

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In English the line reads, "If A-string does not equal the letter Y, then go to line 100." This line could be used in a statement to halt a program until the letter Y—and only the letter Y—on the keyboard is pressed.

Proofreader *should print* MJ *in the upper left corner of your screen when you press Return. Now go back, delete all the spaces, and press Return again. You should still get* MJ, *indicating the line is still entered correctly. Spaces make code easier to read, but often they are optional to the 64.*

Now go back and insert a space after the first quotation mark and in front of the Y *and try it.* Proofreader *will return a different value this time because* " Y" *is not the same thing as* "Y" *and it would affect how the program runs.*

Diary Needed

I'm an active 14-year-old looking for a 64 program that is a diary.
BRIAN S. MULCAHEY
HAMILTON, OH

Almost any word processor could be used as a diary. You could write as little or as much as you want and then save each entry with a filename that represents the date, such as SEP20. There is a program called Notepad 64 *(November 1988) that could prove useful. This machine language program resides in*

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memory while your computer is working on another BASIC program. This means you can call it up at the touch of a key, jot down some thoughts, and then continue with your BASIC program. You can also save the notes with any filename you like. One limitation to the program, however, is that each note can be no more than 1000 characters in length. That's enough to fill one screen. Back issues of this disk and any other Gazette Disk *prior to October 1990 can be ordered from our Greensboro, North Carolina, office for $5, plus $2 for shipping and handling.*

Worldwide User Group

I am working to start a worldwide association of Commodore user groups. As support for the 64 dwindles, user groups play a more important role in supplying users with help and information. I believe an association of user groups would be beneficial, especially for smaller groups.

I would love to hear from user groups who would like to help me organize this group or who would like to join it. Just drop me a line, and I'll bring you up-to-date on what's happening so far.

JOSH JACOBY
98-1689 HAPAKI ST.
AIEA, HI 96701

Keep Gazette posted about your activities, Josh. User groups represent a great resource of information for Commodore users, and we encourage their growth. In this issue we finish our two-part listing of user groups in the U.S. and other countries. If you are not already a member, we recommend you contact a group in your area or see about joining one by mail.

Back to the Boards

Rick Lembrée's article on BBSs (March 1991) was an excellent introduction to what has become one of the last bastions of dedicated Commodore users. Using a BBS is the best way possible to support each other and enjoy the potential of the still-powerful 64s and 128s.

Volunteering as a sysop is a rewarding experience, not only for the knowledge gained, but for the enjoyment of knowing that you are providing others with a medium for sharing and communicating. If you want to try your hand at running a board, there still are plenty of potential members out there who would eagerly join a new board. I especially urge Commodore users to participate on a local BBS. Any computer user who doesn't is missing out on an excellent resource of knowledge and entertainment that is easily available to anyone with a modem. I'm sure many COMPUTE readers would be interested in reading more articles about operating a BBS, as well as about the many features different boards have to offer.

FREDERICK T. MERRITT
ST. PAUL, MN

At the end of your BBS article in the March issue, the supplier of the *C-Net* system was listed incorrectly. The correct name is Perspective Software. The BBS number for support of this package is (313) 981-1524. Also, I feel that this system was not given enough credit as a commercial BBS available for the 64.

JEFF FENSTERMAKER
NEWBURY, OH

Thanks for bringing the correction to our attention, Jeff. Because C-Net *was last on our list of commercial systems for the 64 does not mean it was considered the least. We simply tried to list as many of the current BBS products as we could find for our readers' convenience, and on any list someone has to be last. The listing was not meant to be an endorsement by either Mr. Lembrée or Gazette.*

Bug-Swatter

Several readers wrote in to say that they have experienced problems with *Cross Aid* (March 1991) when they try to use Shift-D to delete misspelled or unwanted words. The documentation was not clear in stating that you must first enter maintenance mode by entering the word that's to be deleted, followed by Shift–Return. The delete function can be invoked by pressing Control-D to erase the word.

Several readers also informed us of a problem with *Castalia* (May 1991). We discovered it has a peculiarity that affects some machines at some times. The problem causes the screen to go blank when you first run the program. If you experience this situation, there is no danger or programming fix required; just try running the game again. On the 128, the problem is especially easy to fix. If the problem occurs, it only does so when an attempt is made to run the program for the first time after powering up. If this happens, reset the computer to 64 mode by holding down the Commodore key while pressing the reset button. You should have no problem the next time the program loads.

If you have a question, comment, or problem, we want to hear from you. Send your letters to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. ❐

GEOS

Steve Vander Ark

GO ONLINE WITH *GEOS*

Telecommunicating with *GEOS* requires special attention. Here are some tips to make the process easier.

This won't come as a big surprise to many of you. If you haven't already discovered it, you've certainly read articles on the subject or heard computer users expound about it. *It* is telecommunicating, and it is great.

It's great, but it's also confusing, intimidating, and a whole lot of other things that keep many people from plugging in a modem and dialing up a bulletin board system (BBS). I avoided telecommunications for these reasons for a long time. I was afraid I would make a fool of myself trying to learn my way around. I thought I'd find a hostile world full of people who were in the know and wouldn't be too happy dealing with a novice poking around at 300 baud.

Boy, was I wrong. When a friend finally convinced me to hook up his modem on my 128 and I timidly dialed a local BBS number, I had no idea what a giant leap I was taking. Over the next four months, I discovered a lot of new computer friends who didn't give a hoot that I needed to call up a menu every time or that I accidentally logged myself off when I meant to upload a file. They offered support, advice, a little good-natured teasing, and friendship.

Now I'm online all the time. This electronic alternative reality is populated by a wide variety of users. They call using IBMs, Macs, Amigas, and, of course, Commodores.

That's where *GEOS* comes in. It wasn't long before I discovered a number of people on various local BBSs who shared my enthusiasm for *GEOS*, and we began comparing notes. We exchanged ideas, gave each other hints for using various applications, and swapped utilities downloaded from other BBSs.

But telecommunicating with *GEOS* requires some special rules. *GEOS* has its own unique way of running a Commodore computer, and terminal software and bulletin boards aren't designed to handle the differences. The stumbling block is the structure of *GEOS* disk files. A file exists on a disk as a scattering of individual blocks of data, linked together with predefined coding. *GEOS* uses a different code from the one built into the 64's system, which means that if you try to use normal Commodore file commands on a *GEOS* file, the system won't know how to put the various chunks back together. That's why you can't copy a *GEOS* file using a normal file copier; the same is true for uploading or downloading.

In order to send or receive a *GEOS* file by modem, it must be converted temporarily into Commodore DOS–compatible format. William Coleman has written a conversion utility called *Convert,* which has become something of an unofficial standard for handling *GEOS* files online. This utility should be the first *GEOS* file you download. It can be loaded and run with BASIC and will convert a program or sequential file to one that can be used by *GEOS*. Once you have *Convert,* you're in business.

Any *GEOS* file you download using your normal terminal program will be a standard sequential or program file until you switch into *GEOS* and run *Convert;* the whole process takes a matter of a few seconds. *Convert* can work both ways. If you have a *GEOS* file that you'd like to upload, you can convert it into a sequential or program file that your terminal program can handle. *Convert* can be found on QuantumLink and on many local BBSs. (*File Converter* is a similar program published in *COMPUTE!'s Gazette,* April 1989.) If you'd rather stay in *GEOS* without returning to the Commodore DOS, there is one terminal program available which operates within the *GEOS* environment. It includes the Convert utility as an option, which makes handling *GEOS* files a breeze. This program is called *geoTerm*. It, too, was written by Coleman, with versions available for the 64 and the 128. Each version includes many features, including a 9K capture buffer for the 64 and a 30K buffer for the 128, programmable function keys, built-in utilities to convert the buffer to and from true ASCII and PET ASCII, as well as the above-mentioned *Convert* program.

The screen can be run in 40, 53, or 80 columns. You can also access either drive for uploads or downloads, scratch files, and so on.

Whether you use geoTerm, available from *RUN* magazine, or another terminal program, you'll find many *GEOS* users out there who are glad to hear from you. BBS Post, a bulletin board in Michigan, has a *GEOS* file area. The sysop, Bismark, says he gets more calls for the Commodore area on his IBM board than for any other. I've put many of the public domain utilities mentioned in this column on BBS Post. If you call long distance, you may download *GEOS* files on your first call. The number is (616) 531-1346.

For the price of a long distance call, it's not a bad place to start. But there are probably people on bulletin boards right in your hometown who would love to hear from you. Why not give them a call?

Steve Vander Ark can be reached on QuantumLink. His handle is SteveV14. ❐

MACHINE LANGUAGE

Jim Butterfield

GIVE IT A NUDGE WITH BINARY FRACTIONS

Move sprites, draw lines, nudge integers, and do other clever things with the help of binary fractions

BASIC uses a number system called *floating point* (or *scientific notation*), which is powerful but complex to code in machine language. Often, you can accomplish what you need through the use of fixed-point binary fractions.

In conventional base 10 mathematics, if you divide 7 by 3, the answer is 2 with a remainder. But if we continue the division, we establish that 7 divided by 3 gives 2.33333 . . . .

Exactly the same thing happens in binary calculations. In binary, we might write 7/3 as %111 divided by %11; using any of several division methods, we produce a first result of %10 with a remainder of 1. But if we don't stop at the "binary point" equivalent of a decimal point and provide somewhere to store the extra fractional result, we will generate %10.01010101 . . . and cut off the endless fraction.

In hexadecimal notation, 1/2 works out neatly as $.80, but 1/3 is the repeating series $.555 . . . .

You've noted that you must trim an endless value at some point. In machine language coding, that amounts to deciding how many bytes you will use to hold the fractions. Roughly speaking, each byte gives the equivalent of 2.4 decimal digits of accuracy.

Binary fractions fit nicely into the whole scheme of math coding. Such numbers add, subtract, multiply, and divide in the same way as integers. For example, you might want to multiply a value by 8 and then divide by 5 to convert miles to kilometers.

Perhaps the most popular use of binary fractions is to nudge an integer value higher. For example, suppose you started with zero and added a value of 1/3 repeatedly. The integer part would bump to the next higher value every three operations. This kind of nudging has many applications in programming.

A programmer might be handling one or more sprites; each sprite is expected to move from time to time. How do we control its speed? Suppose we want it to move gradually, without leaping across the screen. Let's say we just want to nudge its position. By repeatedly adding fractional values to its location, we will eventually cause the sprite's location to move to the next pixel at regular intervals.

When working in high-resolution graphics, it's often desirable to draw a line that's not quite horizontal (or vertical). Binary fractions will help us do the job.

To create a line that's almost horizontal, you want to step across the horizontal *(x)* coordinates, but how do we plot the vertical *(y)* coordinates for each line? Nudge the *y* coordinate value. If the line were 50 pixels wide by 10 pixels high, you'd nudge the *y* coordinate by a value of 1/5; as you sweep across the 50 *x* pixels, the *y* coordinate would travel exactly the 10 pixels that are needed.

Let's write a small program that should be good on almost any Commodore 8-bit computer that will show this kind of calculation. You'll place a value to be nudged at address $2100 with a fraction byte at $2101. You'll place the nudge value at $2102 and $2103, then step through and show the result.

For easy display, you'll start the value at $31 (decimal 49). This corresponds to the ASCII character 1; you can print it to show how it changes.

```
2000 LDA #$31
2002 STA $2100
```

You will add 1/2 ($80) to your starting value; that allows easy rounding of the result. A hi-res graphics line would look better with this kind of rounding, for example.

```
2005 LDA #$80
2007 STA $2101
```

Now store your nudge value in $2102 and $2103. We will choose a value of 1/3, hex $00.55

```
200A LDA #$00
200C STA $2102
200F LDA #$55
2011 STA $2103
```

Now we have our values in place. We'll count our loop through 16 items (the initial value plus 15 steps).

Since we started at ASCII 49 (1), we should end up five full values further along, at ASCII 54 (6). We will use X as our loop counter.

```
2014 LDX #$00
```

Following is the loop. Print first and then add; then test to see whether the loop should be repeated.

```
2016 LDA $2100
2019 JSR $FFD2
201C CLC
201D LDA $2101
2020 ADC $2103
2023 STA $2101
2026 LDA $2100
2029 ADC $2102
202C STA $2100
202F INX
2030 CPX #$10
2032 BNE $2016
2034 RTS
```

That's the whole program. To use this routine while in BASIC, type in SYS 8192 to watch the character 1 as it's nudged through its range. ❐

BEGINNER BASIC

Larry Cotton

MAKE YOUR DATA ENTRY CRASHPROOF

Make your programs so user-friendly that even beginners will have no trouble entering valid data.

The following general-purpose "crashproof" data entry subroutine can be inserted into any BASIC program in which you're asking an inexperienced user to enter data.

The first decision is whether to use INPUT or GET. INPUT is easier to program, but it's vulnerable to errant keyboard presses, such as cursor up/down, Del, Clr, and so on. It's also rudely unforgiving of unexpected input data. GET requires more programming and is vulnerable to garbage collection, a rather nasty habit Commodore computers have.

For a few simple daily entries, however, garbage collection shouldn't be a problem. So let's use GET.

First, let's have all keys repeat. It's helpful when testing the program, and it can be fun. Here's the first line which does that and clears the screen:

```
10 POKE650,128:PRINTCHR$
   (147)
```

Now decide on a cursor. I prefer a nonblinking one. It implies more patience. As for its appearance, take your pick. To determine which cursor shape to use, select a character from the front of the keyboard keys. Then in immediate mode, enter

```
PRINT ASC("X")
```

This will return the value of your preferred character. (See *64 Programmer's Reference Guide* for a complete listing.) I like a thick horizontal line made by pressing the Commodore key and P simultaneously. This returns a character string (CHR$) value of 175. Two keys we want to recognize are the Return key (signaling completion of an entry) and the Inst/Del key (for correcting a typing error). These are defined as constants R$ and D$ respectively. C$ is the cursor. The CHR$ values are from *Reference Guide.*

```
20 R$=CHR$(13):D$=CHR$(20):
   C$=CHR$(175)
```

Now we'll write the crashproof data-gathering subroutine itself, which yields raw data in string form which is given the arbitrary designation of B$. Strings can contain letters, numbers, punctuation—the works. The subroutine can begin anywhere, so let's use line 100. Then change B$ to X$. Using VAL with X$, you may extract the whole string or just the numbers. You can select a portion of X$ by using RIGHT$, LEFT$, or MID$. End the program for now.

```
30 GOSUB100:X$=B$:END
```

The first thing to do with the input routine is clear out B$; then reset the line length to zero. More on that later.

```
100 B$=" ":L=0
```

Now print your cursor (defined in line 20). The semicolon ensures that anything after the cursor will be printed on the same line.

```
110 PRINTC$;
```

Here's where we use the GET statement.

```
120 GETA$:IFA$=" "THEN120
```

The computer goes into a loop until the user presses a key. When any key is pressed, that single character becomes A$. A$ will be examined four times. The first time checks for the Return key:

```
130 IFA$=R$THENPRINTD$A$;:
    RETURN
```

If the Return key is pressed, the cursor moves back one space, deleting itself, and then moves to the next line. The subroutine ends with a RETURN statement.

The second check is for the Del key, which indicates that the user is backtracking and erasing previously typed data.

```
140 IFA$=D$THENGOSUB210:
    GOTO110
```

At line 210 we start another short subroutine that will do the actual deleting. Then we want to go back to line 110 to print the cursor again. This time we're not ready to jump out of the subroutine yet; we're just deleting characters.

The third check is important but fairly complicated. We want to limit the characters which can be typed. We'll do that by examining their CHR$ values. Luckily, the values we need are in the range of 32 to 95, inclusive. According to the ASCII and CHR$ code chart in *Programmer's Reference Guide,* this will encompass the space, all punctuation, all the numbers, all the letters of the alphabet (capitals only), and a few oddball symbols, such as the British pound sign, brackets, and the left- and up-arrow keys. You can restrict that further if you wish. Here's the check:

```
150 IFA$<CHR$(32)ORA$>CHR$
    (95)ORA$=HR$(34)THEN120
```

Next month I'll repeat this line with a detailed explanation of it. Meanwhile, try to figure out why we don't want CHR$(34) and what we'll do next to make your programs virtually crashproof in the hands of computer novices. ❐

PROGRAMMER'S PAGE

Randy Thompson

GEZA'S PAGE

Every so often someone sends me a tip that really sparks my interest, and I may center an entire column around such a tip. Just last week I got a letter from Geza Lucz of La Jolla, California, that contained 16 great tips. Unfortunately, we don't have room for all of them, but here are 4 of the best.

Although the byline at the top of this column is mine, the credit and the "Programmer's Page" award money go to Geza. Thanks for the code!

Here's a whole page of nifty tips for the 64 submitted by one reader.

OCEAN

This program makes the 64's characters roll like the waves in the ocean. There are sound effects, too.

```
JX 100 FOR I=49152 TO 49
       258:READ D:C=C+D:
       POKE I,D:NEXT
KX 110 IF C<>16497 THEN
       {SPACE}PRINT "ERR
       OR IN DATA STATEM
       ENTS":STOP
CP 120 SYS 49152
DA 130 POKE 54278,240:PO
       KE 54276,129:POKE
        54273,34:POKE 54
       272,75
GK 140 FOR I=1 TO 15:POK
       E 54296,I:FOR J=1
        TO 50:NEXT:NEXT
MP 150 FOR I=15 TO 1 STE
       P -1:POKE 54296,I
       :FOR J=1 TO 200:N
       EXT:NEXT
SR 160 FOR I=1 TO 600+IN
       T(RND(1)*1000):NE
       XT
KR 170 GOTO 130
XB 180 DATA 120,169,35,1
       62,192,141,20,3,1
       42,21,3,169,1,141
       ,18,208,133,251,1
       33,254
XH 190 DATA 173,17,208,4
       1,127,141,17,208,
       169,129,141,26,20
       8,88,96,173,25,20
       8,141
JB 200 DATA 25,208,48,7,
       173,13,220,88,76,
       49,234,166,251,23
       2,232,232,232,232
       ,232
EH 210 DATA 232,232,142,
       18,208,134,251,22
       8,254,208,4,230,2
       51,230,254,166,25
       3,232
CD 220 DATA 138,41,15,17
       0,134,253,189,91,
       192,141,22,208,76
       ,188,254,200,201,
       202,203
BS 230 DATA 204,205,206,
       207,207,206,205,2
       04,203,202,201,20
       0
```

FREEZE!

This short machine language routine freezes program execution whenever you hold down the 64's Shift key. You can load and run almost any program and use Shift as a Pause key. If you need to pause a program so you can go off and answer the phone, the Shift Lock key keeps the software frozen until you're ready for it. This freeze feature is also great for programmers who need to pause the computer when listing their programs to the screen.

```
EX 100 FOR I=49152 TO 49
       191:READ D:POKE I
       ,D:NEXT:SYS 49152
HF 110 DATA 120,169,26,1
       62,192,141,20,3
KG 120 DATA 142,21,3,88,
       96,120,169,234,16
       2
EF 130 DATA 49,141,21,3,
       142,20,3,88,96,32
SR 140 DATA 135,234,174,
       141,2,224,1,240,2
       46
HP 150 DATA 76,49,234,0
```

COMMAND HIGHLIGHT

Another practical utility is this program that highlights all of the commands in a BASIC listing. Line numbers and variables appear in the usual blue color, while BASIC commands appear in white.

```
CC 100 FOR I=49152 TO 49
       230:READ D:C=C+D:
       POKE I,D:NEXT
CH 110 IF C<>11843 THEN
       {SPACE}PRINT "ERR
       OR IN DATA STATEM
       ENTS":STOP
CP 120 SYS 49152
MG 130 DATA 169,11,162,1
       92,141,6,3,142,7,
       3
EB 140 DATA 96,16,36,36,
       15,48,32,201,255,
       240
GP 150 DATA 28,133,251,1
       34,252,132,254,16
       6,253,224
QB 160 DATA 5,240,7,169,
       5,133,253,32,210,
       255
DG 170 DATA 165,251,166,
       252,164,254,76,36
       ,167,133
PQ 180 DATA 251,134,252,
       132,254,166,253,2
       24,154,240
DJ 190 DATA 7,169,154,13
       3,253,32,210,255,
       165,251
PP 200 DATA 166,252,164,
       254,76,243,166,20
       8,14
```

GETTING DIZZY?

A close relative of the ocean trick, this program is definitely *not* recommended for the 64 owner with a weak stomach.

```
RS 100 FOR I=49152 TO 49
       266:READ D:C=C+D:
       POKE I,D:NEXT
EG 110 IF C<>13471 THEN
       {SPACE}PRINT "ERR
       OR IN DATA STATEM
       ENTS":STOP
HK 120 POKE 16383,0:SYS
       {SPACE}49152
RJ 130 DATA 120,169,31,1
       62,192,141,20,3,1
       42,21
BE 140 DATA 3,169,0,141,
       18,208,173,17,208
       ,41
KX 150 DATA 127,141,17,2
       08,169,129,141,26
       ,208,88
AE 160 DATA 96,173,25,20
       8,141,25,208,48,7
       ,173
GS 170 DATA 13,220,88,76
       ,49,234,230,254,1
       65,254
QP 180 DATA 41,3,208,21,
       166,251,232,138,4
       1,15
KR 190 DATA 133,251,170,
       189,78,192,141,17
       ,208,189,94,192
JC 200 DATA 141,22,208,7
       6,188,254,24,25
AE 210 DATA 26,27,28,29,
       30,31,31,30,29,28
FG 220 DATA 27,26,25,24,
       203,204,205,206,2
       07,206
GG 230 DATA 205,204,203,
       202,201,200,200,2
       01,202,203,0,0,0,
       0,0
```

❐

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D'IVERSIONS

Fred D'Ignazio

ROBOTS IN DISGUISE

The robot revolution may have started in a way totally different from what we imagined.

I was on my way to Dubuque, Iowa, last week to train a group of intrepid teachers in the art of scavenged multimedia. As I left the airplane for a layover in Chicago's O'Hare Airport, I felt the urge to make a brief stop at the nearest men's room. After I conducted my business, I made my customary stop at a washroom sink. The sink was broken. No handles on the water faucet. No water. I turned to another sink. Its handles were also missing. I turned to another sink. All the handles were missing.

Suddenly I heard the sound of running water. I turned around. Two men were standing in front of two sinks. Two water faucets were gushing gurgling water into two sink bowls. The sinks weren't broken after all!

I slipped back into the bathroom, quietly placed my bags onto the bathroom floor, and tried to appear natural and inconspicuous until the two men at the sinks had departed.

OK, I thought, how did they make the sinks work? My first guess was foot pedals. After all, there were no faucet handles, and I hadn't noticed either man touching anything on the sink. It *had* to be pedals.

I crouched in front of one of the sinks. No pedal. Maybe the pedal was tucked underneath the sink bowl. I reached under the bowl, searching for the mysterious device.

Suddenly a man walked into the room. He immediately halted when he saw me under the sink. I'm sure he was wondering what a small, bearded man in a raincoat was doing in an airport bathroom crawling around under a sink.

"Sink inspector," I said, smiling and trying to appear nonchalant. "We have to do this periodically." I kind of mumbled the last part because the fellow took a brief, critical look at this "sink inspector," smirked, and shot out of the bathroom.

I stood up, still trying to figure out how to work the sink's faucets. Maybe if I stuck my foot under the sink it would work. I lifted my leg, leaned way back, and thrust the toe of my shoe across the sink's porcelain underbelly.

Three teenagers entered the bathroom, jostling each other and laughing. However, after they saw me stroking the sink with my foot, they sank into immediate, puzzled silence.

"It itches," I said, pointing at my foot. "This is the only way to scratch it." I kept probing the fixtures beneath the sink with my toes, desperately hoping I'd soon see water flowing into the basin.

The teenagers did their business and approached a couple of sinks. Water instantly sprang from their sinks' faucets into the bowls.

I rushed over to the teenagers' sinks. "It's a miracle," I exclaimed. I dropped to my knees and looked underneath. "How'd you do that?"

"Little sensor right here, dude," said one of the teenagers, pointing at a small red oval on the wall that had escaped my acute observational powers. "It's easy. You stand in front of the sink; you get water. You move away; the water stops." The teenager stared at me and grinned. "You from some other country, maybe?"

When I was growing up in the 1950s and 1960s, computers were big, new, and frightening. In those days we were afraid that computers would one day be turned into spy machines. They would spy on us average citizens and report to "the people in power." Much of this image came from the book *1984* by George Orwell.

The future turned out to be completely different. Computers shrank from barn-sized behemoths into cornflake-sized chips. As they shrank, they disappeared—into washing machines, microwaves, automobiles, watches, toaster ovens, and bathroom scales.

Instead of a single big brother running a single big computer, we now have zillions and zillions of little computers acting as little brothers. Little computers are now quietly watching us from inside refrigerators, teller machines, filling stations, vending machines, and bathroom sinks. They help us go about our business and then patiently wait for the next human being to come their way.

For years we've been waiting for the robot revolution. We've pictured it as an electromechanical second coming with robots who look like humans, rolling off factory lines to rescue human beings from the grind and toil of daily life.

Maybe the robot revolution has already started. Except it's totally different from what we imagined. Instead of giving robots a human shape, we are quietly giving them the shape of the comfortable, familiar appliances. Remember General Electric's motto: We bring good things to life.

Maybe the being I met in that O'Hare bathroom was almost alive, a primitive precursor on a new evolutionary ladder. Maybe it was a little like *Australopithecus* or Neanderthal man, a robot from the dawn of a new generation of intelligent robots. These robots won't have to have legs, arms, or hands. They won't have to resemble humans. That would be too scary!

Instead they'll just keep evolving at a faster rate, while retaining the outward appearance of our familiar, cozy, old appliances. Except they won't have any handles! ❐

SPANISH VOCABULARY QUIZ

By Christopher M. Stoy

Learning a foreign language can be difficult. Not only do you need to learn a new set of grammar rules, but you must also learn an entirely new vocabulary. The only way to do this is by continually repeating the new words until they become second nature.

Finding someone to quiz you on your new vocabulary can be equally difficult. After all, who wants to sit around asking you drill questions all day? That's the beauty of a computer. Your 64 is happy to help out, with software such as *Spanish Vocabulary Quiz*. This Spanish tutorial will quickly help you learn Spanish words, and it'll never complain about your poor pronunciation or your gringo accent.

Getting Started

Spanish Vocabulary Quiz is written in BASIC with a small machine language subroutine. To help avoid typing errors, use *The Automatic Proofreader* when entering the BASIC portion; see "Typing Aids" elsewhere in this section. When you've finished typing, be sure to save a copy of the program.

Enter the machine language routine with *MLX*, our machine language entry program; see "Typing Aids" again. When *MLX* prompts, respond with the following values.

Starting address: C000
Ending address: C0BF

Save the machine language routine with the name SPAN.ML before you exit *MLX*. Now format a blank disk and place *Spanish Vocabulary Quiz* on it. Use this disk to store the word files you create.

Options

The options menu contains five choices: 1. English Words 2. Palabras de Español 3. Load a Word File 4. File Options 5. Quit

The first two options quiz you on English or Spanish words, respectively. If there is no word file in memory, you'll automatically be taken to option 3.

To load a file, enter its name at the prompt and press Return. To see a list of files on the disk, type a dollar sign ($) and press Return. When a file has been loaded, you'll be given a set of simple instructions. Press Return to begin the quiz.

You'll be given a word in English (or Spanish) and asked to translate it. Type your answer at the prompt and press Return. If you make a mistake, use the Inst/Del key to delete a character or press Shift–Clr/Home to erase the whole word and start over. To enter accented letters such as *á, é, í, ó,* or *ú,* hold down the Commodore key and type the letter. Likewise, to get the tilde (ñ) character, hold down the Commodore key and press N. To write an upside-down exclamation point (¡), press the Back Arrow key. Make an upside-down question mark (¿) by pressing the slash (/) character.

You're given three chances to guess the word. After three incorrect guesses, the program provides the answer. If you wish to see the answer before making three guesses, type a question mark at the prompt and press Return. To exit the quiz before all the words are asked, enter an asterisk at the prompt and press Return.

Scoring

After the quiz you'll be given the number of words you identified correctly and your percentage of correct answers. Your score depends not only on how many words you answered correctly but also on how many guesses it took you. Every incorrect answer will decrease your score. For example, in order to obtain a perfect score of 100 percent, you must answer every question correctly on the first try. A good way to study is by going through the same list repeatedly until you can score 100 percent.

File Options

The menu of file options offers several choices.

1. Create a Word File
2. Append to a Word File
3. Edit a Word File
4. Return to Main Menu

Create a file when starting a new word list. First, enter the name of the file. Next, enter the English word and then the Spanish form. You'll then have a chance to make any corrections, enter more words, or stop.

Select Append to add words to the current list in memory. It's a good idea to limit your list to 20 words or less.

Edit a Word File lets you make corrections to the current word file. The first word in the list will be displayed in English and Spanish. Press E to edit the word. When editing, move the flashing cursor over the English word, make your changes, and then press Return. Do the same for the Spanish word. To move on to the next word, press C to continue. The program will display the next word in the list. When you've finished editing, press Q to quit to the options menu and save any changes you've made.

Spanish Vocabulary Quiz

```
XE 0 REM COPYRIGHT 1991 - COMP
     UTE PUBLICATIONS INTL LTD
     - ALL RIGHTS RESERVED
RH 10 REM SPANISH VOCABULARY Q
     UIZ V1.2
RC 20 REM{8 SPACES}BY CHRIS ST
     OY
SF 30 :
EP 40 GOTO 2200:REM SETUP
SC 100 T=0:PRINT"{HOME}{BLK}"A
     N$"{5 DOWN}":POKE 49153
     ,5:POKE49157,5
RX 105 PRINT"{6}"AW$;SPC(20-LE
     N(AW$))"{WHT}>";:LN=17:
     GOSUB 200
GB 110 ON -(WD$="?")-2*(WD$="*
     ") GOTO 145,700
MQ 115 SYS 49152
KH 116 LC=LEN(AN$):IF LEN(WD$)
     >LEN(AN$) THEN LC=LEN(W
     D$)
KH 117 PC=INT(PEEK(49212)*100/
     LC)-INT(PEEK(49213)/2)
DP 120 IF PC>70 THEN PRINT"
     {DOWN}{WHT}<MUY BIEN! C
     ORRECT!":SC=SC+ABS(T-3)
     :C=C+1:GOTO145
PB 125 T=T+1:IF T=3 THEN 145
DM 126 IF T=1 THEN POKE 49157,
     245
XH 127 IF T=2 THEN POKE 49153,
     6:POKE 49157,229
JX 130 IF PC>30 THEN PRINT"
     {DOWN}{1} ALMOST. TRY A
     GAIN.{DOWN}":GOTO 140
PE 135 PRINT"{DOWN}{2} SORRY,
     {SPACE}WRONG. TRY AGAIN
     .{DOWN}"
XP 140 GOSUB 410:GOTO105
BX 145 W=W+1:RN%(I)=1:PRINT"
```

```
      {6}{DOWN}THE ANSWER IS
      {SPACE}{WHT}"AN$"{6}.":
      GOSUB 1000:IF W=X THEN
      {SPACE}700
SX 150 FL=1:GOTO 400
GX 200 WD$="":POKE 198,0:PRINT
      "<";
DF 205 GET KE$:IF KE$="" THEN
      {SPACE}205
XK 206 POKE54296,15:POKE54296,
      0
HQ 210 IF KE$=CHR$(13) THEN PR
      INT:RETURN
ED 215 IF KE$=CHR$(17) OR KE$=
      CHR$(19) OR KE$=CHR$(14
      5) THEN 205
FA 217 IF KE$=CHR$(147) THEN F
      OR ZZ=0 TO LEN(WD$):PRI
      NTCHR$(20);:NEXT:GOTO 2
      00
GC 220 IF KE$<>CHR$(20) THEN 2
      35
HF 225 IF LEN(WD$)=0 THEN 205
AC 230 WD$=LEFT$(WD$,LEN(WD$)-
      1):PRINT"{2 LEFT}<
      {LEFT}";:GOTO 205
PJ 235 IF LEN(WD$)>LN THEN 205
KR 240 WD$=WD$+KE$:PRINT"
      {LEFT}"KE$"<";
GE 245 GOTO 205
GM 300 IF X<1 THEN 1300
BP 315 PRINT"{CLR}{WHT}{DOWN}"
      TAB(11)"QUIZ "QT$" WORD
      S"
DX 320 PRINTTAB(11)"{1}{18 T}"
HH 325 PRINT"{2 DOWN}{6}
      {2 SPACES}I WILL GIVE Y
      OU A WORD IN {WHT}"QT$"
      {6},"
HD 330 PRINT"{DOWN} THEN I WIL
      L ASK YOU TO ENTER THE
      {SPACE}WORD":PRINT"
      {DOWN} IN {WHT}"OT$"{6}
      ."
JM 335 PRINT"{2 DOWN}{WHT}EXAM
      PLE:":PRINT"{DOWN}"QT$;
      SPC(13);OT$
GG 340 PRINT"{3}{7 T}"SPC(13)"
      {7 T}":PRINT"{6}"EQ$:PR
      INT"{UP}"TAB(20);EO$:GO
      SUB 1000
XH 345 FOR Z=1 TO X:RN%(Z)=0:N
      EXT:W=0:SC=0:C=0
XF 400 I=INT(X*RND(0))+1:IF RN
      %(I)=1 THEN400
CF 405 PRINT"{CLR}{DOWN}{YEL}T
      YPE YOUR ANSWER, THEN H
      IT [{WHT}RETURN{YEL}].
      {2 DOWN}"
SF 410 PRINT"{WHT}"QT$;SPC(13)
      ;OT$:PRINT"{3}{7 T}"SPC
      (13)"{7 T}":RETURN
HD 500 QT$="ENGLISH":OT$="SPAN
      ISH":EQ$="THE WORD":EO$
      ="LA PALABRA"
PG 505 GOSUB 300:IF X=0 THEN 2
      100
QX 510 AW$=EN$(I):AN$=SP$(I):G
      OSUB 100:IF FL THEN 510
BB 513 IF F=1 THEN 500
PC 515 GOTO 2100
HK 600 OT$="ENGLISH":QT$="SPAN
      ISH":EO$="THE WORD":EQ$
      ="LA PALABRA"
SQ 605 GOSUB 300:IF X=0 THEN 2
      100
CX 610 AN$=EN$(I):AW$=SP$(I):G
      OSUB 100:IF FL THEN 610
XK 613 IF F=1 THEN 600
SJ 615 GOTO 2100
DX 700 FL=0:IF W=0 THEN F=0:RE
      TURN
GR 703 PRINT"{CLR}{11 DOWN}
      {WHT}"TAB(12)"CONGATULA
      TIONS!!"
JM 705 PRINT TAB(9)"{DOWN}{6}Y
      OU COMPLETED THE LIST."
GR 710 FOR Z=1TO192:POKE53280,
      Z:NEXT:FORZ=1TO8:PRINT"
      {DOWN}":NEXT:PRINT"
      {HOME}{9 DOWN}"
GJ 715 PRINT"{3 SPACES}{YEL}YO
      UR SCORE:{WHT} ";INT(SC
      /(3*W)*100);"%"
PP 720 PRINT"{DOWN}{3 SPACES}
      {YEL}YOU GOT{WHT}"C"
      {YEL}CORRECT OUT OF
      {WHT}"W"{YEL}{LEFT}."
KQ 730 PRINT"{2 DOWN}
      {4 SPACES}{6}WOULD YOU
      {SPACE}LIKE TO TRY THIS
      LIST"
RK 740 PRINT"{DOWN}{4 SPACES}A
      GAIN ({WHT}Y{6} OR
      {WHT}N{6})?{WHT} ";
CS 750 GET KE$:IF KE$="" THEN
      {SPACE}750
JA 755 IF KE$="Y" THEN PRINT"Y
      ":F=1:RETURN
KK 760 IF KE$<>"N" THEN 750
HM 765 PRINT"N":F=0:RETURN
RF 1000 PRINTTAB(7)"{2 DOWN}
      {YEL}PRESS [{WHT}RETUR
      N{YEL}] TO CONTINUE.":
      POKE 198,0
FM 1005 GET KE$:IF KE$<>CHR$(1
      3) THEN 1005
DS 1010 RETURN
XP 1100 POKE 53272,21:POKE 532
      80,14:POKE 53281,6:PRI
      NT"{7}{CLR}":END
AJ 1200 INPUT#15,ER,ER$,DT,DS:
      FL=0
JC 1205 IF ER=62 THEN PRINT"
      {CLR}{RED}{9 DOWN}"TAB
      (13)"FILE NOT FOUND.":
      FL=1:RETURN
FB 1210 IF ER>19 THEN PRINT"
      {RED}{2 DOWN}DISK ERRO
      R #"ER;ER$"{8 DOWN}":F
      L=1
BQ 1215 RETURN
RP 1300 PRINT"{CLR}{WHT}{DOWN}
      "TAB(12)"LOAD A WORD F
      ILE"
XJ 1315 PRINTTAB(12)"{3}{16 T}
      "
PF 1320 PRINT"{2 DOWN}{6}
      {4 SPACES}ENTER NAME O
      F FILE AT THE PROMPT."
QM 1325 PRINT"{DOWN}{3 SPACES}
      TYPE [{WHT}$*{6}] TO VI
      EW DIRECTORY."
FC 1330 PRINT"{DOWN}{3 SPACES}
      PRESS [{WHT}RETURN{6}]
      ALONE TO RETURN TO"
RC 1335 PRINT"{DOWN}{3 SPACES}
      {WHT}OPTIONS {6}MENU."
RP 1340 PRINT:PRINT"{2 DOWN}
      {7}NAME OF FILE:{WHT}>
      ";:LN=15:GOSUB 200
FX 1345 IF WD$="" THEN 2100
QJ 1350 IF WD$="$" THEN 1410
GF 1360 FL$=WD$:OPEN15,8,15:OP
      EN2,8,2,"0:"+FL$+",S,R
      "
PA 1365 GOSUB 1200:IF FL=1 THE
      N CLOSE2:CLOSE15:GOSUB
      1000:GOTO 2100
JJ 1390 INPUT#2,X:FOR S=1 TO X
      :INPUT#2,EN$(S),SP$(S)
      :NEXT
CQ 1400 CLOSE2:CLOSE15:GOTO 21
      00
FP 1410 PRINT"{CLR}{6}PRESS [
      {WHT}SHIFT{6}] TO PAUS
      E.":SYS 49250:PRINT:GO
      SUB 1000:GOTO 1300
BB 1600 PRINT"{CLR}{WHT}{DOWN}
      "TAB(11)"WORD FILE OPT
      IONS":PRINTTAB(11)"{3}
      {17 T}"
MQ 1605 PRINTTAB(16)"{DOWN}{6}
      OPTIONS":PRINTTAB(16)"
      {2}{7 T}"
GX 1610 PRINTTAB(8)"{DOWN}
      {WHT}1. CREATE A FILE"
      :PRINTTAB(8)"{DOWN}2.
      {SPACE}APPEND TO A FIL
      E"
AB 1615 PRINTTAB(8)"{DOWN}3. E
      DIT A FILE"
CD 1620 PRINTTAB(8)"{DOWN}4. R
      ETURN TO {WHT}MAIN MEN
      U{2 DOWN}"
BK 1630 PRINT"{6}{6 SPACES}ENT
      ER YOUR CHOICE{WHT}:
      {4 SPACES}{3 LEFT}";
GJ 1635 GET KE$:IF KE$<"1" OR
      {SPACE}KE$>"5" THEN 16
      35
SS 1640 PRINT KE$:ON VAL(KE$)
      {SPACE}GOTO 1700,1700,
      1800,2100
XA 1698 REM CREATE/APPEND A FI
      LE
RE 1700 KE=VAL(KE$):IF KE=2 AN
      D X=0 THEN 1300
QE 1705 PRINT"{CLR}{WHT}{DOWN}
      "TAB(12)"MAKE A WORD F
      ILE":PRINTTAB(12)"{3}
      {16 T}"
JX 1707 IF KE=2 THEN 1720
FB 1710 PRINT"{DOWN}{4 SPACES}
```

```
        {6}NAME OF FILE{WHT}:"
        ;:LN=15:GOSUB 200:IF W
        D$="" THEN 2100
ES 1715 FL$=WD$+LEFT$(NL$,16-L
        EN(WD$)):F=F+1:F$(F)=F
        L$:X=0:KE=2:GOTO 1705
HX 1720 X=X+1:PRINT"{HOME}
        {4 DOWN}"TAB(10)"{YEL}
        FILE:{WHT}";FL$
KX 1725 PRINTTAB(7)"{DOWN}
        {YEL}NUMBER OF WORDS S
        O FAR{WHT}:";X-1
JQ 1730 PRINT"{6}{2 DOWN}
        {4 SPACES}FIRST, ENTER
         THE {WHT}ENGLISH{6} W
        ORD AT"
RE 1735 PRINT"{3 SPACES}THE PR
        OMPT, THEN ENTER THE
        {WHT}SPANISH."
RK 1740 PRINT"{DOWN}{8} ENGLIS
        H WORD: {WHT}";:LN=17:
        GOSUB 200:EN$(X)=WD$:I
        F WD$="" THEN 1763
KQ 1745 PRINT"{2 DOWN}{8} SPAN
        ISH WORD: {WHT}";:LN=1
        7:GOSUB 200:SP$(X)=WD$
        :IF WD$="" THEN 1763
BF 1750 PRINT"{2 DOWN}{YEL} IS
         THIS CORRECT ({WHT}Y
        {YEL} OR {WHT}N{YEL})?
        {WHT} ";
QJ 1755 GET KE$:IF KE$="N" THE
        N PRINT"N":GOTO 1705
PX 1760 IF KE$<>"Y" THEN 1755
SR 1763 IF WD$="" THEN PRINT"
        {BLK}":X=X-1
FD 1765 PRINT"Y":PRINT"{RIGHT}
        {YEL}{DOWN}ENTER ANOTH
        ER WORD ({WHT}Y{YEL} O
        R {WHT}N{YEL})?{WHT} "
        ;
PH 1770 GET KE$:IF KE$="Y" THE
        N PRINT"Y":GOTO 1705
SE 1775 IF KE$<>"N" THEN 1770
PC 1780 PRINT"N":OPEN15,8,15:I
        F KE=2 THEN PRINT#15,"
        S0:"+FL$:GOSUB 1200
HJ 1785 IF FL THEN CLOSE 15:GO
        SUB 1000:GOTO 2100
RM 1790 OPEN2,8,2,"0:"+FL$+",S
        ,W":GOSUB 1200:IF FL T
        HEN CLOSE 2:GOTO 1785
XD 1791 PRINT#2,X:FOR S=1 TO X
        :PRINT#2,EN$(S):PRINT#
        2,SP$(S):NEXT:GOSUB 12
        00
HE 1792 IF FL THEN CLOSE 2:GOT
        O 1785
QB 1793 PRINT"{CLR}{6}{9 DOWN}
        "TAB(14)"FILE SAVED.
        {2 DOWN}"
XA 1794 CLOSE2:CLOSE15:GOSUB10
        00:GOTO 2100
KP 1800 IF X=0 THEN GOSUB 300:
        GOTO 2100
GP 1810 S=1:FL=1:PRINT"{CLR}
        {WHT}{DOWN}"TAB(15)"ED
        IT A FILE"
QJ 1815 PRINTTAB(15)"{3}{11 T}
        "
QF 1820 PRINT"{DOWN}{YEL} FILE
        : {WHT}";FL$;SPC(17-LE
        N(FL$))"{YEL}# OF WORD
        S:{WHT}";X
RP 1825 PRINT"{DOWN}{3}{40 Y}"
PA 1830 PRINT"{HOME}{8 DOWN}
        {6} ON WORD:{WHT}
        {4 SPACES}{4 LEFT}";S
AH 1835 PRINT"{2 DOWN}{8}
        {2 SPACES}ENGLISH WORD
        : {WHT}";EN$(S);LEFT$(
        SC$,22-LEN(EN$(S))):PR
        INT
MS 1840 PRINT"{8}{2 SPACES}SPA
        NISH WORD: {WHT}";SP$(
        S);LEFT$(SC$,22-LEN(SP
        $(S))):PRINT
GD 1845 PRINT"{2 DOWN}{YEL}[
        {WHT}E{YEL}] TO {WHT}E
        DIT{YEL} WORDS"
MK 1850 PRINT"{DOWN}[{WHT}C
        {YEL}] TO {WHT}CONTINU
        E{YEL} LISTING"
QH 1855 PRINT"{DOWN}[{WHT}Q
        {YEL}] TO {WHT}QUIT
        {YEL} TO {WHT}OPTIONS
        {YEL} MENU{DOWN}"
GQ 1860 GET KE$:IF KE$="" THEN
        1860
RK 1865 ON -(KE$="E")-2*(KE$="
        C")-3*(KE$="Q")GOTO189
        0,1870,1880:GOTO1860
PM 1870 S=S+1:IF S < (X+1) THE
        N1830
JD 1875 S=1:GOTO1830
XA 1880 IF FL THEN 2100
QM 1885 KE=2:PRINT"{BLK}":GOTO
         1780
DA 1890 PRINT"{HOME}{11 DOWN}"
        TAB(16);"{WHT}";:POKE1
        9,65:INPUTTE$:POKE19,0
        :PRINT
HS 1891 PRINT"{DOWN}"TAB(16);"
        {WHT}";:POKE19,65:INPU
        TTS$:POKE19,0:PRINT
RK 1892 IF TE$<>EN$(S) OR TS$<
        >SP$(S) THEN EN$(S)=TE
        $:SP$(S)=TS$:FL=0
BQ 1893 GOTO 1830
RK 2100 PRINT"{CLR}{DOWN}"TAB(
        9)"{WHT}SPANISH VOCABU
        LARY QUIZ"
BS 2105 PRINTTAB(9)"{3}{23 T}"
PR 2110 PRINTTAB(16)"{DOWN}{6}
        OPTIONS":PRINTTAB(16)"
        {BLU}{7 T}{DOWN}"
ER 2115 PRINTTAB(8)"{WHT}1. EN
        GLISH WORDS":PRINTTAB(
        8)"{DOWN}2. PALABRAS D
        E ESPA{N}OL"
RF 2120 PRINTTAB(8)"{DOWN}3. L
        OAD A WORD FILE":PRINT
        TAB(8)"{DOWN}4. FILE O
        PTIONS"
BP 2125 PRINTTAB(8)"{DOWN}5. Q
        UIT"
FS 2130 PRINT"{2 DOWN}{6}
        {4 SPACES}ENTER YOUR C
        HOICE{WHT}: ";
FC 2135 GET KE$:IF KE$<"1" OR
        {SPACE}KE$>"5" THEN 21
        35
XX 2140 PRINT KE$:ON VAL(KE$)
        {SPACE}GOTO 500,600,13
        00,1600,1100
XX 2200 POKE53280,0:POKE53281,
        0
QQ 2202 IF LV=1 THEN POKE 56,5
        6:CLR:GOTO 2245
XR 2205 PRINTCHR$(14)"{6}{CLR}
        "TAB(9)"{2 DOWN}{WHT}S
        PANISH VOCABULARY QUIZ
        "
PP 2210 PRINTTAB(9)"{3}{23 T}"
FX 2215 PRINTTAB(12)"{DOWN}{6}
        COPYRIGHT 1991"
BG 2216 PRINTTAB(4)"{2 DOWN}
        {WHT}COMPUTE PUBLICATI
        ONS INTL LTD{2 DOWN}"
EM 2220 PRINTTAB(10)"{YEL}ALL
        {SPACE}RIGHTS RESERVED
        "
JM 2230 PRINTTAB(13)"{3 DOWN}
        {WHT}PLEASE WAIT..."
GC 2240 IF LV=0 THEN LV=1:LOAD
        "SPAN.ML",8,1
XH 2245 DIM EN$(30),SP$(30),RN
        %(30),F$(120)
DC 2255 POKE 56334,PEEK(56334)
         AND 254:POKE 1,PEEK(1
        ) AND 251:SYS 49217
CD 2265 POKE 1,PEEK(1) OR 4:PO
        KE 56334,PEEK(56334) O
        R 1
SF 2270 READ A:IF A=-1 THEN228
        0
FM 2275 FOR I=0 TO 7:READ B:PO
        KE 14336+A*8+I,B:NEXT:
        GOTO2270
CD 2280 POKE 53272,(PEEK(53272
        )AND 240)OR 14
JC 2285 SC$="{21 SPACES}":GOTO
         2100
PE 2435 DATA 30,36,0,102,102,1
        02,102,62,0
EA 2440 DATA 31,0,24,0,0,24,24
        ,24,24
KX 2445 DATA 47,0,24,0,24,48,9
        6,102,60
BD 2450 DATA 98,6,24,0,56,24,2
        4,60,0
KA 2455 DATA 106,54,72,124,102
        ,102,102,102,0
MF 2460 DATA 112,6,8,60,6,62,1
        02,62,0
QK 2465 DATA 113,6,8,60,102,12
        6,96,60,0
KP 2470 DATA 120,6,8,102,102,1
        02,102,62,0
GA 2475 DATA 121,6,8,60,102,10
        2,102,60,0
EJ 2480 DATA 158,219,255,153,1
        53,153,153,193,255
SG 2485 DATA 159,255,231,255,2
```

```
        55,231,231,231,231
SP 2490 DATA 175,255,231,255,2
        31,207,159,153,195
SA 2495 DATA 226,249,231,255,1
        99,231,231,195,255
QE 2500 DATA 234,201,183,131,1
        53,153,153,153,255
SB 2505 DATA 240,249,247,195,2
        49,193,153,193,255
HJ 2510 DATA 241,249,247,195,1
        53,129,159,195,255
FG 2515 DATA 248,249,247,153,1
        53,153,153,193,255
BP 2520 DATA 249,249,247,195,1
        53,153,153,195,255
GJ 2525 DATA -1
```

SPAN.ML

```
C000:A9 05 85 FC A9 05 85 FB 80
C008:A0 00 8C 3C C0 8C 3D C0 A2
C010:8C 3E C0 AE 3E C0 B1 FB BE
C018:C9 3C D0 01 60 DD 00 04 36
C020:F0 10 CA DD 00 04 F0 07 4E
C028:E8 E8 DD 00 04 D0 06 EE 72
C030:3D C0 EE 3C C0 EE 3E C0 21
C038:C8 4C 13 C0 00 00 00 EA 8A
C040:EA A9 00 85 FB 85 FD A9 95
C048:D8 85 FC A9 38 85 FE A2 4A
C050:08 A0 00 B1 FB 91 FD 88 C3
C058:D0 F9 E6 FC E6 FE CA D0 07
C060:F0 60 A9 01 A2 08 A0 00 2E
C068:20 BA FF A9 02 A2 BC A0 F7
C070:C0 20 BD FF 20 C0 FF A2 B8
C078:01 20 C6 FF 20 CF FF 20 BB
C080:CF FF 20 CF FF 85 FB 20 19
C088:CF FF 05 FB F0 25 A9 0D CE
C090:20 D2 FF AD 8D 02 29 01 79
C098:D0 F9 20 CF FF AA 20 CF BC
C0A0:FF 20 CD BD A9 20 20 D2 A0
C0A8:FF 20 CF FF F0 D4 20 D2 1A
C0B0:FF D0 F6 A9 01 20 C3 FF EF
C0B8:20 CC FF 60 24 30 00 00 65
```

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SPEEDSWAP

By Larry Hagney

Most of us don't use *SpeedScript* to write the Great American Novel. Usually we confine our efforts to smaller endeavors such as letters, reports, term papers, program documentation, and such. As a result much of the text memory available to *SpeedScript* remains empty.

Suppose you're using *SpeedScript* to write a term paper. In the midst of your efforts, you remember a couple of paragraphs in a document that you wrote a couple of months ago and decide they would fit perfectly with this paper. To incorporate that material takes more than a little effort. First, you save your paper to disk, load in the old document, copy the relevant section into the text buffer, erase the old document, load in the term paper, and then finally insert the saved text in the appropriate area of your paper.

Well, those days are gone forever. With *SpeedSwap* patched into your copy of *SpeedScript* 3.2 for the 64, two text documents can coexist in memory. The problem mentioned above is now simple to solve. Just move to your alternate screen and load the old document. Now both documents are independently accessible. Material can be copied from one document to the other, or one text area can be your workscreen while the second serves as a storage area for various reference materials.

Getting Started

SpeedSwap is a BASIC program which contains a short (227 bytes) machine language routine. To avoid typing errors, enter the program using *The Automatic Proofreader;* see "Typing Aids" elsewhere in this section. When you've finished typing, save a copy of the program to a disk containing *SpeedScript.* Your copy of *SpeedScript* must be saved with the filename SPEEDSCRIPT because *SpeedSwap* automatically loads and runs that filename.

When you run *SpeedSwap,* it lets you allocate memory for each of two text areas, identified onscreen as area 0 and area 1. Default sizes of 21,504 and 21,760 bytes are displayed in white text. Pressing CRSR-down decreases the size of text area 0 in 256-byte chunks, while increasing text area 1 by a similar amount. CRSR-up performs the opposite function. Note that the total number of bytes of both text areas is always 43,264. This is 256 bytes less than *SpeedScript* normally makes available because *SpeedSwap* allocates a 256-byte safety zone between each text area.

If you're not sure how many bytes to allocate for a file that's already on disk, corresponding disk block sizes are also displayed. Once the text areas are adjusted for your needs, press Return to boot *SpeedScript. SpeedSwap* sets up its machine language routine which loads *SpeedScript,* patches itself in, and then runs the word processor.

Only One Command

With *SpeedSwap* patched into *SpeedScript,* you have complete, independent control over two areas of text memory. Only one command is needed to switch between the two. Press the Ctrl key and Commodore logo key simultaneously to toggle between text area 0 and text area 1.

When *SpeedScript*'s screen first appears, you'll see a 0 in the command line, indicating that you are now working in text area 0. Press the Ctrl key and the = key simultaneously to see the amount of memory allotted to this area.

Press Ctrl-Commodore to access area 1, indicated by a 1 in the command line. Area 1 provides 43,264 bytes minus the number of bytes in area 0 for text storage.

Each text area is completely independent of the other. Text can be printed from, loaded into, or saved from one area, without disturbing or being affected by the other. You can erase all text in one area while text in the other area remains untouched. Each area also supports its own text and background colors.

In short, every *SpeedScript* command behaves as though the active text area is the only text area. One notable exception is *SpeedScript*'s text buffer; text from one area can be copied into the buffer and inserted into the other text area. Similarly, HUNT and REPLACE phrases are also portable to each area. One handy *SpeedSwap* feature is cursor positioning. When you return to a text area, you'll find the cursor in the same position as you left it. This is convenient when using one text area for viewing reference materials and the other for writing.

Keep in Mind

The changes *SpeedSwap* makes to *SpeedScript* are not permanent, so load and run *SpeedSwap* whenever you want to use it. There are a few cautions that you should bear in mind, however. Do not attempt to load a document into a text area for which you haven't allocated enough space. For in-

stance, if area 0 has 21,504 bytes allocated and you attempt to load a 100-block document, text area 0 will be filled, but the rest of the document will spill over into area 1. The text in area 1, however, cannot be accessed. You must erase all text in area 1 before you can use that screen.

This could be avoided by allocating 25,600 bytes to area 0 prior to loading the 100-block document. Also, if you attempt to load a file too large for area 1, *SpeedSwap*'s machine language will be overwritten by the text, and *SpeedScript* will crash.

Also, if you plan on using *SpeedSearch* (May 1987) to search any *SpeedSwap*-generated files, be aware that documents saved from area 0 will have a normal load address of 9472. Documents saved from area 1, however, will have a load address of X * 256 where X = (number of area 1 bytes / 256) + 37. However, the load address is irrelevant to *SpeedScript*, any *SpeedScript* enhancement program, or any other program designed to process *SpeedScript* text files.

If you plan to exit *SpeedScript* and then return from BASIC, be sure that text area 0 is active when you quit. Otherwise, text could be damaged.

SPEEDSWAP

```
DB 10 REM COPYRIGHT 1991 COMPU
      TE PUBLICATIONS INTL LTD
       - ALL RIGHTS RESERVED
GP 20 POKE808,234:PRINT"{CLR}
      {N}{H}{8}";:DIMX,Q$,A,B,
      C,S,E,E$:X=121:E$="DATA
      {SHIFT-SPACE}ERROR IN LI
      NES"
AQ 30 S=828:E=934:GOSUB180:IFC
      <>11409THENPRINTE$190"-"
      250:STOP
XC 40 SYSS:PRINT"SPEEDSCRIPT 3
      .2 SPEEDSWAP":PRINT"{4}
      {DOWN}COPYRIGHT 1991"
MA 50 PRINT"COMPUTE PUBLICATIO
      NS INTL LTD":PRINT"ALL R
      IGHTS RESERVED{DOWN}"
BH 60 S=53000:E=53226:GOSUB180
      :IFC<>25771THENPRINTE$26
      0"-"390:SYS906:STOP
GF 70 PRINT"PRESS CRSR UP/DOWN
       TO SELECT SIZE
      {7 SPACES}(IN BYTES) OF
      {SPACE}EACH TEXT AREA."
CM 80 PRINT"PRESS RETURN TO LO
      AD SPEEDSCRIPT."
XG 90 PRINT"PRESS CTRL/C= FROM
      WITHIN SPEEDSCRIPT
      {3 SPACES}TO SWAP TEXT A
      REAS.{DOWN}"
EQ 100 FORA=.TO1:PRINT"TEXT AR
      EA"ASPC(8)"DISK BLOCKS"
      :NEXT
MS 110 PRINT"TOTAL BYTES 43264
      {3 SPACES}TOTAL BLOCKS
      {SPACE}169{WHT}{UP}"
DF 120 PRINT"{2 UP}"SPC(11-(X<
      77))X*256-9472SPC(13-(X
      <137)-(X<47))" "X-37
PK 130 PRINTSPC(11-(X>166))529
      92-(X+1)*256SPC(13-(X>1
      06)-(X>196))" "206-X
SP 140 GETQ$:ON-(Q$="{DOWN}"OR
      Q$="{UP}")GOTO170:IFQ$<
      >CHR$(13)THEN140
BP 150 POKE53041,X:X=X+1:POKE5
      3209,X:POKE53218,X:POKE
      53224,X:POKE53226,X
GB 160 SYS906:PRINT"{CLR}{8}LO
      ADING SPEEDSCRIPT...":P
      OKE808,237:SYSS:END
QC 170 X=X+(Q$="{DOWN}")-(Q$="
      {UP}"):X=X-162*((X=40)-
      (X=203)):POKE646,-(X=12
      1):GOTO120
GD 180 C=.:FORA=S TOE:READB:PO
      KEA,B:C=C+B:NEXT:RETURN
AR 190 DATA120,169,0,141,14,22
      0,169,27,141,17,208,169
      ,91,141,20,3,169
DM 200 DATA3,141,21,3,169,1,14
      1,26,208,141,18,208,88,
      96,169,58,172
MG 210 DATA135,3,205,18,208,20
      8,8,169,1,172,136,3,140
      ,32,208,140,33
PG 220 DATA208,141,18,208,201,
      1,240,8,169,1,141,25,20
      8,76,188,254,169
BM 230 DATA1,141,25,208,76,49,
      234,0,12,0,120,169,0,14
      1,26,208,141
BG 240 DATA32,208,141,33,208,1
      69,49,141,20,3,169,234,
      141,21,3,169,1
SQ 250 DATA141,14,220,88,96
BX 260 DATA169,5,162,8,168,32,
      186,255,169,11,162,205,
      160,207,32,189,255
MA 270 DATA169,0,133,10,141,8,
      32,32,213,255,169,76,16
      2,207,141,134,10
EB 280 DATA142,135,10,142,11,3
      2,169,121,141,177,9,169
      ,37,141,9,32,173
MF 290 DATA29,13,141,235,207,1
      73,44,13,141,236,207,32
      ,55,9,76,13,8
JE 300 DATA162,49,142,38,216,1
      73,11,32,201,207,240,1,
      202,142,38,4,173
CF 310 DATA141,2,201,6,208,103
      ,165,2,160,0,145,57,132
      ,162,165,162,41
DB 320 DATA16,240,250,162,3,18
      9,12,32,157,220,207,202
      ,16,247,162,3,189
BE 330 DATA19,32,157,227,207,2
      02,16,247,160,16,185,8,
      32,190,216,207,153
MC 340 DATA216,207,138,153,8,3
      2,136,16,240,162,1,181,
      57,188,233,207,157
EC 350 DATA233,207,152,149,57,
      202,16,242,173,29,13,17
      2,235,207,140,29,13
RB 360 DATA141,235,207,173,44,
      13,172,236,207,140,44,1
      3,141,236,207,160,0
RS 370 DATA177,57,133,2,32,246
      ,9,76,228,255,83,80,69,
      69,68,83,67
MH 380 DATA82,73,80,84,0,122,0
      ,207,0,0,0,0,40,0,122,0
      ,0
DK 390 DATA0,0,0,122,0,122
```

Larry Hagney lives in Las Cruces, New Mexico. ❐

CREDIT CONTROL

By George R. Reid

When the temptation to use a convenient credit card becomes too great to ignore, a program such as *Credit Control* can be a welcome financial guide and advisor. Successful credit card management depends on three requisites: a careful budget, accurate accounts, and financial discipline.

Credit Control is a simple program for the 64 that can help you plan your expenditures and alert you against overspending. It also provides some general fiscal advice.

Getting Started

Credit Control is written entirely in BASIC. To help avoid typing errors, use *The Automatic Proofreader;* see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program when you've finished typing it in.

Taking Charge

Have your monthly credit card statement and any late purchase receipts on hand when you run *Credit Control.* When you first use the program or if your financial situation later changes, move the highlight cursor to the Statistics menu option and press Return. A series of prompts will guide you. Simply enter your card's finance charge

rate, your monthly payment date, your self-imposed monthly credit purchase limits, and your credit limit. After you make these entries, you'll return to the main menu.

To record your credit transactions, select the Data Entry option. You'll be asked to enter the month and day of each transaction and the seller's name and description of items purchased. (Keep the name and description to 13 characters or less.) For your first entry, enter the date and balance due from your last monthly credit statement. Then enter any credit purchases or payments made since the statement date.

At the end of each transaction, you'll be given several options. You may enter another transaction, make changes to previous entries, return to the main menu, or display your current entries. After you've entered all of your credit card transactions, return to the menu and select the Storage option to save your data. You may want to save the data with a name that is similar to your credit card's. Use any valid filename up to 12 characters in length. *Credit Control* appends a prefix of CDF to each filename for easy identification, but omit these letters when loading the data back into your program.

Taking Control

After you charge an item or make a payment on your account, load your file from the Storage option, select Data Entry, and then enter the transaction. If you make a payment, place a minus sign immediately before any payment amounts or returns. These will appear as subtractions from the account balance. Save the file when data entry is complete. *Credit Control* takes care of everything else.

On the menu screen you'll be informed of your credit card balance. You'll also receive some friendly advice on credit management, if necessary. A listing of transactions and balances can be made at any time. Error corrections can be made easily for the last two entries. Earlier errors can be rectified by making a new entry that adds or subtracts the proper amount to correct the balance.

Each credit card's account can be maintained in a separate file. However, if you begin the system with a realistic self-imposed monthly spending limit, *Credit Control* will advise you when to get rid of those extra cards. Also, be aware that you don't have to accept the card company's suggested monthly payment amount. *Credit Control* will advise you on payment size and other factors, too.

Keep all your credit slips handy in an envelope or simple file. Then get into the habit of regularly entering them. Follow the program's financial advice, enjoy *Credit Control,* and don't abuse your credit with overuse.

CREDIT CONTROL

```
XE 0 REM COPYRIGHT 1991 - COMP
     UTE PUBLICATIONS INTL LTD
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EX 10 REM CREDIT CONTROL -BY G
     . REID. CC
KC 20 MX=61:X=0:L=1:O$="10.5":
     P$="10TH OF MONTH":M=10:
     CL=1000
AK 30 DIM D$(MX,4)
AA 40 PRINT"{CLR}"
AJ 50 FORXX=1TO5:PRINT"{DOWN}"
     :NEXT:GOSUB980
MR 60 PRINT"{HOME}{2 DOWN}";TA
     B(13)"{GRN}CREDIT
     {SHIFT-SPACE}CONTROL{7}"
CX 70 PRINTTAB(13)"**********
     ***"
CP 80 PRINT CHR$(14)
BP 90 SY$="{RVS}{CYN}":SZ$="
     {OFF}{7}"
GE 100 N$(1)="DATA ENTRY":N$(2
     )="DISPLAY"
AS 110 N$(3)="STORAGE":N$(4)="
     STATISTICS"
SM 120 N$(5)="EXIT"
ER 130 FOR C=1TO5:PRINTTAB(13)
     N$(C):NEXT
GK 140 PRINT"{6 UP}":C=1:PRINT
     TAB(13)SY$N$(1)SZ$
XD 150 GETG$:IFG$=""THEN150
KR 160 IFG$=CHR$(13)THEN200
CE 170 IFG$="{DOWN}"THEN PRINT
     "{UP}";TAB(13)N$(C):C=C
     +1:PRINTTAB(13)SY$N$(C)
     SZ$
MK 180 IFC=6THENPRINT"{UP}";:G
     OTO140
DX 190 GOTO150
AE 200 ON C GOTO330,570,730,21
     0,1240
AQ 210 PRINT"{CLR}{2 DOWN}STAT
     ISTICAL DATA ENTRY":PRI
     NT
QE 220 PRINT"ENTER YOUR NEW:-"
XS 230 PRINT"{DOWN}ANNUAL FINA
     NCE CHARGE RATE"
GA 240 PRINT"CURRENT IS--";O$:
     INPUT O$:IFVAL(O$)<1THE
     N210
FS 250 PRINT"{DOWN}MONTHLY PAY
     MENT DATE"
AX 260 PRINT"CURRENT IS--";P$:
     INPUT P$
CP 270 PRINT"{DOWN}BUDGETED MA
     XIMUM MONTHLY CREDIT"
AQ 280 PRINT"PURCHASES AMOUNT
     {SPACE}$"
FA 290 PRINT"CURRENT IS--";M:I
     NPUT M:IFM<1THEN270
SJ 300 PRINT"{DOWN}ASSIGNED CR
     EDIT LIMIT"
FF 310 PRINT"CURRENT IS--";CL:
     INPUT CL
DH 320 GOTO40
GQ 330 X=X+1:Y=0:I$="--":IFX>M
     X-1THENPRINT"{CLR}
     {DOWN}FULL FILE":X=L:GO
     TO430
DE 340 PRINT"{CLR}{2 DOWN}ENTE
     R MONTH & DAY OF PURCHA
     SE":GOSUB420
HQ 350 PRINT"{CLR}{2 DOWN}ENTE
     R SELLER'S NAME/DESCRIP
     TION":GOSUB420
BD 360 PRINT"{CLR}{2 DOWN}ENTE
     R AMOUNT (CHARGED OR PA
     ID) $"
QE 370 PRINT"(PAYMENT MUST BE
     {SPACE}MINUS E.G.
     {2 SPACES}-56){DOWN}":L
     =X:GOSUB420
XQ 380 B2=B2+VAL(D$(X,3)):B2=I
     NT(B2*100+.5)/100:D$(X,
     4)=STR$(B2)
HX 390 IFVAL(D$(X,3))<0THENB4=
     B3:B3=B2
RS 400 IFX=LTHEN430
BD 410 X=X+1:GOTO520
DR 420 INPUTI$:Y=Y+1:D$(X,Y)=I
     $:I$="--":RETURN
RG 430 PRINT"{DOWN} E=ENTER: C
     =CHANGES: M=MENU: D=DIS
     PLAY"
CB 440 GET N$:IFN$=""THEN440
SE 450 IF N$="E"THEN330
FG 460 IF N$="C"THEN500
MG 470 IF N$="M"THEN40
QQ 480 IF N$="D"THEN570
DD 490 GOTO440
BA 500 PRINT"{CLR}{DOWN}HIT RE
     TURN AFTER CHANGES OR T
     O BY-PASS{2 SPACES}AN E
     NTRY"
JC 510 X=X-1:IFX<1THENX=1
JS 520 PRINT"{DOWN}ENTER NEW D
     ATA AT CURSOR:-"
EB 530 B2=VAL(D$(X-1,4)):PRINT
QE 540 PRINT"#";X;TAB(5)"DATE:
     {3 SPACES}";D$(X,1);:IN
     PUT D$(X,1)
XF 550 PRINTTAB(5)"SELLER: ";L
     EFT$(D$(X,2),13);:INPUT
     D$(X,2)
KA 560 PRINTTAB(5)"AMOUNT: ";D
     $(X,3);:INPUT D$(X,3):P
```

```
      RINT:GOTO380
HJ 570 G=1:C2=18:C1=C2
CH 580 PRINT"{CLR}{DOWN}";C$:P
      RINT" NO DATE{2 SPACES}
      SELLER/DETAIL{2 SPACES}
      AMOUNT BALANCE"
AA 590 PRINT" -- ----
      {2 SPACES}-------------
      {2 SPACES}------ ------
      -"
SK 600 FOR C=GTO L
DM 610 PRINTC;TAB(4)LEFT$(D$(C
      ,1),6);TAB(10)LEFT$(D$(
      C,2),13);
FE 620 PRINTTAB(23);:F$=D$(C,3
      )
BC 630 GOSUB640:F$=D$(C,4):GOS
      UB640:PRINT:GOTO680
HF 640 F$="{5 SPACES}"+F$:FT$=
      RIGHT$(F$,3):IFLEFT$(FT
      $,1)="."THEN670
XP 650 IFMID$(FT$,2,1)="."THEN
      F$=F$+"0":GOTO670
CH 660 F$=F$+".00"
MM 670 PRINTRIGHT$(F$,8);:RETU
      RN
MQ 680 IF C<C1THEN720
HG 690 PRINT"{DOWN}RETURN"
ME 700 GET PA$:IFPA$=""THEN700
DB 710 C1=C1+C2
MP 720 NEXT:PRINT:GOTO430
JS 730 PRINT"{CLR}{2 DOWN}":IN
      PUT"ENTER FILE-NAME";C$
QD 740 PRINT" L=LOAD:
      {2 SPACES}S=SAVE"
MR 750 GET X$:IFX$=""THEN750
MH 760 IFX$="L"THEN900
AF 770 IFX$<>"S"THEN750
AQ 780 PRINT"WISH TO {YEL}SAVE
      {7} ";C$;" ? Y/N"
DG 790 GETX$:IFX$=""THEN790
MP 800 IFX$<>"Y"THEN40
CP 810 OPEN 1,8,2,"@0:CDF"+C$+
      ",S,W"
GS 820 Q$=CHR$(13)
CM 830 PRINT#1,P$Q$O$Q$M,Q$L,Q
      $CL
JF 840 C=1:Y=1
CX 850 IF C>LTHEN890
HR 860 A$=D$(C,Y):PRINT#1,A$:Y
      =Y+1
GG 870 IF Y>4THEN Y=1:C=C+1
RX 880 GOTO850
DH 890 CLOSE 1:PRINT"{CLR}
      {DOWN}SAVED "C$:GOTO50
HS 900 OPEN 1,8,2,"0:CDF"+C$+"
      ,S,R"
PK 910 INPUT# 1,P$,O$,M,L,CL
FJ 920 C=1:Y=1
DD 930 IF C>LTHEN970
BS 940 INPUT#1,A$:D$(C,Y)=A$:Y
      =Y+1
PK 950 IF Y>4THEN Y=1:C=C+1
BC 960 GOTO930
JG 970 CLOSE 1:X=L:B2=VAL(D$(C
      -1,4)):GOTO570
ME 980 U=VAL(D$(X,4))
MG 990 UM=INT((U-M)*100+.5)/10
      0
XG 1000 PRINT:PRINT"{YEL}SELEC
      T{7} WITH CURSOR AND R
      ETURN"
KQ 1010 PRINT"{2 DOWN}";TAB(10
      )"----------------"
GC 1020 PRINT"{GRN}YOUR CURREN
      T BALANCE IS $";
BR 1030 IFU>MTHENPRINT"{3}"U"
      {7}":GOTO1050
BC 1040 PRINTU:IFU=<0THENPRINT
      " CONGRATULATIONS!":GO
      TO1230
PH 1050 IF(CL-U)<CL*.2 THEN PR
      INT" YOUR CREDIT LIMIT
       IS $";CL
AD 1060 IFVAL(D$(X,3))<0THEN10
      90
HD 1070 PRINT" TO AVOID FINANC
      E CHARGE AT ";O$;"% AP
      R,"
JA 1080 PRINT" PLEASE PAY BY "
      ;P$;"{7}"
FA 1090 IFU=<M THEN1230
DD 1100 PRINT"{1}BALANCE EXCEE
      DS $";STR$(M);"-BUDGET
       BY";UM
RF 1110 R=VAL(O$)/12/100:IF(U/
      M*R) >.99999THEN1210
MF 1120 N=LOG(1/(1-(U/M*R)))/L
      OG(1+R)
QE 1130 PRINT" IF NO FURTHER P
      URCHASES, IT TAKES"
HE 1140 PRINTINT(N*10+.5)/10;"
      MONTHS TO PAY OFF.{7}"
KD 1150 IF N<1.15THEN1230
JK 1160 IF VAL(D$(X,3))<(.25*M
      )THEN IF U<B4THENPRINT
      " GOOD TREND...BUT"
FQ 1170 IF N>2 THEN1220
KQ 1180 PRINT"{3}INCREASE YOUR
       BUDGET TO $";INT(M*N)
      ;
PQ 1190 IF N<1.5THEN1230
BA 1200 PRINT" OR":GOTO1220
KD 1210 PRINT"{3} CANNOT BE RE
      PAID.{2 SPACES}BUDGET
      {SPACE}OF $";M;"IS
      {4 SPACES}VERY LOW.
      {2 SPACES}REPEAT!"
AK 1220 PRINT"{YEL}HIDE
      {SHIFT-SPACE}YOUR
      {SHIFT-SPACE}CARD AWAY
      !{7}"
CQ 1230 RETURN
AG 1240 PRINT"{2 DOWN}DID YOU
      {SPACE}SAVE YOUR DATA?
      {3 SPACES}Y/N"
JG 1250 GETS$:IF S$=""THEN1250
MA 1260 IF S$="Y"THEN PRINT"
      {CLR}":END
HP 1270 GOTO40
```

George R. Reid is a professor of business. He lives in Savannah, Georgia, and has excellent credit. ❐

PLOTTER

By Daniel Lightner

Have you ever designed a screen on the 64 that you would like to use in a program that you're writing? Poking those character values into the proper screen memory locations is a fast and efficient way to do it, but determining those poke values is another story. *Plotter* is just the utility to help you determine those values.

Typing It In

Plotter is written entirely in machine language. To enter it, use *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: C000
Ending address: C207

Be sure to save a copy of the program before you exit *MLX*.

Putting It to Work

To use the program, enter LOAD"PLOTTER",8,1 and then press Return. When it has finished loading, don't run it. Instead, type *NEW*, press Return, and then enter SYS49152. If all has gone well, the program will announce its presence.

To see how *Plotter* works, place the cursor on any character, anywhere on the screen. Press f1. Two numbers should appear in the upper left corner of the screen. The first number is the screen location of the cursor, and the number following the comma is the poke value of the character stored at that location.

If you load *Plotter* from the 64's opening screen and go through the preceding steps, you should see that *Plotter* has been enabled and the word *READY* should be near the bottom of the screen. Place your cursor over the letter *R* in the word *READY* and press f1. At the top of the screen, you may see 1904,18. If your cursor isn't on line 24, you may get a different first number, but you should get an 18, which is the value to poke to the screen to print an *R*.

Now press the space bar to delete the letter *R*. Move the cursor to any

blank line on the screen, enter POKE 1904,18, and press Return. (Use the numbers at the top of your screen if they are different.) The *R* should now be back in the word *READY.* Press f7 to clear those values; then move the cursor to another location and press f1 again.

How Does It Do That?

Plotter wedges itself into the 64's hardware interrupt routine and then turns control of the 64 back to the BASIC editor. The program waits in the background, quietly scanning the keyboard for f1 to be pressed. When it detects f1, it copies the characters and colors from the first eight bytes of screen memory. *Plotter* writes the screen location of the cursor and the value of the character under the cursor to the top left corner of the screen. It then scans f7 for a keypress. When the program detects that the f7 key has been pressed, *Plotter* replaces the characters at the top of the screen that may have been overwritten.

You can disable *Plotter* by pressing Run/Stop and the Restore key simultaneously. It would be good practice to disable *Plotter* before using the disk drive. You can activate it again with SYS49152.

PLOTTER

```
C000:A0 00 B9 B0 C1 20 D2 FF 48
C008:C8 C0 54 D0 F5 AD 14 03 47
C010:8D 11 03 AD 15 03 8D 12 B9
C018:03 78 A9 2B 8D 14 03 A9 8D
C020:C0 8D 15 03 58 A9 00 8D 2F
C028:20 CB 60 AE 20 CB E0 00 95
C030:D0 16 A6 CB E0 04 F0 03 2D
C038:6C 11 03 A2 01 8E 20 CB 0D
C040:A5 CE 8D 36 CB 6C 11 03 92
C048:A5 CF C9 01 F0 13 AE 20 2B
C050:CB E0 01 F0 12 E0 02 F0 28
C058:14 E0 04 F0 07 E0 03 F0 5E
C060:09 6C 11 03 4C 34 C1 4C D6
C068:D4 C0 4C 88 C1 A9 03 8D DE
C070:20 CB A5 D1 85 FB A5 D2 01
C078:85 FC 18 A5 D3 65 FB 85 0B
C080:FB A9 00 65 FC 85 FC A5 5E
C088:FC A6 FB 8D 34 CB 8E 33 AB
C090:CB A2 09 8E 35 CB A0 B0 75
C098:AD 33 CB DD A5 C1 AD 34 D8
C0A0:CB FD A6 C1 90 0F 8D 34 88
C0A8:CB AD 33 CB FD A5 C1 8D 36
C0B0:33 CB C8 D0 E3 98 CA F0 EC
C0B8:10 C9 B0 F0 03 8D 35 CB 5E
C0C0:2C 35 CB 30 04 A9 00 F0 D9
C0C8:05 29 7F 20 7B C1 CA 10 91
C0D0:C5 6C 11 03 A9 02 8D 20 33
C0D8:CB A0 00 A9 00 85 FB A9 BA
C0E0:04 85 FC A9 21 85 FD A9 C4
C0E8:CB 85 FE B1 FB 91 FD C8 97
C0F0:C0 08 D0 F7 A0 00 A9 00 C6
C0F8:85 FB A9 D8 85 FC A9 29 9B
C100:85 FD A9 CB 85 FE B1 FB 3F
C108:91 FD C8 C0 08 D0 F7 A9 16
C110:03 8D 00 D8 8D 01 D8 8D B5
C118:02 D8 8D 03 D8 8D 04 D8 92
C120:8D 05 D8 8D 06 D8 8D 07 55
C128:D8 A2 04 86 FE A2 00 86 B2
C130:FD 6C 11 03 A5 CB C9 03 13
C138:F0 03 6C 11 03 A9 00 8D DF
C140:20 CB A0 00 A9 00 85 FB 2F
C148:A9 04 85 FC A9 21 85 FD FC
C150:A9 CB 85 FE B1 FD 91 FB E0
C158:C8 C0 08 D0 F7 A0 00 A9 6A
C160:00 85 FB A9 D8 85 FC A9 DF
C168:29 85 FD A9 CB 85 FE B1 60
C170:FD 91 FB C8 C0 08 D0 F7 23
C178:6C 11 03 8C 31 CB A0 00 99
C180:91 FD E6 FD AC 31 CB 60 2B
C188:A9 20 8D 06 04 8D 07 04 63
C190:A9 2C 20 7B C1 AD 36 CB AC
C198:85 FB A9 00 85 FC A9 04 8A
C1A0:8D 20 CB 4C 87 C0 01 00 72
C1A8:0A 00 64 00 E8 03 10 27 58
C1B0:0D 0D 9A 43 4F 50 59 52 46
C1B8:49 47 48 54 20 31 39 39 72
C1C0:31 0D 43 4F 4D 50 55 54 28
C1C8:45 20 50 55 42 4C 49 43 6F
C1D0:41 54 49 4F 4E 53 20 49 71
C1D8:4E 54 4C 20 4C 54 44 0D 6D
C1E0:41 4C 4C 20 52 49 47 48 32
C1E8:54 53 20 52 45 53 45 52 E8
C1F0:56 45 44 0D 0D 50 4C 4F DB
C1F8:54 54 45 52 20 45 4E 41 7D
C200:42 4C 45 44 00 00 00 00 A6
```

Daniel Lightner lives in Sidney, Montana. He is the author of *Noah's Arc,* which was published in July 1991. ❐

SHOWDOWN

By Arihant Jain

Some games are very simple to play, but difficult to master. *Showdown* is such a game.

This board game for one or two players resembles Chinese checkers. The board has 32 pegs arranged in in a cross-shaped grid, with one open position in the center. The object is to clear the board of as many pegs as possible. You remove a peg by jumping it with an adjacent peg, but you must land in an empty space. If that space has a peg in it, you can't jump.

Typing It In

Showdown is written entirely in BASIC. To avoid typing errors, enter the program with *The Automatic Proofreader;* see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program when you've finished typing it in.

Let's Play

When you run *Showdown,* you'll be asked whether you want to play or watch a replay of an earlier game. Since there will be nothing to watch at first, press P for play.

You'll then be asked whether you want to play singles or a combined effort. If you elect to play alone, make sure your joystick is in port 2. When two people play, two joysticks are required, and players take turns jumping pegs.

Pegs are removed automatically when you jump them. Remember that you can jump a peg only if you are next to it and the space on the other side of the jumped peg is vacant. You can only jump up, down, left, or right. Diagonal moves are not allowed.

Use the joystick to position your cursor on any peg you like. To jump, press the fire button and then move the stick in the direction you want to jump. If the move is legal, the computer will make the move and remove the jumped piece. You'll get a message if a move is illegal.

When you have removed as many pegs as possible, press the @ key to receive your score and a message about how well you played. If you are sharp and have planned your moves carefully, it's possible to remove all the pegs but one.

Watch a Replay

When you've finished a game, you'll be asked if you want to save it. Saving games will give you a chance to watch each move again and see where you went wrong. It'll also give you a chance to prove to others how brilliantly you played.

If you decide to save a game, *Showdown* will ask for a filename and then your name. The game and each move will be saved to disk.

To see a saved game, press R for replay on the opening screen and supply the filename. The game board will appear, and *Showdown* will automatically play back every move you made during that game. You can slow down the replay moves by pressing L or make them move faster by pressing F.

SHOWDOWN

```
QF 100 DIMF(2000),G(2000)
FR 110 GOSUB 880
AK 120 GOSUB1000
PC 130 S = 1475:O=1274:B=1391:
       C=1397:M=0:W=0:F=0:G=0:
       U=0
RA 140 PRINT"{CLR}{HOME}{BLK}"
       :POKE 53280,13:POKE5328
       1,12
JA 150 PRINT"{4 DOWN}
       {10 RIGHT}{RVS}
       {4 SPACES}{DOWN}{LEFT}
       {SPACE}{DOWN}{LEFT}
       {5 LEFT} {UP}{LEFT}
       {UP}{LEFT} "
HB 160 PRINT"{HOME}{7 DOWN}
       {7 RIGHT}{RVS}
       {3 SPACES}{OFF}WWW{RVS}
       {3 SPACES}{OFF}{UP}
       {6 LEFT}WWW"
RX 170 PRINT"{DOWN}{7 RIGHT}
       {RVS} {DOWN}{LEFT}
       {DOWN}{LEFT} {DOWN}
       {LEFT}{3 SPACES}{OFF}W
       {RVS}W{OFF}W{RVS}
       {3 SPACES}{UP}{LEFT}
       {UP}{LEFT} {UP}{LEFT}
       {8 LEFT}{OFF}";
SP 180 PRINT"WWWWWWWW{DOWN}
       {7 LEFT}WWW WWW"
XS 190 PRINT"{8 RIGHT}WWWWWWWW"
HX 200 PRINT"{DOWN}{9 RIGHT}
       {RVS} {OFF}WWW{RVS}
       {OFF}"
FA 210 PRINT"{9 RIGHT}{RVS}
       {5 SPACES}"
PX 220 IFH=-1THEN 1190
GQ 230 V=2
KX 240 IFV=3THEN V=1
SM 250 IFI=0THENV=2
MG 260 JO=USR(V):GETA$
HS 270 IF(JOANDl5)=1THENW=-40:
       GOTO480
FC 280 IF(JOANDl5)=4THENW=-1:G
       OTO480
SR 290 IF(JOANDl5)=8THENW=1:GO
       TO480
JJ 300 IF(JOANDl5)=2THENW=40:G
       OTO480
HE 310 IF(JOANDl6)=0THEN GOTO3
       40
EE 320 IF A$ ="@" THEN 610
BH 330 GOTO 240
DQ 340 JO=USR(V):IF(JOANDl5)=0
       THEN GOTO340
DD 350 IF(JOANDl5)=1THENW=-40:
       GOTO400
BH 360 IF(JOANDl5)=4THENW=-1:G
       OTO400
AJ 370 IF(JOANDl5)=8THENW=1:GO
       TO400
DX 380 IF(JOANDl5)=2THENW=40:G
       OTO400
KQ 390 GOTO 240
QS 400 Y=S+W:R=0:IF PEEK(S)=21
       5THEN R=R+1
KF 410 IFPEEK(Y)=87THENR=R+1
GG 420 IFPEEK(S+W+W)=32THENR=R
       +1
KF 430 IFR=3 THEN 450
BX 440 GOTO 530
JE 450 M=M+1:POKES,32:POKES+W,
       32:GOSUB560:POKE S+W+W,
       215:S=S+W+W:V=V+1:U=U+1
XH 460 F(U)=1:G(U)=W
PB 470 GOTO 240
JS 480 J=0:Z=PEEK(S):Y=S+W :IF
       PEEK(Y)=87THENQ=87:J=J+
       1
AH 490 IFPEEK(Y)=32THENQ=32:J=
       J+1
FD 500 IF J=1 THEN 520
SB 510 GOSUB 530
KH 520 POKES,Z-128:POKES+W,Q+1
       28:S=S+W:U=U+1:F(U)=0:G
       (U)=W:GOTO 240
QM 530 PRINT"{HOME}{22 DOWN}IL
       LEGAL MOVE":GOSUB 560
DQ 540 PRINT"{HOME}{22 DOWN}
       {12 SPACES}"
SG 550 GOTO{2 SPACES}240
HR 560 REM
EE 570 POKE54296,15:POKE54277,
       64:POKE54273,162:POKE54
       272,37
SQ 580 POKE54276,17:FORT=1TO20
       0:NEXT
HJ 590 POKE54276,16:FORT=1TO50
       :NEXT
HP 600 RETURN
MK 610 J=32-M:F(U+1)=-1:G(U+1)
       =0
BX 620 PRINT"{CLR}{2 DOWN}";J;
       "PEGS REMAINING{2 DOWN}
       "
AR 630 IFJ>10THEN PRINT"POOR!"
       :W=-1:GOTO700
FG 640 IFJ>7THEN PRINT"SATISFA
       CTORY PLAY!":W=-1:GOTO7
       00
HA 650 IFJ>5THEN PRINT"GOOD!":
       W=4:GOTO700
RH 660 IFJ>3THEN PRINT"GREAT!"
       :W=5:GOTO700
BQ 670 IFJ>2THEN PRINT"WELL PL
       AYED!":W=11:GOTO700
FH 680 IFJ>1THEN PRINT"MISSED!
       ":W=6:GOTO700
BX 690 IFJ>0THEN PRINT"DID IT!
       ":W=6:GOTO700
EB 700 PRINT"{3 DOWN}WANT TO S
       AVE? (Y/N)"
QF 710 GETK$:IF K$=""THEN710
JB 720 IF K$<>"N"ANDK$<>"Y"THE
       N 710
KQ 730 IFK$="N" THEN 800
XF 740 INPUT"FILENAME";N$:INPU
       T"YOUR NAME";M$
SR 750 OPEN15,8,15:OPEN2,8,2,"
       @0:"+N$+",S,W"
HG 760 PRINT#2,M$:FORV=1TOU+1
JB 770 PRINT#2,F(V)
RM 780 PRINT#2,G(V):NEXT V
JS 790 CLOSE2:CLOSE15
AA 800 PRINT"{3 DOWN}WANT TO P
       LAY? (Y/N)"
FB 810 IFW<0THENGOTO840
JD 820 QZ=4*40:FORK=QZ+55336TO
       QZ+55336+W:POKEK,V:V=V+
       1:IFV>255THENV=0
QP 830 NEXT K
AM 840 GET M$:IF M$="" THEN 81
       0
CG 850 IF M$="N"THENPRINT"
       {CLR}":END
PB 860 IF M$="Y" THENGOTO 120
JQ 870 GOTO 840
MK 880 JJ=49152:JH=INT(JJ/256)
       :JL=JJ-JH*256:POKE785,J
       L:POKE786,JH
SC 890 FORK=JJTOJJ+67:READ Y:P
       OKEK,Y:NEXT
RQ 900 DATA 120,70,97,176,21,1
       69,127,141
FS 910 DATA 0,220,173,1,220,20
       1,255,240
QE 920 DATA 4,169,31,208,13,17
       3,0,220
PC 930 DATA 16,8,169,255,141,0
       ,220,173
XC 940 DATA 1,220,41,31,73,15,
       208,4
HH 950 DATA 133,97,240,23,133,
       98,169,136
BA 960 DATA 133,97,169,0,133,9
       9,133,100
CX 970 DATA 133,101,133,102,19
       8,97,6,98
CF 980 DATA 16,250,88,96
CE 990 RETURN
QB 1000 PRINT"{CLR}{2 DOWN}PLA
        Y, WATCH A REPLAY (P/R
        )"CHR$(142)
ER 1010 GETF$:IFF$=""THEN1010
RR 1020 IFF$="P" THEN 1050
KR 1030 IFF$="R"THEN 1120
HS 1040 GOTO 1010
JQ 1050 PRINT"{CLR}{2 DOWN}ONE
         OR TWO PLAYER GAME? (
        1/2)"
GR 1060 GET I$::IFI$=""THEN106
        0
PB 1070 IFI$="1"THEN I=0:GOTO1
        100
DG 1080 IFI$="2" THENI=1:GOTO
        {SPACE}990
QH 1090 GOTO 1060
JQ 1100 H=0:PRINT"{2 DOWN}JOYS
        TICK IN PORT 2"
SP 1110 PRINT"PRESS "CHR$(34)"
        @"CHR$(34)" TO END":FO
        R E=1 TO 900:NEXT:RETU
        RN
JF 1120 U=0:N=0:INPUT"FILENAME
        ";N$
QR 1130 OPEN15,8,15:OPEN2,8,2,
        "0:"+N$+",S,R":INPUT#2
        ,M$
MK 1140 GOTO 1330
EA 1150 INPUT#2,F(U),G(U)
DS 1160 IFF(U)=-1 THEN U=U-1:G
        OTO1180
```

```
KF 1170 U=U+1:GOTO 1150
FR 1180 H=-1:PRINT"{CLR}":GOTO
        150
XD 1190 S=1475:TI%=200
XH 1200 FOR V=0TOU
GJ 1210 E=S+G(V):GETA$
KR 1220 IF F(V)=0THEN POKES,PE
        EK(S)-128:POKE E,PEEK(
        E) +128:S=S+G(V)
EG 1230 IF F(V)=1 THENPOKES,32
        :POKEE,32:POKEE+G(V),2
        15 :S=S+G(V)+G(V):GOSU
        B560
JP 1240 IFA$="F"THENTI%=TI%-50
MF 1250 IFA$="L"THENTI%=TI%+50
CJ 1260 IF TI%>1000THENTI%=100
        0
RA 1270 IF TI%<0THENTI%=0
HR 1280 FORA=1TOTI%:NEXT:NEXTV
        :PRINT"BY:";M$
QH 1290 PRINT"{2 DOWN}{RVS}PRE
        SS SPACE BAR TO CONTIN
        UE"
HJ 1300 GETA$:IFA$<>" "THEN 13
        00
JA 1310 CLOSE2:CLOSE15
SR 1320 RESTORE:GOTO 110
XM 1330 INPUT#15,EN,EM$,ET,ES
XQ 1340 IF EN>0THENPRINTEM$:GO
        TO 1360
AH 1350 GOTO 1150
XH 1360 CLOSE15:CLOSE2:GOTO 11
        20
```

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MEDIUM-DENSITY DRIVER

By Matthew Spinks

Over the years, I've done a good deal of graphics work on my computer that has included plotting graphs and drawing pictures. I've always been frustrated by the high-resolution graphics system used by the 64. It's generally more trouble than it's worth when all you want to do is plot a simple graph or picture.

At the other extreme of the graphics spectrum, the resolution of the normal text screen is usually too low to provide the detail required by straightforward graphs or pictures. What is needed is a graphics mode between the two extremes, a mode which offers a reasonable resolution but avoids the complexity associated with bitmapped graphics.

Such a graphics mode does exist. If you enter PRINT CHR$(190): PRINT CHR$(188): PRINT CHR$(187): PRINT CHR$(172), you'll see four characters on the screen. Each one fills one quadrant of a whole text cell. These characters enable the normal text screen to be turned into a medium-resolution graphics screen which has twice the resolution of the ordinary text screen. This format provides new screen dimensions of 80 points horizontally by 50 points vertically, an overall resolution of 4000 plot points.

This medium-density graphics mode has an attractive, chunky feel to it and is excellent for plotting graphs and drawing simple pictures. It also allows text and graphics to coexist peacefully. Unlike bitmap mode, the medium-density graphics mode requires no extra memory to store graphics data, and it requires only a small graphics driver. Perhaps best of all, the medium-density graphics mode is simple and easy to use.

Entering the Program

Medium-Density Driver is a short routine written entirely in machine language. To enter it, use *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: 033C
Ending address: 03D3

When you've finished typing, be sure to save a copy of the program before exiting *MLX*.

The driver sits safely in the cassette buffer, leaving the overused area at 49152 ($C000) free for your own programs. This lets you plot individual points to the normal text screen.

After you've typed in a copy of the driver, you can then use it to create your own medium-density graphic screens. To use it, simply load the machine language program with the ,8,1 extension and type NEW. This NEW command is necessary because it resets some important BASIC pointers.

The Plot Thickens

To plot graphs or pictures, simply use the command SYS828, *x, y, on/off, color*. Here *x* and *y* are the screen coordinates for points to be plotted. The range is 0–79 on the *x*-axis and 0–49 along the *y*-axis. On/off is a flag which determines whether or not a point is plotted or erased. If on/off = 1, a point will be plotted. If on/off = 0, a point will be erased. Color, of course, is the color of the point to be plotted and should be in the range 0–15, representing the standard Commodore colors.

For example, to plot a white point at the top left-hand corner of the screen, enter the following command:

SYS828, 0, 0, 1, 1

Similarly, to erase a point at the opposite corner (the bottom right-hand corner), the command SYS828, 79, 49, 0, 1 would be used. Note that despite the fact that we are erasing a point, the color must still be specified. This is necessary because the program checks all parameters, and if any value falls outside the ranges mentioned or if any parameter is missing, you'll get a SYNTAX ERROR.

Points to Ponder

Because the medium-density graphics mode uses the normal text screen and color memories, setting the color of one point will also affect the color of the neighboring three points. Some care must be taken when plotting in more than one color to achieve the desired effect. Although this may seem like a drawback at first, it does have the advantage of allowing text and standard Commodore graphics characters to be integrated onto the graphics screen.

Text can be printed and character values can be poked to the screen in the normal way. Note, however, that with the graphics driver you can neither erase text or nongraphics characters nor plot over text or other characters. This prevents text and other graphics from being accidentally erased.

A Demonstration

Demo is a short demonstration program written entirely in BASIC. It will give you some idea of how you can use the driver. To help prevent typing errors, use *The Automatic Proofreader* to type it in; see "Typing Aids" elsewhere in this section.

Demo plots Lissajous figures. These are a series of curves found by combining perpendicular harmonic motions. They are commonly exhibited by feeding two harmonic frequencies into an oscilloscope's *X* and *Y* input circuits. (Don't worry. You don't have to understand Lissajous figures to see how the program works. They're easier to demonstrate than to explain.)

Before running the demonstration, make sure *Driver* is already in memory. When running the demonstration, try experimenting with the values the program asks for. Entering 1,2 will produce entirely different results than will 2,1.

The patterns produced will be in monochrome, but you can easily add color by changing the value of the color variable, C, in line 270. For a rainbow of color, try *Demo* with these lines added.

```
262 C=C+1
264 IF C=16 THEN C=0
```

Now that you have an idea of how *Medium-Density Driver* works, try creating some figures or patterns of your own.

MEDIUM DENSITY DRIVER

```
033C:A0 03 8C D2 03 20 00 E2 8D
0344:8A AC D2 03 D9 BE 03 B0 C5
034C:6E 99 D3 03 88 10 EB A9 A0
0354:02 8D D7 03 4E D5 03 90 4A
035C:06 0E D7 03 0E D7 03 4E 38
0364:D6 03 90 03 4E D7 03 AE 5F
036C:D5 03 20 F0 E9 AD D6 03 E7
0374:18 65 D1 85 D1 90 02 E6 2E
037C:D2 20 24 EA A0 00 B1 D1 61
0384:A2 0F DD C2 03 F0 04 CA 36
038C:10 F8 60 AD D4 03 F0 1A 6E
0394:E0 0F F0 15 AD D3 03 91 92
039C:F3 8A 2C D7 03 D0 0A 18 C9
03A4:6D D7 03 AA BD C2 03 91 F2
03AC:D1 60 8A 2C D7 03 F0 F9 6E
03B4:38 ED D7 03 4C A7 03 4C D0
03BC:08 AF 10 02 32 50 20 7C 64
03C4:7E E2 6C E1 7F FB 7B FF 51
03CC:61 EC 62 FE FC A0 00 00 65
```

DEMO

```
CX 100 REM DRIVER DEMONSTRATIO
       N
BF 110 REM COPYRIGHT 1991 - CO
       MPUTE PUBLICATIONS INTL
        LTD - ALL RIGHTS RESER
       VED
JB 120 REM MAKE SURE DRIVER IS
        IN MEMORY!
DK 130 :
KX 135 PI=3.14159
JS 140 POKE 53280,11:POKE 5328
       1,11
GK 150 PRINTCHR$(147)CHR$(5)
RD 160 PRINTTAB(11)"LISSAJOUS
       {SPACE}FIGURES"CHR$(17)
RX 170 PRINT"PRESS ANY KEY AFT
       ER VIEWING FIGURE"
QE 180 PRINTCHR$(17)"ENTER ANY
        TWO NUMBERS, EACH"
BH 190 INPUT"WITH VALUES LESS
       {SPACE}THAN 5";X,Y
DR 200 IF X>5 OR Y>5 THEN 180
HP 210 PRINTCHR$(147)
XM 220 FL=1:GOSUB 260
MR 230 POKE 198,0:WAIT 198,1
QP 240 FL=0:GOSUB 260
SF 250 END
RR 260 FOR T=1 TO 2*PI*100+(10
       *PI*(X+Y))
JK 270 SYS 828,(1+SIN(X*T))*40
       ,(1+COS(Y*T))*25,FL,C
SD 280 NEXT
SK 290 RETURN
```

Matthew Spinks, who wrote *Loader-Maker* (May 1991), lives in Erica, Victoria, Australia. ❐

RAPIDFORMAT 128

By Mahmood Hasan Merchant

A number of fast formatting programs have been around for the 64 ever since the 1541 disk drive was introduced by Commodore. These programs greatly improve the performance of the drive in terms of time saved.

Commodore probably took a lesson from these programmers and added a much more efficient format routine into its 1571 disk drive. The drive formats a double-sided disk in 41 seconds, but wouldn't we all appreciate an even faster procedure? *RapidFormat 128* should do the trick.

RapidFormat 128 is an easy-to-use, prompt-driven program for the 128 that cuts almost in half the time required to format all 70 tracks of a double-sided disk. It will format a single-sided disk in a mere 12 seconds.

Getting Started

RapidFormat 128 is written entirely in BASIC. To help prevent typing errors, use *The Automatic Proofreader* to type it in; see "Typing Aids" elsewhere in this section. When you've finished typing, be sure to save a copy of the program. When you type RUN, the data will be read and written to disk as *RapidFormat*, a machine language program.

Once *RapidFormat* has been generated, it can be loaded and activated with the command RUN "RAPIDFORMAT". At this point you should remove the disk containing the program and insert the disk which is to be formatted. You are prompted to indicate whether you wish to format only the top side (for 1541 use) or both sides of the disk. If you frequently need to access your files both in the 64 and 128 modes, then it may be a good idea to format only the top side of the disk. This will prevent the annoying *Illegal Track or Sector* error message which results when part of the file being accessed lies on a disk's second side.

To V or Not to V?

Next you have to specify whether you wish to verify the format. If verification is enabled, each sector on every track is read and checked for errors. If any are spotted, they are reported by the program. However, choosing this option will slow down the formatting somewhat. To format a disk at maximum speed, omit the verify option.

This option is provided to meet the needs of various users. Write errors occur rarely with the 1571, and if you have reasonable faith in the head alignment of your drive (1571s are more trustworthy in this regard than older 1541s), then you may save time by choosing not to verify. As long as the disk used is at least of average quality, there shouldn't be any problems.

If, however, the idea of not verifying makes you nervous, then you have the option. I would strongly advise you to verify if you are using generic or low-quality disks or if you wish to format both sides of a disk which is certified only for single-side use. In these cases, the caution and the extra time are probably worth it.

Enter a name for the disk as you would in a conventional format routine. Be sure it is no longer than 16 characters and is followed by a 2-character ID. This ID is written as a sort of signature to every sector on the disk, and its main purpose is to indicate to the drive when a disk has been changed.

Once you press Return, the disk will

start to format. Make sure that the disk containing *RapidFormat* is not in the drive. To be safe, put write-protect tabs on disks that contain programs or valuable data. *RapidFormat* checks for write-protect tabs. If it finds one, the disk will not be formatted, and an error message will be displayed. Using write-protect tabs on all valuable disks is a good practice to follow.

How It Works

RapidFormat works by reprogramming the disk drive. It transfers a section of code to the buffer at address $0500. Once activated, the program copies the standard format routine from the drive ROM to the internal RAM and makes a few changes to it.

If the verify option is not chosen, these routines are bypassed. Additional time is saved by using a fixed value to space out sectors on all tracks. The standard format routine writes and rewrites on each track to calculate the individual length of gaps between sectors.

This modification, coupled with faster changing of tracks, brings about the speed improvement of *RapidFormat*. Disks formatted with this program work just as well as those formatted using the standard routine.

RAPIDFORMAT 128

```
SH 10 BANK1:SCNCLR:COLOR0,15:C
      OLOR4,15:COLOR5,2
EC 20 PRINTCHR$(18)"
      {16 SPACES}786/110
      {17 SPACES}";
PC 30 PRINT"{11 SPACES}RAPIDFO
      RMAT - 1571{11 SPACES}";
MQ 40 PRINT" COPYRIGHT 1991 -
      {SPACE}COMPUTE PUBS INTL
       LTD ";
DE 50 PRINT"{11 SPACES}ALL RIG
      HTS RESERVED{10 SPACES}"
      ;
AG 70 SA=7169:EA=8153:DT=16
DA 80 PRINTCHR$(17)SPC(14)"REA
      DING ML!"CHR$(17)CHR$(17
      )
PF 90 FORI=0TODT-2:READ D$:D=D
      EC(D$)
GS 100 CHAR1,11,10:PRINT"LOADI
       NG AT:{2 SPACES}";HEX$(
       SA+I)
QM 110 POKESA+I,D:CK=CK+D:NEXT
       :READ D$:D=DEC(D$):CK=C
       KAND255
DB 120 IFD<>CKTHENBEGIN
QK 130 :PRINTCHR$(17)"DATA ERR
       OR IN LINE";
KD 140 :PRINTPEEK(65)+256*PEEK
       (66):STOP
FR 150 BEND
PR 160 SA=SA+DT-1:CK=0:IFSA<=E
       AGOTO90
JK 170 PRINTCHR$(17)CHR$(17)"P
       RESS "CHR$(18)" RETURN
       {SPACE}";
XA 180 PRINTCHR$(146)" TO SAVE
        'RAPIDFORMAT'";:INPUTD
       $
XA 190 BSAVE"RAPIDFORMAT",B1,P
       (7169) TO P(EA+1):PRINT
       DS$
MB 200 END
QR 210 :
JS 220 :
FC 1000 DATA 49,1C,0A,00,99,22
        ,93,22,A3,35,29,22,12,
        20,52,86
BH 1010 DATA 20,41,20,50,20,49
        ,20,44,20,46,20,4F,20,
        52,20,05
HM 1020 DATA 4D,20,41,20,54,20
        ,2D,20,31,35,37,31,20,
        92,22,31
HK 1030 DATA 3A,20,4E,24,B2,22
        ,22,3A,56,24,B2,22,22,
        3A,49,EF
QK 1040 DATA 44,24,B2,22,22,3A
        ,53,24,B2,22,22,00,74,
        1C,14,A9
XE 1050 DATA 00,99,A3,35,29,22
        ,12,20,20,20,28,31,39,
        39,30,29
XM 1060 DATA 29,20,20,4D,41,48
        ,4D,4F,4F,44,20,4D,45,
        52,43,B5
XE 1070 DATA 48,41,4E,54,20,20
        ,20,92,22,00,9E,1C,1E,
        00,99,B0
KF 1080 DATA 22,11,11,46,4F,52
        ,4D,41,54,20,54,59,50,
        45,3A,A9
BS 1090 DATA 20,20,12,20,31,20
        ,92,20,20,42,4F,54,48,
        20,53,35
FG 1100 DATA 49,44,45,53,11,22
        ,00,BE,1C,28,00,99,A3,
        31,34,FB
SX 1110 DATA 29,22,12,20,32,20
        ,92,20,20,54,4F,50,20,
        53,49,50
PQ 1120 DATA 44,45,20,4F,4E,4C
        ,59,22,00,D4,1C,32,00,
        99,A3,6B
XC 1130 DATA 31,35,29,22,11,31
        ,9D,9D,9D,22,3B,3A,85,
        53,24,5D
XB 1140 DATA 00,EC,1C,3C,00,8B
        ,A8,53,24,B2,22,31,22,
        AF,A8,6C
PX 1150 DATA 53,24,B2,22,32,22
        ,89,35,30,00,FF,1C,41,
        00,8B,74
PH 1160 DATA 53,24,B2,22,32,22
        ,A7,53,24,B2,22,30,22,
        00,12,F5
AJ 1170 DATA 1D,43,00,53,24,B2
        ,C7,28,C6,28,53,24,29,
        AB,34,E5
XB 1180 DATA 38,29,00,38,1D,46
        ,00,99,22,11,11,56,45,
        52,49,0F
EJ 1190 DATA 46,59,3F,20,28,59
        ,2F,4E,29,22,A3,31,35,
        29,22,9B
GS 1200 DATA 4E,9D,9D,9D,22,3B
        ,3A,85,4E,24,00,50,1D,
        50,00,70
AB 1210 DATA 8B,A8,4E,24,B2,22
        ,59,22,AF,A8,4E,24,B2,
        22,4E,DF
EX 1220 DATA 22,89,31,30,00,6A
        ,1D,55,00,56,24,B2,22,
        30,22,88
BB 1230 DATA 3A,8B,4E,24,B2,22
        ,59,22,A7,56,24,B2,22,
        31,22,CE
XR 1240 DATA 00,7D,1D,57,00,56
        ,24,B2,C7,28,C6,28,56,
        24,29,9D
MX 1250 DATA AB,34,38,29,00,94
        ,1D,5A,00,99,22,11,11,
        4E,41,B7
XX 1260 DATA 4D,45,22,A3,31,33
        ,29,3B,3A,85,4E,24,00,
        AD,1D,1A
PK 1270 DATA 64,00,8B,C3,28,4E
        ,24,29,B2,30,B0,C3,28,
        4E,24,64
HD 1280 DATA 29,B1,31,36,89,31
        ,30,00,C2,1D,6E,00,99,
        22,11,44
BB 1290 DATA 49,44,22,A3,31,33
        ,29,3B,3A,85,49,44,24,
        00,D4,5E
PM 1300 DATA 1D,78,00,8B,C3,28
        ,49,44,24,29,B3,B1,32,
        89,31,35
AX 1310 DATA 30,00,DE,1D,82,00
        ,9E,37,37,32,30,00,FB,
        1D,8C,BF
EH 1320 DATA 00,99,A3,31,34,29
        ,22,11,11,11,12,20,46,
        4F,52,38
RK 1330 DATA 4D,41,54,54,49,4E
        ,47,20,92,22,00,26,1E,
        96,00,C2
EK 1340 DATA 9F,31,35,2C,38,2C
        ,31,35,3A,98,31,35,2C,
        22,55,D6
GA 1350 DATA 34,22,53,24,56,24
        ,49,44,24,22,2C,22,4E,
        24,3A,14
FE 1360 DATA A0,31,35,3A,99,44
        ,53,24,00,00,00,A6,BA,
        A0,0F,A3
XD 1370 DATA A9,00,20,38,F7,85
        ,B7,20,C0,FF,A6,B8,20,
        C9,FF,59
ME 1380 DATA 20,7D,FF,55,30,3E
        ,52,01,00,20,CC,FF,A9,
        05,A0,EB
RB 1390 DATA 00,85,FB,84,FA,A2
```

```
         ,0A,86,FE,A9,AF,85,FC,
         A9,1E,CE
XA 1400  DATA 85,FD,A5,BA,20,3E
         ,E3,A9,6F,20,D2,E4,A9,
         4D,20,26
BH 1410  DATA 03,E5,A9,2D,20,03
         ,E5,A9,57,20,03,E5,A5,
         FA,20,8D
DH 1420  DATA 03,E5,A5,FB,20,03
         ,E5,A9,20,20,03,E5,A0,
         00,B1,B2
EF 1430  DATA FC,20,03,E5,C8,C0
         ,20,90,F6,20,26,E5,18,
         A5,FC,16
EE 1440  DATA 69,20,85,FC,90,02
         ,E6,FD,18,A5,FA,69,20,
         85,FA,3E
RR 1450  DATA 90,02,E6,FB,C6,FE
         ,D0,AF,4C,E7,FF,4C,46,
         05,20,9F
CJ 1460  DATA C2,05,20,7C,87,A2
         ,00,86,0B,A2,24,86,0A,
         AD,02,22
BD 1470  DATA 02,85,1F,F0,08,A9
         ,B0,85,02,A5,02,30,FC,
         A2,01,F4
CR 1480  DATA 86,0A,A9,E0,85,02
         ,A5,02,30,FC,C9,02,90,
         03,4C,1D
HG 1490  DATA 0A,E6,20,05,F0,A9
         ,24,A6,1F,F0,02,A9,47,
         A0,07,20
RR 1500  DATA 8C,7A,02,4C,73,A7
         ,AD,00,1C,29,10,D0,05,
         A9,08,F6
SM 1510  DATA 4C,B5,99,A9,60,85
         ,20,A5,0A,85,51,85,67,
         20,4B,24
MG 1520  DATA F2,85,43,20,50,06
         ,A5,1F,F0,10,20,F8,93,
         18,A5,5C
BR 1530  DATA 51,69,23,85,51,20
         ,50,06,20,F5,93,A6,0A,
         E8,E0,49
AG 1540  DATA 24,D0,12,86,14,20
         ,E7,87,C6,14,D0,F9,A2,
         12,86,0B
PG 1550  DATA 0A,A9,01,4C,B5,99
         ,86,0A,BD,08,94,85,44,
         AD,00,AD
GP 1560  DATA 1C,29,9F,05,44,8D
         ,00,1C,20,DF,87,20,DF,
         87,A5,87
HJ 1570  DATA 1F,D0,03,4C,46,05
         ,C6,64,C6,64,20,F8,93,
         20,DF,87
JC 1580  DATA 87,20,DF,87,20,F5
         ,93,4C,46,05,20,FE,05,
         A9,E9,01
RC 1590  DATA A0,06,8D,77,07,8C
         ,78,07,A9,01,8D,CD,06,
         A9,0A,79
HQ 1600  DATA 8D,20,06,A9,08,8D
         ,26,06,A9,C5,A0,07,8D,
         B9,07,7F
PX 1610  DATA 8C,BA,07,A9,60,8D
         ,EE,07,AD,03,02,D0,05,
         A9,4C,54
KX 1620  DATA 8D,9A,07,60,B1,14
         ,91,2C,C8,60,AD,04,02,
         AC,05,9C
AM 1630  DATA 02,85,12,84,13,A9
         ,93,A0,9B,85,14,84,15,
         A9,06,88
DC 1640  DATA A0,50,85,2D,84,2C
         ,A0,00,20,F8,05,D0,FB,
         E6,15,D5
FF 1650  DATA E6,2D,20,F8,05,C0
         ,9E,D0,F9,60,00,00,00,
         00,00,B7
```

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TYPING AIDS

MLX, the machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. These labor-saving utilities are on each Gazette Disk and printed in issues of Gazette through June 1990.

If you don't have access to a back issue or to one of our disks, write and we'll send you free copies of both of these handy utilities. We'll also include instructions on how to type in Gazette programs. Please enclose a self-address, stamped envelope. Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Greensboro, North Carolina 27408.

Gazette is looking for utilities, games, applications, educational programs, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it on disk to

Gazette Submissions Reviewer
COMPUTE Publications
324 W. Wendover Ave.
Ste. 200
Greensboro, NC 27408

Please enclose an SASE if you wish to have the materials returned.

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, Gazette Disk offers bonus programs and original 64 and 128 artwork. Here are the programs featured this month.

Super Cataloguer 128

Diego Martin Zamboni
Mexico City, Mexico

Catalogue all of your software (up to 2500 titles) quickly and easily with this outstanding utility for the 128. An 80-column monitor is required.

Read a disk directory, select which files you wish to add to the list, and then save them, sort them, search through them, and delete names at the touch of a key. If you can't recall the contents of a file, the program will list it to the screen. It even works with sequential, user, and relative files.

Super Cataloguer 128 is also a great disk manager. You can edit filenames and delete files, whole disks, or even portions of disks. The program provides memory information, prints lists in several modes, and much more. This is one utility all 128 users should have.

Spanish Vocabulary Quiz

Christopher M. Stoy
Edensburg, PA

To help you use *Spanish Vocabulary Quiz*, one of this issue's type-in programs, see page G-25, we have included ten vocabulary files, containing dozens of English words and their Spanish equivalents. Load and use any of these files from the program's main menu.

MLX

Machine Language Entry Program for Commodore 64

Ottis R. Cowper

Type in and save some copies of *MLX*—you'll want to use it to enter future ML programs from Gazette. When you're ready to enter an ML program, load and run *MLX*. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the *MLX*-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in *MLX*) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters *A–F*. But even if you know nothing about ML or hex, you should have no trouble using *MLX*.

After you've entered the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option. A functions menu will appear. The first option in the menu is Enter Data. If you're just starting to type in a program, pick this. Press the E key and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you stopped typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing Return alone when asked for the address. (You can get back to the menu from most options in the program by pressing Return with no other input.)

Entering a Listing

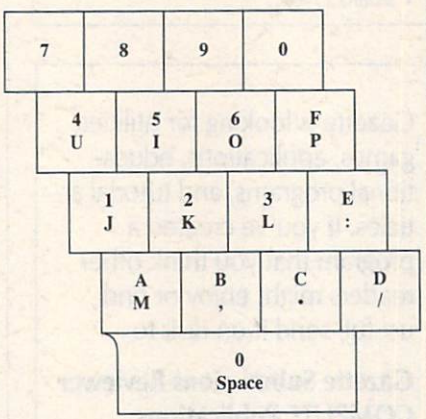
Once you're in Enter mode, *MLX* prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an *MLX*-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows *MLX* to check your typing.

When you enter a line, *MLX* recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if *MLX* detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; *MLX* automatically inserts these for you. You *do not* press Return after typing the last number in a line; *MLX* automatically enters and checks the line after you type the last digit.

64 MLX Keypad



Only the numerals 0–9 and the letters *A–F* can be entered. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, a numeric keypad function is included. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration. *MLX* checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, *MLX* will catch your mistake. There is one error that can slip past *MLX:* Because of the checksum formula used, *MLX* won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the Inst/Del key to delete the character to the left of the cursor. If you mess up a line badly, press Clr/Home to start the line over. The Return key is also active, but only before any data is typed on a line. Pressing Return at this point returns you to the command menu. After you type a character, *MLX* disables Return until the cursor returns to the start of a line. Remember, press Clr/Home to quickly get to a line-number prompt. To make corrections in a line that *MLX* has redisplayed for editing, compare the line on the screen with the one printed in the listing and then move the cursor to the mistake and type the correct key. The cursor-left and -right keys provide the normal cursor controls. (The Inst/Del key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, Return is active; pressing it tells *MLX* to recheck the line. You can press the Clr/Home key to clear the entire line if you want to start from scratch or if you want to get to a line-number prompt to use Return to get back to the menu.

Display Data

The second menu choice, Display Data, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, *MLX* asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. *MLX* displays program lines until it reaches the end of the program, at

which point the menu is redisplayed. You can pause the display by pressing the space bar. (*MLX* finishes printing the current line before halting.) Press the space bar again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press Return.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are Save File and Load File. When you press S or L, *MLX* asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. This is normal behavior. *MLX* opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Also note that the drive prefix 0: is added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for save-with-replace, so be sure to give each version saved a different name.

Remember that *MLX* saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When you're saving a partially completed listing, make sure to note the address where you stopped typing.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. It also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran *MLX;* LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started *MLX;* and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started *MLX*. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun *MLX*, being careful to enter the correct starting and ending addresses.

The Quit menu option has the obvious effect—it stops *MLX* and enters BASIC. The Run/Stop key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, Run/Stop–Restore also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or press any other key to return to the menu. After quitting, you can type RUN again and reenter *MLX* without losing your data, as long as you don't use the Clear Workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready for the results. Refer to the corresponding article for details on loading and running the program.

An Ounce of Prevention

Don't take chances—use *The Automatic Proofreader* to type the new *MLX*, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the display option to verify that the data has been entered correctly. Test the save and load options to ensure that you can recall your work from disk.

64 MLX

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
       I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
       4=254:Z5=255:Z6=256:Z7=
       127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
       :BS=PEEK(55)+Z6*PEEK(56
       ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
       :S$=" ":D$=CHR$(20):Z$=
       CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
       +23:POKE I,0:NEXT:POKE
       {SPACE}SD+24,15:POKE 78
       8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
       R$(8):POKE 53280,15:POK
       E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
       {2 SPACES}{8 @}
       {2 SPACES}"SPC(28)"
       {2 SPACES}{OFF}{BLU} ML
       X II {RED}{RVS}
       {2 SPACES}"SPC(28)"
       {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
       {3 SPACES}COMPUTE!'S MA
       CHINE LANGUAGE EDITOR
       {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
       RESS{4}";:GOSUB300:SA=A
       D:GOSUB1040:IF F THEN18
       0
GF 190 PRINT"{BLK}{2 SPACES}EN
       DING ADDRESS{4}";:GOSUB
       300:EA=AD:GOSUB1030:IF
       {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
       R WORKSPACE [Y/N]{4}";A
       $:IF LEFT$(A$,1)<>"Y"TH
       EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
       ING...";:FORI=BS TO BS+
       EA-SA+7:POKE I,0:NEXT:P
       RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
       {BLK}{RVS} MLX COMMAND
       {SPACE}MENU {DOWN}{4}":
       PRINT T$"{RVS}E{OFF}NTE
       R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
       LAY DATA":PRINT T$"
       {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
        FILE":PRINT T$"{RVS}Q
       {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
       MID$("EDLSQ",I,1)THEN A
       =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
       90,700,280:GOSUB1060:GO
       TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
       T"{DOWN}{4}ARE YOU SURE
        [Y/N]";A$:IF LEFT$(A$,
       1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
       LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
       =MID$(IN$,3):GOSUB320:A
       D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
       $(B$,J,1):B=ASC(A$)-C4+
       (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
       0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
       H$,B+1,1);:B=A-B*C6:PRI
       NT MID$(H$,B+1,1);:RETU
       RN
RR 360 A=INT(AD/Z6):GOSUB350:A
       =AD-A*Z6:GOSUB350:PRINT
       ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
```

```
      CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
       {4}";:GOSUB300:IF IN$<>
       N$ THEN GOSUB1030:IF F
       {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
       {SPACE}":GOSUB400:IF IN
       $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
        THEN PRINT IN$:PRINT"
       {UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$
       =S$:FOR J=1 TO 2:IF F T
       HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<
       24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A
       $>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-
       3*(A$=".")-4*(A$="/")-5
       *(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":
       ")-9*(A$="U")-10*(A$="I
       ")-11*(A$="O")-12*(A$="
       P")
CM 487 A=A-13*(A$=S$):IF A THE
       N A$=MID$("ABCD123E456F
       0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J
       =1)OR F)THEN PRINT B$;:
       J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
       NT B$:J=2:NEXT:I=24:NEX
       T:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF TH
       ENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
       ((I=0)AND(J=1))THEN GOS
       UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;
       :J=2-J:IF J THEN PRINT
       {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
       {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:INPUT#3,IN$
       :IF IN$=N$ THEN CLOSE3:
       GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
       MID$(IN$,I):GOSUB320:IF
        I<25 THEN GOSUB380:A(I
       /3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
       B1060:PRINT"{BLK}{RVS}
       {SPACE}ERROR: REENTER L
       INE {4}":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
       R I=0 TO 7:POKE B+I,A(I
       ):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
       LOSE3:PRINT"{DOWN}{BLU}
       ** END OF ENTRY **{BLK}
       {2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
       {SPACE}DISPLAY DATA ":G
       OSUB400:IF IN$=N$ THEN2
       20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
        {RVS}SPACE{OFF} TO PAU
       SE, {RVS}RETURN{OFF} TO
        BREAK{4}{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
       I=BTO B+7:A=PEEK(I):GOS
       UB350:GOSUB380:PRINT S$
       ;
CC 640 NEXT:PRINT"{RVS}";:A=CK
       :GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
       ENPRINT"{DOWN}{BLU}** E
       ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
       SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
       UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
       {SPACE}DATA ":OP=1:GOTO
       710
PC 700 PRINT"{DOWN}{RVS} SAVE
       {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILE
       NAME{4}";IN$:IF IN$=N$
       {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
       {RVS}T{OFF}APE OR {RVS}
       D{OFF}ISK: {4}";
FP 730 GET A$:IF A$="T"THEN PR
       INT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
       ,15,"I0:":B=EA-SA:IN$="
       0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":G
       OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
       H*256):PRINT#1,CHR$(AL)
       ;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
       R$(PEEK(BS+I));:IF ST T
       HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
       O940
GS 800 GOSUB1060:PRINT"{DOWN}
       {BLK}ERROR DURING SAVE:
       {4}":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
       OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
       $)+256*ASC(B$+Z$):IF AD
       <>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
       OKE BS+I,ASC(A$+Z$):IF(
       I<>B)AND ST THEN F=2:AD
       =I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
       >0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
        CLOSE1:CLOSE15:GOSUB10
       60:PRINT"{RVS}ERROR: "A
       $
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
       187,PEEK(FA+3):POKE188,
       PEEK(FA+4):IFOP=0THEN92
       0
HJ 890 SYS 63466:IF(PEEK(783)A
       ND1)THEN GOSUB1060:PRIN
       T"{DOWN}{RVS} FILE NOT
       {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
       30):IF AD<>SA THEN F=1:
       GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
       2)-1:F=F-2*(A<EA)-3*(A>
       EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
       OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
       UB1010:ON OP GOTO950:SY
       S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
        SAVE COMPLETED **":GOT
       O220
XP 950 POKE147,0:SYS 63562:IF
       {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
        LOAD COMPLETED **":GOT
       O220
DP 970 GOSUB1060:PRINT"{BLK}
       {RVS}ERROR DURING LOAD:
       {DOWN}{4}":ON F GOSUB98
       0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
       G ADDRESS (";:GOSUB360:
       PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
       AD=SA+AD:GOSUB360:PRINT
        D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
       ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
       *256):POKE193,AL:POKE1
       94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
       *256):POKE174,AL:POKE1
       75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
       1050
CR 1040 IF (AD>511 AND AD<6528
       0) THEN GOSUB1080: F=0
       : RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
       {SPACE}INVALID ADDRESS
        {DOWN}{BLK}":F=1:RETU
       RN
AR 1060 POKE SD+5,31:POKE SD+6
       ,208:POKE SD,240:POKE
       {SPACE}SD+1,4:POKE SD+
       4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
       TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
       240:POKE SD,0:POKE SD+
       1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
       KE SD+4,0:POKE SD,0:PO
       KE SD+1,0:RETURN
```

Take a sneak peek at what's up in The Treehouse, get the jump on Reader Rabbit II, and peruse in-depth reviews of many more.

THE TREEHOUSE

Once your child encounters *The Treehouse,* Brøderbund Software's excellent follow-up to the award-winning *Playroom,* the fun and learning start right away. An interactive chalkboard boasts six-color click-and-drag drawing capability. A small clock tells time. But besides these surprises, you get four detailed games.

Unlike anything else for kids, *Treehouse*'s music synthesizer screen displays an orchestra pit with illustrations and simple descriptions of the instruments. The program also plays a sample note from each instrument. But this is no simple playback machine. It's truly interactive and inspired. Children can store songs in a songbook and print them out, look at a few notes, or read two lines of music. They can choose which instrument will play their music, with such exotic choices as bottles and kazoos. Best of all, children can write music by selecting note and rest length and then clicking on a piano key.

In addition, *Treehouse* includes a very clever music maze game that plays simple musical phrases (two or three notes) and then requires you to pick the correct one out of four options. A correct choice earns a note, and completion of the maze is rewarded with a song.

Another *Treehouse* game teaches counting, with chips or cash as options. The third part consists of an animal guessing game, which teaches deductive reasoning, and an animated puppet theater that encourages storytelling. All of the games boast excellent graphics and sound. The synthesized music especially is very true to life, provided you have an Ad Lib or Sound Blaster card.

The Treehouse should be on store shelves by early autumn. Get your copy before the leaves begin to fall.

BETH ANN MURRAY

READER RABBIT II

This excellent successor to *Reader Rabbit* combines whimsy and word skills in just the right measure to keep your child interested and learning. The entire game has fantastic graphics appeal, and its fanciful demeanor hides, but doesn't detract from, its educational content.

Give your child an educational boost with an entertaining visit to this arboreal playroom.

Reader Rabbit II *playfully teaches youngsters word association.*

Reader Rabbit II consists of four games, all designed for early readers. The first, *Word Mine,* teaches the formation of compound words and words that begin or end with two-letter blends (like *match*). Help your bunny pal and his mole miner friends put together words and fill a rail car with word crystals. Youngsters will enjoy the rewards of collecting the crystals, and they will begin to recognize the relationships that lead to a more complex vocabulary.

A second game, *Vowel Pond,* teaches long and short vowel sounds in the guise of a happy fishing trip. Help Reader Rabbit net a day's catch by identifying words that match a particular vowel sound. For extra assistance, children will also see a word that matches the appropriate vowel sound. For instance, if they are looking for words that contain a short *u,* they'll see the word *stuff.* As a parade of fish swim by, the player must select the ones that carry the appropriate-sounding words emblazoned on their sides. Pick the correct fish, and it goes into the net; pick the wrong fish, and it's the one that gets away.

Another word sound game, *Match Patch,* asks kids to identify word patterns and associations. These include simple rhymes among words that share the same letters (like *pat* and *fat*), word opposites (like *find* and *lose*), homonyms (like *to* and *too*), and harder rhymes among words that share the same sound but not the same letters (like *time* and *rhyme*). Each of these levels draws upon different vocabulary and pattern recognition skills.

Rounding out this rollicking rabbity foursome is *Alphabet Dance,* which teaches word order. This is an essential skill necessary for sorting and for working with alphabetized lists and references like

Scheduled Release: October 1991
IBM PC and compatibles, 512K RAM for CGA, 640K for VGA; hard drive optional, supports mouse, supports Ad Lib, Sound Blaster, Sound Master, and Tandy 3-voice sound—$59.95

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dictionaries. The game takes place at a barn dance. The object is to line up the dancing partners as directed. Start out with simple first-letter ordering among words that directly follow one another (like *Frank, Gertrude, Harvey,* and *Ismelda*), and move on to harder groups that don't follow in direct sequence (like *Alfred, Karen, Paul,* and *Yolanda*). For more of a challenge, kids can order names according to the second letter in the name, and by the first and second letters in the name. Each successive level builds upon the skill learned from the level before. For assistance, a list of the alphabet appears at the top of the screen disguised as a banner above the dance floor.

Aimed at a slightly older audience (from five to eight years of age) than its predecessor, *Reader Rabbit II* promises to be as much a classic as the original *Reader Rabbit.* Even in this video age, word skills are as important as ever. Here's a chance to give your kids a head start or to reinforce what they're learning in the classroom.

PETER SCISCO

Scheduled Release: August 1991
IBM PC and compatibles, 512K RAM (640K required for Tandy 16-color graphics)—$59.95

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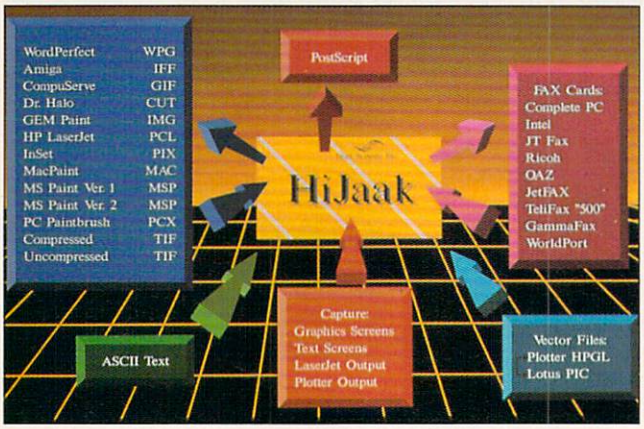
HIJAAK

Tame the Tower of Babel that PC graphics formats have become—that's the goal of *HiJaak,* an all-purpose graphics-translation program and unparalleled screen-capture utility. Despite a buggy user interface and lack of a screen-preview program, its reasonable price and encyclopedic list of both raster and vector formats make it a formidable product.

HiJaak's installation program is a little terse, with no options and no explanation of its functions. It doesn't tell you that an installation is successful, and it doesn't start *HiJaak* or mention that you must choose a configuration from the main menu the first time that you run it (although the manual's instructions make this very clear). The program takes up about 1.5 megs of disk space and requires 320K of free RAM, or 5K of RAM if run in TSR mode, which uses the hard disk to hold the foreground application at bay temporarily. *HiJaak* loses no features in TSR mode, so actually only 5K of RAM is needed to run it, albeit with a performance penalty exacted in more disk accesses.

HiJaak can be run completely in TSR mode and is not limited to the screen-capture utility in this mode. That's the good news. The bad news is that running in TSR mode requires three other programs: RPM.EXE, LOADRPM.COM, FREERPM.COM, as well as *HiJaak* itself. RPM is the Resident Process Manager, which serves as a sort of master menu to save screens, print them, or run *HiJaak.* LOADRPM turns RPM and *HiJaak* into memory-resident programs. FREERPM removes everything from memory. I'd much prefer that all of these functions be rolled into *HiJaak* itself. And I'm sure inexperienced users would prefer that RPM be described in better detail; the manual gives it short shrift. I had many more problems with RPM than with other TSRs, but it was still useful. I'm especially fond of its ability to save the state of *HiJaak* at any moment, even in the middle of a dialog; I never lost my place when I popped back from the foreground application.



Through myriad options, HiJaak *renders almost all graphics formats accessible.*

Discussion of RPM is about the only thing the manual stints on, except perhaps for the index (for example, neither *Windows* nor BMP could be found there, even though the program supports *Windows* bitmap files). Otherwise, the manual is a model of its kind, blessedly covering even the most challenging topics with dogged thoroughness, never underestimating the reader's experience or intelligence. Two other unusual aspects of the manual deserve mention here. An initial chapter titled "Condensed Instructions" allows power users to be up and running quickly and completely explains the support policy. And because of the wild profusion of PC graphics formats, the manual's more-the-merrier approach is welcome; it covers every detail. The section for each graphics format, for example, starts with a box giving the address of the organization that developed it and a Vital Statistics box summarizing answers to the most frequently asked questions about the format.

HiJaak stands out for both its wide variety of supported formats and its world-class screen-capture/print abilities. If you need to produce screen shots for publication or in-house documentation on laser printers, *HiJaak* is the way to go. If you need support for literally every popular graphics format used on the PC, *HiJaak* will do the trick. A partial list of supported formats includes Amiga IFF, ASCII text, *AutoCAD* DXF, CompuServe GIF, GEM metafile and image files, HPGL plotter files, Lotus PIC, *MacPaint, MacDraw, Windows* metafiles, TIFF, *WordPerfect,* and about 20 fax formats. *HiJaak* offers solid support for translating a large number of files at once. Use the point-and-click interface to queue up several files chosen from a directory list (a mouse is reasonably well supported) or run *HiJaak* from the command line. I found the latter option to be much quicker

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than the new mousing interface—the command line seemed more flexible. Running *HiJaak* from the command line allows you to create a text file containing execution options, but, notably, neither the point-and-click method nor the command line method lets you change settings for different files of the same type. In other words, if you have a group of DXF files you want to convert to CGM format and you want some of them to be translated with gray scaling, others to be translated using full colors, and others to black-and-white only, you must run three separate batches. (Inset promises to address this shortcoming, and *HiJaak* may have these abilities before this review sees print.) Oddly, you can't *see* any of the files you convert; unlike *ImPort* by Zenographics, *HiJaak* offers no way to see either the input or the output file without firing up a graphics program that can accept that file format.

HiJaak has the rare ability to convert from vector files (such as those produced by CAD and draw programs) to raster format, although not the reverse (by nature, raster-to-vector conversions are exceedingly tricky). This means you can effortlessly move, say, an *AutoCAD* or *Lotus 1-2-3* image into a paint program, such as the *Paintbrush* program that comes with *Windows*. I experienced no problems with such conversions, although I suppose there are some potentially nasty problems with shaded or 3-D *AutoCAD* images.

If you're among the growing number of LaserJet users who have a fax card installed in your PC, you'll appreciate the inclusion of fonts designed for just this purpose. You can mimic or replace the basic fonts HP supplies on its LaserJets, and the default font is 300 dpi, the same resolution as that of HP laser printers. LaserJet users will also appreciate its brilliant handling of LaserJet soft fonts. You can convert HP soft fonts into a format usable by *HiJaak* for a perfect rendering of the image. I've never seen this ability in any other conversion program, even though HP's font format is well known. *HiJaak* is indispensable for the true LaserJet power user.

A simple *Windows* capture utility lets you snag *Windows* 3.0 images in *HiJaak*'s own file format, which can then be translated into any of the supported output formats. The utility's interface is a bit confusing, and there's no help file, but the manual explains its use well. To activate the utility, choose its Install item, which puts up a dialog box explaining what keys to press. The icon then courteously disappears until you've pressed the hot keys to capture the screen, at which time the capture utility reappears with a request for a filename. That's all there is to it.

However, the conversion process terms both *Windows* and *OS/2 Presentation Manager* BMP files as PM Bitmaps, which isn't very clear. You must choose PM Bitmaps, then select the *Windows* option to get *Windows* bitmap files. Another side note is that *Microsoft Paintbrush* is one of the output options but it doesn't work for the version of *Paintbrush* that comes with *Windows* 3.0. Inset plans a fix. It doesn't matter, though, because the *Paintbrush* in *Windows* 3.0 imports PCX files directly, and *HiJaak* performs flawlessly on PCX files.

HiJaak has a mountain of options. The conversion dialogs hide them artfully, and the defaults are usually well chosen, so you may never need them. Nonetheless, every input and output option comes with a screenful (or more) of options whenever they're necessary. For example, vector file formats seldom have consistent handling of fonts and typefaces, and *HiJaak* allows you to remap (change) your typefaces. CGM files, for example, contain only font numbers. Since one person's font 1 might be a Times Roman while another person's might be a Dingbat, font remapping can prove useful.

Colors are another source of disparity. *HiJaak* not only maps color schemes to your satisfaction, but it also has automatic conversions to black-and-white or gray scale—useful shortcuts for owners of fax machines or laser printers.

I called Inset's tech support with a number of problems and was dealt with quickly and reasonably—even on Monday morning, a notoriously difficult time to reach support lines. It's a toll-free call, and Inset charges nothing for its support. The manual promises that, should you call while all technicians are busy, at least one attempt will be made to return your call within an hour. At least three attempts to reach you will be made within "a reasonable period." Further, a ten-page booklet of release notes details shortcomings in both *HiJaak* and the products it supports. This includes work-arounds where the other product is at fault and common pilot errors with CompuServe GIF files. This all amounts to the best support you can get for $199. I'm very impressed. *HiJaak* is flawed, but nevertheless a major achievement. Its features are comprehensive, its uses myriad, and its support so good that even the worst problems I encountered had a satisfactory workaround. That's the sign of a mature and well-developed product, even if it does have a few minor failings.

TOM CAMPBELL

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THE SECRET OF MONKEY ISLAND

Obviously, *The Secret of Monkey Island* was designed as much for fun as for nail-biting adventure. That it manages to provide a healthy amount of both is testament to the resounding success of its design.

"We believe that you buy games to be entertained, not to be whacked over the head every time you make a mistake," reads the manual to Lucasfilm Games' *The Secret of Monkey Island*. "We think you'd prefer to solve the game's mysteries by exploring and discovering, not by dying a thousand deaths."

They got that right. Blessed forgiveness is only one of several virtues that make *The Secret of Monkey Island* such a thoroughly delightful adventure game. It loses none of its edge in excitement or challenge by offering multiple chances at success, and in doing so it gains a friendly accessibility that keeps it from becoming frustrating and irritating the

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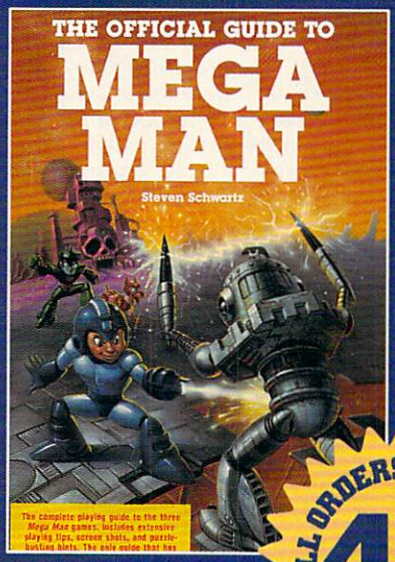

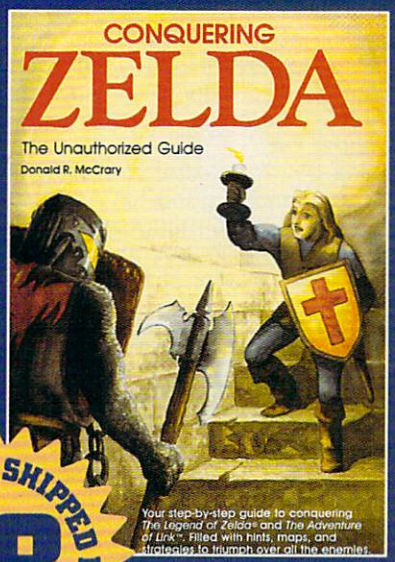

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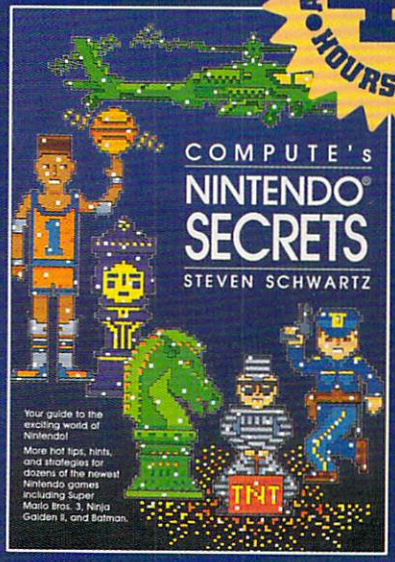

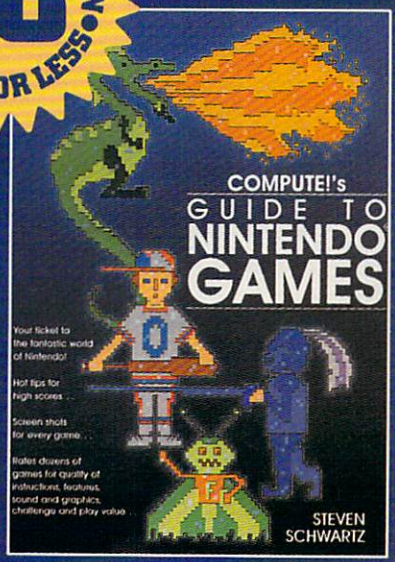

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way other adventure games can sometimes be.

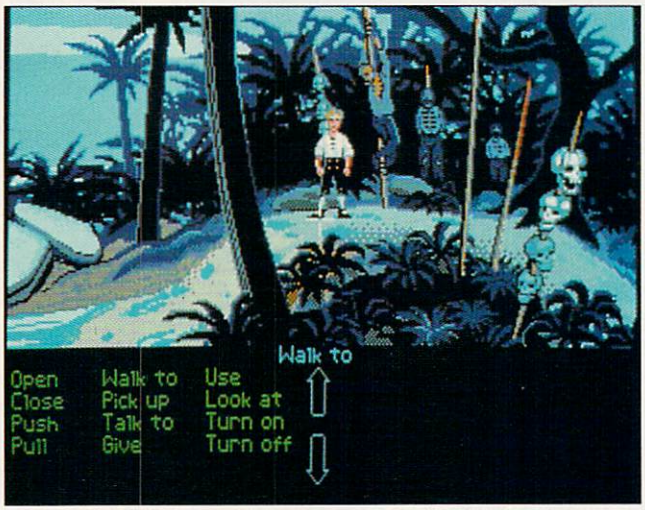
The game begins on Melee Island, where amiable goof Guybrush Threepwood has come to seek his fortune by becoming a pirate. The first stop is the Scumm Bar, where Threepwood endures the first of many cracks about his silly name and learns firsthand from three important-looking pirates what he must do to begin a life of robbing and pillaging. In very satisfying detail, the adventure-game hero gets to dish out as many wisecracks as he takes. "You're a bunch of foul-smelling, grog-swilling pigs!" Threepwood can bark at his pirate mentors.

Initially, Threepwood must learn about and complete a series of tasks designed to acquaint him with pirating. These tasks include sword fighting and treasure hunting. Ultimately, he must assemble a crew, obtain a ship, and embark for Monkey Island in search of the secret that gives the game its title. Among other frightful encounters, Threepwood has to outfight Melee Island's hottest sword slinger, outwit a pack of frothing piranha poodles, and navigate a dark, dangerous forest.

Controlled by arrow keys, joystick, or mouse, Threepwood moves briskly through an impressively cinematic graphic landscape. Melee Island's village looks cartoonishly ominous beneath a lovely, star-strewn sky, with shady pirates and their pet rats hanging out or roaming the streets. Back in the island's inner recesses, there's an impressive circus tent glowing with inner light and a dimly lit shipyard called *Stan's Previously Used Vessels.* Unexpected and humorous touches abound, some cornier than others: "If there's one type of piracy I don't like," says one character, "it's CONS-piracy!"

The Secret of Monkey Island is good fun and may have you laughing as you study to become a high-seas terror, so hoist the mainsail and post a lookout. For cutlass-swinging adventure, *Monkey Island* is somewhere on your horizon.

EDDIE HUFFMAN



A pirate's life means more than grog and doubloons.

IBM PC and compatibles, 640K RAM, CGA, EGA, MCGA, VGA; hard drive recommended, joystick and mouse optional, supports Roland, Ad Lib, and Sound Blaster sound cards—$69.95 for VGA, $59.95 for other versions

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PLAY IT BY EAR

Few professions have embraced the arrival of the personal computer as eagerly and as creatively as musicians. While people who crunched numbers and processed words found immediate and effective applications for the new technology, composers and performers exploited the artistic power of the new machines just as quickly. Amateurs, too, found that these electronic tools offered them inexpensive ways to pursue music as a hobby or to prepare for at least a part-time career.

Three features of personal computers make them good tools for musicians: their sound capabilities, their connections to real musical instruments through MIDI interfaces, and their unlimited patience. A human music teacher can tire quickly of the repetitive drills necessary to train a musician in some of the more elementary aspects of composition and performance; a computer exists to serve the student.

Ibis Software's *Play It by Ear* is an effective training tool for both amateurs and professionals who need to either develop or hone their skills in ear training. The included exercises help you recognize and play back melodies, chords, scales, and intervals, using graphic representations of either a piano keyboard or a guitar. You select the desired exercise, listen to the series of notes, and play them back using either the mouse (no option for keyboard control is available) or an actual instrument (if you're connected through a MIDI interface). Or you can identify the chord or interval played from the list of several displayed.

The main screen is divided into several different work areas; pull-down menus present options available for choosing the desired exercise, difficulty level, volume, duration and range of notes, and type of scale or chord played. Once you've chosen an exercise and the combination of musical notes to be classified or repeated has been played, you can choose to hear the phrase again, skip over it, or display the correct answer. Good note/bad note icons track your correct and incorrect answers as you go along, and progress charts can be pulled up at any time to show how you're doing.

Play It by Ear's user interface is sleek. While crowded, the main working screen isn't difficult to navigate. Minimal written documentation is provided, though you likely won't need it if you just take a few minutes to explore the menus and control settings.

Ibis recommends a MIDI interface, but if you're using the program strictly for ear training, it's unnecessary. I tested the program on a bare-bones XT clone with no special sound capabilities, and the notes were clear and recognizable.

At $99.95, *Play It by Ear* may be more appealing to the aspiring professional than to the novice. If you

want a simple drill-and-practice program that helps you recognize and play back notes on a guitar or piano, though, *Ear*'s just right. For more advanced music students who want to train their ears to discern the difference between varying mode scales (Dorian, Phrygian, and so on) or to be able to tell what interval is being played in a chord (triads, 9ths, 11ths), *Play It by Ear* offers this more sophisticated capability, too.

Serious musicians would most likely want to be able to use the program by connecting their computers to an actual instrument through a MIDI interface or to at least broaden the program's usefulness with more enhanced sound capabilities. For people with such aspirations, this program facilitates a basic element of music education and offers a bridge to their real-life musical tools.

KATHY YAKAL

IBM PC and compatibles, 640K RAM, CGA, EGA, or VGA; supports Roland or 100-percent compatible MPU-401 MIDI cards, Ad Lib, Sound Blaster—$99.95

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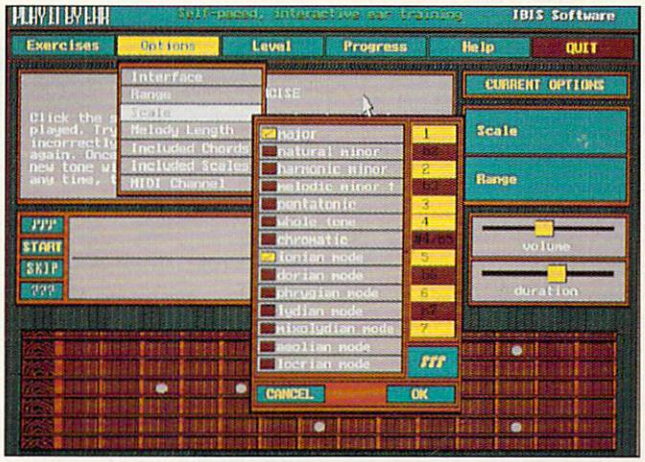
WORD FOR WINDOWS

Imagine the ultimate word-processing software. It would be easy to use, with intuitive commands. It would be so powerful that you'd never run up against a wall creating a complicated document. It would allow you to use graphics and multiple fonts, like your desktop publishing program, but would also keep up with your fastest typing, like your text editor. A dream word processor? No, it's *Microsoft Word for Windows*.

The original version of *Word* was always respected as a powerful program, but its quirky menu interface gave it something in common with *WordStar:* You either loved it or hated it. When I first tried *Word* back in early 1984, I was amazed at the program's power, but the user interface kept getting in my way, and I eventually fell back to a simpler word processor.

After seven years of development, the program has grown even more powerful, but it wasn't the new features that drew me back to it—it was Microsoft's announcement of a *Windows* version of *Word*.

Word for Windows 1.1 *(WinWord)* is an amazing program. Its titanic suite of features will please the college student, the professional writer, and the home office user alike. Yet its simplicity affords pleasurable ease of use to the novice computer user or the keyboard-wary executive. In fact, only the steep price and hardware requirements should keep anyone away from this astounding program. You'll need at least a 12-MHz 286 with 2MB RAM to get decent performance from the program, but that's true of all *Windows* applications. You'll also need *Windows* 2.11 or later (if you're not using version 3.0 yet, upgrade now) and about 4.5MB of free hard disk space to use the program.



Play It By Ear *nurtures musical talent.*

No matter how many features a word processor has, the most important characteristic is ease of basic text editing. *WinWord* excels in this aspect. The program handles even the speediest typing with no discernible lag. Scrolling through documents is faster than I thought possible in a graphics-based word processor; the speed is especially surprising on a 286. You can highlight blocks of text in a snap with the mouse; click once with the left mouse button to start selecting text or twice to select the word under the cursor. Use the right button for columnar operations.

All commands can be accessed using the keyboard or mouse. While I found the program quite usable sans pointing device on my Grid laptop, I was much more productive using the program with a mouse.

A row of menu items tops the screen, with a control bar called the ribbon and a ruler below that. At the bottom of the screen, a status bar keeps you informed of your current page, line, and column number. You can toggle the ribbon, ruler, and status bar off if you prefer to have the entire screen available for editing text.

Fonts, point sizes, styles, tabs, and spacing can all be adjusted with single operations on the ribbon or ruler. You'll find keyboard equivalents for all icon and menu items, but there are so many choices in *WinWord* that you'll appreciate having rarely used commands on the menu bar. (In fact, there are so many choices that the included keyboard template wouldn't fit above my PC's function keys!) If you do have trouble finding a function, *WinWord*'s comprehensive context-sensitive online help is only a keypress away.

WinWord has a plenitude of features to simplify document creation. The one I've used most is the glossary, which lets you abbreviate often-used text. For instance, for this review, I created a glossary item called *ww,* standing for *WinWord.* Whenever I needed *WinWord* in my text, I just typed *ww* and hit F3. The abbreviation expanded out to the full word, complete with italics. You can also store longer blocks of boilerplate text as glossary items, such as addresses or standard greetings.

Style sheets let you record a group of character and paragraph characteristics, assign them a name, and save them. For instance, consider using *WinWord* to create a

newsletter. You could create styles for headlines, subheads, body copy, and sidebar text. When you create a new element, you can change font, spacing, style, size, and justification with one operation instead of five. Style sheets can be stored for use in other documents.

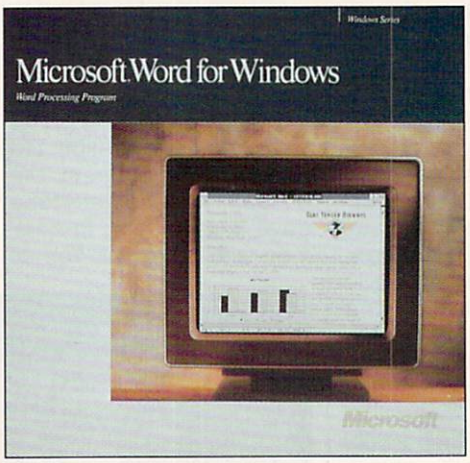
Even more comprehensive is *WinWord*'s document template feature. Each template can store boiler plate text, style sheets, glossary items, macros, and custom menu and key configurations. The 20+ sample templates included with *WinWord* simplify the creation of articles, legal briefs, brochures, contracts, dissertations, envelopes, form letters, mailing labels, memos, and other documents. They also serve as excellent examples for creating your own glossary items and macros.

WinWord has the most sophisticated macro facility I've seen in an application program. You can create macros by recording keypresses and menu selections, as in most other programs. However, *WinWord* also has a built-in programming language called WordBASIC that lets you create truly potent macros. You can automate even the most sophisticated operations. For instance, you could create a macro for developing a résumé; that macro would bring up dialog-box requesters asking for each piece of information individually and then assemble them into a formatted résumé. You'll need some programming background to take full advantage of *WinWord*'s macro facility, but if you've ever used *Microsoft QuickBASIC*, you'll feel right at home using WordBASIC. Unfortunately, the documentation for WordBASIC isn't in the manual—you must either print a 77-page document included with the program to get basic documentation or purchase the helpful *Microsoft Word Technical Reference for Windows and OS/2* for $22.95.

If your needs are fairly simple, you can use *WinWord* as a desktop publishing program. It supports multiple columns (side-by-side or newspaper-style snaking columns) and can insert pictures within your text. Manual kerning gives you DTP-style control over letter spacing. You can directly load TIFF-format graphics or paste them from the clipboard. *WinWord* also supports the DDE (Dynamic Data Exchange) feature of *Windows* 3.0, so you can link a graphic from another DDE-capable program into your document.

If you're using *WinWord* to create documents that will be seen and modified by more than one author, you'll appreciate the program's redlining and annotation features. Redlining allows you to make changes in a document while keeping the original text around for reference (the old text is shown with a line through it). Alternately, you can use the document-compare feature, which will mark any paragraphs that change between two versions of a document. Annotations let you attach comments or suggestions to any block of text. The comment author's initials appear in the text, and the annotation in a window below. You can lock documents so that annotations can be added but no changes can be made in the text.

WinWord has just about every other feature you could want in a word processor. You can automate the creation of columnar tables, outlines, indexes, and tables of contents. Students and researchers will appreciate the program's footnote and endnote capabilities. *WinWord* will perform math operations on groups of numbers within your text, and you can type mathematical and scientific equations and see them onscreen as they'll look when printed. Other standard functions, such as search and replace, spelling check, and mail merge, work as expected.



Feature-packed, Word for Windows *will satisfy casual and professional writers.*

Writers will find the online thesaurus invaluable. It not only provides synonyms for the selected word, but it also gives you a choice of definitions for the word in different contexts and lists the part of speech. For instance, different synonyms are given for the word *clear,* depending upon whether you're using it to mean "transparent" or "to remove obstructions from."

If you're moving up to *WinWord* from another word processor or if you share documents with users of other word processors, you'll appreciate its file-conversion features. You can load and save files in DCA, *DisplayWrite, MultiMate,* RTF, *Windows Write, Word for DOS, Word for Macintosh, WordStar, WordPerfect,* and *Works* formats. All but the most esoteric formatting codes are supported, so you should lose little or nothing in the translation.

WinWord uses the standard *Windows* printer drivers, so the quality of its output is excellent overall, but at the same time, dependent upon your printer. Generally, your printer's built-in fonts will look quite good, but the *Windows* system fonts will look rough. If you need to use fonts not resident in your printer, pick up a copy of *Adobe Type Manager.* The print-preview function lets you view single or facing pages before printing. You can choose whether or not to include summary info, annotations, and hidden text in your printed document.

WinWord's documentation lives up to the high standards set by other Microsoft products. A 25-page Getting Started booklet will walk you through installing the program. The 126-page Pocket Guide is a tutorial that will introduce you to *WinWord*'s major features. The 475-page User Reference tome lists all the program's functions in alphabetical order, making it a snap to find any feature. Al-

so included is a 90-page Printer Reference Guide and a keyboard template. All the texts are extremely well written—simple enough for the novice but not condescending to the knowledgeable.

I couldn't find anything to complain about in *Word for Windows,* except perhaps the fact that the company doesn't make a version for the Amiga, the other platform I spend much of my time using. Once you've used *WinWord,* other word processors seem like simple text editors in comparison. The only negative aspects are the program's hunger for memory and its sluggish performance on machines slower than 12 MHz. However, those are more the fault of *Windows* than *WinWord* and a small price to pay for versatility and power.

If you're looking for a no-compromise word processor and have the hardware to handle it, *Word for Windows'* herculean features and connectivity with other programs make it the obvious choice for all your text-editing needs.

DENNY ATKIN

IBM PC and compatibles; 1MB RAM (2MB recommended); EGA, VGA, XGA, or 8514; hard drive; 80286 or higher processor—$495

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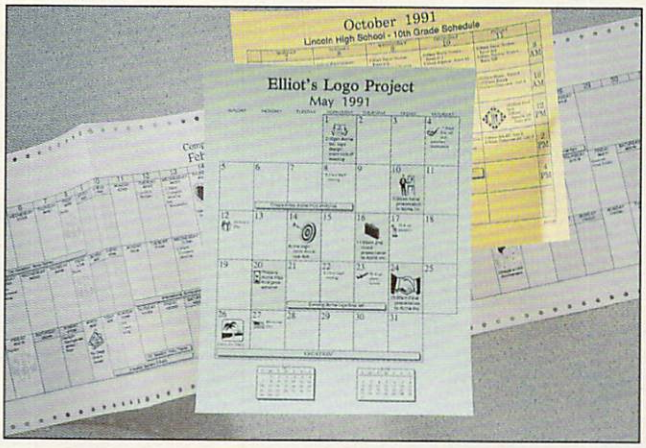
Circle Reader Service Number 355

AIR STRIKE USA

Armchair pilots looking for a simple tactical flight simulator may want to strap themselves into Cinemaware's *Air Strike USA.* In this action/strategy air-combat contest, you concentrate on making the world safe for the allies, rather than memorizing a keyboard-load of esoteric flight commands. But while your jet is a breeze to fly, the missions, which have you taking out both ground and air targets, require quick reflexes and careful planning.

For straightforward high-speed air combat, fly Air Strike USA.



Useful calendars are simple to make with Calendar Creator Plus.

The EGA/VGA graphics feature solid, 3-D scenery and an assortment of 16-color battle maps and instrument panels. Unfortunately, no sound cards are supported. Although *Air Strike USA* won't teach you to fly a jet, it'll provide hours of missile-pounding, machine gun–blasting action.

CLAYTON WALNUM

IBM PC and compatibles; 384K RAM for CGA, 640K RAM for EGA, VGA, or Tandy 16-color; floppy or hard drive; mouse or joystick optional—$39.95

Also available for Amiga—$39.95

CINEMAWARE
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Circle Reader Service Number 356

CALENDAR CREATOR PLUS

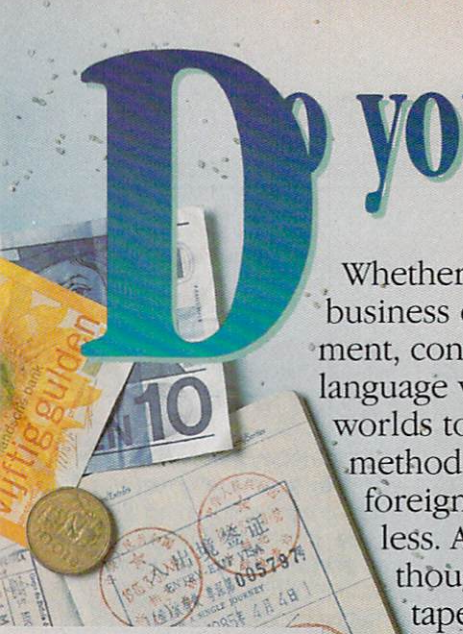
Many of today's mainstream applications are overkill when it comes to doing the smaller jobs we want our silicon partners to accomplish. Power Up has managed to create a product that not only fills a much needed niche but can help you organize the daily events in your life without giving you a learning-curve heart attack.

Calendar Creator Plus creates customized calendars to help you organize both your personal and business activities. The program allows you to set up event lists for all your activities, incorporating them into the calendar. What's more, the program includes clip art and gives you the ability to highlight special events using alternative fonts and shading. When ready to print, you can preview the calendar, graphics and all. Calendars may be printed in eleven different formats and in varying sizes, from a giant one-year calendar to miniatures small enough to fit in your pocket organizer. I found the documentation, tutorial, and quick reference card well written, concise, and easy to follow. The installation process was user-friendly.

Calendar Creator is a quality product. The only disappointments are the lack of mouse support and the lengthy printing times for the calendars themselves. Using a print spooler alleviates the latter problem, though there's no excuse for overlooking mice. Despite these minor problems, for those of you who need this type of product, I can recommend it without reservation. If you pay *Calendar Creator* the least attention, you'll always

Do you know the incredible learning a foreign

Whether for travel, business or entertainment, conversing in a foreign language will open up whole new worlds to you. And now there's a method that makes learning a foreign language simpler. Painless. And faster than you ever thought possible. The first 15 tapes of this package are the very same tapes used by the U.S. State Department to train career diplomats. They're tried and proven effective. But it's the second 15 tapes utilizing the latest *European* learning techniques that make this system so special. This marriage of two teaching concepts literally gives you <u>two courses in one</u> . . . the best of both worlds in language instruction.



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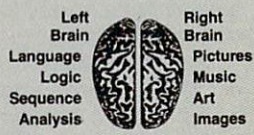
BREAKTHROUGHS in language technology by European learning researcher **Dr. Georgi Lozanov** are the basis of the remarkable Accelerated Learning Language Series. The series is so effective, we guarantee you'll be hearing, reading, understanding and beginning to converse in your new language in 30 days - or your money back. This unique new system links the left side of the brain (language and logic) with the right side of the brain (music and art) for dramatically increased retention and learning speed. In the same way you remember the words to a song with little or no effort, Accelerated Learning uses Baroque music to "un-stress" the learning process.

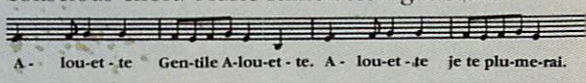
"American managers with language skills open more doors."
Wall Street Journal Editorial
July 25, 1988



"(the superlearning method is) fascinating . . . the results are extraordinary."
Prof. Lawrence Hall
Harvard University

Boost your memory with music.

Have you ever wondered why you can remember the words to a song with little or no conscious effort? Music stimulates right brain



activity. Speech is a left brain activity. When the two are combined, as in a song, you have left/right brain linkage. You've used your whole brain, so your memory is much stronger. Accelerated learning uses the same technique. You will learn the language as *stresslessly* as a child does, by hearing new vocabulary and phrases in alternately loud whispered, and emphatic intonations, all accompanied by slow, rhythmic music. The effectiveness of Baroque music as a memory aid is well documented and leaves you feeling alert and rested.

"American ignorance of other tongues has been hurting American business executives in their competition for (overseas) markets."
The New York Times
September 5, 1988

rewards of language?

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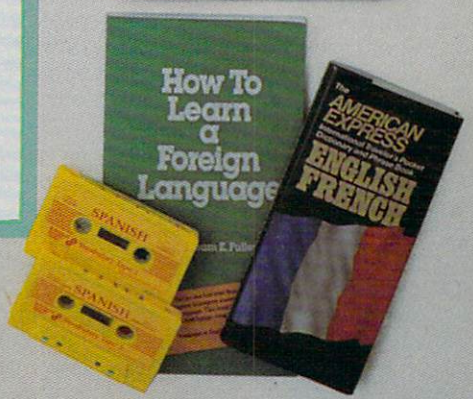

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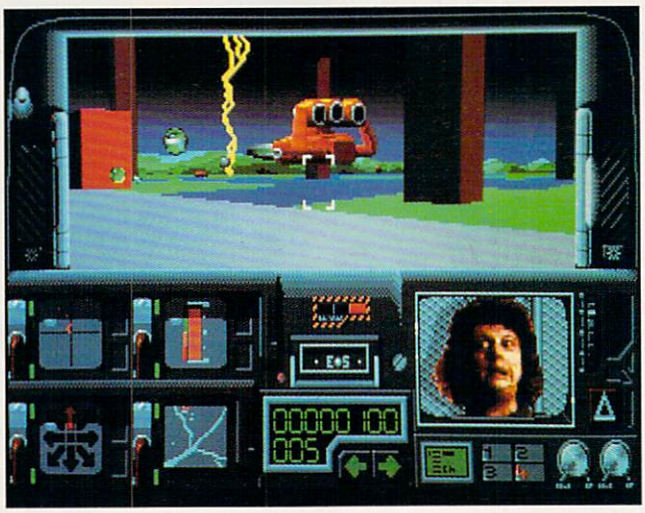
HOVERFORCE

Lord Darkenill, the slime who controls the streets of MetaCity, is making another run, selling Aftershock, a hideous bioserum. But this time the mayor is determined to terminate the flow of drugs and reclaim his city. He's commissioned you to pilot technology's perfect crime prevention weapon—the HoverKill 1000.

In this sleek craft, you'll sweep through the city at breakneck speed and realize why Accolade calls *HoverForce* the fastest game you'll ever play. It'll have you zipping around corners and making 180-degree turns, and you perform all these brilliant maneuvers with a mouse. Mastering wrist gymnastics may seem impossible at first, but soon you'll wonder why games ever used keyboards.

The HoverKill comes with several weapons, shields, and various detection devices that keep you informed of what your drug-running opponents are up to. But cleaning the streets of MetaCity is no easy task, even with the help of topnotch gadgetry. Four mutant criminals, or Alterants, control different sections of the city. You take them on one by one, interfering with their drug runs whenever possible.



Drug lords meet their match when you pilot the deadly HoverKill.

These masterminds have help; henchmen lurk in the shadows ready to attack in what scientists call *neosteroidal rage,* a result of the Aftershock that turned them into mindless automatons. Fighting these street thugs makes up most of the action in *HoverForce.*

At night the Alterants move on to the next drop. Waste no time going after them, or it's back to face your boss, gruff Sheriff Stone, empty-handed. Watching the drug runner's large vessel go up in smoke only once is not enough. As Alterants, your foes have taken enough Aftershock to survive three lethal assaults. If you manage to beat them three times, though, you simply move on to the next quadrant of the city until finally you meet Lord Darkenill himself.

The designers graced *HoverForce* with clean, swift graphics, and fair, but serviceable sound effects. Fast-paced, full of bad guys, and insidiously playable, *HoverForce* deserves a place on the hard drives of action fans everywhere. You need only take the controls of the HoverKill, and you'll be hooked. Hunting down Alterants is a hard habit to break.
JONATHAN BELL

IBM PC and compatibles, 640K RAM, EGA or VGA; mouse or joystick optional, Ad Lib, Sound Blaster, Roland MT-32, LAPC-1, and Tandy 3-voice sound supported—$49.95

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DESIGNCAD 2-D

Many professional CAD programs come with so many bells and whistles attached that they seem unnavigable. Lightweight or stripped-down versions may be easier to use, but they usually lack the power professional designers demand. Enter *DesignCAD 2-D* from American Small Business Computers.

With this CAD package a casual user can turn graphic ideas into finished drawings in minutes, yet professionals will find that the program can easily handle most design challenges. The features packed into *DesignCAD* are especially amazing when weighed against the program's low price.

Easy to install and configure for your computer, printer, plotter, or digitizer, *DesignCAD* sets your units of measure in either English or metric units. Files can be directed to any output device or port. If you use a mouse or digitizing tablet, these devices can easily be included during the initial installation process. You can also specify aspect ratios of screen displays and a preferred background color for EGA or VGA displays.

Once you've installed the program, a 60-page tutorial takes you through the basics. This manual guides the new user through many commonly used commands: lines, curves, arcs, circles, boxes, and polygons.

Drawing commands in *DesignCAD* use points as references. To draw a line, curve, or polygon, for example, set a number of points and then select the appropriate command. A line appears and connects the points.

You can set points in a variety of ways, most commonly by pressing a mouse button. Points can also be selected by more sophisticated methods. Various commands set points at the nearest existing point on a drawing, at specified *(x,y)* coordinates, or at a specified distance and angle from the last point set.

When drawing perpendicular lines for a blueprint, a mouse or digitizing tablet may be convenient, but not necessarily the best choice. Sometimes it's easier and more accurate to position the cursor with the computer's arrow keys. Regardless

of which input device you use, it's a simple matter to set a point on one line and invoke a command to create a perpendicular line. Another command adjusts lines to make them exactly vertical or horizontal.

Should you create several variations of a drawing, you can display them simultaneously on the screen. A View command lets you open windows to display any three files. You can also zoom in to show different details of the same drawing if you prefer. Other features include a user-definable icon menu that lets you customize your screen or digitizer tablet. *DesignCAD* supports high-resolution printing on dot matrix and laser printers. Furthermore, it also has its own programming language that lets advanced users create their own custom commands in a format similar to BASIC's. Frequently used symbols can be saved as macros and inserted with a click of a mouse. More than 500 symbols are supplied with the package. Extended memory and a math coprocessor are supported but not required, and a 360-page manual puts all *DesignCAD* commands at your fingertips in an easy-to-reference alphabetical listing.

Version 5 of *DesignCAD,* which should be available by press time, will support even more printers, plotters, and digitizers and offer improved dimensioning techniques, multiple file handling, the ability to run external programs from within *DesignCAD,* and many new commands. Owners of the previous version of *DesignCAD* may upgrade for $50.

Packed with powerful commands and features, *DesignCAD*'s power nevertheless proves easy for any user to harness. Its system of menus, keyboard commands, and shortcut keystrokes makes the program immediately accessible. For anyone looking for a powerful yet low-cost CAD program, *DesignCAD* is an excellent choice.

TOM NETSEL

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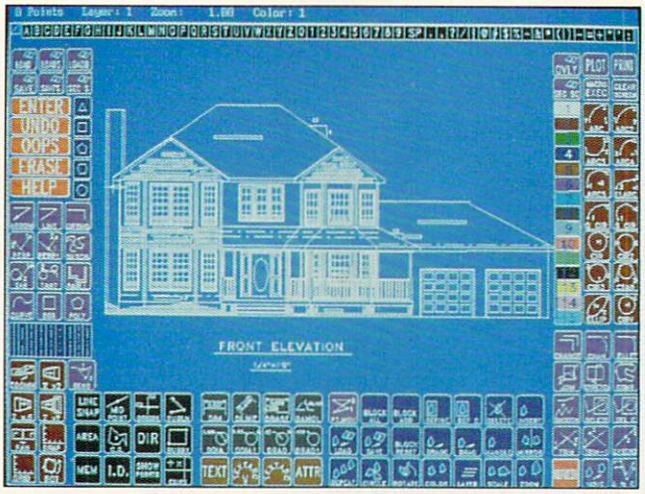
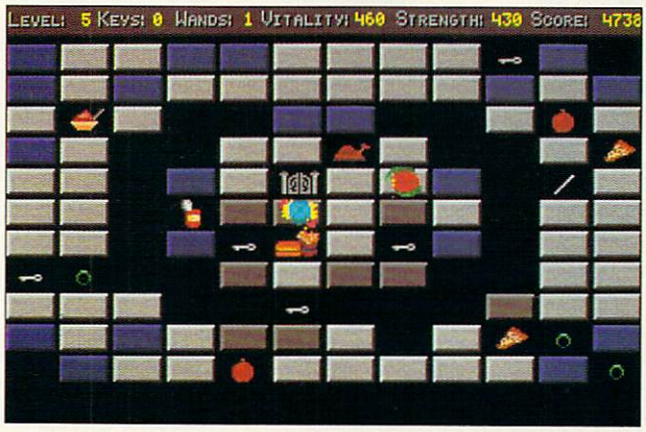


DesignCAD 2-D *delivers high-end blueprints for a low-end price.*



Freakin' Funky Fuzzballs *could be the sleeper hit of the year.*

FREAKIN' FUNKY FUZZBALLS

Tired of shooting everything in sight or flying cross-country to blast some MiGs to their eternal rest? Try *Freakin' Funky Fuzzballs,* a refreshing change from most of the games on the shelves today.

The idea is simple: Collect enough keys or cards to be able to get out of the level you're in. And every so often, when you reach a new level, you'll find yourself in a different world. If you're good enough to conquer level 15, you may qualify for the Fuzzball Hall of Fame.

Along the way, though, you'll need to replenish your energy by scarfing shakes, burgers, sundaes, and other goodies that appear. Shields and armor can go far to further your progress. Numerous magical spells, including spells for confusion, invisibility, blindness, and enlightenment add variety.

Once you get started, you'll find it hard to quit playing this game. Unique and enjoyable, *Freakin' Funky Fuzzballs* gets my highest recommendation.

RICK LEINECKER

IBM PC and compatibles, 384K RAM for CGA, 512K RAM for EGA, 640K RAM for VGA—$29.95

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Circle Reader Service Number 360

COLLEGE COST EXPLORER

High school students who think they can't afford a college education should take a look at *College Cost Explorer.* With it you create a list of colleges and calculate the amount of aid available from those colleges and the amount you'll need to contribute toward your expenses. The results could surprise you.

Details on the types of forms you need to complete, deadlines for requesting aid, and the total costs including tuition, out-of-state fees (if applicable), room and board, and transportation are displayed along with the name of the college and its location. The introduction, pop-up menu, and online help

and glossary offer all the information you need to apply for financial aid to 2900 colleges and universities nationwide, and all information is updated annually. Though the process of choosing a college remains a daunting one, *College Cost Explorer* promises matter-of-fact assistance.

JOYCE SIDES

IBM PC and compatibles, 256K RAM—$59.95 (1992 edition—$89.95)

Also available for Apple II series—59.95 (1992 edition—$89.95)

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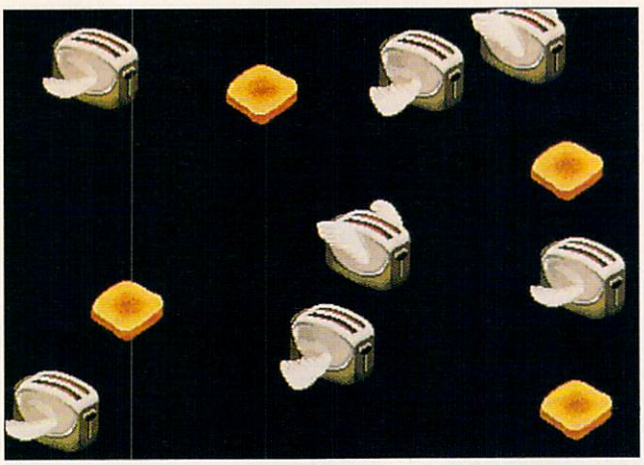
Circle Reader Service Number 361

AFTER DARK/ INTERMISSION

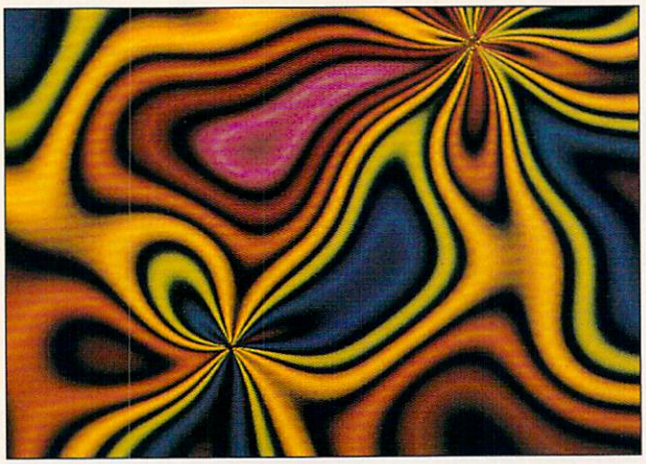
Screen burnout occurs when a bright, unchanging image—like the typical *Windows* screen—is left too long on the monitor. The bright areas "burn in," and the phosphors gradually die. Screen-saver programs protect your monitor's display by blanking the screen when the computer is idle or when you move the cursor to one corner of the screen. But most people really buy a screen saver for the amusing animated graphics the programs display during blanking.

Two screen savers for *Windows, After Dark* and *Intermission,* offer similar features—with more than thirty sets of screen animations between the two, plus password protection. With mobile clocks, dragon kites, a choice of moiré patterns, and a swarm of bees and wasps, *Intermission* has a slight edge in graphic cleverness, but I did like *After Dark*'s flying toasters. *After Dark*'s stormy cityscape is eye-catching, too. Both programs offer simple blanking to a black screen for those times when you don't need visual distractions, and either of these programs will do a satisfactory job of saving your screen from the specter of burnout.

STEVEN ANZOVIN



After Dark's *humorous flying toasters won't permit screen burnout.*



Of the many screens that come with Intermission, *this is perhaps the most mesmerizing.*

After Dark
IBM PC and compatibles, *Windows* 3.0 or higher—$49.95

BERKELEY SYSTEMS
1700 Shattuck Ave.
Berkeley, CA 94709
(415) 540-5535

Intermission
IBM PC and compatibles, *Windows* 3.0 or higher—$49.95

ICOM SIMULATIONS
648 S. Wheeling Rd.
Wheeling, IL 60090
(708) 520-4440

Circle Reader Service Number 362

PAM: PROGRAM AUTOMATED METHOD

Despite the generic name, *PAM* is a lightning-fast relational database with industrial-strength capabilities.

PAM consists of an application generator and a run module. Use the application generator to design your database through its associated screens and reports. Compile it (with just a few simple keystrokes); then move to the run module to run it. At no time do you write a single line of program code. It's all done for you by the application generator.

Application generators are not new. The ones included with the big-name databases are definitely more intuitive to use, but they usually carry with them a hefty overhead that slows things down, fills up your hard disk, and empties your pocketbook. This is where *PAM* earns its market share, by being faster, leaner, and less expensive than other relational databases with comparable power.

A curious but welcome throwback to earlier days of programming, *PAM* favors speed and program efficiency over glitzy, no-brainer interfaces. The code is lean and direct, leaving out the high overhead associated with holding the user's hand every step of the way to productivity.

To learn *PAM,* set aside a good four- to six-hour block of time to work through the excellent tutorial—250 of the manual's 355 clearly written pages. As you progress through the lessons, you'll learn *PAM*'s arcane keystrokes, and while there's nothing intuitive about them, they are definitely learnable. And a word of advice: Don't skip the tutorial—you'll only frustrate yourself.

I do have a few complaints. In text fields, you can't use the backspace key. You're stuck with the left arrow and delete combination. A fast typist or data entry operator hits the back-

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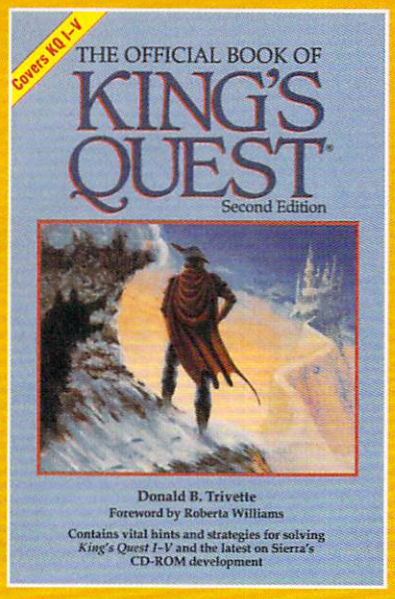

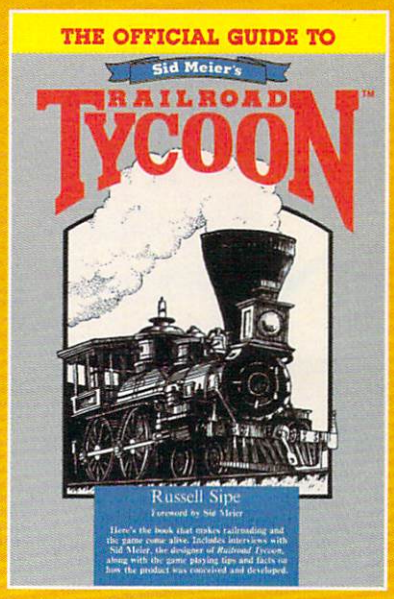

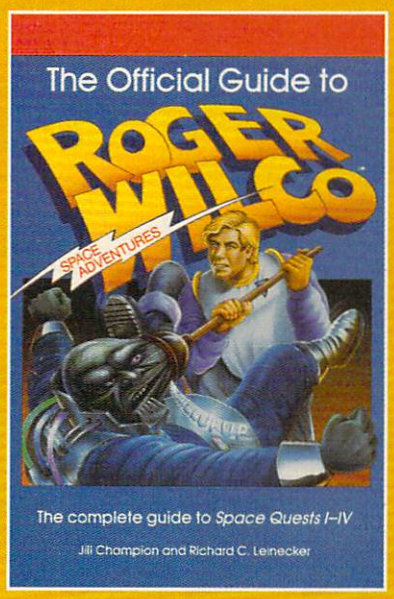

THE OFFICIAL BOOK OF KING'S QUEST, SECOND EDITION

Here's the source for hints, tips, and background for the newest adventure, *King's Quest V.* This new volume includes more clues, maps, and inside details, along with more ways to add even more fun to all five of the best-selling King's Quest games. Covers *King's Quest I - V.*

THE OFFICIAL GUIDE TO SID MEIER'S RAILROAD TYCOON

This is the book that makes railroading and the game come alive. Inside players will find interviews with Sid Meier, the designer of Railroad Tycoon, along with facts on how the product was conceived and developed. Also includes formulas the program uses to determine income and expense.

THE OFFICIAL GUIDE TO ROGER WILCO'S SPACE ADVENTURES

For the first time, Space Questers can learn what goes on in the mind of the most legendary janitor in the universe. Inside, you'll find complete maps for every Space Quest scenario, point values for every reaction, and Roger's walk-through to the finish of all the games. Covers *Space Quest I - IV.*

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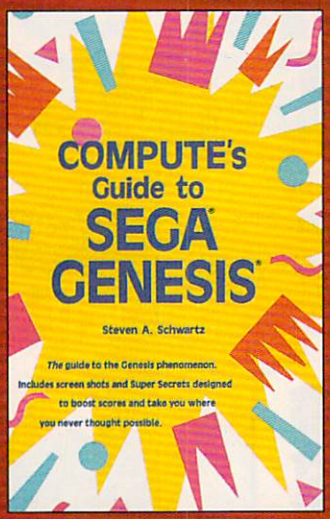

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space key automatically; it should be supported by *PAM*. And a few editing functions don't work as described in the manual.

PAM packs a rich feature set. Fields can be set to be all upper- or lowercase or to automatically capitalize the first letter of each word. Fields can have required entry or be set to accept only full fields. Automatic field duplication, incrementing, and skipping are supported. Furthermore, *PAM* offers a matrix-table function that allows spreadsheetlike "what if" calculations—only much faster. *PAM* imports and exports standard *Lotus* and *dBase* files, as well as other common formats, making your data extremely portable.

After the initial learning phase, you can easily build complex databases that compare well in functionality with the well-known database programs. Your databases may not look as elegant, but they'll do the job. And at *PAM*'s price, that's affordable dependability.

RICHARD MANN

IBM PC and compatibles, 256K RAM, hard drive and floppy drive—$65 for single database (flat file), $145 for 3 relational databases, $245 for 6 relational databases, $345 for 28 relational databases

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(214) 985-8018

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PAM puts you in direct control of your database without a GUI.

IMPERIUM

Control of the Throygon Empire rests in your hands. As Emperor Amarillus, you expand your empire from its pitiful beginnings to galactic dominance. Accomplish this by colonizing productive worlds, some of which will, hopefully, produce nostrum, a drug that extends your life span and that of your compatriots. Nostrum means life—humans usually live less than a century, but you want to rule for 1000 years.

Competing empires are led by the same motives as yours, which means you face a constant struggle. And law requires that an election be held every 50 years. So stay sharp and don't do anything rash, or your people will vote you out, and you'll be emperor no more.

Imperium requires more than just military prowess and political charm; several economic and diplomatic factors must be taken into account. Your predecessor, though, has left an intelligence report describing the responsibilities of an emperor at every game turn.

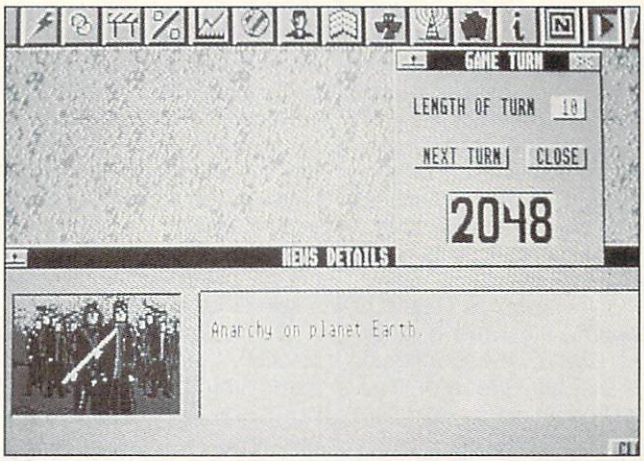
Within a single turn you make decisions about economic factors that will affect the wealth of your empire, as well as oversee the military and handle diplomatic affairs. You face decisions about which planets to subsidize so they will become more productive, which em-

pires to attack and which to befriend, and how high or low import taxes should be.

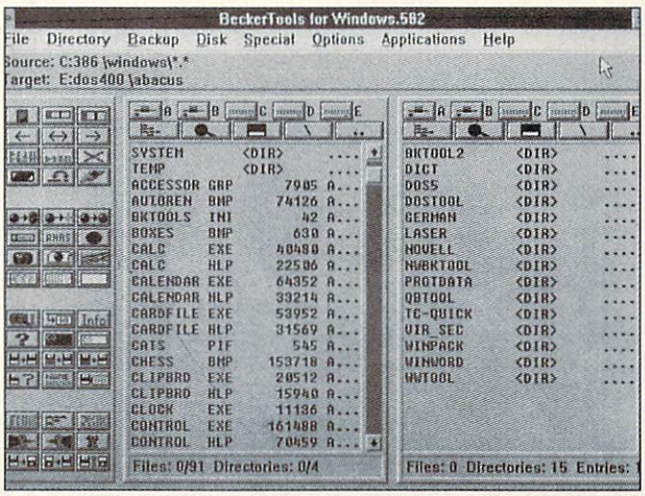
Balancing all those factors is daunting at first, but you can delegate day-to-day control to subordinates, leaving you with the responsibilities of initiative and intervention. Do be careful; some of your subordinates are incompetent or even disloyal, though they may improve with awards and promotion.

You'll need to intervene often anyway if you expect to win the game. Assuming your empire isn't destroyed (or you don't die from a lack of nostrum), *Imperium* lasts for 1000 years or until you conquer all other empires. Both veteran game players and novices should find *Imperium* addictive, but mastering the game will take time and effort no matter what your level of experience. Expect to spend several weekends mastering the subtleties of dictatorship. The developers help you out here by including a complete reference to every game function in the *Imperium* manual. Read the italicized hints and save your game often as you try different strategies.

Control your empire using the icon bar at the top of the screen. From this bar you pull down menus that provide access to areas of concern—the military, economy, alliances, colony ships, subordinates, and so on. This graphical user interface is a long way from the ease of use proclaimed by its programmers. In a world with *Microsoft Windows* and the Apple Macintosh, *Imperium*'s GUI is frustrating by comparison. It requires too many keystrokes and mouse clicks to navigate. For example, *Imperium* demands at least six keystrokes to enter the copy protection information.



Anarchy poses some minor problems to your reign as emperor.



BeckerTools *is a replacement for* Windows' File Manager.

Unfortunately, *Imperium* has another major failing in the way of graphics. Almost everything appears in monochrome no matter what the video mode is. Does gray scale interest you when you have a VGA card? Probably not.

I will give credit, however, to the sound and graphics of the title screen. The color graphic is a fair reproduction of the package art. And if you have a sound card installed, Beethoven's *Moonlight* Sonata comes across well, too. Despite its outward appearances, *Imperium* should keep anyone who appreciates a challenge addicted—especially those with galactic ambitions.

JONATHAN BELL

IBM PC and compatibles, 512K RAM (640K for Tandy). CGA, EGA, VGA, Tandy 16-color, or Hercules; supports Ad Lib, Sound Blaster, and Roland MT-32 sound cards; mouse optional—$39.95

Also available for Amiga—$39.95

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BECKERTOOLS FOR WINDOWS

Some computing enthusiasts regard *Windows* 3.0 with near reverence. Yet recent converts have been quick to point out that *Windows' File Manager* leaves much to be desired. Sure, you get conventional file and disk management options such as Copy, Move, Delete, Rename, Find files, Edit text, and Format. *Windows' File Manager* also launches applications. However, it handles these tasks in a less than elegant way. Even Microsoft acknowledges there is room for improvement in *File Manager*, and the company promises a performance upgrade by year's end, when *Windows* 3.1 ships.

If you seek file manager relief now, don't despair. *BeckerTools* may be just what you need to overcome *File Manager*'s deficiencies. Once installed, it offers dozens of disk and file options previously unavailable under *Windows*. For example, you can undelete files and directories, read disks in a single pass to make multiple copies, do selective backups, pack (compress) or unpack specified files and directories, find duplicate files, create a bootable System disk, and much more. Advanced users will appreciate the specialized hexadecimal, sector, and file editors. Any one of these options may be selected with the point and click of a mouse.

Setup is a breeze! *BeckerTools* installs directly from *File Manager* or from the DOS prompt. The application (along with an aesthetically pleasing screen saver called *STARLITE*) can be configured to load automatically with *Windows*. Alternatively,

you can disable automatic loading and elect to have *BeckerTools* and its screen saver sidekick added to the Accessories or Applications group.

The first time you view the *BeckerTools* window, you may experience a bit of a shock. The screen could be a clip from a movie titled *Nightmare on Icon Street.* I counted 65 3-D icons, not including scroll arrows and boxes and title bar boxes. Luckily, whenever the cursor points at an icon in the Toolbox area, the program displays a brief description of that icon at the bottom of the screen. For example, aim at the icon labeled *Info,* and the bottom line message reads *Display directory information.* Zero in on the icon with the large red *X,* and the bottom line discloses *Unselect all files and directories.* Toolbox options can also be invoked from pull-down menus (on the menu bar) or with keyboard command shortcuts.

The *BeckerTools* workspace is divided into five areas. The icon-rich Toolbox and two windows depicting the contents of Source and Target directories occupy most of the screen. A menu bar and two additional information fields (one showing current source and target paths, the other displaying user and system messages or icon descriptions) complete the lineup. Unfortunately, the information line at the bottom of the screen displays icon descriptions only for the Toolbox area and not for the Source or Target window areas.

Spend some time with *BeckerTools,* and navigating the workspace presents little difficulty. To complete a task, you must first set up a Source directory. This tells the program where to look when you click on a Toolbox icon.

Next, establish a target path. Then select an icon (tool) from the Toolbox window. In this way, copying or moving files and directories from one disk or directory to another is reduced to a few simple mouse clicks. Several tools—such as Delete or Rename files and directories, Create new subdirectory, Display directory tree, and Format disks—do not require a target path.

BeckerTools offers online help and a choice of three menu displays. To minimize confusion, new users should select Beginner. Seasoned veterans of *Windows*-type interfaces may opt for the Intermediate feature level or Advanced (complete) menu display. Whatever option you run *BeckerTools* under, it performs flawlessly.

You can launch an application by selecting executable programs from a Source directory, double-clicking to pull up the Quick menu, and pressing Launch. Alternatively, you can launch as many as ten applications via a user-configurable list available from the Applications menu.

As a substitute for *Windows' File Manager, BeckerTools* offers a host of different utilities designed to please novices as well as techies. And since it does such a nice job of launching applications, you might even prefer it to *Windows' Program Manager.*

CAROL HOLZBERG

IBM AT and compatibles, *Windows* 3.0 or later—$129.95

ABACUS
5370 52nd St. SE
Grand Rapids, MI 49512
(800) 451-4319

Circle Reader Service Number 365

WILL BUILDER

Few of us welcome the prospect of writing a will, and often the document remains unwritten until it's too late. While the average person probably has some hazy ideas about what's required, the specifics are a problem, and people are reluctant to pay a lawyer for advice.

Will Builder offers a partial solution. It educates, and it helps you prepare documents that you might otherwise dread preparing, whether for their supposed complexity or simply for their gloomy nature. A 240-page companion book (prepared by two attorneys) explains the processes of creating a will, assigning power of attorney, appointing an executor, and writing a living will. You'll find further explanations in the program itself, along with a rather lengthy index. The user interface looks and feels a tad primitive, devoid of many of the visual niceties we've grown to expect from software. But since the program doesn't have a lot of functional depth, it doesn't require much operational assistance.

Will Builder meets its simple goal and takes you by the hand to walk you through the process of preparing legal documents relating to the handling of your estate after your death. You can also put together documents that give other individuals named by you power to make certain decisions on your behalf about your right to die, should you become seriously incapacitated.

Will Builder will tailor your documents to meet the requirements of your home state's laws and is equipped to address many of the special issues that have become commonplace in late twentieth-century life in this country—personal affairs like single parenthood, stepparenting, and unmarried life partners.

Done simply, this process requires answers to a few personal questions, explains what the law requires in each matter discussed, and then fills in the blanks of predesigned legal documents based on your responses. As with any software of this sort, a disclaimer in the program suggests that you employ legal assistance if you're at all unsure of anything.

If you follow the steps carefully and thoroughly read and understand the reference material provided, your documents should be as legal as those prepared by an attorney, though the software designers cannot take responsibility for any problems that might arise. You are, in essence, choosing to act as your own lawyer by taking on this task using a software package alone.

Costing less than the average 60-minute period in an attorney's office, *Will Builder* contains more general information than a lawyer could easily dispense in that period of time. For savings like that, many of us would brave the difficulty of completing our own legal paperwork. If you're willing to be your own counsel in one area of your legal affairs or if you want to be better informed when you do consult an attorney, *Will Builder*'s worth a look.

KATHY YAKAL

IBM PC and compatibles, 512K RAM, hard disk—$59.95

SYBAR
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ABC FLOWCHARTER

I've never liked flow charts and never thought I would. Roykore's *ABC Flowcharter,* however, has changed my mind. Drawing upon *Microsoft Windows'* advanced graphics capabilities, the attractive and flexible *ABC Flowcharter* receives high marks for functionality.

Programmers use flow charts to chart out a program before writing a single line of code. A visual representation of a program, flow charts depict certain actions with different shapes; a call for user input might appear in the form of a blue circular box, while a message written to the screen may be placed in a rectangular red box. Lines denote relationships between the shapes, and text within a shape further explains that shape's function.

If you find traditional outliners too confining, *ABC Flowcharter* provides a graphical approach to structuring information; you just move shapes around with your mouse naturally and easily. Programmers will find that this program has the power to accommodate today's complex software design—a single chart can hold over 32,000 shapes. Office managers can use *ABC Flowcharter* to map office procedures; because it's essentially a minihypertext system, *ABC Flowcharter* could assist in creating training exercises.

Say you want to create a simple training exercise. You create a series of shapes signifying the various steps needed to perform a task, along with lines denoting the logical procedure. Highlighted by red shapes, important tasks stand out; explanatory notes, denoted by blue shapes, don't clamor for attention but wait in the wings. (Since *ABC Flowcharter* ships with 30 different shapes built in, you shouldn't run out soon.)

But wait—you realize that the user could take an entirely different course of action, and you don't want to clutter up your main chart with the new branch. No problem: Because *ABC Flowcharter* offers a three-dimensional effect, you can link the main chart with a subchart. You can uncover any shape linked to another shape with a simple click of the mouse button. Subcharts can link to subcharts, and thanks to a command that shows every aspect of your flow chart, you'll never lose track of your logic.

However, a few inconveniences and inconsistencies in *ABC Flowcharter* will drive you to distraction, especially if you work exclusively within the *Windows* environment. Written for earlier versions of the program, the manual doesn't reflect the changes made for *Windows* 3.0. The failure to place the Close command under the File menu may have been technically correct, but its omission still annoys the end user.

Otherwise well presented, *ABC Flowcharter* should serve the needs of virtually any computer user. Flow charts can prove more useful than you might expect, and if you need to create lots of them, you'll want to use *ABC Flowcharter.*

KEVIN REICHARD

IBM PC AT and compatibles, *Windows* 2.11 or later, hard disk with at least 1MB of free space—$295

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San Francisco, CA 94123-3413
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Wizardry

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The Sequel to Bane of the Cosmic Forge

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FINAL ORBIT

Fans of vertically scrolling shoot-'em-ups will enjoy *Final Orbit,* even though its plot is a variation on an old theme. Stranded on a planet, you must battle your way through nine levels to its core and destroy it before garbage bags and other intelligent waste destroy you.

Due to awkward steering controls and the sheer number of adversaries, the game is difficult even in its easiest mode. Fortunately, you can pick up more powerful weapons and play simultaneously with a friend. The graphics and animation are stupendous—this one will put you in orbit.

LEN POGGIALI

IBM PC and compatibles, 640K RAM, CGA, EGA, VGA, or Tandy 16-color; joystick optional, supports Ad Lib sound card—$34.95

INNERPRISE SOFTWARE
128 Cockeysville Rd.
Hunt Valley, MD 21030
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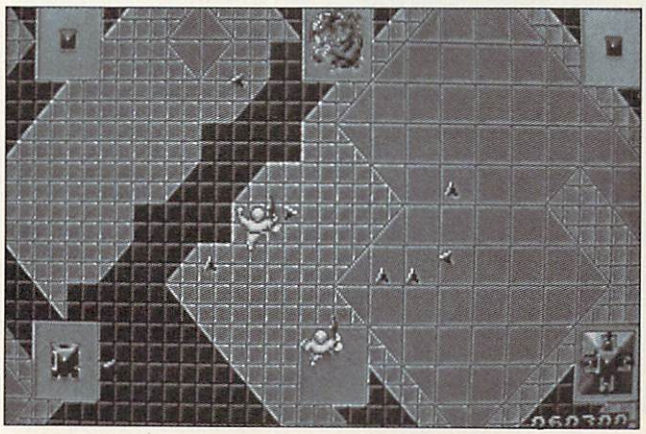

Final Orbit *pits you against a planetful of animate garbage.*

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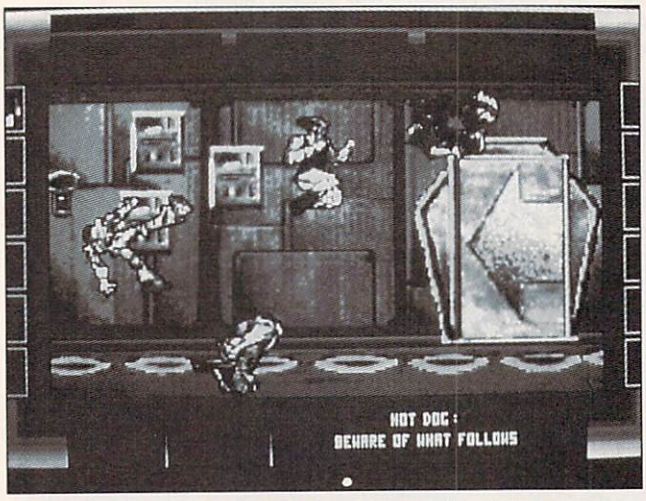
CYBERGENIC RANGER

A massive, state-of-the-art arcade game, *Cybergenic Ranger* consumes almost five megabytes of disk space, requires at least a 12-MHz machine with EGA video (VGA is infinitely better), and deserves every bit of the pampering you give it.

The story is lovingly detailed in a professionally produced comic book, a comic that also serves as copy protection (you have to enter a randomly chosen word from the book before you can start). While the plot is pulp, the graphics are (dare I say it?) out of this world. If you've been waiting for a game whose makers had the guts to leave CGA behind, wait no longer. *Cybergenic Ranger* features scrolling backgrounds for a true arcade 3-D effect. As you move the character through scenery, objects further back move more slowly than objects near the front. Digitized music plays remarkably well through the PC speaker, though of course the Sound Blaster and Ad Lib boards offer superior sound.

While there are some ho-hum space battles, interesting travel on the surface of seven different moons and planets more than compensates. Quick-moving, 256-color monsters left me with the impression that I should have been feeding quarters into my 386; *Cybergenic Ranger* pushes the machine to the limit and is every bit as exciting as a visit to your neighborhood arcade.

TOM CAMPBELL



Cybergenic Ranger's *striking advanced graphics bring arcade standards home to your PC.*

IBM PC and compatibles, 640K RAM, EGA or VGA, 4.9MB disk space; Sound Blaster and Ad Lib sound cards supported—$49.95

(*Editor's note*—Owners of earlier versions of *Cybergenic Ranger* receive a free upgrade supporting sound cards and a joystick. Call the toll-free number listed below.)

SYMTUS
P.O. Box 912
Palacios, TX 77465
(800) 255-2374

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STUDYWARE FOR THE GRE

Some friends of mine took the Graduate Record Exam when they were fresh out of undergraduate school. Smart move. Not only do you start to lose test-taking skills shortly after graduation, but that mass of knowledge that you built up for a diploma starts to fade away pretty quickly, too. Depending on what kind of higher degree you're after, those GRE scores can be quite important. And whenever you take the test, some studying may be in order. Based on actual current exams, *StudyWare for the GRE* allows your preparation time to be focused and well used. If you're comfortable using the computer, then *StudyWare* may be an appealing study tutor.

The program is broken down into two main areas of preparation: the *StudyWare* test preparations and course reviews, and an electronic version of *Cliffs GRE Preparation Guide*. (Remember *Cliffs Notes?* Those inordinately helpful little booklets with yellow and black stripes?)

You can take the *StudyWare* tests in either Test mode (which operates like a real examination, only allowing you to answer questions) or Tutor mode (which gives you immediate feedback, telling you whether you answered a question correctly and supplying the right one if you didn't, along with a brief explanation).

In many cases, *StudyWare* can supply additional information before you answer a question, to help you make the correct choice. If you're in Tutor mode and don't know the definition of a word, you can look it up in the built-in glossary. In mathematical areas, you can peruse online charts and graphs as study aids.

Available tests gauge and sharpen your quantitative, verbal, and analytical abilities. In the verbal area, for example, choose to test yourself in areas like sentence completion, analogies, and reading comprehension. Quantitative exams analyze your abilities in standard mathematical subjects.

StudyWare for the GRE

comes with a paper copy of *Cliffs GRE Preparation Guide;* it is awkward to use this portion of the program—you must read the test questions out of that document and answer them on the electronic answer form within the software.

You can operate the program through either the mouse or the keyboard, and the user interface is elementary enough that little use of the accompanying brief manuals is required. *StudyWare* monitors your progress and reports on your level of success at the end of each section.

Gloomy projections regarding the job market for this year's graduating college seniors may prompt many of them to remain in academia instead of job-hunting immediately, in the hopes that a higher degree may help them nab a better position in the real world. If you're one of these seniors or if you're trying to return to school after being out in the work force for a few years, invest in *StudyWare for the GRE* and give yourself a decided edge.

KATHY YAKAL

IBM PC and compatibles, 256K RAM—$49.95

Also available for Apple II—$49.95 and Macintosh—$49.95

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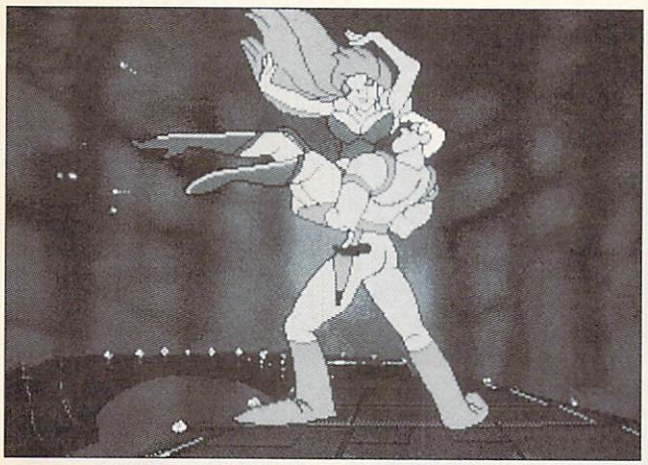

Through dash and daring, the lead in the Space Ace *space opera saves the day and gets the girl.*

SPACE ACE

In this interactive cartoon loosely derived from the popular Dragon's Lair series, you take on the persona of Space Ace as he struggles to stop Commander Borf from transforming Earth's population into infants. Space Ace has already been mildly affected by Borf's infanto ray and so keeps metamorphosing into a weakling kid named Dexter. Reverse aging sure doesn't make his mission any easier!

Before you reach the end of your quest, you'll maneuver Space Ace/Dexter through dozens of colorful scenes. The animation is smooth and cartoonlike, and the digitized sounds, voices, and music are clear and crisp. (A sound card is required.) Dragon's Lair fans will not want to miss this engaging space epic.

CLAYTON WALNUM

IBM PC and compatibles; 640K RAM; CGA, EGA, VGA, or Tandy 16-color; floppy or hard drive; supports Ad Lib and Sound Blaster sound cards; joystick optional—$59.95

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ARACHNOPHOBIA

On a dark and bug-infested night, deep in the steamy jungles of South America, an arachnid steals passage on a plane headed for the United States. Immediately upon arrival, it mates with harmless domestic spiders. Hordes of oversize, poisonous offspring result, ready to take on the world.

The deadly new species reproduces at an alarming rate. One town after another falls prey to the infestation. Bitten humans drop like flies. Only Delbert McClintock, ace exterminator, and his Spider Infestation Control Team can eradicate the poisonous threat. Loosely based on the plot of a movie by the same title, Disney's *Arachnophobia* weaves a web of arcade action that's sure to keep you busy for several hours.

As Delbert, you maneuver your truck through seven spider-infested towns on life-threatening arachnid search-and-destroy missions. Your goal: Locate and terminate the Queen, mother of all spiders. Only when the Queen has been throttled can you proceed to the next town. But every town has several buildings to explore, and each building has loads of surprises—mostly of the eight-legged variety. Obliterate all the bugs in a building and save defenseless human victims along the way to earn extra bug bombs. Terminate every Queen on the home front, and you can clobber critters in the heart of the Amazon rain forest.

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sound effects, digitized human speech, and an eerie musical score really give you the creeps when you plug Disney's inexpensive ($34.95) Sound Source peripheral into your computer's parallel port. Don't go on a bug raid without it! *Arachnophobia*'s animation is so well designed and the sound effects so authentic that you'll be watching where you plant your feet long after you shut down your computer.

Easy to play, *Arachnophobia* nevertheless proves difficult to win. While carrying out your mission, you must avoid the menacing little monsters, each intent on biting you. Use your Toxi-Max insecticide to fumigate every spider and egg sac. Domestic Soldiers succumb easily to a single spray of the bug gun. They also squish underfoot if you stomp them.

Heavy-footed boot techniques won't work on Queen spiders and South American beasties. These bugs require massive doses of Toxi-Max or the firepower available from an aerosol flamethrower. Be prepared to meet your maker if you run out of Toxi-Max at an inopportune moment. Delbert's company vehicle has a never-ending supply, but when you leave a house before locating the Queen, the building repopulates with spiders! You'll need that unlimited insecticide.

Delbert can sustain up to four Soldier spider bites before dying. He can suffer only two bites from a Queen and merely a single chomp from the macho South American menace. Restore his health with a quick shot of antivenin, if you can locate the first-aid kit. Pummel an egg sac, and the directional arrow on the Bugometer compass will point you in the direction of the Queen.

Follow Delbert's techniques, and you will live long and profit. Slip up once too often, and your days as an Arachnid Abatement Technician are numbered. *Arachnophobia* may not offer many intellectual challenges, but action games don't necessarily require tedious puzzles. Grab your Toxi-Max and go on a bug hunt!

CAROL HOLZBERG

IBM PC and compatibles, 512K RAM (640K with Sound Source), CGA, EGA, MCGA, VGA, or Tandy 16-color; joystick optional—$49.95

Also available for Amiga—49.95 and Commodore 64/128—$29.95

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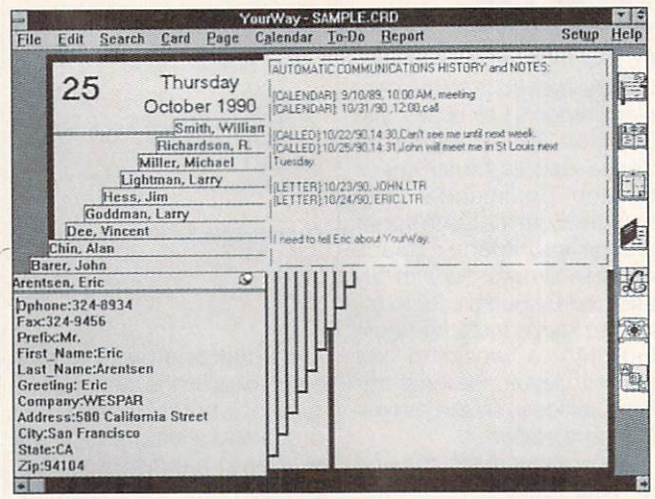
Spiders make themselves at home in Arachnophobia.



Automate your card file with YourWay.

YOURWAY

Though *YourWay* is often reviewed as a personal information manager (PIM), Prisma Software prefers to call it a *Personal Productivity Workstation.* What's that? It turns out to be a contact management–based program that handles schedules, phones, to-do lists, and basic written communication centered on the personal information database that's the hub of an office worker's day.

Viewed as traditional PIM, *YourWay* has shortcomings. Once you understand its objectives, however, you'll find that it's right on target.

YourWay is designed to automate an office worker's card file of contacts, with automatic dialing, scheduling, letter writing, and a historical record of all contacts.

It all revolves around a simple card file. (As a *Windows* 3.0 program, *YourWay* presents the cards graphically onscreen.) Simply label the fields you want on each card; thereafter the field names appear on every card. In the word processor, you can design letter templates that pull address data from the cards, or you can simply write a letter while the addressee's card is on top of the pile. In either case, the letter will be logged into the card's note field, which could be thought of as a large piece of paper folded and stapled to the back of the index card.

To call someone, pull up that card and have the computer dial for you. As you talk, add directly to the note field. The call and certain basic information about it will be logged into the note field automatically.

To schedule time, pull up the calendar; put the card for the person involved on top of the pile. Enter the event on the calendar, and an automatic notation appears in the card's note space.

Use the to-do list—presented as a drawing of a clip-

board with four lists in priority order—to track tasks without specific deadlines. Again, entries post to the note field of the top card.

Launch applications directly from *YourWay* by putting the associated filename on an index card. If you need a certain spreadsheet when you talk to the boss on the phone, for example, put the filename on his or her card. Click on it, and *YourWay* summons the spreadsheet.

For any serious word processing, you'll want to launch your regular word processor. *YourWay* automatically passes your text to the *Windows* clipboard; just paste it into your mainline word processor and continue. While less versatile than *Write* (the program that comes with *Windows*), *YourWay*'s word processor possesses a surprisingly robust spelling checker and thesaurus that might prove useful.

Some may find the index cards themselves confusing. The field names are there, but they're not like those in any other database you've used before. You can enter as much text as you'd like in each field—they're all free-form text fields. You can even delete fields from individual cards and type extraneous material anywhere on a card. While useful, this feature sometimes proves disconcerting.

YourWay provides tightly integrated contact management and history, with basic functions that are easily augmented by full-function applications. While this clever program isn't exactly my way, it could easily be yours.

RICHARD O. MANN

IBM PC and compatibles, hard disk with 2MB available, 286 or higher microprocessor, *Windows* 3.0 or higher, mouse—$199

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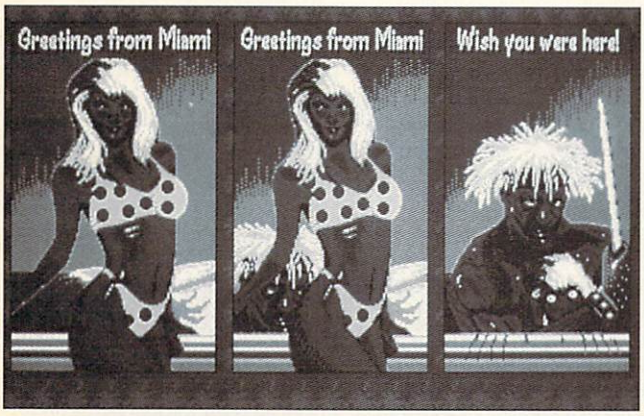

Miami's no place to go on vacation in Fountain of Dreams.

FOUNTAIN OF DREAMS

Mutant rats? Homicidal beachcombers? Killer clowns? In the nuclear war–ravaged environs of Miami that serve as the setting for *Fountain of Dreams*, radiation levels may be high, but the silliness indicator jumps off the meter.

The plot calls for you to locate the source of the precious Dream Water, the only known curative for the horrible mutations threatening to overwhelm the remaining pockets of "civilization." Factional strife among the different groups vying for control of Miami adds a bit of intrigue to the story line, but this is an adventure where brawn rather than brains will carry the day. Combat occurs frequently, whether you're spoiling for a fight or not. And if one of the bizarre beasties or bad guys doesn't get you, the tedium of resolving the interminable battles might.

Not for the gun-shy, *Fountain of Dreams* is for players who prefer to approach the unknown with one eye glued to the sights of an M-16 assault rifle.

JEFF SEIKEN

IBM PC and compatibles, 512K RAM, EGA, MCGA, or VGA—$49.95

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NEGOTIATOR PRO

Scads of books, audiotapes, and training sessions have been dedicated to the delicate art of negotiating. Now there's a software program that promises to provide expert advice molded to fit your negotiating style and, moreover, to propose strategies that will help you work effectively to reach a mutually agreeable solution.

Negotiator Pro is based on 15 leading books, including the best-selling *Getting to Yes*, and draws on such notable experts as Roger Dawson, author of several helpful audiotape programs and books. One of the program's strengths is its hypertext system, an online help tool that lets you see definitions of highlighted terms. If another term in the definition is highlighted, you can read that explanation as well. Hypertext allows you to perform research by free association, a very pleasant experience that stimulates creative thinking. You'll find related terms, definitions, strat-

egies, and tips that you might not otherwise unearth using a printed text. You'll find the information when you need it so you can use it for maximum effect.

First, categorize your negotiating style. *Negotiator Pro* asks ten questions concerning your style of time management, use of threats, methods of revealing information, and likelihood of giving concessions. The results tell you whether you are cooperative or competitive. You repeat the process for your opponent.

How well does this system work? I left one question blank because I couldn't decide how to answer. However, when *Negotiator Pro* read my other answers, it suggested how I would have answered that question—a nice touch that makes me believe that you can get a fairly good idea of personality styles based on just a few questions. However, I had limited information for my opponent and can't believe that *Negotiator Pro* could have made an intelligent guess on answers that I really wasn't sure of. Still, if you have some knowledge of your opponent, this tool could provide further useful insights.

The computer selects the most effective negotiating style and displays suggestions on the screen. For instance, I have an amiable style, as does my opponent. The computer advised this strategy: *Be somewhat like them; be friendly and informal. Ask personal questions. Be nonthreatening, consistent, and professional. Don't push too hard, but gently use objective criteria and time limits to help the amiable reach closure. Be reassuring and stress the benefits to all the people that would flow if your interests are fulfilled. Show how everyone benefits in a win-win outcome.* This paragraph contains a lot of practical advice.

The next step involves the creation of an action plan and briefing book to guide your team through the negotiating process. The program presents an outline of 35 stages of negotiating, such as opening gambits, midpoint tactics, and approaches to closing. After you select a topic, the computer takes you to a small word processor, which allows you type your ideas, goals, and strategies.

If you're strapped for time, *Negotiator Pro* will present you with the top ten outline topics. Whichever method you choose, you can also import text from other programs, so if you assign part of the plan to others, you won't have to reenter the text—merely integrate their work with yours. When you've finished, you can print the document and present it to each member of your team. The publisher stresses this feature because if participants enter the negotiating sessions in latter stages, they will have the benefit of reading this master plan to gain insight into the other side's negotiating character and your side's goals and strategies.

While clear, the manual could be better organized. It includes 35 pages of definitions and negotiating tips, but not all the hypertext terms are listed. Why were some terms and strategies included but not others? What was the distinction? The manual does contain a wealth of information, but it is presented in alphabetical order, rather than categorized by strategies or skills. In short, the material is interesting, but not as valuable as it would be with more logical organization.

Each time you use the program, you must specify the appropriate batch file to load your computer's monitor type. This is a minor flaw, but a dated process. You also must unload all TSRs as the program uses all 640K memory. I failed to do this initially and found myself waiting literally 15 minutes as the computer displayed a *collecting memory* message on the screen, which led me to believe the computer was working. In reality, the computer was hung up. A toll call to the company for support resulted in a phone message and the promise of a return call the next day. The courteous chief programmer called with the answer the next morning. Despite the flaws with the manual and installation, *Negotiator Pro* will help you organize your thoughts, brainstorm, and gain insight into your own needs and wants as well as those of your opponents. That's a pretty good compromise.

DANIEL JANAL

IBM AT and compatibles; 640K RAM; hard disk; CGA, EGA, VGA, or Hercules—$299, Library of Negotiations—$49

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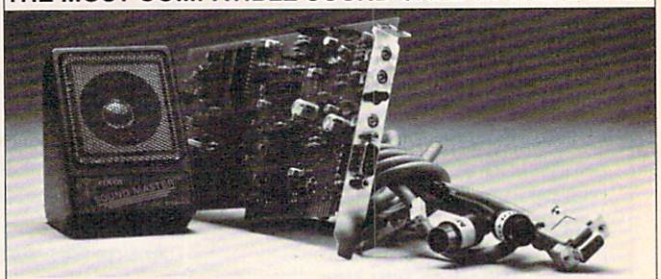

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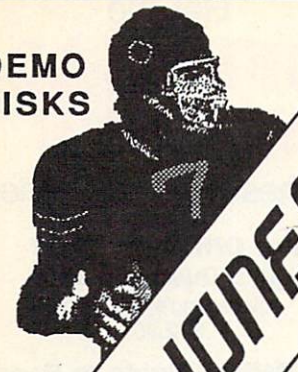

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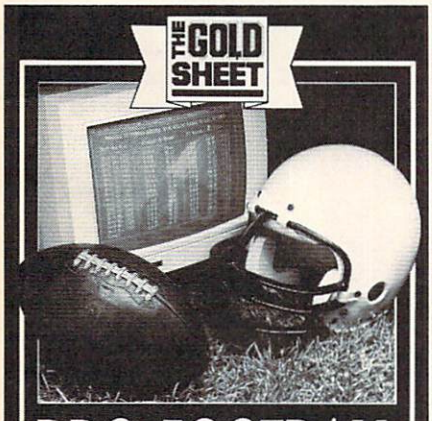

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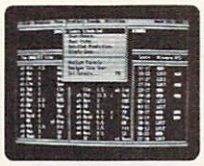

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CONVERSATIONS

Peter Scisco

GAMES ARE US

COMPUTE: What's in store for computer games in the next three years?

Trip Hawkins: I think what the consumer cares about is the audiovisual realism of the experience. There's a big leap from 8-bit to 16-bit. On the Sega Genesis and the Super Nintendo, the graphics look as good as EGA graphics and even better, because the animation is very good.

C: Will we see the same kind of explosion we saw with the 8-bit NES happening with these 16-bit systems?

Hawkins: Yes, in fact it's happening right now. It's related to two factors. The smaller factor . . . is the growth of the home office market. A lot of consumers who are home office workers are going to buy an IBM compatible, and once they make the decision to get one, they can do a lot of different things with it, including entertainment. Videogames have a far more dramatic growth pattern because of the price point of the hardware. Plus, you've got 30 million households that were brought up on the 8-bit videogame systems. You only need a fraction of those to switch over to the 16-bit [market] that's already as big as the IBM floppy disk market.

C: If 16-bit videogame systems become that successful, will developers abandon the personal computer?

Hawkins: A high-end flight simulator like *Chuck Yeager's Air Combat*—you can't do that kind of a product on a videogame system. It needs to have bitmapped graphics and a lot of memory space. You can't do really fast polygon rendering, which is the technique used in flight simulators. We're still going to bring some of our simulations technology down to the videogames, but we can't do it at the same level. Other than that, if you have a good game, you're going to put it on all of the machines.

C: Define multimedia *and its role in entertainment.*

Hawkins: Here's what it means to me. It has to be interactive. If it's not interactive, then why bother? There are all kinds of digital technology being brought to audio and video, which is fine. But to call it *multimedia* and say it's a new business—well, what's new about it? It has to be interactive to really be new.

C: Define interactive.

Hawkins: It's to be contrasted with *passive.* If I am watching television and the information is all one way, the only way I interact with my TV is by pressing buttons on my remote.

C: How is that different from an arcade game? Just pressing a fire button—I wouldn't call that interactive.

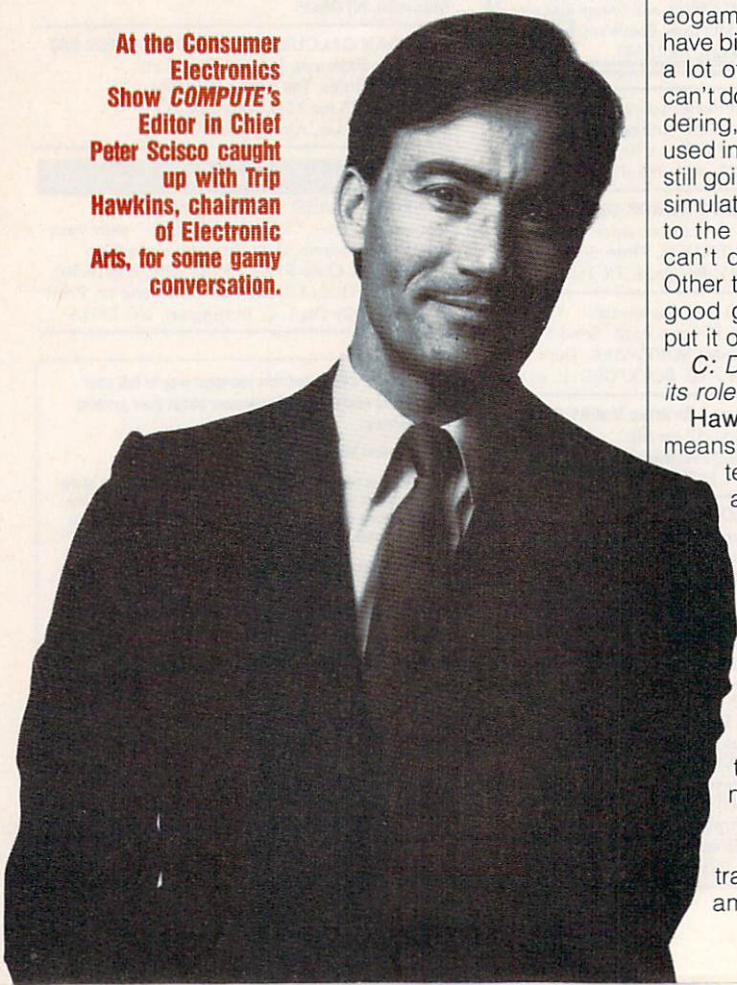
Hawkins: There's a lot more going on than that, though the control may be simplistic. The thing about the TV remote is that's a real strong indication of people's desire to interact. Television is passive, and the passivity is brain numbing. People need to be stimulated so they're constantly changing what's on the screen.

C: I see arcade games as a linear experience.

Hawkins: That may be a function of the environment more than anything else. In a coin-op situation, you're trying to get a couple more quarters out of somebody every couple of minutes. So that influences the way the games are designed. But there's nothing intrinsic about the technology that makes it have to be that way.

C: Can entertainment software play a role in education?

Hawkins: Absolutely. The brain research that's been done in the U.S. over the last 20 years has proven that interaction is the single best way to increase your intelligence. There's no question in my mind that a kid who spends a lot of time playing videogames will have superior skills in pattern recognition. This is a cultural problem. Parents look at a kid playing a videogame, and he's staring at the screen almost like in a trance—and it scares them. They don't realize that that's good. He's intense. There's a lot of brain activity going on. If parents see their kid lounging around watching the TV, they don't realize that he's not being stimulated, that there's not as much brain activity going on. ❐



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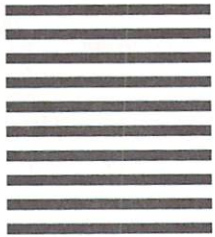

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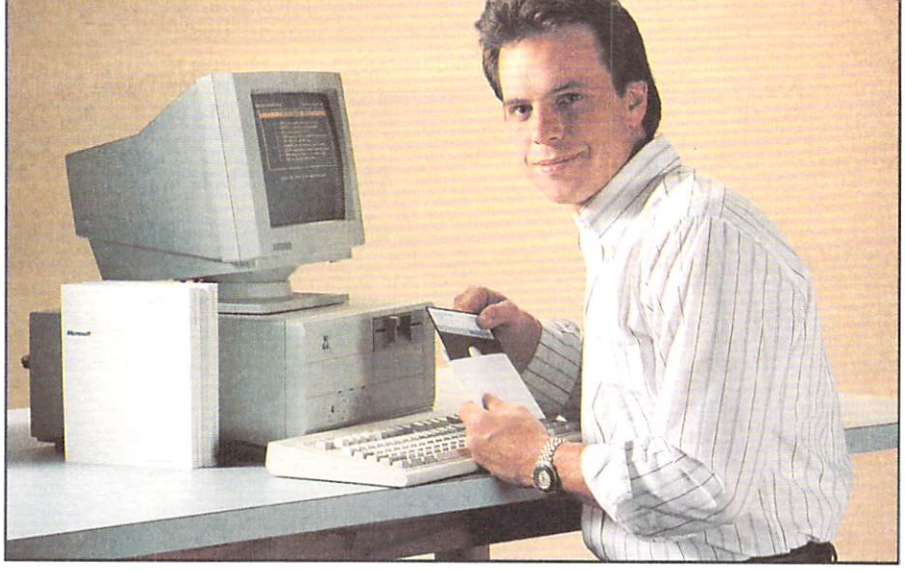

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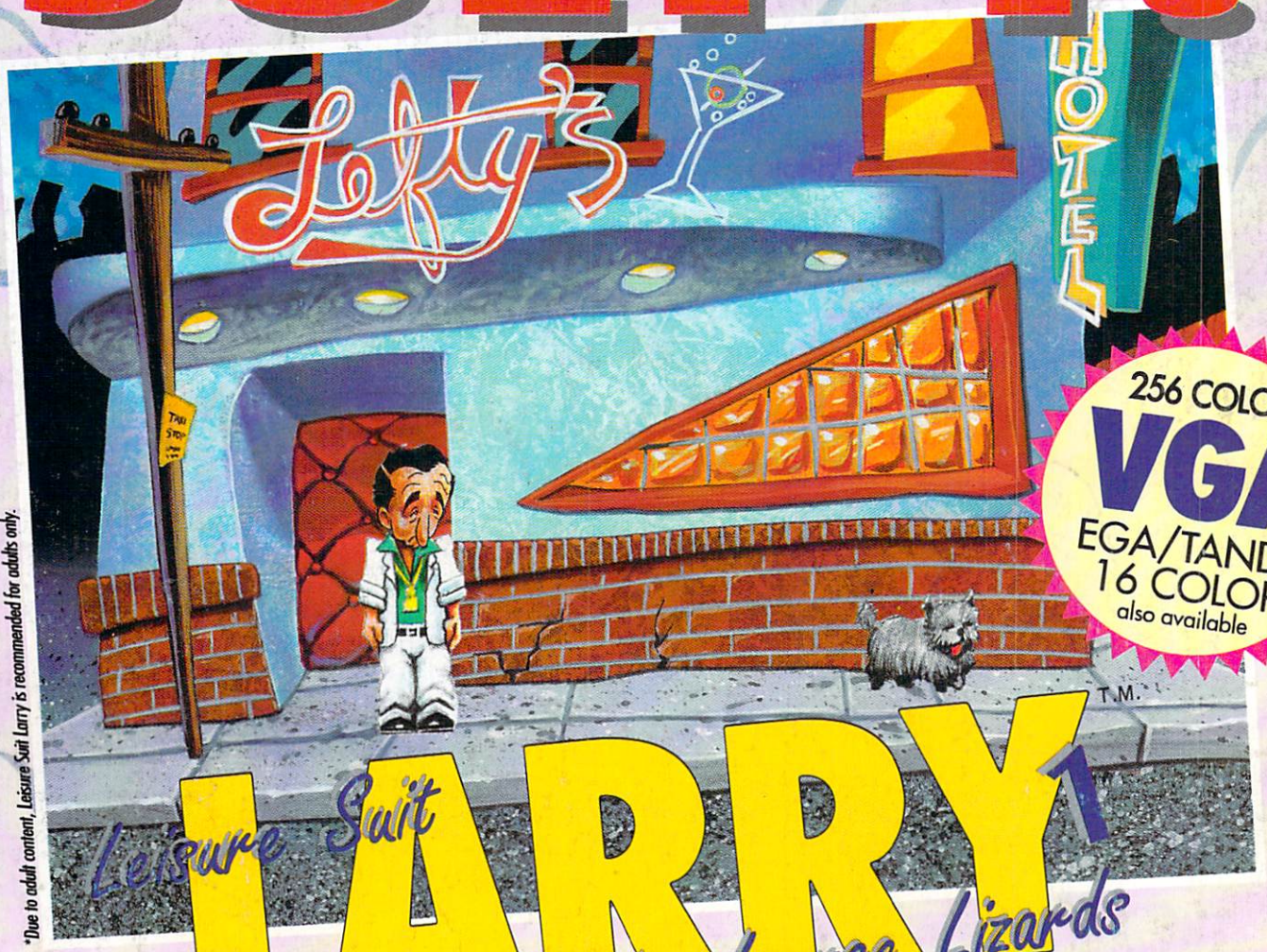

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