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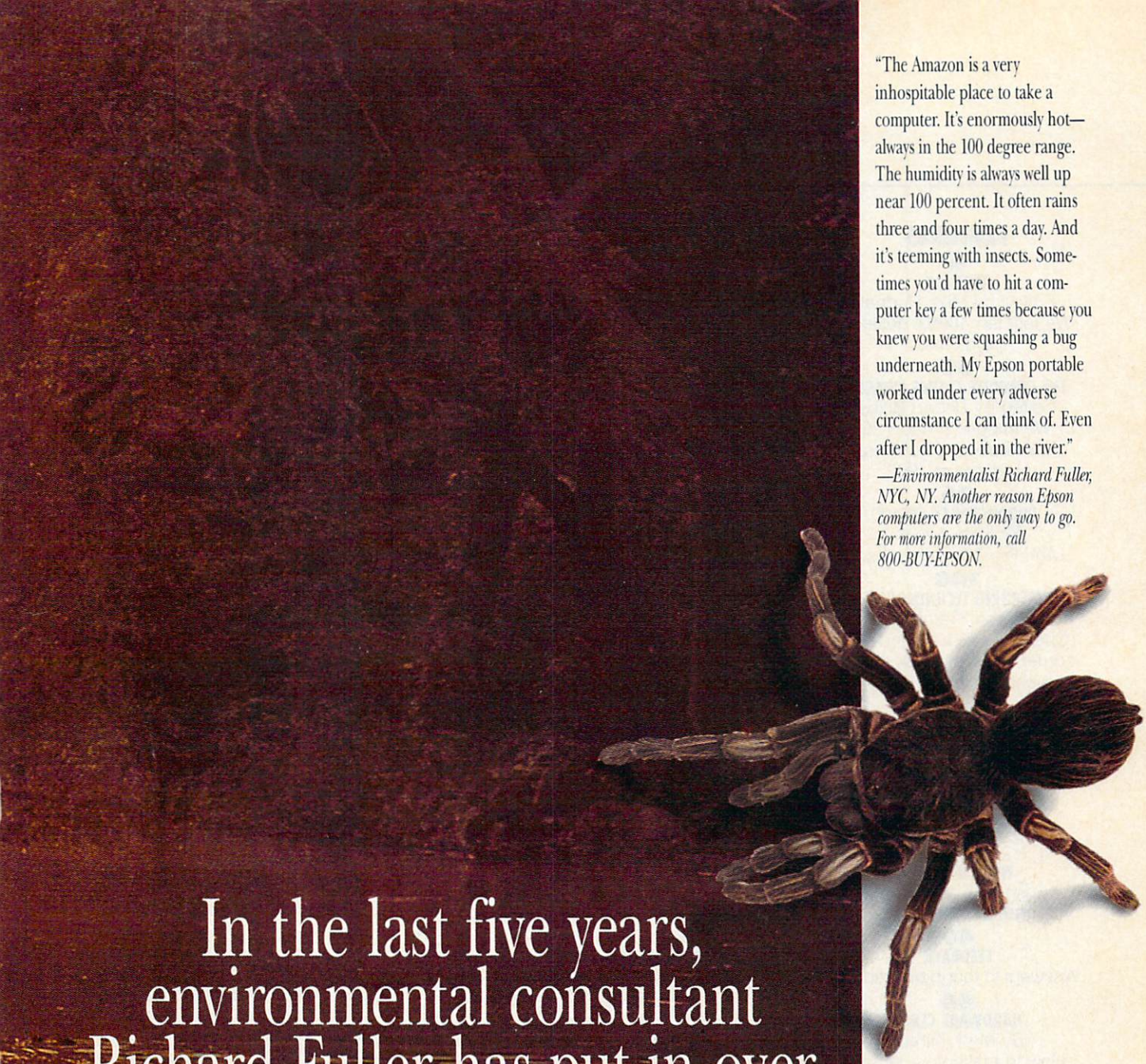

In the last five years, environmental consultant Richard Fuller has put in over 107,000 unusually grueling miles of business travel.

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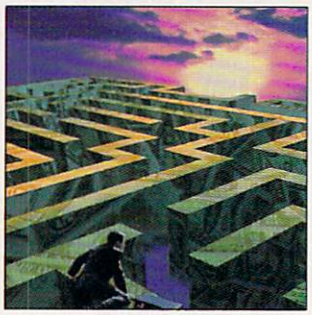

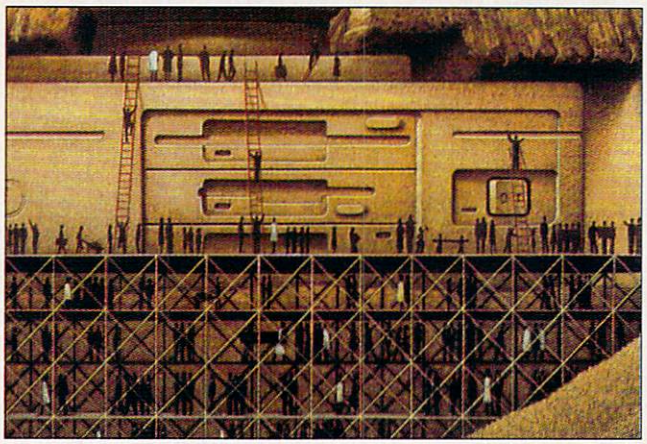

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Circle Reader Service Number 125

EDITORIAL LICENSE

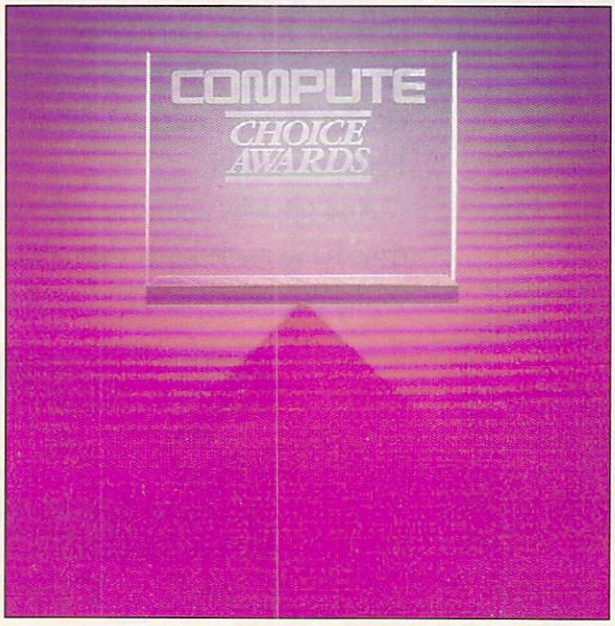
Clifton Karnes

January is a time for celebration and reflection, and here at COMPUTE we're doing both. We're reflecting on the best hardware and software products of 1992, and we're celebrating the winners with our annual COMPUTE Choice Awards.

If you're new to COMPUTE, here's some background on the awards. Each year, COMPUTE's editors and writers nominate the hardware and software products that they think are the year's best. We study the nominations, and from that list, we choose what we think are the top products.

For this year's awards, we selected 25 categories, everything from Best Word Processor to Best Laptop/Notebook Computer to Best Arcade Game. We took nominations from COMPUTE's editors and writers, and when the smoke cleared, we had a list of 131 products. This list of nominees comprises what we feel are the best products going—a Who's Who of PC software and hardware. And from this group of top contenders, we chose the best of the best.

This year's COMPUTE Choice Awards honor the 25 best hardware and software products of the year.



Choosing the winners is tough every year, but this year it was harder than ever. The reason is simple: Software and hardware products keep getting better and better. Each year they're more sophisticated, more powerful, and easier to use. And in fact, in one instance, Best Desktop Publishing/Graphics Program, we had to go with a tie.

The point I want to make is that almost all these races were photo finishes. I don't want to take anything away from the winners, but I'd like to stress that being nominated is the real honor. To bring this point home, in this year's Choice Awards feature, we're listing the nominees in each category along with a reader service number for each, so you can get more information about them if you're interested. This is something we've never done before, but we want to recognize the nominees as well as the winners.

We've also added a special technology award this year, and we have two winners: the PCMCIA interface and the VESA local bus. Both of these exciting new technologies are really bus innovations: PCMCIA gives a notebook computer the same expansion options as a desktop, and the VESA local bus offers blinding speed for video. In the future, local bus will make hard disks and almost anything else that normally fits in a slot on your PC lightning fast.

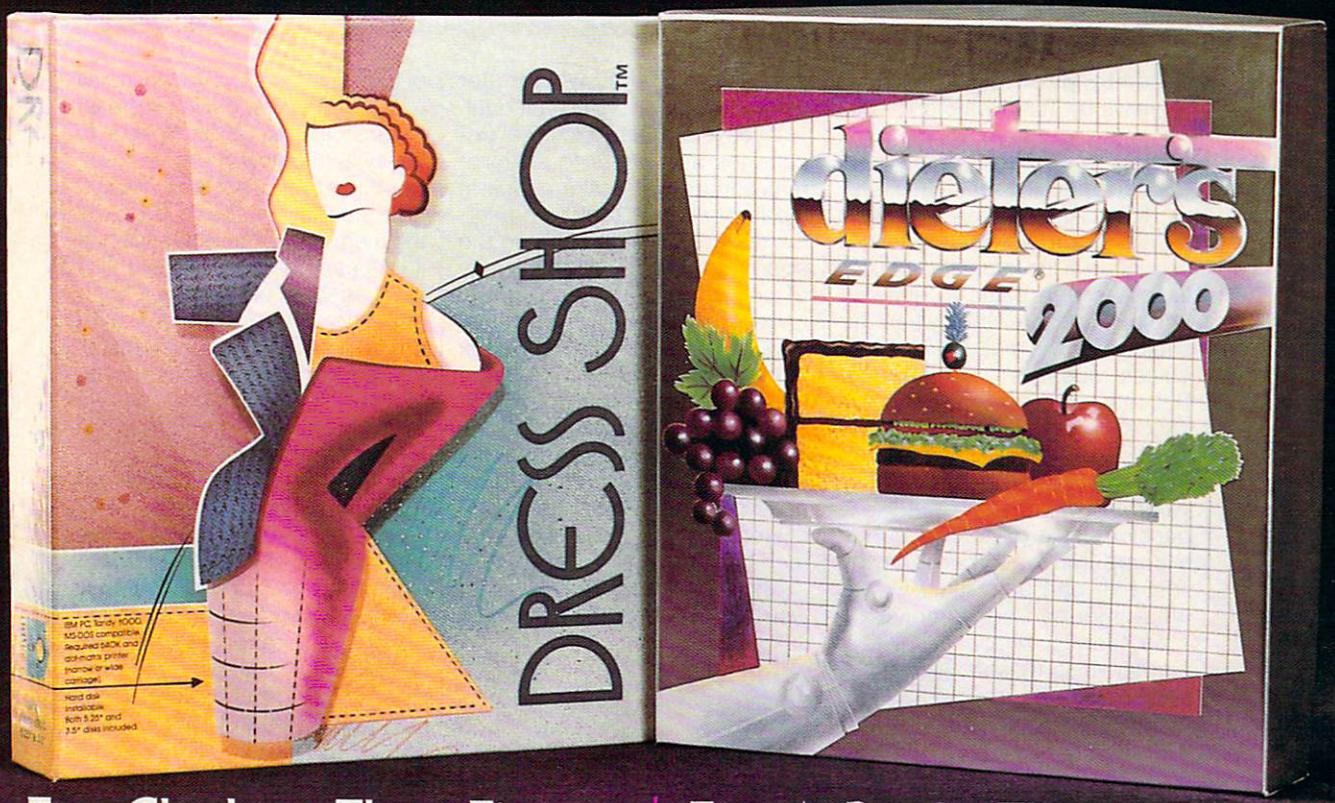
One other aspect of the COMPUTE Choice Awards deserves special mention: our time frame. You may find yourself looking at these products and wondering why something that appeared in December, for example, wasn't nominated. There are several reasons for this. The first is that the January issue actually appears on the newsstand on December 15 and goes to subscribers even earlier. We also need at least one month to evaluate any new products for award consideration. Add to that the time it takes to actually produce COMPUTE, and you have a lead time of a few months. For this reason, we've decided to adopt an award year that runs from September 1 to September 1—roughly the same year the auto industry uses.

It's also worth noting that while we allow editors to nominate software products still in beta (prerelease version of the soon-to-be-shipping software), we made a new ruling for this year's awards that only shipping products could win. This eliminated several superb pieces of software, but they'll have a chance at next year's awards.

The last point I'd like to touch on is the categories we chose. The 25 award categories are based on the types of software and hardware that we feel are important to you, our readers. Where do we get the input on what's important to you? From lots of sources, but the most important is from the readership surveys that we run twice a year. In these surveys you tell us not only what you like about COMPUTE and what you'd like to see changed but what types of software and hardware you're interested in. You can see from this how important these surveys are to us at COMPUTE.

In this issue, you'll find 1993's first readership survey to sound off with. Let us know what kind of hardware you have. The software you're using. What you'd like to read about. And, in the comments section at the end, tell us what you think of the COMPUTE Choice Awards. Your vote counts! ❐

FIT HAPPENS



For Clothes That Fit...

"You no longer need a personal dressmaker to have custom-fit clothes. What you do need, aside from some basic sewing skills and a sewing machine, is an IBM-compatible computer, a dot matrix printer and the Dress Shop® disk."— *Glamour* Magazine

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Dress Shop® is $99.95 plus $5 S/H (CA add 7¼% tax). It requires an IBM-compatible with 640K RAM and dot matrix printer.

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Best New Use of a Computer

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Circle Reader Service Number 174

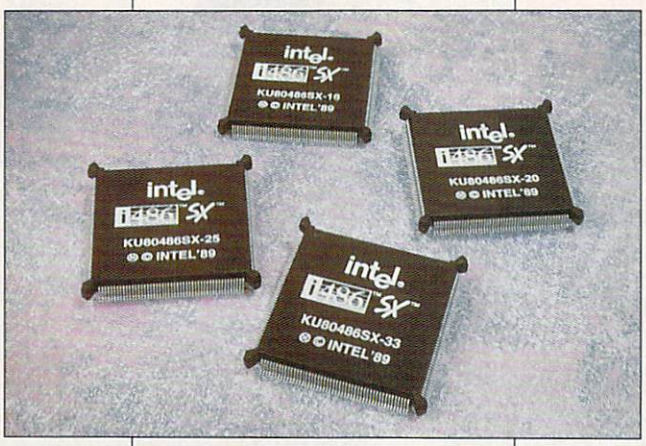
TEST LAB

Edited by Mike Hudnall
Reviews by Tom Benford

They're powerful, fast, and capacious, these 486SX systems. And undeniably tempting. I know: It's easy to get caught up in the hype and the statistics, for the pulse to quicken and the mouth to water when the subject turns to megahertz, megabytes, megathis, and megathat. But rest assured that buying a 486SX system makes sense.

This month, Test Lab focuses on ten 486SX systems that offer value, power, and room for expansion. It's a great time to buy a computer, and this month's Test Lab can help make you a more informed consumer.

To see just what a great value these systems are, consider the four 386SX systems we covered in the April 1992 Test Lab. List prices ranged from $1,195 to $2,348. Less than a year later, eight of the ten 486SX systems featured here have list prices below that of the most expensive 386SX. Decreases in microprocessor prices and increased competition among computer manufacturers have made this very much a buyer's market.



This month's systems offer more than attractive prices, however. They deliver considerable bang for the buck. The 486SX microprocessor has a 32-bit path internally and externally (unlike the 386SX, which has only a 16-bit external path), it runs faster than the 386s we tested, and it contains a highly efficient internal cache.

The only difference between the 486SX and the 486DX is that the 486SX lacks the latter's built-in math coprocessor. So powerful is the 486, in fact, that we had to redesign our application benchmarks so that they would offer more statistically significant data.

If you're put off by technical discussions and prefer to examine real-world results, take a look at the Test Lab bar graphs. The Norton system benchmarks and the application benchmarks offer realistic pictures of relative performance. You can see, for example, how a particular 486SX system handles a word processor, a spreadsheet, and a database. These benchmarks prove especially useful, however, because they reflect the overall performance of a particular system—the microprocessor, hard drive, and memory all working together.

The system components that work in concert with the powerful 486SX microprocessor provide another reason for buying. Take hard drives as an example. In April the largest hard drive on one of the 386SX systems was 84MB. In this month's lineup, the smallest hard drive is 80MB, and many of the systems offer as part of the standard configuration hard drives with more than 100MB of storage as well as options for hard drives with capacities over 600MB.

All of this month's systems come with 4MB of RAM, a realistic configuration for working with today's Windows applications. What's really surprising is the number of options for expansion. Two of the systems allow you to install 64MB of RAM, and five others let you install up to 32MB. Several of the systems allow you to upgrade the microprocessor to a 486DX, and most allow you to upgrade the memory on the video adapter if it doesn't already come with a full megabyte of memory.

If the internal cache isn't enough, some of the systems let you add an external cache—up to 256K. Clearly, these system manufacturers are looking to the future, planning for applications that make greater and greater demands on system memory and storage. For all of the distinctive features of these power machines, look to the reviews, which also comment on documentation, installation, drive bay options, open slots, and many other features you'll want to check out before you buy. For convenient side-by-side comparisons, there's also a features grid.

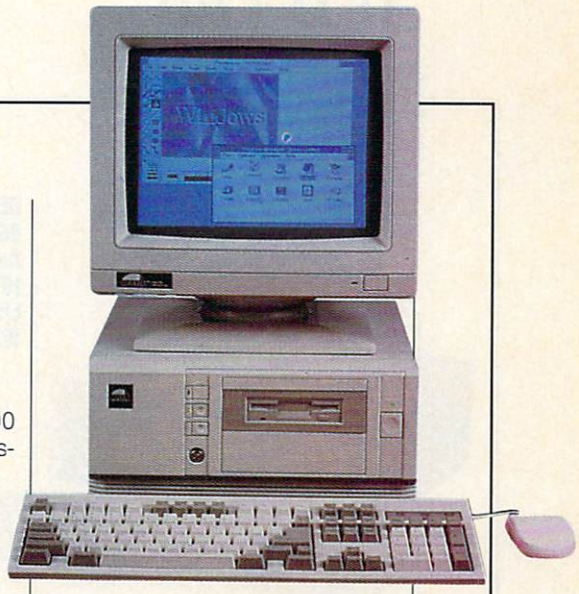
Most of these systems come standard with Windows 3.1, and you'll really appreciate the snappy performance of Windows apps on these systems. While a number of Windows programs will work on a 386SX running at 16 MHz, their lack of speed can leave you frustrated, especially if you've had a chance to try the same programs on a 486. For sizzling performance, three of this month's systems offer local bus video.

These 486SX systems pack so much power, performance, and value that your only question may be which system to buy. With reviews, benchmark data, and detailed information about system features, Test Lab can help you make that decision.

MIKE HUDNALL

CUMULUS WORKBOX 486SX/20

CUMULUS
23500 Mercantile Rd.
Cleveland, OH 44122
(216) 464-2483
List price: $1,598
Warranty: one year



If you're in the market for a good entry-level 486SX system that comes ready for work right out of the box, take a look at the Cumulus WorkBox 486SX/20.

With a baby-AT form factor, the WorkBox fits comfortably on the desktop and provides a stable platform for the monitor. The clean, uncluttered front of the unit features a recessed power switch; unobtrusive LEDs for power, floppy drive, and hard drive activity; a keyboard key lock; and a single 3½-inch high-density floppy drive.

This system comes with a 120MB IDE hard drive. The system supports RAM expansion from the standard 4MB configuration up to a maximum of 16MB. For adding peripheral devices to the system, you'll find six available expansion slots.

Cumulus supplies a 16-bit Super VGA adapter populated with 512K of video RAM and featuring the Trident TVGA-9000 graphics chip. This board can display 16 colors at 1024 × 768 resolution in interlaced mode (but not noninterlaced mode), which is limiting for those users who desire a 256-color palette in the extended VGA ranges.

The CPU is an i486SX running at 20 MHz. If you discover you need more power later, you can install a coprocessor or replace the microprocessor with one of Intel's new upgrade chips.

The WorkBox comes standard with 4MB of RAM on the motherboard, and you can expand up to 8MB directly on the motherboard itself, but expansion beyond that point requires an auxiliary memory board that mounts in a dedicated expansion slot. The memory board is standard equipment with the WorkBox, but you must fully populate it with 8MB (in eight SIMMs) before the system will recognize the additional board. The system supports configurations of 1MB, 2MB, 4MB, 8MB, or 16MB (but not 10MB or 12MB). Installing the expansion board is quite a simple affair; once you install the SIMMs in their spring-clipped retainers, the expansion board merely slips into the dedicated slot on the motherboard and doesn't require any additional attention.

Cumulus also provides a socket to accept either an Intel or a Weitek 487SX/20-MHz math coprocessor. If you'll be working frequently with spreadsheets, graphs, or other operations that perform complex mathematical calculations, adding a math coprocessor makes a great deal of sense.

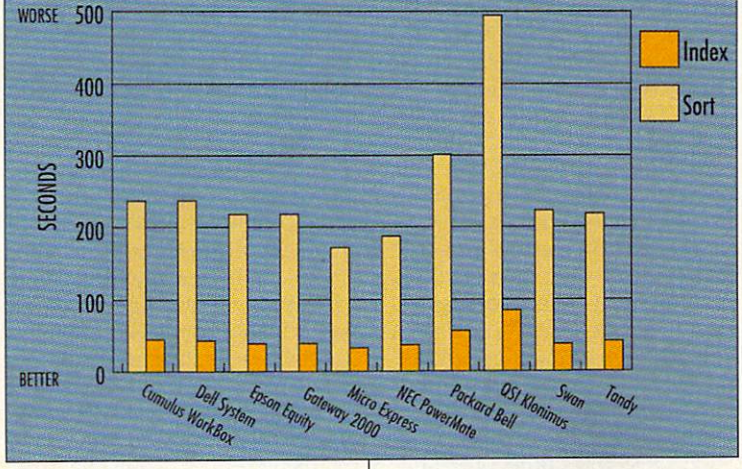
The WorkBox ships with MS-DOS 5.0 and Windows 3.1 already loaded on the system's hard drive, as well as floppy copies with concise versions of the manuals. To get you off to a productive start immediately, Cumulus includes Microsoft Works 2.0 in the WorkBox software bundle, along with video and system utilities.

A two-button Cumulus serial mouse and a comfortable 101-key audible-click keyboard round out the system's standard equipment. Add the monitor of your choice, and you're ready to enter the world of 486SX computing.

Circle Reader Service Number 272

DATABASE TESTS

Our database tests use a 25,636-record database (each record contains 32 fields) which is not indexed. The Index Test records the elapsed time required to index the entire database on a single primary field. The Sort Test times how long it takes to sort this database on a secondary field and create a sorted database.



TEST LAB

DELL SYSTEM 486D/25

DELL COMPUTER
9505 Arboretum Blvd.
Austin, TX 78759
(512) 338-4400
List price: $2,319
Warranty: one year, parts and labor

A machine with a future is what Dell engineers obviously had in mind when they designed the 486D/25. This system provides plenty of room for expansion as your requirements grow.

The mid-size system case stands a full six inches tall from the desktop, and its excellent interior design allows for six full-length 16-bit expansion slots. Since the drive controller circuitry and the video adapter are integrated into the motherboard itself, slots that would otherwise be occupied by cards for these two essential functions are available for adding user peripherals instead. With so many of today's PCs suffering from "board cramp" because of small case designs, it's refreshing to see a machine that provides plenty of room for expanding the system.

Upgrade the i486SX/25 central processing unit simply by replacing it with a 33-MHz i486DX or faster CPU. And for doing CAD, number crunching, or other tasks that require the extra computational power and speed, you can use the motherboard socket for an optional 25-MHz i487SX math coprocessor. Of course, if you upgrade the CPU to a DX chip, the math coprocessor is built in.

The standard video setup for the 486D/25, an integrated 16-bit VGA adapter with 512K of video RAM, can be upgraded to a full megabyte of video RAM (an option available for $49), which transforms the video into a 32-bit system capable of displaying 256 colors at a resolution of 1024 × 768 or 32,768 colors at 640 × 480. The video refresh rate is 70 Hz, non-interlaced, for a crystal-clear display without flicker, whether you're dealing with text or graphics.

The 486D/25 comes standard with 4MB of RAM, expandable to a maximum configuration of 64MB directly on the motherboard itself, so there's plenty of room for growth here, too.

The review unit came equipped with an 80MB IDE hard drive installed, but you can have the 486D/25 factory-configured with larger hard drives in a variety of "flavors"; 100MB, 200MB, and 320MB IDE drives; 330MB and 650MB ESDI drives; and 200MB, 330MB, 650MB, and 1.4GB SCSI drives are also available as options.

A Microsoft two-button bus mouse that connects to the 486D/25's PS/2 mouse port came supplied with the review unit, although Dell also gives you a choice of a Microsoft serial mouse, a Dell serial mouse, or a Dell System (PS/2-compatible) mouse. Other options include various tape backup devices and an internal 2400-bps modem.

MS-DOS 5.0 came preinstalled, and you can buy the system with or without the operating system disks. If you wish, you can get the 486D/25 with IBM's OS/2 operating system.

I rate Dell's documentation excellent—clearly written and well illustrated, with good organization and layout. Finding particular information about the system's features, settings, and options is easy.

You'll find using the 486D/25 a pure delight, thanks to its excellent Dell Ultrascan monitor and superb 101-key keyboard with great tactile feedback. The i486SX CPU provides snappy performance, which is perfectly mated to the system's fast IDE hard disk. Dell's SmartVu system diagnostics LED display is mounted right on the front of the machine above the conveniently located power and reset switches; it keeps you abreast of system conditions and operations (represented by numeric codes) at all times.

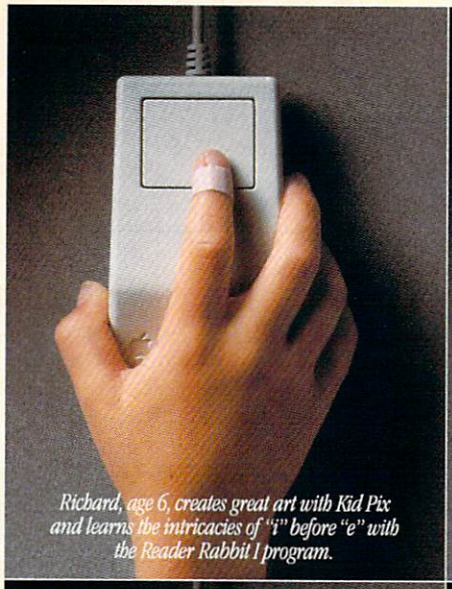
If you expect your present computing needs to grow (and who doesn't?), then you should seriously consider the Dell System 486D/25. This is definitely a machine with a future.

Circle Reader Service Number 273

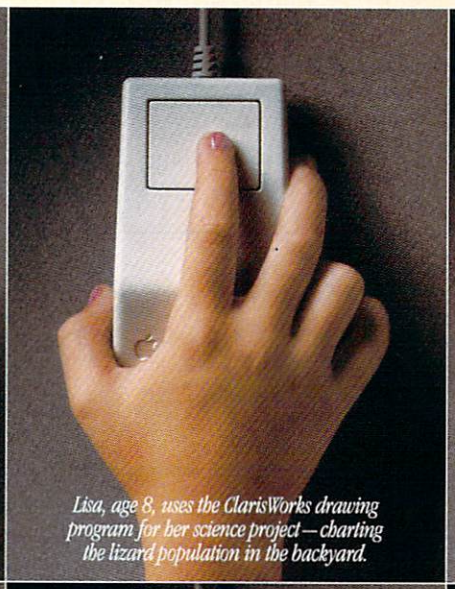
EPSON EQUITY 486SX/25 PLUS

Epson's Equity 486SX/25 Plus offers an attractive combination of 486-based power, integrated components, and room for expansion in an AT-sized desktop case.

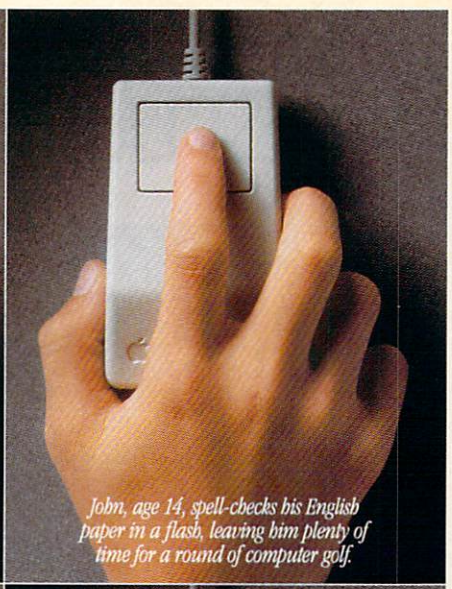
An Intel 80486SX CPU running at 25 MHz provides the computing power on the motherboard, which comes with 4MB of RAM as its standard configuration. One of the unique features of this motherboard is that Epson permanently soldered the RAM into the assembly rather than using removable DRAM chips or SIMMs. You can expand memory 12MB above and beyond this 4MB foundation by using either 256K or 1MB



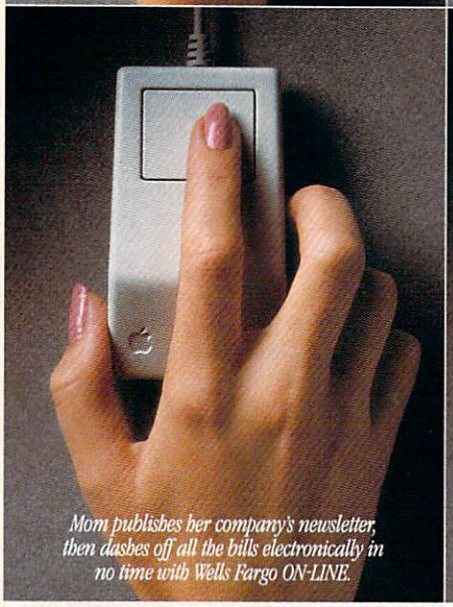
Richard, age 6, creates great art with Kid Pix and learns the intricacies of "i" before "e" with the Reader Rabbit I program.



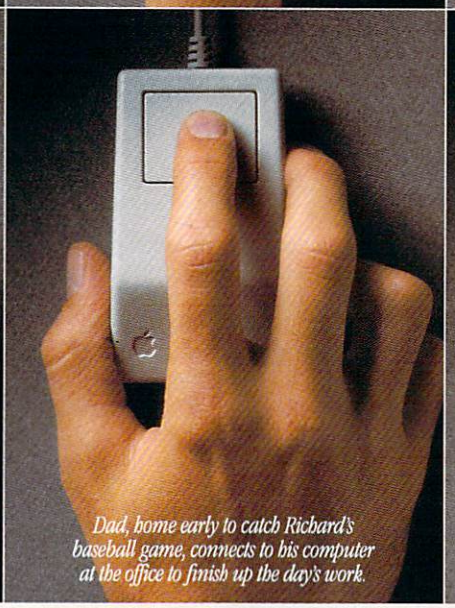
Lisa, age 8, uses the ClarisWorks drawing program for her science project—charting the lizard population in the backyard.



John, age 14, spell-checks his English paper in a flash, leaving him plenty of time for a round of computer golf.



Mom publishes her company's newsletter, then dashes off all the bills electronically in no time with Wells Fargo ON-LINE.



Dad, home early to catch Richard's baseball game, connects to his computer at the office to finish up the day's work.

Rex, tired of being ignored while everyone uses the Macintosh, discovers a new way to grab Dad's attention.

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The new Apple® Macintosh® Performa™ family of personal computers is especially designed for your family. They're flexible enough to run the software your kids use at school. Powerful enough to run the programs you use at work. And getting started on one is incredibly easy, because of everything it includes. You'll get the basic software, already built in. A toll-free helpline. And a one-year limited warranty with in-home service for warranty repairs.* For a retailer near you, call 800-538-9696, ext. 215. Or visit one of the stores below. And bring home the power every family needs. The power to be your best.®

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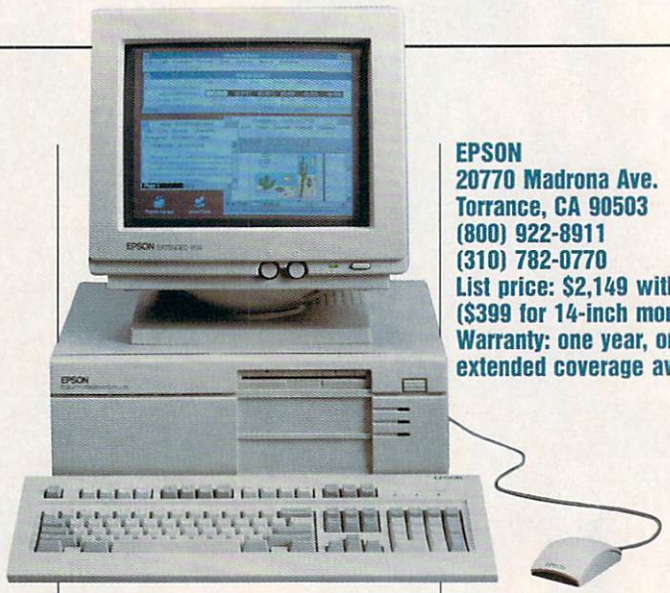
TEST LAB



EPSON
20770 Madrona Ave.
Torrance, CA 90503
(800) 922-8911
(310) 782-0770
List price: $2,149 without monitor ($399 for 14-inch monitor)
Warranty: one year, on-site; extended coverage available

SIMMs to achieve a maximum configuration of 16MB. For those computation-intensive applications, just add an 80487SX math coprocessor chip in the slot provided on the motherboard.

In keeping with the current design trend of high-scale integration, Epson has built all of the essential controllers and I/O channels into the motherboard itself, thereby leaving the six expansion slots (five 16-bit, one 8-bit) vacant and available for installing any peripheral cards the user desires. So on the motherboard itself, you'll find the floppy and IDE hard drive controllers as well as the serial, parallel, keyboard, and PS/2-style mouse ports.

The tall case affords a generous amount of room for adding devices in the mass storage bays. The case can accommodate up to five drives in various combinations. The review unit came with a slimline 3½-inch drive mounted topmost in the cabinet, leaving two front-accessible half-height bays available below it. The system's 240MB hard drive is internally mounted inside the case, where you'll find space for adding another unexposed device as well.

The VGA adapter built into the motherboard gets a performance boost from the 1MB of video RAM. The adapter is capable of noninterlaced mode only in 800 × 600 or 1024 × 768 resolutions with a 16-color palette. The 256-color palette is supported only in 640 × 480 mode, and for resolutions over 640 × 480, you'll need a multifrequency monitor. This is an unfortunate limitation, since you'll have to purchase an aftermarket high-resolution video card if you want 256 colors or more to be displayable at the higher resolutions.

A large 101-key keyboard with audible click provides a comfortable means of inputting data and commands to the system. In addition to the usual illuminated lock indicators and a top-mounted row of 12 function keys, this keyboard also provides dedicated editing, cursor control, and numeric keypads. The slope and contour of the keyboard are excellent—it's clearly one of the more ergonomically pleasing keyboards I've used.

Both MS-DOS 5.0 and Windows 3.1 come preinstalled on the system's hard drive, and the floppy copies of the programs and full user manuals are also provided. Additional system software consists of a reference disk and three utility disks, all supplied on 3½-inch media.

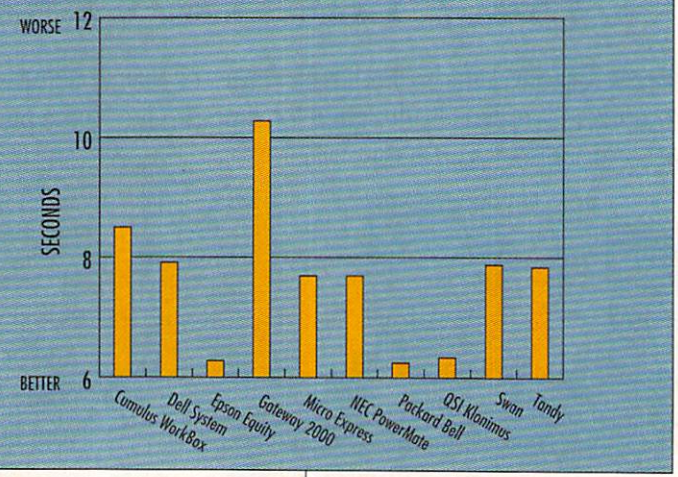
The documentation for the Equity is up to Epson's usual standards for clarity and completeness. I found both the user's manual and the reference guide well organized, clearly written, and rich in illustrations and diagrams.

Overall, the system provides a solid foundation upon which you can expand to meet your future needs while providing an adequate amount of workhorse muscle for today's tasks.

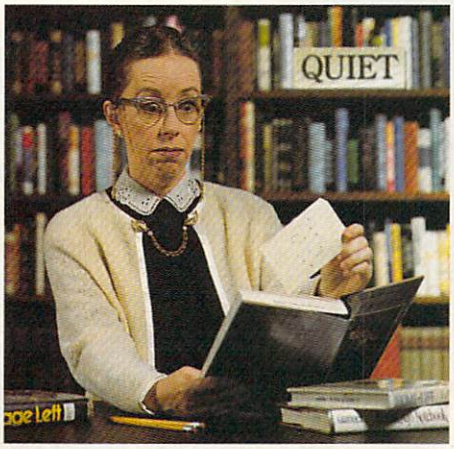
Circle Reader Service Number 274

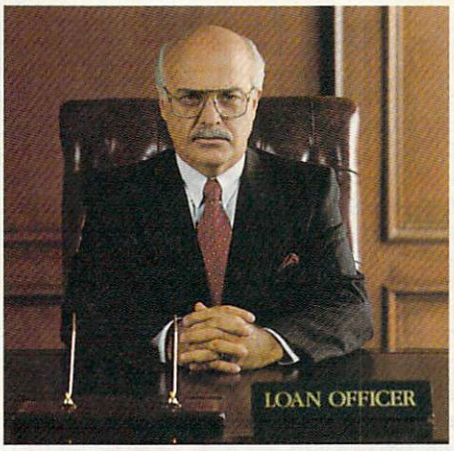
SPREADSHEET TEST

The Spreadsheet Test determines the elapsed time for calculating an amortization table which yields the interest and principal amounts on a monthly basis over a 1500-month term using an eight-digit (two decimal places)principal and a four-digit (two decimal places) interest rate.



Introducing the first dot matrix printer with multiple personalities.





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We like to say the GSX-230 is the practical printing alternative. Call 1-800-4-PRINTERS for more

QUIET ACHIEVEMENT
CITIZEN PRINTERS
1992

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TEST LAB

GATEWAY 2000 486SX/25

Editor's note: After our laboratory had completed its testing and this review had been written, Gateway announced an updated version of this 486SX system. According to a Gateway representative, the new system will be the same as the system reviewed here, except that it will have a new case (16 × 16.25 × 4.25 inches), offer an optional 340MB IDE drive, use a 1MB DRAM Western Digital video adapter, and offer Microsoft Works as part of the standard package. The price of the new system will actually be lower—$1,495—when this issue of COMPUTE appears. Please keep in mind that the benchmarks for Gateway reflect the performance of the reviewed system and, because Gateway changed the video adapter, may not reflect the performance of the new system for the graphically oriented tests.

These days quite a few people are unpacking boxes with a distinctive cow-print exterior, and I don't think it's because of Gateway's catchy advertisements. Rather, it's because Gateway knows and delivers what consumers want: quality components, competitive prices, and lots of options. A case in point is this 486SX/25 machine.

GATEWAY 2000
610 Gateway Dr.
N. Sioux City, SD 57049
(800) 523-2000
List price: $1,795
Warranty: one year, parts and labor

The review system came outfitted with an Intel i80486SX/25-MHz CPU installed on a motherboard manufactured by Micronics, a well-respected name in the industry. The SIMM sockets on the motherboard come populated with 4MB of RAM as the standard configuration, which you can expand to a maximum of 32MB by replacing the standard 1MB SIMMs with 4MB SIMMs. If you need more computing power, just plug a math coprocessor into the socket provided on the motherboard.

The CPU includes an 8K cache, and you can expand this by having an optional cache card installed in the machine. With the card, external caching in sizes of 64K, 128K, or 246K is possible.

Gateway uses top-grade components when it puts a system together, as evidenced by the well-known OEM names: Epson floppy drives, a Western Digital IDE hard drive, an ATI video card, and a Micronics motherboard. Such choice elements endow the system with excellent performance and reliability.

You get two 8-bit and six 16-bit expansion slots on the system board, but only four are available in the standard configuration. For most users this should prove adequate, but if you need more expansion room, you can order the 486SX/25 in a tower case instead of the AT-sized desktop case.

The proprietary Gateway keyboard sports 124 keys. One set of 12 function keys lines the top of the keyboard, and another set forms a double column at the left of the main keyboard. The board includes dedicated keypads for editing, cursor control, and numeric operations, along with three illuminated lock indicators and a program LED. You can program the additional keys using the provided software utility to execute macros or use any alternate characters you want.

An ATI Graphics Ultra adapter provides superb 1024 × 768 resolution with 256 colors on the 14-inch high-resolution Gateway CrystalScan noninterlaced monitor that accompanies the system. Color saturation, text resolution (even at small sizes), and overall video display performance were a pleasure to view during the review.

The full-size case provides plenty of room for adding devices such as a hard drive or a tape backup unit. And you'll have plenty of opportunity to customize: Gateway will alter the base configuration to meet your specifications. That's an important factor to consider if you have a special need and can't find a standard model from other manufacturers that has just the configuration you want.

The performance of the system is just what you'd expect when quality is the main consideration in building the machine. The 486SX/25 handles text and graphics applications from both DOS and Windows with ease. MS-DOS 5.0 and Windows 3.1 come preinstalled on the hard drive, and the floppy copies and full manuals are also provided. The user manual, customer support guide, and other included documentation provide a wealth of information in an easy-to-understand format.

If you're looking for a 486SX/25 system with plenty to offer, including options, you'll want to consider the Gateway 2000 486SX/25.

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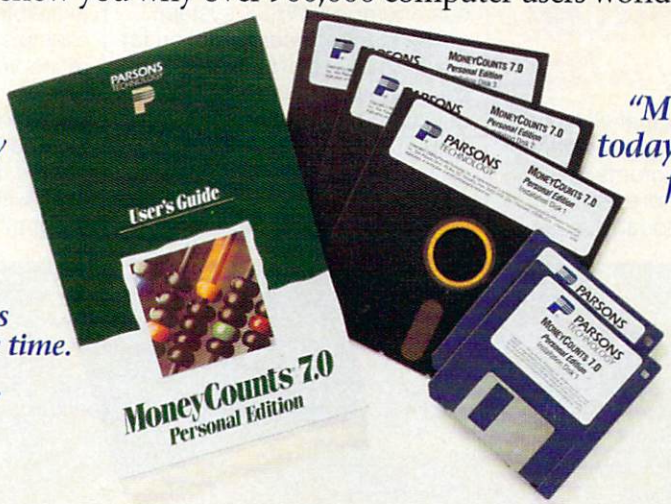
- *Organize and manage your investments like you've always wanted to—but never had the time.*
- *You can do all this and much, much more with this award-winning software.*



"MoneyCounts is one of today's top buys in personal finance software."
— PC Computing

COMPUTER SHOPPER Best Buy 1988•1989•1990•1991

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Restrictions.

1. *This offer good when ordered via mail or fax only.*
2. *Your order must be postmarked by midnight, June 30, 1993.*
3. *Limit of one offer per household.*
4. *This product cannot be resold at any price.*
5. *This offer not available to computer software resellers.*
6. *Orders outside North America, please add $20.*

System Requirements.

MoneyCounts 7.0 requires an IBM® or compatible PC with 512K RAM (640 recommended), DOS 3.0 or later and 2MB hard drive space. Works with all monitors and printers. Mouse supported but not required.

Questions? Call toll free 1-800-223-6925.

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Method of payment: ❑ Check or Money Order
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TEST LAB

MICRO EXPRESS 486-LOCAL BUS/SX/25

MICRO EXPRESS
1801 Carnegie Ave.
Santa Ana, CA 92705
(800) 989-9900
(714) 852-1400
List price: $2,600 (as reviewed)
Warranty: two years, parts and labor, limited

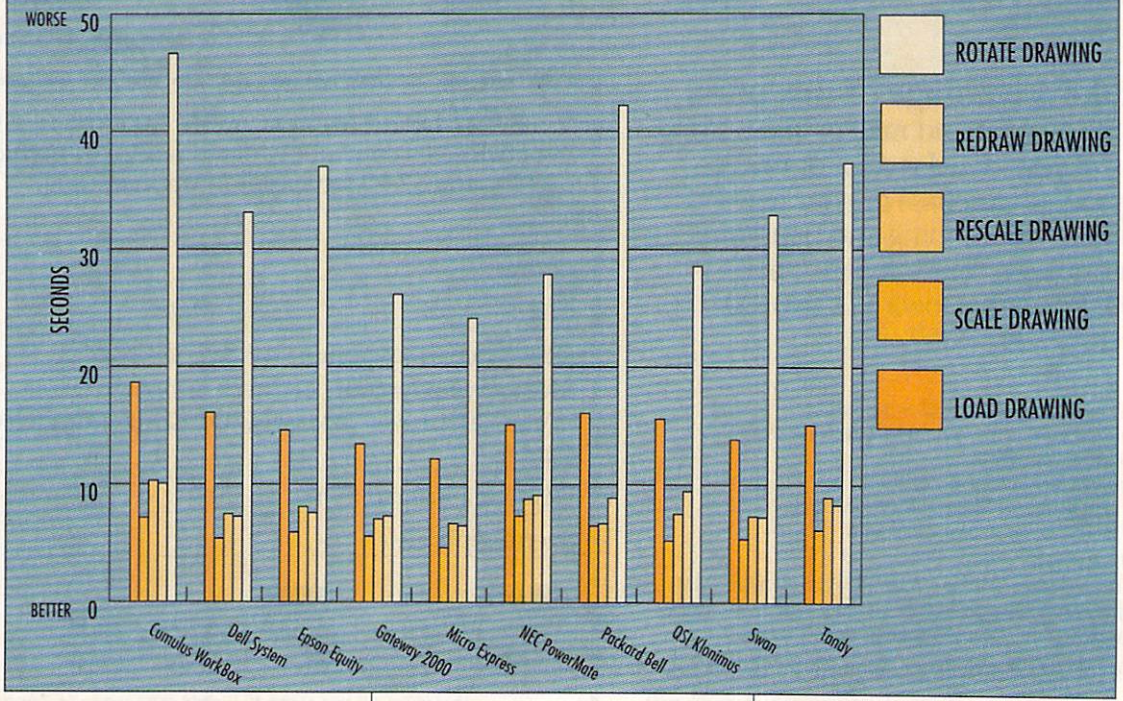
As Windows and other GUIs continue to dominate the majority of new software programs, we can expect to see more and more machines using local bus video architecture to provide video performance commensurate with the demands of these applications. Micro Express is responding to these demands with its new local bus-equipped 486SX system.

The standard configuration for this system consists of a desktop case equipped with dual floppy drives, a 170MB IDE hard drive, 4MB of RAM on the motherboard, a Super VGA color monitor, and a mouse, along with DOS 5.0 and Windows 3.1. You get all of this for $2,175. The system sent for review deviated from this standard base configuration, however, in that it was housed in a minitower case and had a 425MB Quantum IDE hard drive, which increased the price by $324. All of the other components were the same as for the desktop configuration, including the 4MB RAM complement.

In addition to providing plenty of room for installing additional devices and peripherals, the minitower case provides alternative positioning options that aren't available with desktop cases. For example, with a minitower configuration you can place the system unit next to your desk rather than on top of it to help alleviate clutter and desktop congestion. Of course, it also fits on the desktop itself without taking up much ad ditional room when positioned

CAD TESTS

For the CAD tests, we used Drafix Windows CAD 2.1 to assess the system's ability to handle complex vector-based graphics based on computed mathematical coordinates. The tests time how long the system takes to load a target drawing, to alter its default scaling to two different ratios, to redraw the drawing, and to rotate it 359 degrees.



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Create Songs on Your Sound Card with MusicTime.

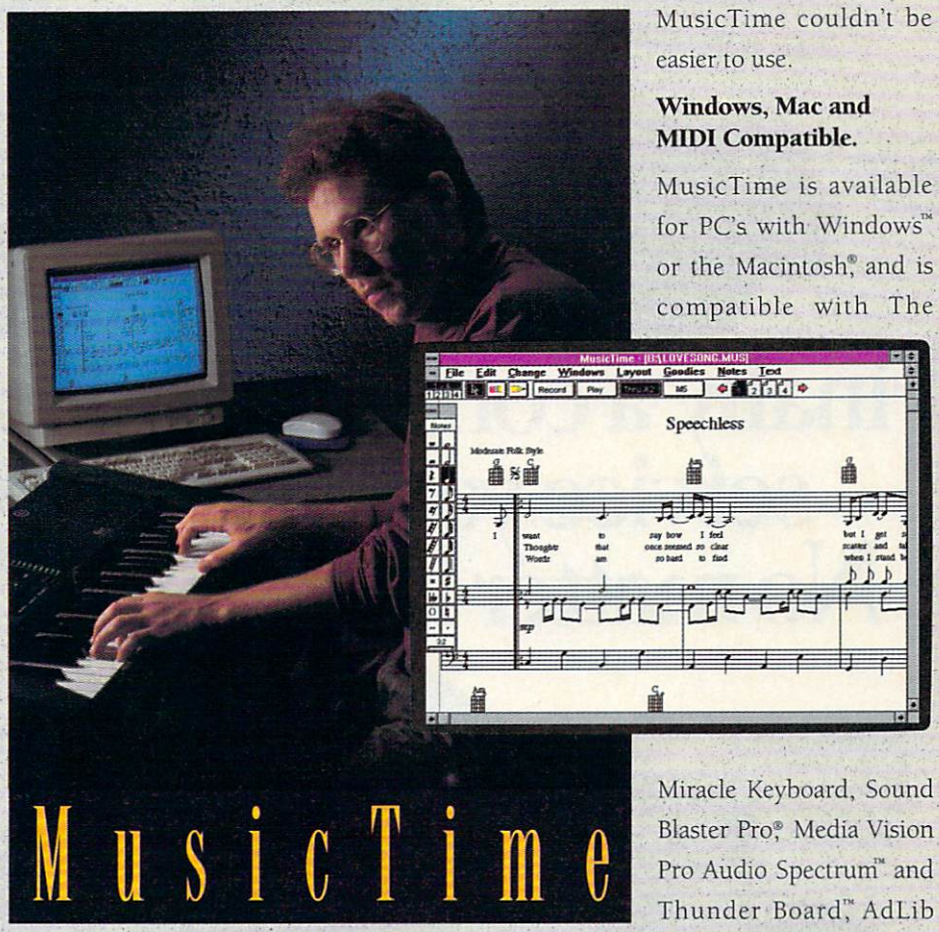
Whatever your musical ability, MusicTime will inspire you to create your own breathy love songs, foot-tapping jazz or head-slammin' rock 'n' roll. With MusicTime and either a sound card or a MIDI instrument, you can compose, edit, play back and print sheet music on your PC.

Bring Your Music to Life.

Use your mouse to click musical notes and symbols onto a staff sheet. If you've got a Miracle™ or MIDI keyboard, MusicTime will record and transcribe your live performance into music notation in real time—right before your eyes!

Easy to Play Back, Edit and Print.

Play back instantly through your sound card or MIDI gear. Editing is easy with MusicTime's cut, copy and paste commands. Automatically transpose notes into any key. Add guitar chords. Write beautiful lyrics. Print out publishing-quality sheet music.

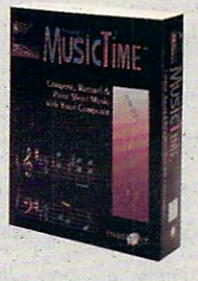


MusicTime couldn't be easier to use.

Windows, Mac and MIDI Compatible.

MusicTime is available for PC's with Windows™ or the Macintosh®, and is compatible with The Miracle Keyboard, Sound Blaster Pro®, Media Vision Pro Audio Spectrum™ and Thunder Board™, AdLib Gold™ and most popular PC sound cards.

For your copy of MusicTime, call Passport or visit your nearest computer or music store. If you're tired of just playing games with your sound card, get MusicTime and turn your beeps and blasts into be-bop and hip-hop.



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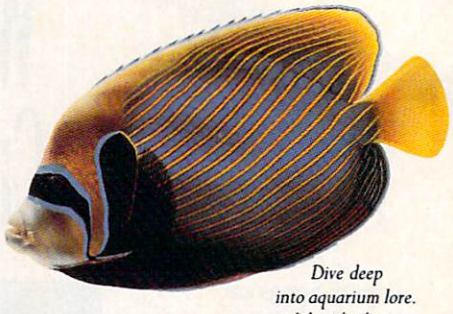

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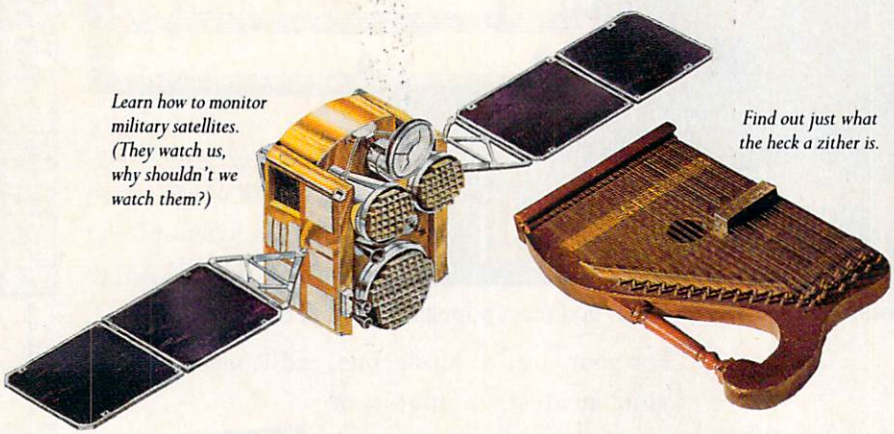
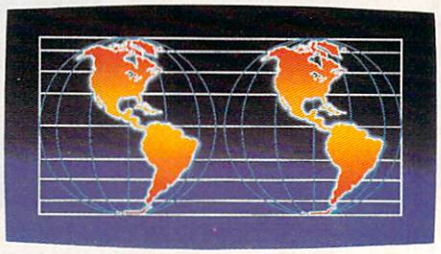


Find out just what the heck a zither is.



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Because CompuServe is filled with people, from beginners to experts. So you can share software or work out a few personal computer bugs with your system's designer on Monday, battle a nefarious evildoer from Cleveland on Tuesday, and fax someone a list of bed and breakfasts in Vermont on Wednesday.

And that still leaves you the rest of the week to keep exploring. In fact, the more you use CompuServe, the more uses you'll find for it. It's the one computer

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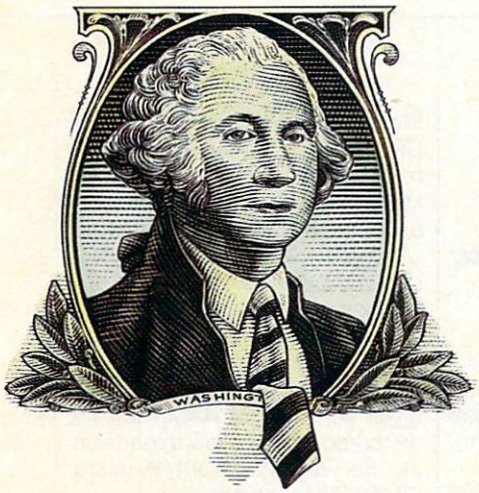
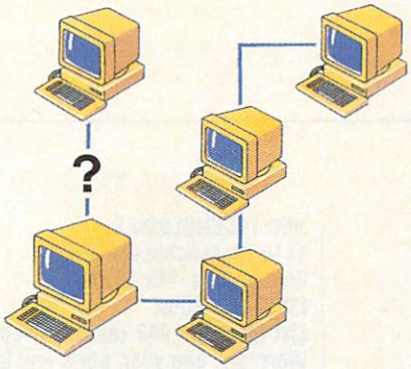
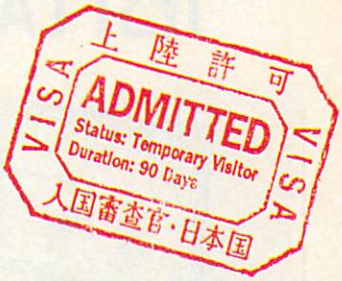




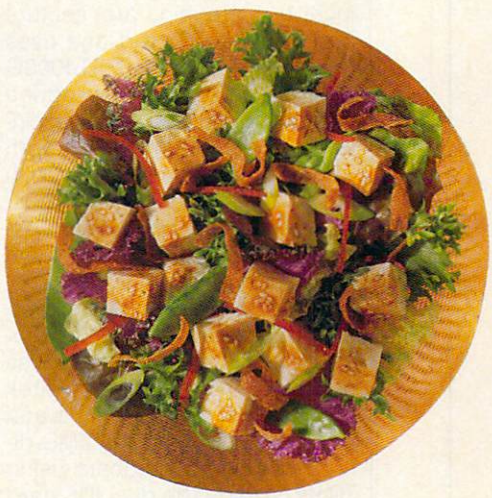
Find out why your PC won't talk to your LAN. And what you can do about it.



Find out how in the world to apply for a visa.

Discover a good place to dive, or get the lowdown on bouyancy compensators.

Copy down a truly delicious tofu recipe. (Really!)



Get the current phone number of your old friend from high school, and tell his new wife why you used to call him "Stinky."

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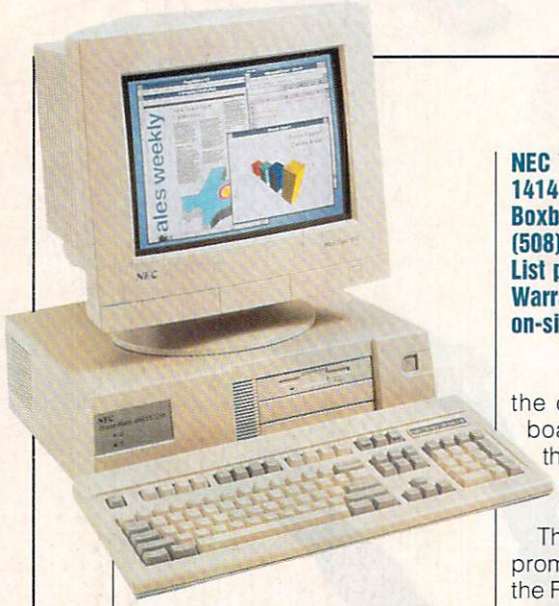

next to the monitor. Having used both case configurations extensively, I prefer the minitower design.

The 486SX/25 integrates the local bus graphics architecture into the motherboard and uses the 16-bit Tseng Labs ET4000G graphics chip set to produce extended video modes with resolutions up to 1024 × 768 with 32,768 simultaneous colors. With 1MB of video RAM and local bus, video performance is quite spiffy, as one would expect from such a setup.

The machine also sports 256K of 20-ns write-back cache memory on the motherboard as well as a socket for adding a Weitek 4167 math coprocessor. Expand RAM all the way up to 32MB directly on the motherboard using 70-ns SIMMs. The dual IDE hard disk controllers, dual floppy drive controllers, single parallel port, and dual serial ports are all integrated into the motherboard, which leaves seven full-length 16-bit slots available for expansion.

Expansion and upgrading concern PC purchasers today, and Micro Express has made sure that its 486SX will accommodate upgrading as your needs increase. You can upgrade the microprocessor to a 66-MHz DX-2 CPU by simply replacing it in a lever-activated ZIF (Zero Insertion Force) socket and changing the clock jumper. The motherboard comes equipped with three clock crystals to generate clock speeds from 20 MHz to 66 MHz.

The system's Flash BIOS also promotes easy upgrading. With the Flash BIOS, you can upgrade the BIOS with a simple disk utility. The BIOS also supports video shadowing and automatic memory-size detection.

I found the documentation quite serviceable and well organized, though not as extensive or as lavish as that supplied with some of the other systems reviewed here.

You get a good 101-key enhanced keyboard as the standard input device supplied with the machine; for a mere $75 more, you can opt for a programmable keyboard.

Micro Express has done a superb job of integrating all of the most sought-after features into a neat package that lets you upgrade to meet your applications' increasing demands, and it delivers video performance that's sure to bring a smile to even the most jaded power user's face.

Circle Reader Service Number 276

NEC TECHNOLOGIES
1414 Massachusetts Ave.
Boxborough, MA 01719
(508) 264-8000
List price: $3,048 (as reviewed)
Warranty: one year, parts and labor, on-site

NEC POWERMATE 486SX/25i

NEC maintains its reputation as a producer of high-quality PCs and monitors with its PowerMate series, and the new PowerMate 486SX/25i attests to this. The system provides plenty of i486SX computing power along with good opportunities for upgrading and expansion.

You can upgrade the PowerMate from its 25-MHz i486SX CPU to a 33-MHz i486DX chip by replacing the microprocessor, installing a heat sink, and changing a jumper configuration, so if and when you need the additional computing oomph a DX CPU and higher clock speed have to offer, making the change won't require an engineering degree.

The standard configuration gives you 4MB of RAM, but the motherboard will allow expansion all the way up to 36MB using SIMMs. The motherboard also accomodates optional external secondary memory caches of either 64K or 128K. For even more computing power, you can add an Intel 486SX-25 math coprocessor.

In keeping with current design and technological trends, the PowerMate's motherboard is highly integrated and incorporates all of the necessary electronics—the IDE and floppy controllers, I/O ports, mouse port, and high-resolution VGA controller featuring Image Video (NEC's own dedicated high-speed local bus). Consequently, the motherboard's four expansion slots are all available for accepting your peripheral cards.

NEC's heavy involvement in video hardware would lead you to expect its PCs to provide extraordinary video capability; the PowerMate comes through in this area as well. Equipped with 1MB of video RAM, the integrated VGA controller can provide 1280 × 1024 resolution with 16 colors or 1024 × 768 resolution with 256 colors at express speeds, thanks to the Image Video feature. Another unique feature is NEC's Image-Sync circuitry, which optimizes

Benchmark/performance testing was conducted by Computer Product Testing Services, Inc. CPTS is an independent testing and evaluation laboratory based in Manasquan, NJ. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.

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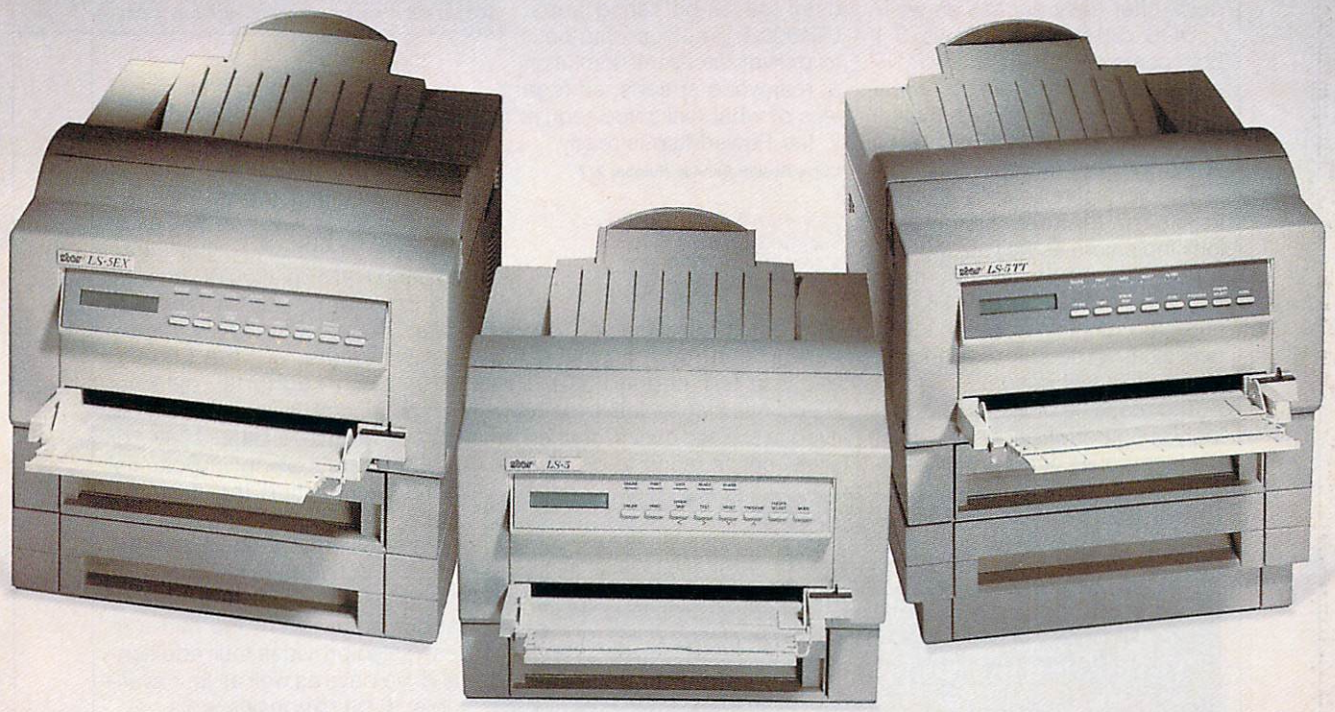

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Circle Reader Service Number 203

the frequency of certain NEC MultiSync FG monitors for exceptionally clear, flicker-free images. The review unit came equipped with an NEC MultiSync 3FGx color monitor, and the resulting video was, in a word, dazzling.

The review unit came equipped with a 240MB IDE hard disk and a 3½-inch slimline floppy drive. You can add another slimline or half-height device to the system cabinet. The front-mounted keyboard and mouse ports offer easy access as well.

DOS 5.0 and Windows 3.1 both come preloaded on the PowerMate's hard drive, and floppy backup copies along with the full versions of the manuals also come with the system.

The very comfortable 101-key keyboard features illuminated lock indicators as well as dedicated editing, cursor, and numeric keypads in addition to 12 top-mounted function keys. The keyboard has an audible click and exceptionally fast action.

The machine delivered surprisingly crisp performance in light of the fact that its heart is only a 25-MHz 486SX CPU. Numeric- and text-intensive tasks ran effortlessly, as well as the more demanding graphics, DTP, and art and design programs I tried. The NEC Image Video technology uses the 16-bit Tseng Labs ET4000G graphics chip set to deliver excellent resolution at real-world speeds, so regardless of what tasks you require of it, the PowerMate is ready.

Circle Reader Service Number 277

PACKARD BELL
9425 Canoga Ave.
Chatsworth, CA 91311
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without monitor ($350 for monitor)
Warranty: one year, on-site, limited

PACKARD BELL LEGEND 670

If productivity is what you're looking for, then take a look at the Packard Bell Legend 670. This PC comes loaded with productivity software and accessory peripherals, so it's ready to go to work as soon as you plug it in.

An Intel 80486SX CPU running at 25 MHz gives the Legend 670 plenty of computing punch, which is augmented by the standard 4MB of RAM. If that's not enough memory, you can expand RAM up to 20MB directly on the motherboard. The Intel 486 CPU provides its own internal 8K cache, but the Legend 670 also supports external cache memory expansion on the motherboard to 64K, 128K, or 256K. There's plenty of potential here for boosting the system's capabilities.

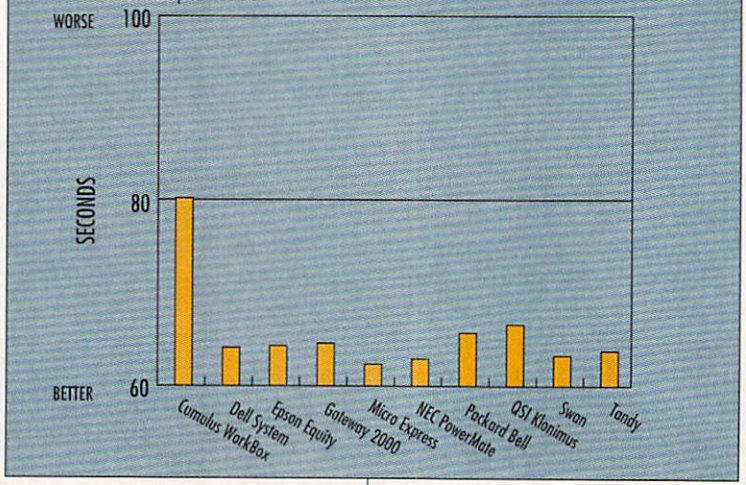
In addition to a good complement of I/O ports (a serial port, a parallel port, a PS/2 mouse port, and a game port), the mid-size case also provides four additional drive bays as well as four available 16-bit expansion slots.

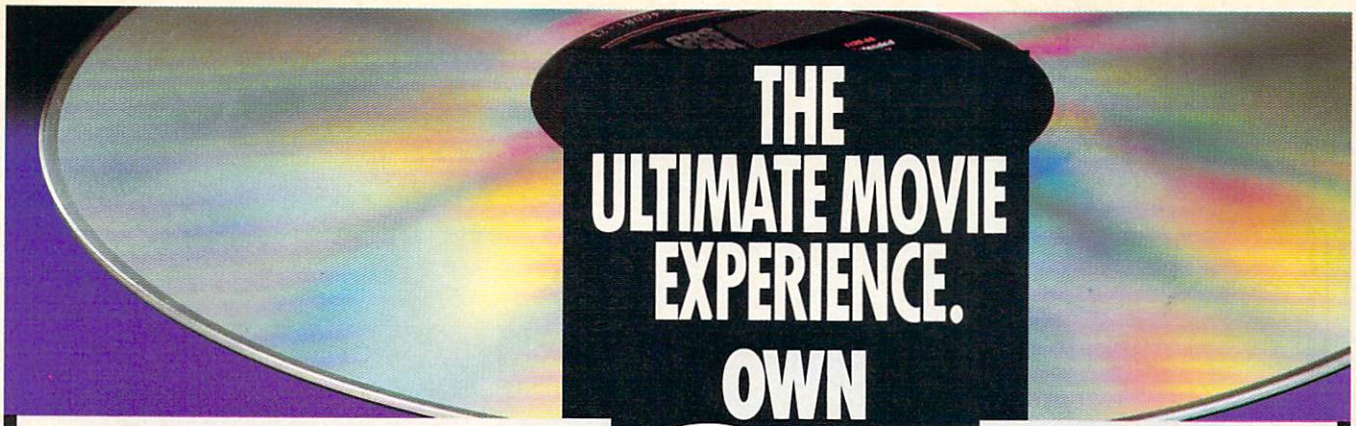
A 1024 × 768 extended VGA video controller integrated into the motherboard comes with 512K of video RAM. You can expand the video RAM to 1MB, which will speed up video processing and increase the color palette from 16 colors to 256 colors in 1024 × 768 mode.

The Legend 670 comes with a comfortable 101-key keyboard sporting 12 function keys in addition to illuminated lock indicators and dedicated cursor, editing, and numeric keypads. I found the tactile feedback excellent, and if you're like most users,

GRAPHICS TEST

The Graphics Test involves timing the load of a highly complex color graphic incorporating thousands of gradient dithered color "washes" within outlined forms. Since the gradients must be calculated on the fly, this test is particularly indicative of the system's floating-point calculation capabilities.





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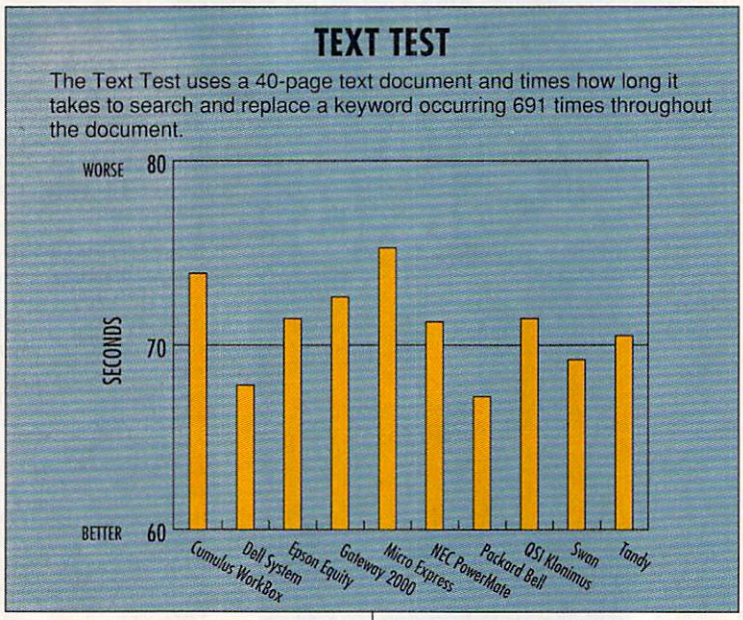

you'll delight in the fast, sure action and good ergonomic design of this keyboard.

Today's applications require lots of hard drive space, and the Legend 670 obliges with a 170MB IDE hard drive featuring a 17-ms access time. It also provides dual floppy drives (both 3½-and 5¼-inch formats), so the data storage and transference capabilities are well covered on this machine.

Also standard on the Legend 670, a sleek two-button high-resolution mouse attaches to the PS/2 mouse port. The mouse looks like a fattened version of the standard Microsoft model, but its button action is slightly stiffer. A preinstalled internal fax/modem gives you data transfer capabilities as soon as you plug the phone cable into a telephone jack.

Packard Bell also provides a generous supply of software on this system. MS-DOS 5.0 and Windows 3.1 come preloaded on the hard disk, along with several other application packages; you'll find floppy copies of all software enclosed for backup purposes.

You get a special Packard Bell version of Lotus 1-2-3 for Windows, the Lotus Write word processor, a Lotus SmartPics starter kit (a clip art package for Windows applications), Delrina's WinFax, a Prodigy startup kit with one month of free service, and Packard Bell's own graphical support and tutorial modules.

Since virtually everything is already installed and loaded on the system, setup is simply a matter of taking the Legend 670 out of the box, attaching the cables, plugging it in, and turning it on. I rate the documentation very good in its scope, organization, and clarity; you'll probably need it only for occasional reference.

If you're looking for a good 25-MHz 486SX system offering plenty of productivity potential and good expansion capabilities at an affordable price, consider the Legend 670.

Circle Reader Service Number 278

QSI KLONIMUS 486SX/25

QSI builds systems to meet the needs of its customers, so its machines can include components from a variety of manufacturers. The Klonimus 486SX/25 model is an example of such custom-built construction.

The motherboard isn't as highly integrated as those on some of the other machines covered here, which permits some customization and flexibility in the configuration, although this is at the expense of the expansion slots. In the review machine, for example, two of the 16-bit slots were occupied (by the multi-I/O card and the VGA adapter card), leaving five of the 16-bit slots and the one 8-bit slot vacant. The 16-bit video card supports up to 640 × 480 resolution as shipped; adding video RAM (up to a maximum of 1MB) will enable the card to display Super VGA with a 256-color palette and resolutions of up to 1024 × 768.

A NOTE ON PRICES

With computer products changing more rapidly than ever and with options more plentiful than ever, computer prices can be a tricky business.

It pays to keep the following points in mind:

Street prices can be considerably lower than list prices. Shopping around helps you find the best price.

Because computer technology evolves so rapidly, a product may have changed by the time our review sees print. Verify configuration details with manufacturers or vendors before you buy.

Because consumers are more sophisticated than ever about what they want in computer products and because manufacturers have responded with more options and configurations than ever, one computer model may be subject to dozens of variations, each with a slightly different price.

At COMPUTE, we make every effort to verify prices and differentiate between the price for a review configuration and the price for a standard configuration. The list price we present is usually for a standard configuration. It's still a good idea, however, to call the manufacturer or vendor to make sure that the configuration you want matches the price you have in mind.

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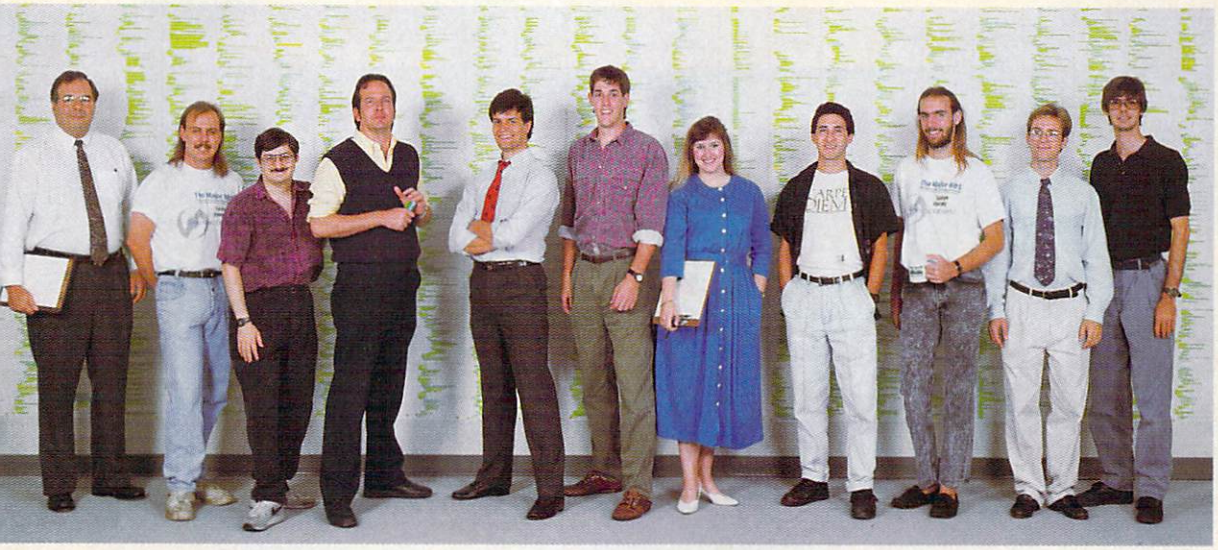

The Major BBS Development Team with about 5% of the code they wrote and tested, line by line. From left to right: Bert Love, Edward Bush, Richard Skurnick, Tim Stryker, Bob Stein, Brian Stephens, Sheri Robert, Les Bird, Chris Robert, Scott Brinker, Chris Kotacka

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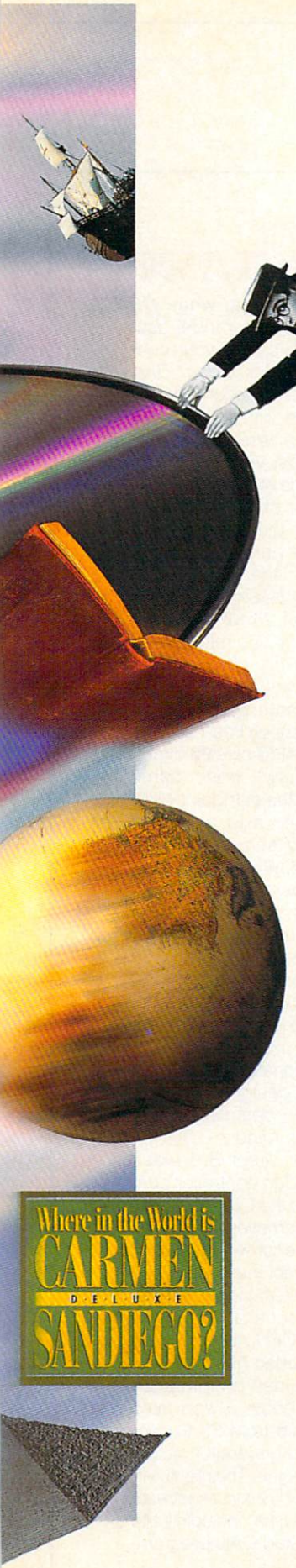

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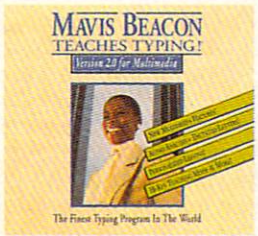

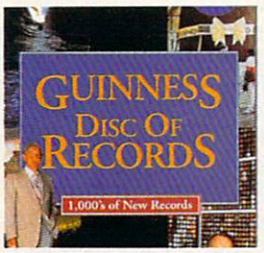

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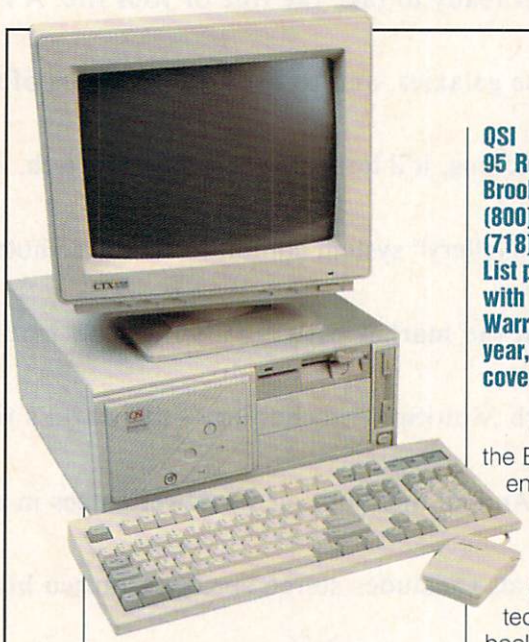

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(718) 834-4545
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The motherboard on the review unit came populated with 4MB of RAM. Eight SIMM sockets on the board can accommodate expansion up to a maximum of 32MB using 4MB SIMMs. A socket is also provided on the motherboard for adding a Weitek 4167 math coprocessor.

Two front-accessible half-height bays remain vacant beneath the half-height 5¼-inch high-capacity floppy drive installed top-most in the Klonimus. A high-density 3½-inch floppy drive mounts vertically to the right of the three half-height bays, and a 128MB IDE hard drive mounts internally in the unit.

The documentation for the Klonimus consists of a 50-page booklet entitled Getting Started with Your Klonimus Computer. It provides very basic generic information about unpacking and setting up the machine. By *generic,* I mean simply that the information contained in the booklet could apply to virtually any computer, Klonimus or not. I found no machine-specific material in this booklet.

To augment the Getting Started booklet, Klonimus ships the OEM (Original Equipment Manufacturer) documentation for the devices or components used in the completed system. The review unit came with a 4-page data sheet on the BTC keyboard; a thin booklet entitled 486M 80486 Mainboard User's Manual, which describes the features and setup of the motherboard including CMOS settings and some technical references; a 12-page booklet on the Seagate ST3144A IDE hard drive; and a single-page data sheet on the IDE Plus-V3 multifunction card. A 60-page user's manual for the STB PowerGraph VGA adapter also came with the system, along with a video utilities disk in both 3½- and 5¼-inch formats. In addition, QSI supplied a two-button mouse and a shrink-wrapped copy of Revolution Software's VGA Dimmer utility with its manual.

MS-DOS 5.0 came preinstalled on the system, but QSI did not provide the original floppy disks and the Microsoft documentation.

The performance of the Klonimus was lackluster, to say the least. Many of the applications I ran during the review process moved along at a snail's pace, especially in Windows, when compared with performance on the other systems covered here. I can't offer any explanation for this, but I suspect that the motherboard's nonintegration and slow floppy drives were major contributors to the system's slow performance.

Buying a computer often involves a series of trade-offs, especially when you place price high on your list. If you're a power user looking to upgrade to a high-performance 486SX system, you might want to continue your search for a machine to purchase.

Circle Reader Service Number 279

SWAN 486SX/25DB

If you're wondering what *DB* stands for in Swan's model designation, let me satisfy your curiosity: It stands for *Direct Bus,* Swan's own combination of local bus architecture with the S3 video accelerator chip. While this results in incredibly fast video performance, it's just one of the many noteworthy features of this machine.

Described in the company's literature as "the perfect entry into the 486 family," the 486SX/25DB has an Intel i486SX CPU at its core running at 25 MHz. Just in case you decide you might need more computing power later, there's a socket for adding a Weitek 4167 math coprocessor, and the motherboard can accommodate up to 64MB of RAM directly. The review unit came equipped with the standard 4MB.

Dual floppies and a 120MB IDE drive also come standard with this model. While the system usually includes a Swan 1024 (interlaced) 14-inch VGA monitor, the review unit came with the noninterlaced version of the Swan 1024 monitor, which added $100 to the usual price of the system. I highly recommend the noninterlaced monitor, however; it's well worth the additional cost, especially since Swan designed this entire system with optimized video performance in mind.

With Swan's Direct Bus video scheme, the video controller connects directly to the CPU via the local bus, which removes the I/O bottlenecks that occur with standard architecture machines. Since the Direct Bus architecture offers a 32-bit path and runs at the same speed as the CPU, there are no wait states in video memory.

To give the video performance an additional boost, Swan uses the 86C924 chip from S3 Corporation, a second-generation accelerated video engine. The result: virtually instantaneous screen refreshes in any application, including the most sophisticated CAD program.

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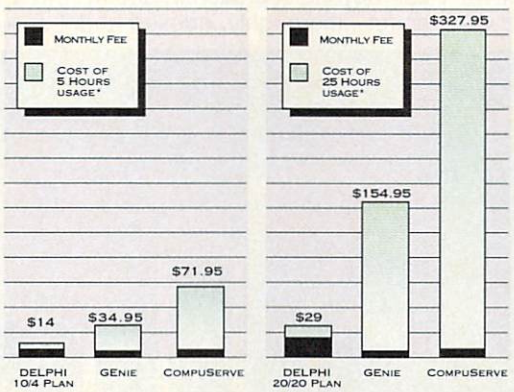

**Comparison is based on total evening/weekend use in one month of GEnie℠ Value Services and CompuServe® Extended Services at 2400bps. Rates are current as of October 25, 1992. GEnie is a service mark of General Electric Company. CompuServe is a trademark of H&R Block, Inc.*

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Circle Reader Service Number 161

Desktop publishing, word processing, spreadsheet, graphing, charting, and paint programs also look and perform better on the 486SX/25DB, thanks to the Direct Bus architecture.

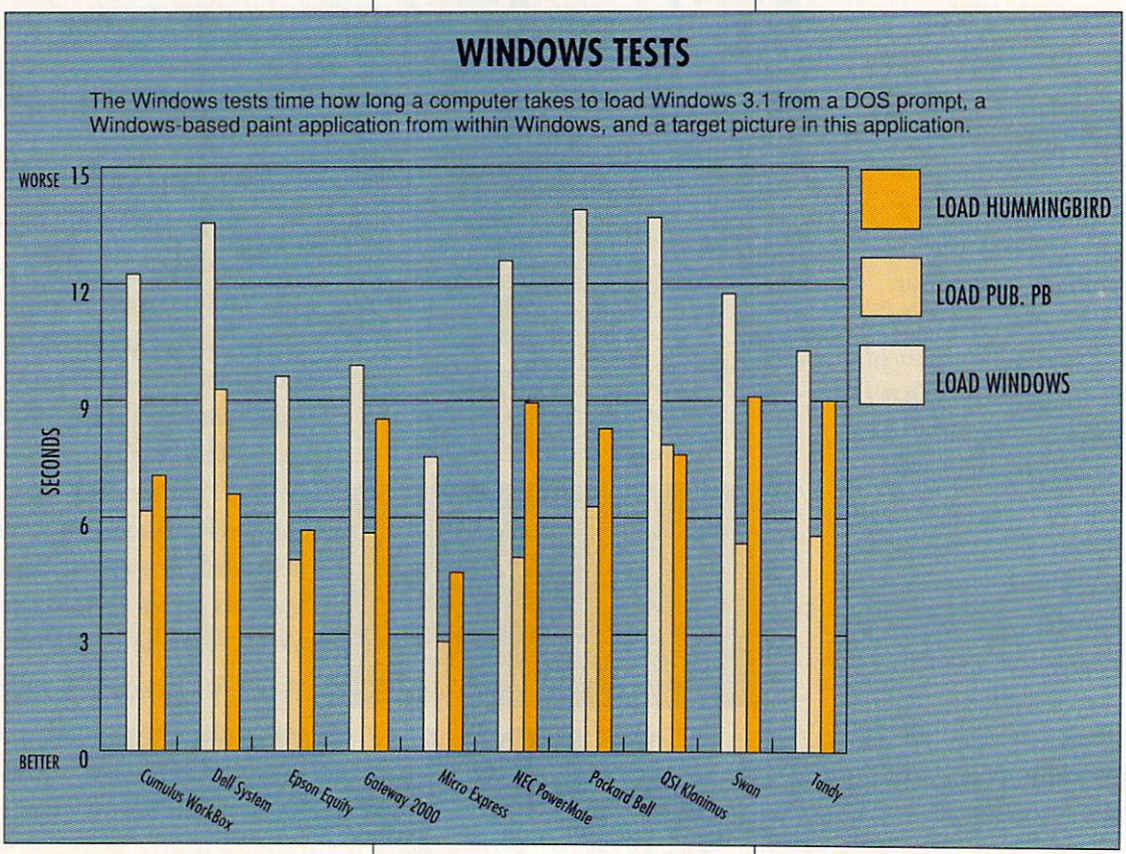
Other features that make the Swan a quality machine include its 200-watt power supply and 128K caching controller, both standard on the DB series, as well as a slimline dual-floppy drive. Swan also gives you a choice of baby AT, desktop, or tower cabinet configurations, as well as your choice of 60MB, 120MB, 200MB, or 400MB IDE hard drives or 400MB or 660MB SCSI hard drives. All of the cases provide ample room for adding peripherals and media devices. The review unit came equipped with a 60MB IDE drive in the standard desktop cabinet, which had five of the system board's six 16-bit full-length expansion slots vacant and available for use.

SWAN
3075 Research Dr.
State College, PA 16801
(800) 468-9044
List price: $2,195
Warranty: two years, on-site

While the video attributes of the system are undoubtedly the main attraction, Swan has taken great pains not to overlook other system areas important to the user as well. The keyboard, a very comfortable 101-key unit, features an audible click (my personal preference); and an excellent software bundle consisting of MS-DOS 5.0, Windows 3.1, Microsoft Works for Windows, Quicken for Windows, and WealthBuilder is included. I found the documentation beyond reproach in any respect—thoroughly indexed and full of outstanding technical references and information.

With today's operating environments and software all directed toward GUIs, it makes sense to consider the video performance of a computer system as an increasingly important factor. The Swan 486SX/25DB provides a combination of features and video performance that's hard to beat.

Circle Reader Service Number 280



Close the Windows. Lock the DOS.

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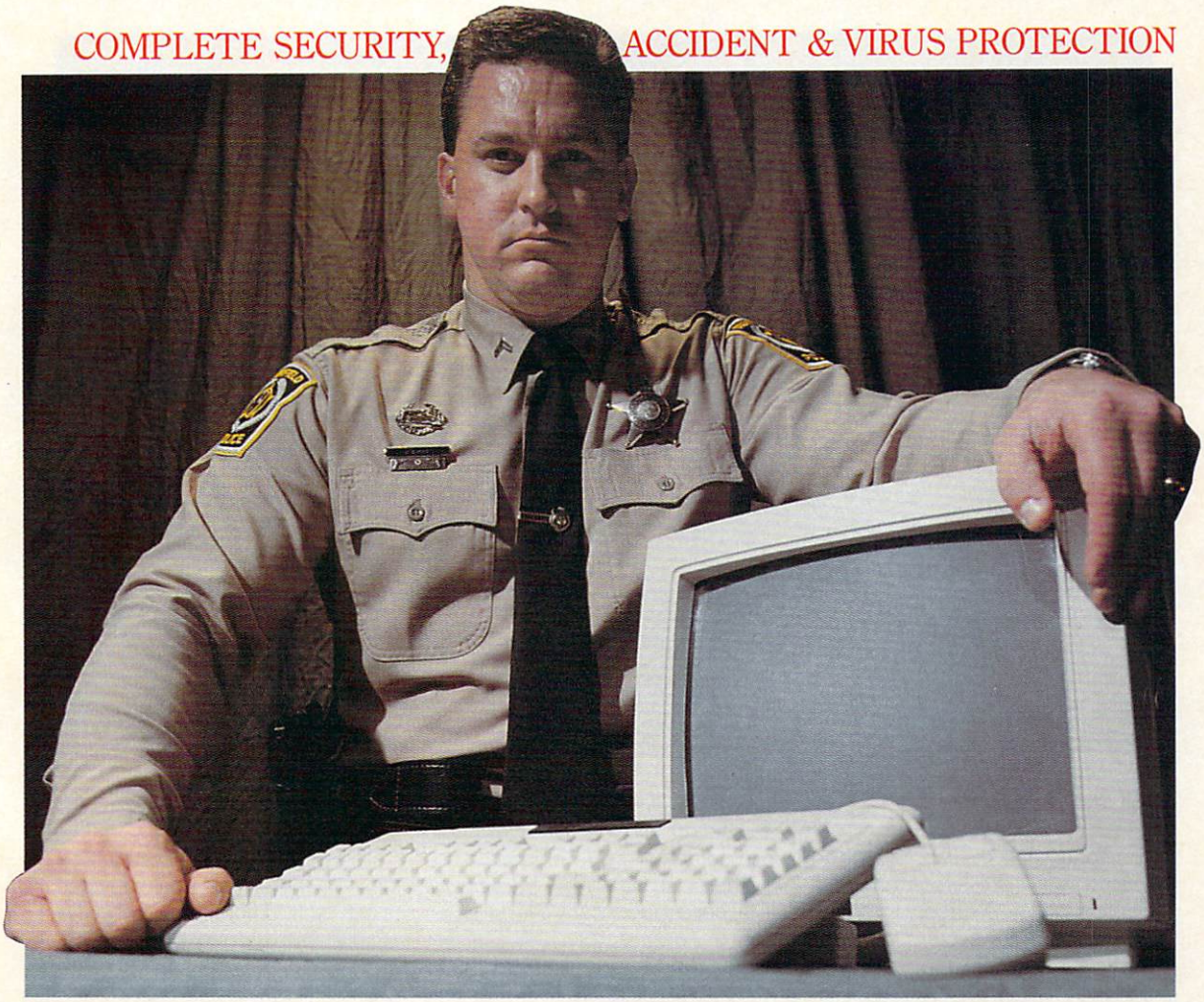

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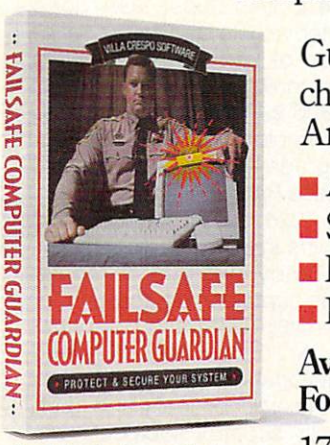

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MADE IN USA

Circle Reader Service Number 124

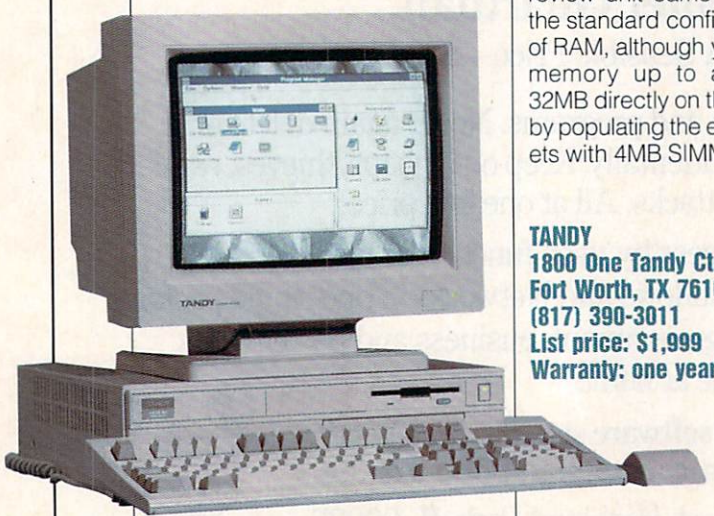
FEATURES	Cumulus WorkBox 486SX/20	Dell System 486D/25	Epson Equity 486SX/25 Plus	Gateway 2000 486SX/25	Micro Express 486-Local Bus/SX/25
CPU speed	20 MHz	25 MHz	25 MHz	25 MHz	25 MHz
Case type	baby AT	AT	AT	AT	minitower
Coprocessor socket	487	487	487	Weitek 4167	Weitek 4167
Standard RAM	4MB	4MB	4MB	4MB	4MB
Maximum RAM	16MB	64MB	16MB	32MB	32MB
Standard hard drive[1]	120MB	80MB	240MB	120MB	170MB
Floppy drives	1 3½	1 3½, 1 5¼	1 3½, 1 5¼	1 3½, 1 5¼	1 3½, 1 5¼
Serial ports	2	2	1	2	2
Parallel ports	1	1	1	1	1
PS/2 mouse port	0	1	1	0	0
Game port	0	0	0	0	0
Slots	8 16-bit	6 16-bit	5 16-bit, 1 8-bit	6 16-bit, 2 8-bit	7 16-bit
Panel features	reset/turbo buttons, power/drive LEDs, power switch	external reset switch, Dell SmartVu Display, power switch	reset switch, power/drive LEDs, power switch	reset/turbo buttons, power/drive LEDs, power switch	reset/turbo buttons, power/drive LEDs, power switch

[1]or the review hard drive if there is no standard

TANDY 4825 SX

The Tandy 4825 SX PC is a good entry-level 486SX system in a slimline baby-AT case.

The 4825 SX system case affords acceptable expansion possibilities despite its compact size. Thanks to a highly integrated motherboard, there are three full 16-bit expansion slots available for adding user-installed peripherals. The motherboard contains the floppy and hard drive controllers, keyboard connector, PS/2-style mouse port, single parallel port, and dual serial ports, in addition to an integrated video controller. The review unit came equipped with the standard configuration of 4MB of RAM, although you can expand memory up to a maximum of 32MB directly on the motherboard by populating the eight SIMM sockets with 4MB SIMMs. You also get a socket on the motherboard for adding a math coprocessor.



TANDY
1800 One Tandy Ctr.
Fort Worth, TX 76102
(817) 390-3011
List price: $1,999
Warranty: one year, parts and labor

There's room in this system box for you to add two storage devices to the 1.44MB floppy drive and the 120MB hard drive installed as part of the standard system. A single vacant upper drive bay will accommodate a 3½-inch device, while a single vacant lower bay can accept either a 5¼-inch or 3½-inch half-height device.

The built-in Super VGA video adapter with its standard configuration of 512K of video RAM yields noninterlaced 1024 × 768 and 800 × 600 graphics modes with 16-color palettes. An optional upgrade kit from Tandy boosts the video RAM to 1MB, which supports 1024 × 768 noninterlaced graphics in 256 colors.

A Tandy two-button mouse comes supplied with the unit for accessing GUI-based applications. While the mouse is indeed a functional device, it's a far cry from the ergonomically and operationally superior Microsoft two-

Get the best of Windows and OS/2 without learning all this.

Sure, you want to get your PC flying. With features like multiple open applications and background printing. Maybe even the ability to maintain your host connection while you work on something else.

But for that you need Windows or OS/2. Which means you also need to learn enough to get a pilot's license. And spend enough on hardware and software for a down payment on a jet.

PC MAGAZINE EDITORS' CHOICE October 30, 1990 Software Carousel, Version 4.0

But with new Software Carousel, you can get the biggest benefits of Windows and OS/2 by doing almost nothing.

It's #1 in task switching software.

Software Carousel got to be a best-seller because it works. Simply and reliably. Day in and day out.

And because it gives you the single most practical and powerful function of OS/2 and Windows—the ability to quickly switch from one application to another.

Simply load your programs as usual in individual Software Carousel work areas (it handles up to 12). Then switch instantly from one to another with just a keystroke. Each program gets as much RAM as it needs. And all your programs look and act just like they always did.

Best of all, nearly any program that now runs on your PC will work with Software Carousel. Even RAM resident utilities, graphics programs and network software. And Software Carousel works on all types of PCs. So you can have the kind of multi-application capability you want, without buying anything new.

Now with Print'N'Run.

Thanks to Print'N'Run, new Software Carousel is also an advanced print handler. One that quickly takes over your printing jobs by accepting all the output bound for the printer, then sending it to the printer as fast as it can take it.

While your printer keeps running, you can keep working in the same application. Or switch to another Software Carousel work area running a different application.

No more wasted time waiting for your printer. No more lost productivity.

OLÉ. A network idea whose time has come.

OLÉ is the optional Open Link Extender* for Software Carousel. And it could be the best thing to happen to networks since OS/2 itself.

With OLÉ and Software Carousel, you can connect to any host or service over a network—whether it's a mainframe, a mini, etc.—then "switch away" to work on another application, and not lose your connection.

OLÉ even makes sure that incoming data is received, even though your PC may be occupied with another application.†

And OLÉ works with all kinds of connection software. Including IBM, Attachmate, and others. Without changes to your hardware or software.

Even the experts agree.

Garry Ray, writing for PC Week, said, "Of these alternative operating environments (OS/2, DesqView and Software Carousel), Carousel may be the best choice of the day."

Barry Simon of PC Magazine concurred with, "...I find it difficult to imagine using my computer without Carousel. This package has become an essential tool and one that I strongly recommend."

So if you really want the major benefits of Windows and OS/2, don't get grounded with high cost and mind-bending complexity. Take off today with Software Carousel. It's easy. And it's just $89.95.

Software Carousel $89.95

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*Open Link Extender is sold separately. †Requires NetBIOS connection.

Circle Reader Service Number 182

FEATURES	NEC PowerMate 486SX/25i	Packard Bell Legend 670	QSI Klonimus 486SX/25	Swan 486SX/25DB	Tandy 4825 SX
CPU speed	25 MHz	25 MHz	25 MHz	25 MHz	25 MHz
Case type	AT	AT	AT	AT	slimline AT
Coprocessor socket	487	487	Weitek 4167	Weitek 4167	487
Standard RAM	4MB	4MB	4MB	4MB	4MB
Maximum RAM	36MB	20MB	32MB	64MB	32MB
Standard hard drive[1]	239MB	170MB	120MB	120MB	120MB
Floppy drives	1 3½	1 3½, 1 5¼	1 3½, 1 5¼	1 3½, 1 5¼	1 3½
Serial ports	2	1	2	2	2
Parallel ports	1	1	1	1	1
PS/2 mouse port	1	1	0	0	1
Game port	0	1	1	0	0
Slots	4 16-bit	4 16-bit	7 16-bit, 1 8-bit	6 16-bit	3 16-bit
Panel features	power/drive LEDs, power switch	reset/turbo buttons, power/drive LEDs, power switch	reset/turbo buttons, power/drive LEDs, power switch, key lock	reset/turbo buttons, power/drive LEDs, key lock	reset switch, power/drive LEDs, power switch

[1]or the review hard drive if there is no standard

button mouse that I prefer.

The standard 101-key keyboard with audible clicks connects to a dedicated mini-DIN port next to the mouse port, and it makes for fast and comfortable typing and data input, abetted by dedicated numeric, editing, and cursor control keypads. Unfortunately, when the computer arrived, some of the keys had fallen off, and I was forced to use another keyboard.

The 4825 SX ships with MS-DOS 5.0 and Windows 3.1. To help you get off to a productive start as soon as you power the system up, Tandy also gives you Microsoft Works for Windows 2.0 as part of its bundle.

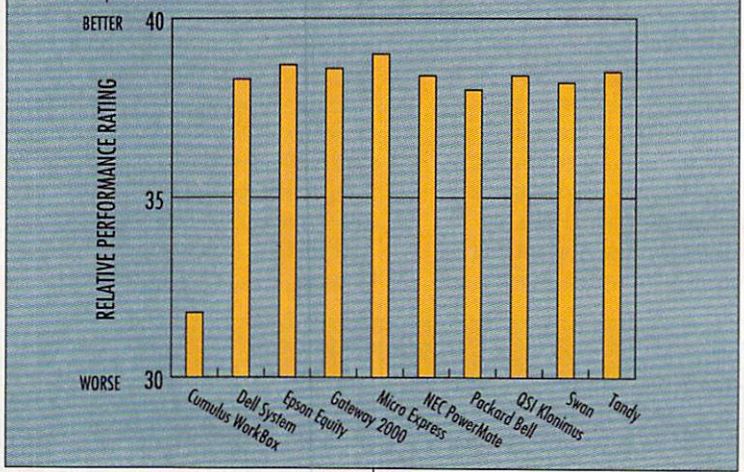
I usually find Tandy's documentation quite good, and the 4825 SX User's Guide and other accompanying documentation doesn't disappoint me. The material is logically organized and well indexed, making it easy to find information on particular areas of interest about the system.

Although the machine's CPU cannot be upgraded to a faster DX processor, the 4825 SX makes a good entry-level machine in its off-the-shelf configuration while providing a comfortable number of expansion possibilities for most users.

Circle Reader Service Number 313

THE NORTON OVERALL INDEX

The Norton Overall Index factors in microprocessor and disk performance, among other things, to indicate how well a computer performs when compared to a 4.77-MHz IBM XT. The greater the index value, the faster the computer.



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No purchase required. To enter complete the entry form or hand print your name, address, and phone number on a 3" x 5 " piece of paper. Also print the name of the magazine in which you saw this sweepstakes in the lower left corner of your envelope. Mail your entry to: Dodge Dakota Sweepstakes, Box 501, Gibbstown, NJ 08027. Limit one entry per person. Entries must be received by March 1, 1993.

The sweepstakes is sponsored by General Media, Inc., 1965 Broadway, New York, NY 10023. Winner will be selected by 3/15/93 in random drawings conducted by POWER GROUP, INC., an independent judging organization whose decisions are final. Odds determined by number of entries received. Sponsors not responsible for lost, illegible, misdirected, or late entries. Winner will be notified in writing and required to execute and return an affadavit of eligibility within 21 days of date on notification letter or an alternate will be selected. Except where prohibited, winner agrees to use of his or her likeness for advertising and publicity without added compensation.

Open to residents of the U.S. except in New York State and where prohibited. Employees and their families of General Media, Inc., POWER GROUP, INC., and their respective subsidiaries or affiliates are not eligible. Winner releases General Media, Inc., POWER GROUP, INC., their respective subsidiaries and affiliates from all liability regarding prize awarded. All federal, state, and local laws and regulations apply.

Prize (1): 1993 Dodge Dakota Pick-Up Truck, estimated retail value, $19,500. All taxes, licensing, transportation, dealer preparation and additional equipment charges are winner's responsibility. Winner will be required to pick up prize at nearest dealership. If winner is under 18, prize will be awarded to parent or legal guardian. Prize is not transferable or redeemable for cash. No substitution of prize except as necessary due to availability.

For winner's name, send a self-addressed stamped envelope to Dodge Dakota Sweepstakes Winner, General Media, Inc., 817 Dixon Boulevard, #14A, Cocoa, FL 32922 after March 1, 1993.

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NEWS & NOTES

Jill Champion

Multistorage for Multimedia

Since *multimedia* has become the catchword for PC users in the 1990s, it only makes sense that manufacturers should come up with innovative means of storing all those disks, tapes, and cartridges that have become necessities for computer users. Two companies have redesigned the standard disk holder—traditionally storing only 5¼- or 3½-inch disks—to incorporate all sorts of media.

Curtis Manufacturing's Multi Media Disk Box provides storage for a combination of

Keep track of your multisized media, design an efficient office, and save space and money with all-in-one hardware.

5¼-inch disks, 3½-inch disks, mini data cartridges, standard data cartridges, and CD-ROMs. Designed with different-sized dividers and tabs, each tray can be customized according to subject. Suggested retail price for the Multi Media Disk Box is $6.95. To find out more, contact Curtis Manufacturing, 30 Fitzgerald Drive, Jaffrey, New Hampshire 03452; (603) 532-4123.

From Fellowes Manufacturing comes the High Capacity Multi-Media Disk Tray. Retailing for $14.95, the tray can accommodate up to 165 3½-inch disks or 160 5¼-inch disks, or a combination of both. It also stores other media formats, including CD-ROMs, data cartridges, and 8-mm tapes. Features include a lock and key for security and a window for quickly viewing contents. For more information, contact Fellowes Manufacturing, 1789 Norwood Avenue, Itasca, Illinois 60143-1095; (800) 945-4545.

Designing Software

Now that you have your media organized, what about your office? New from Autodesk is Office Layout, a PC software package that simplifies space planning and inventory management. If you're responsible for space planning in your office or if you work out of your home, Office Layout gives you the tools to produce an accurate space plan quickly and easily—one that can be modified as your space requirements change. The program is also useful for tracking office-equipment locations and other fixed assets. For companies with very small budgets, the program can actually eliminate any need for a professional space planner. For larger offices, Office Layout will help facilitate communication with architects and planners.

The program has self-guiding menus and online help, so a new user can start creating a space plan within an hour with the more than 200 predrawn precision symbols that include partitions, equipment, work surfaces, desks, tables, and chairs. All are color-coded and available in a range of standard sizes. In addition, you can create custom symbols and add them to your menu for future use. A 25-step undo/redo feature means you don't have to worry about making mistakes. When you're drawing a plan, the program allows you to work on several different layers so the separate elements can easily be identified, and you can zoom in on sections of the drawing for detail work. Each symbol can be tagged with tracking information such as department, user, manufacturer, style, serial number, price, and up to five custom fields of information. Measurements can be displayed to 1/16 inch—precisely enough to create actual layouts. In addition, plans created in Office Layout can be exported to other computer-aided design (CAD) packages, including AutoCAD and AutoSketch, which permits the exchange of files between architect and client, eliminates the need for redrawing plans, and reduces the chances of making serious errors.

Since you can export physical-asset location information into other programs, Office Layout is very useful for preparing critical business reports such as inventory management, tax depreciation calculations, and insurance assessments. Suggested retail price for the software is $149.95. For more information, contact Autodesk Retail Products Division, 11911 North Creek Parkway South, Bothell, Washington 98011; (800) 228-3601.

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Writers can pick the greatest brains of all time with Quotemaster Plus for Windows, the literary quotation retrieval software package. Quotemaster Plus can search by author or subject, and it lets you add favorite quotations. New version features include an interactive interface with the Windows look and feel. Button bars and icons now direct you through quotation search steps.

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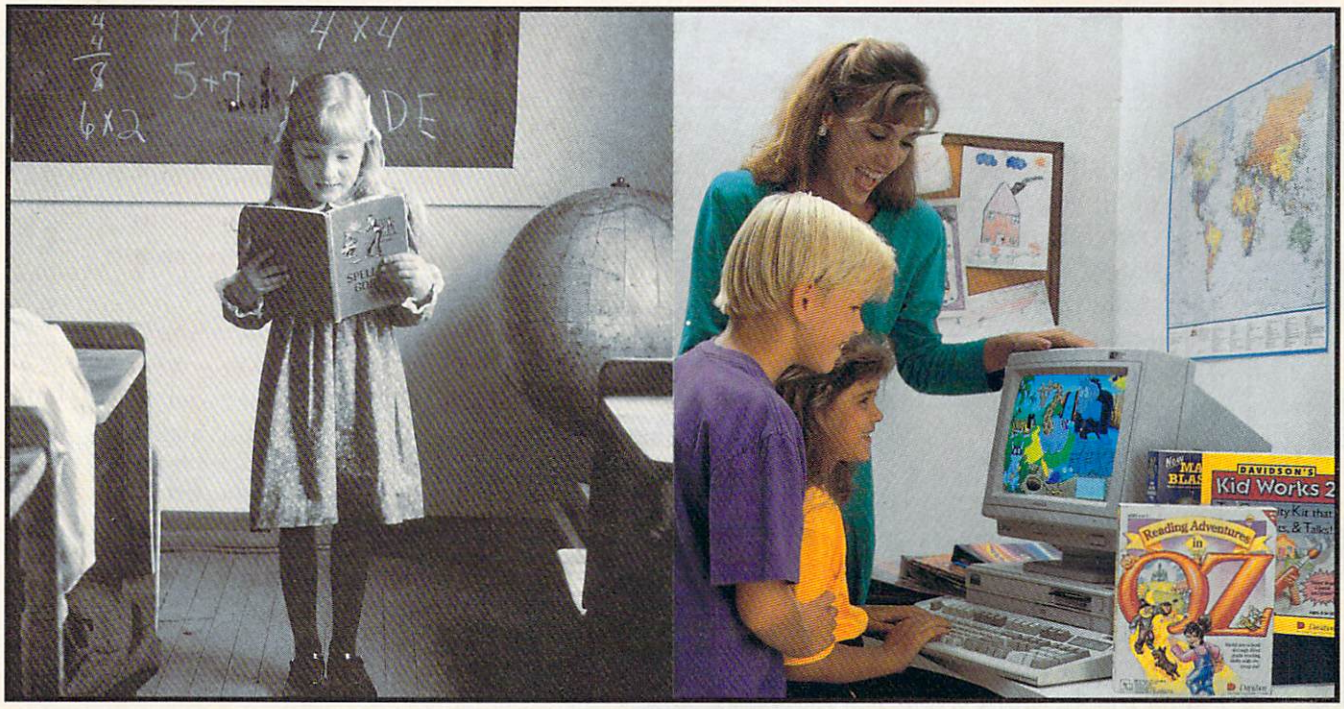
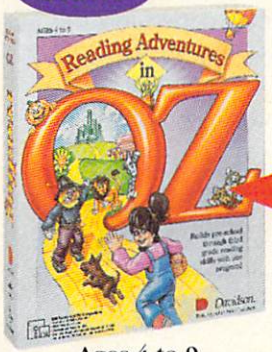


Remember learning the 3R's when you were in school—primary readers with stories about Dick and Jane, drill and practice with flash cards, and writing with big, fat #2 pencils? The importance of learning reading, writing and arithmetic hasn't changed. Fortunately, the tools for learning them have!

New!



READING

Reading Adventures in OZ™

Reading Adventures in OZ uses the characters and excitement of L. Frank Baum's Oz books to develop basic reading skills and a lifelong love of reading. The program has three skill levels—pre-reader, early reader and experienced reader—so it will build your child's reading skills from preschool through third grade.

Ages 4 to 9
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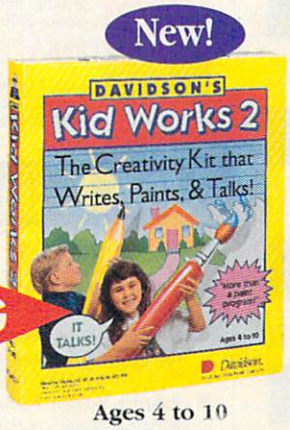
Davidson's Kid Works 2™

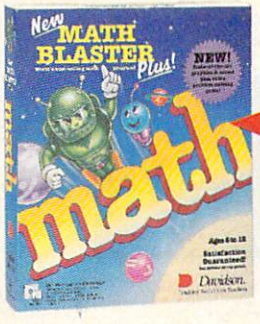
Imagine a program that allows children to create and hear their very own illustrated stories. *Davidson's Kid Works 2* uniquely combines a word processor and a fully-equipped paint program, with text-to-speech that will read your child's stories aloud!

WRITING

New!



Ages 4 to 10
$59.95 MS-DOS Mac



ARITHMETIC

New Math Blaster® Plus

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$49.95 MS-DOS
$59.95 Mac/Windows

Davidson programs contain colorful VGA graphics, exciting animations, speech and sound effects that will capture your child's imagination and make learning fun!

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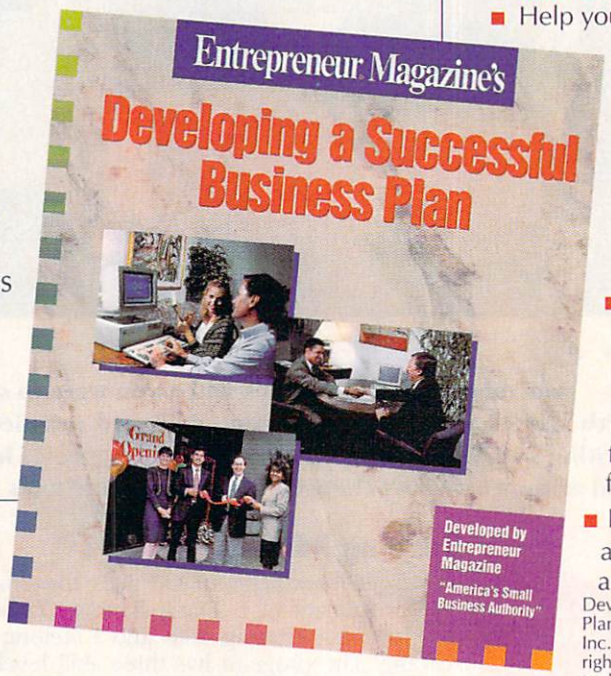
Circle Reader Service Number 144

Everything You Ever Wanted To Know About Writing A Business Plan But Were Afraid To Ask

Ever wish you had a personal mentor who could answer all your questions about successfully running your own business?

As most successful business owners will tell you, aside from having a great idea, developing a professional and effective business plan is the first major step on your road to success.

That's where the Entrepreneur Magazine's Developing A Successful Business Plan comes in. The Entrepreneur Business Planner is the most complete easiest-to-use software available to produce your business plan.



Designed by a panel of successful senior business executives and the editors of Entrepreneur Magazine, the Entrepreneur Business Planner Software will:

- Help you organize your thoughts and your objectives regarding your start-up or existing business venture
- Help you develop strategies to meet those objectives
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- **Context Sensitive Help Screen** — That's right! Now you don't have to wade through one help screen after another to get the information you need. Pertinent information is intuitively accessed based on where you are in the program when you request help.
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Entrepreneur

finds every quotation containing them. The average time to search a subject is 1/20 second. If the right word escapes you, you can try the hierarchical search, which focuses a broad area of interest into specific words and subjects that will provide numerous quotations on your subject. For instance, *human nature* yields the secondary subject *competition,* which, in turn, yields the word *originality,* which originates a dozen or more quotes for you to choose from.

Individual "quotepacks" are available with even more quotations on specific topics. Four of the newest quotepacks available are Humor, Society, Government/Politics, and Motivational. Suggested retail price for Quotemaster Plus for Windows is $89. Additional quotepacks are $60 each. An additional Author Information Base is available for $45. Suggested retail price for the entire package, including all quotepacks, is $270. For $55, current users can upgrade to the base package and receive a free quotepack. For more information, contact PennComp, P.O. Box 271529, Houston, Texas 77277-1529; (800) 326-6145.

Tax Season Returns

One of the benefits of having a PC at home is that it can take the drudgery out of preparing your tax return. AM Software's new AM-Tax is designed as an affordable solution for anyone who wants to fill out tax forms more quickly and more accurately. The software comes in versions for both personal and professional use: AM-Tax Personal and AM-Tax Professional.

The 1992 update of the software expands printing capabilities, adds more forms, provides an easier and quicker user interface for many functions, and increases error checking for certain deduction limitations.

The 1992 version adds a K-1 worksheet that automatically transfers business partnership data to all appropriate forms and schedules. The new update also lets users enter data from multiple W-2s and similar forms at one time without having to return to the main screen. Beginning AM-Tax users pay an initial price for the software package and then pay a lower renewal fee for annual updates.

The AM-Tax product line includes AM-Tax Personal 1 for individuals with standard tax needs; AM-Tax Personal 2 for individuals who require a wider range of forms and features; AM-Tax Professional for accountants, bookkeepers, and other tax preparers; and AM-Tax Electronic Filing for those who want to send files over a modem directly to the IRS or to Nelco, a national electronic filing service. The programs are available directly from AM Software, 1500B NW Vivion Road, Kansas City, Missouri 64118; (816) 426-8361 to order or (816) 741-7848 for more information.

DOC•UMENT IT

New from Okidata is a product that integrates business-quality printing, faxing, copying, and scanning into one compact desktop unit. Called DOC•IT, this is one of the first products in a new category of highly integrated peripherals that make it possible for users to create, manage, and communicate documents of all formats with ease. DOC•IT runs under Windows, providing complete compatibility to existing Windows applications and hundreds of DOS software programs.

If you create documents from multiple sources—whether in text, graphics, image, or facsimile form—you can now access and manipulate information regardless of its format. You can create new documents from this information and then distribute them—all without leaving your PC. For example, DOC•IT lets you scan a graphic, cut and paste it into an existing word processor document, and then fax the document to multiple sites. At the same time, a colleague can make several copies. According to Gartner Group of Stamford, Connecticut, the integrated peripheral market is expected to reach $8 *billion* by 1995.

Samuel Bleecker, a workplace expert from Boca Raton, Florida, says the office is changing so fast that "by the end of the 1990s, your office may seem more like an information control room than a place to rest your feet or write memos. Integrated products are here, and they will continue to become more and more powerful."

DOC•IT consists of three elements: a desktop document processor, a controller processor board for insertion into an AT-compatible PC, and desktop document-processing (DDP) management software, called DOC•IT Manager. The image engine can be removed and used as a hand scanner for newspapers, books, and other nonconventional shapes.

Suggested retail price for DOC•IT 3000, designed for presentation-quality printing and copying, is $3,999; for DOC•IT 4000, which gives even higher-quality output, the suggested retail price is $4,999. For more information, contact Okidata, 532 Fellowship

Circle Reader Service Number 192

FROM THE MAKERS OF AFTER DARK

STAR TREK®
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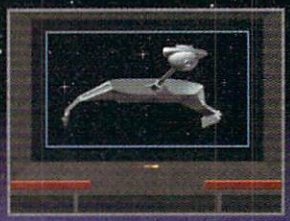
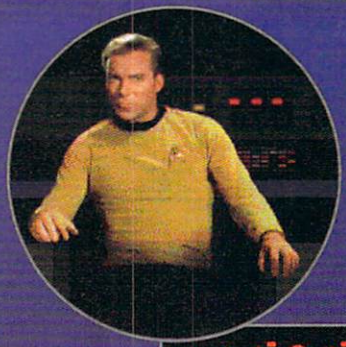
Captains Log: Stardate 1992

On our mission to prevent phosphor burn-in...

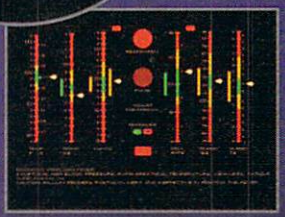


...we found ourselves surrounded by Klingons!



I asked Mr. Spock and Dr. McCoy for a full diagnosis.

Bones said the problem was burn-in, and a new screen saver was the answer.



So we beamed some tribbles into the Klingon engine room and headed for Earth to pick up a copy!

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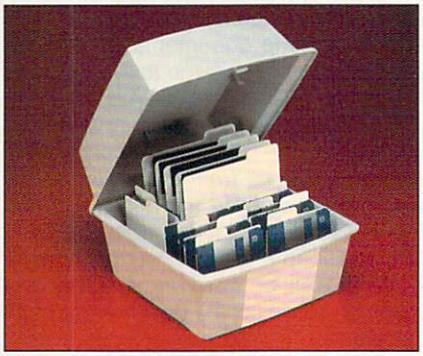
NEWS & NOTES

Road, Mt. Laurel, New Jersey 08054; (609) 235-2600.

A New Kind of Workhorse

Imagine having the power and flexibility of six office machines in one desktop device without sacrificing speed. Thanks to Digital Design, you can. The company's new Gateware Model 3370 PC is a combination of 486 PC, laser printer, plain-paper fax machine, scanner, digital copier, and modem all rolled into one—without the speed-negating bottleneck of serial and parallel ports. You simply plug in your keyboard, monitor, and mouse, and watch the Gateware 3370 perform.

With this remarkable machine, a Gateware 3370 user can issue a single set of directions to extract a document from internal accounting software, print it, fax it, and save it for future use—all in one operation without leaving the desk.



Curtis's Multi Media Disk Box gives you mass storage.

While you're operating the PC, you can receive an incoming fax without interruption. The fax can be viewed, saved, printed, or diverted to another printer without interrupting the current job. The Gateware 3370 is easy to customize and upgrade without adding new hardware.

Pricing starts at $3,995. For more information, contact Digital Design, 8400 Baymeadows Way, Jacksonville, Florida 32256; (800) 733-0908.

The Artist's Touch

Your reports, presentations, and newsletters will project a more professional business image with the artist-drawn electronic clip art Series editions from Masterclip Graphics. Based on clip art developed for large corporate users, the Series is a set of 24 topical titles, each sold separately.

Each Series title contains 50 to 60 full-color images relating to a single subject or theme. Current titles include Americana, Technology, Office, Energy/Natural Resources, Construction, Backgrounds/Borders, Sports, Medical, Humor, Business/Finance, Communications, Education, and more. Since most smaller businesses use a few images for a specific event, report, or presentation, the Series product means you don't have to buy thousands of clip art images to get the three or four you want to use.

Masterclip artists produce hand-drawn clip vector art which can be recolored, resized, and even changed while maintaining its integrity. Most other computer clip art consists of scanned-in images, which lose their integrity, develop jagged lines, and can't be modified. Masterclip images are full color but can be printed in black-and-white without loss of impact or detail. Suggested retail price for a Series title is $39.95, through retailers or directly from Masterclip. For more information, contact Masterclip, 5201 Ravenswood Road, Suite 111, Fort Lauderdale, Florida 33312-6004; (800) 899-7440.

Message in My Pocket

SkyTel (255 East Pearl Street, Jackson, Mississippi 39201; 800-759-8737) and Ex Machina (45 East 89th Street, #39-A, New York, New York 10128-1232; 800-238-4738) announced a joint marketing agreement for the integration of PC software and wireless messaging services.

Ex Machina's Notify! software will be enhanced to take full advantage of SkyTel's satellite-based wireless messaging network, and SkyTel will market Notify! directly to end users through its nationwide sales organization.

According to David S. Rose, president of Ex Machina, the agreement with SkyTel means that users of Notify!-friendly programs on Macs or on PCs using DOS or Windows can now integrate their desktop applications with pagers and portable and palmtop computers "from Syracuse to Singapore and thousands of points in between." E-mail messages sent from a LAN can appear instantly on a full-text display in a subscriber's pocket, whether across the street or across the world.

Companies or public relations firms with items of interest suitable for "News & Notes" should send information along with a color slide or color transparency to News & Notes, Attn: Jill Champion, COMPUTE Magazine, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. ❐

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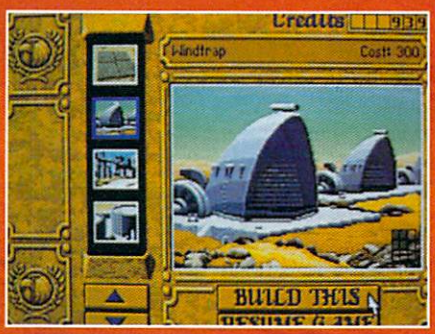

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Circle Reader Service Number 183

FEEDBACK

Globetrotting, making a quick copy, reading your old disks, needing some assembly, and computing on TV

Time Zoned

I work at Interpol Ottawa, where we have a constant need to know what time it is in various parts of the world. I would like to write a program that would give me the time of day in the major cities of the world.

LEN BABIN
ORLEANS, ON

Here's a program, Zone, that reads data statements until it locates a city name that matches what was typed at the command line. It needs to be compiled with QuickBASIC. To add cities to the list, simply insert as many city names as you like in the data line that represents the cities' time zone.

For example, in the first line you would probably want to add Greensboro and Macon and any other major cities you can think of that are in the Eastern time zone. The word end *is a delimiter that represents the end of one time zone and the beginning of the next.*

When you've compiled the program, type zone city, *where* city *stands for the name of the city where you want to know the time. Don't use the cities in the example list as references. East of Newfoundland and west of British Columbia, we weren't sure about the layout of time zones. We suspect that there's more than one time zone between Tokyo and Singapore, for example. To use this program in a city in a different time zone, simply move as many data statements from the top to the bottom as there are time zones between you and the Eastern time zone.*

```
a$ = TIME$: b$ = COMMAND$
itn = 0
a = VAL(LEFT$(a$, 2))
WHILE itn < 24
itn$ = LTRIM$(STR$(itn))
DO
READ city$
IF UCASE$(city$) =
  UCASE$(b$) THEN
a = (a + itn) MOD 12
PRINT a; MID$(a$, 3, 3)
END
END IF
LOOP UNTIL city$ = "end"
itn = itn + 1
WEND
PRINT "City not in
  database."
END
DATA "Ottawa","London",
  "St. Thomas","Port
  Stanley","end"
DATA "Manitoba","end"
DATA "Saskatoon","end"
DATA "Vancouver","end"
DATA "Sitka","end"
DATA "Seward","end"
DATA "Adak","end"
DATA "Tokyo","end"
DATA "Singapore","end"
DATA "New Delhi","end"
DATA "Diego Garcia","end"
DATA "Kabul","end"
DATA "Teheran","end"
DATA "Aden","end"
DATA "Jerusalem","end"
DATA "Istanbul","end"
DATA "Palermo","end"
DATA "Paris","end"
DATA "Greenwich","end"
DATA "Funchal","end"
DATA "Reykjavik","end"
DATA "Godthaab","end"
DATA "Cabo de Sao
  Roque","end"
DATA "St. John's","end"
```

Making Passes

I'm running a 386DX with 4MB of RAM, DOS 5.0, and Windows 3.0. Whenever I use Diskcopy it takes me three or four passes to copy a high-density disk, whether I've just booted the system or not. My DOS manual suggests that I don't have enough memory. Where did it go?

DICK FRECH
CASPAR, WY

Your manual is wrong. DOS's Diskcopy only copies 360K at a time, even in DOS 5.0. If you upgrade to Windows 3.1 and use the File Manager's Copy Disk menu command or obtain a third-party disk copy utility (Dskclone and Cpydsk are two), you can make the copies in a single pass. Lacking these utilities, many people create a directory specifically for copying and use the Xcopy command to copy disks. If you were copying the disk in your A drive, you would use this command.

```
xcopy a:. \copydir /s
```

When all the files are copied, insert a freshly formatted disk in drive A and issue this command.

```
xcopy \copydir\. A: /s.
```

An additional benefit of this process is that it allows you to copy between different capacities and different media, which you can't do with the standard Diskcopy command.

Using dBASE

I have several 360K 5¼-inch disks of software, including dBASE III PLUS, which were used on an IBM XT. Are these disks usable on a 286 clone with its 1.2MB drive? Or do I have to buy an XT to maintain compatibility?

JAMES HOWARD
CHILLICOTHE, OH

You should have no trouble using the lower-capacity disks with your AT. The 1.2MB drive reads 360K disks. There's some additional wear on the heads, though, because of the coarser medium used on the surface of the 360K disks. You should use the disks in your high-capacity drive no more than is absolutely necessary.

You might consider copying the files from the 360K

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Circle Reader Service Number 247

disks onto 1.2MB disks. Since you'll probably install the program on your hard disk anyway, you aren't likely to use the disks more than once.

Utilities Needed

I need a good assembler and something to capture screens from my PC. Do you have any recommendations?

ROBERT JACKSON
HAMILTON, New Zealand

Borland's Turbo Assembler (popularly known as TASM) and Microsoft's Macro Assembler (MASM) are highly recommended products for learning and writing machine language on the PC. They're provided with the languages published by those companies (Turbo Pascal and QuickC, QuickBASIC, and Macro Assembler 6.0, for example).

There are a number of powerful screen-capture programs available. A favorite is Collage Plus from Inner Media. HiJaak from Inset Systems can not only capture screens but also convert graphics files among many different formats.

Computer TV

I need to get a videotape of my screen display for training purposes. Is there any way to capture a VGA screen on videotape or in an NTSC composite image?

JAMES JOHNSON
DETROIT, MI

Digital Vision recently introduced a product that converts a VGA signal into a composite signal for capture on a VCR or on a television screen. The product is called TelevEyes. It's an external box that connects between your VGA output and your monitor. Not all VGA monitors will be able to display the screen while TelevEyes is in use. The unit costs $299.95. Contact Digital Vision at 270 Bridge Street, Dedham, Massachusetts 02026 or call (617) 329-5400.

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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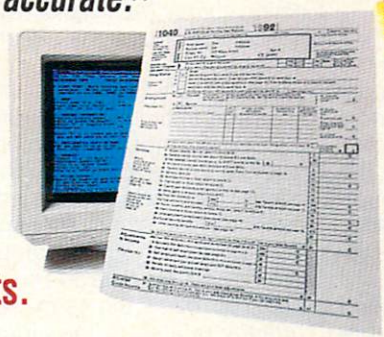
Of course, I'd have to know I was paying the least tax and it'd be perfectly accurate."

NEW! TaxCut is now available for IBM/DOS, Windows and Macintosh!



With TaxCut® Software, filing your own tax return is a simple two-step process:

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2. Print and file!

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How It Works

You start by selecting the Interview, Shoebox, or the Direct-to-Forms method.

The Interview. TaxCut asks you simple Yes-or-No questions right on your computer screen. Based on your answers, TaxCut selects just those questions you must answer to correctly fill out your return, from the thousands of questions in its database.

As TaxCut learns more about you, it decides which forms you need and fills them out for you. The Interview asks you to key in the relevant numbers from your receipts, forms, etc.

After you've answered the questions, TaxCut shows you your completed return on the screen, and prints IRS-approved forms, on plain paper, ready to file.

The Shoebox. Pick up any receipt from your pile of records. Use the scroll-down list TaxCut shows you to identify the type of record. Then key in the number. TaxCut decides where it should go on your return...then does all the calculations.

Direct to Forms. If you prefer, you can go right to the forms. Simply enter the numbers, and let TaxCut automatically carry the amounts to each relevant form. TaxCut will then do all the math.

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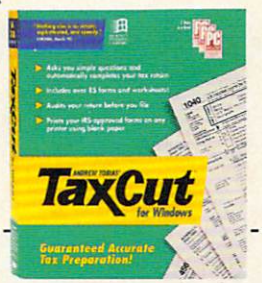
Windows: IBM PC/Compatible, 286 or higher, Hard Drive, Windows 3.1, 2MB RAM.
Mac: Mac Plus, system 6.0.2 or higher, Hard Drive, 2MB RAM.



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HARDWARE CLINIC

Mark Minasi

POWER PINCHING

Here's how laptops try to get more power per hour.

In the last two columns, I've looked at laptop battery technologies and suggested some ways to make batteries last longer. But there's a limit to the amount of power that engineers can pack into a battery. Extending laptop life means using less power somehow.

One question I get when I talk about this subject concerns solar power. "Isn't it possible to power a laptop with solar power?" people sometimes ask. The answer is, "Not yet, but eventually." There are solar panels for laptops that can provide about 500 milliamps of power; notebooks need around 3000 milliamps. You'd need a pretty big set of panels to power a laptop.

There's not much we can do about solar-power research, so let's consider a second approach—lowering laptop power requirements. In descending order, the biggest users of juice in your laptop are the display, the hard disk, the RAM, the floppy drive, the CPU and support chips, the keyboard, the system clock, the I/O ports, and the math coprocessor (if present). Let's examine these power porkers in order.

Displays draw the most power. I see that every time I connect my laptop to an external display—the laptop runs for hours and hours off a single charge. Displays would be a lot easier on the batteries if they were (1) slower, (2) lower resolution, and (3) not backlit. Displays must be refreshed many times per second, meaning that an electrical circuit must repaint the image on the LCD screen usually about 50 times per second.

Here's a side note that will be useful for the rest of this article. Any circuit that does things on a regular basis, like a clock ticking or a video circuit refreshing a screen, is an alternating current (AC) signal. The frequency of that signal affects the circuit's power-consumption rate like so: $P=CV^2f$.

In that formula, C refers to the Capacitance of the circuit, V refers to the Voltage of the circuit, and f refers to the frequency of the circuit. In terms relevant to our current problem—displaying data on a computer screen—the term *frequency* relates to the video refresh rate. Typically, a screen should refresh at about 60 times per second, but 50 is acceptable, and look what it does for the power consumption. Changing the frequency from 60 to 50 reduces display power consumption by 17 percent.

Unfortunately, that refresh clock isn't driven by the number of screens painted per second; it's driven by the number of lines painted on the screen per second. Suppose we're building a CGA-compatible display; CGA screens have 200 horizontal lines on them (as you may know, CGA resolution is 640 × 200). This means that the line clock must tick 200 × 50 times per second. But today's notebooks have at least a VGA resolution, and VGA has 480 lines of horizontal resolution. This means that going from CGA to VGA resolution increases laptop screen power requirements by 240 percent!

The next laptop display problem comes from backlighting. Supertwist LCDs show high resolution, but they really need to be backlit to be visible (in my opinion, that is—there are certainly supertwist LCDs that aren't backlit, but I find them unreadable). The fluorescent light behind a backlit LCD draws substantial juice.

What can be done to keep laptop power consumption down? You can shut down the laptop display altogether during inactivity. It's annoying, but if you're like me, you probably get distracted in the middle of battery-powered work by airline seatmates, flight attendants, or the like. Those extra minutes of display downtime can significantly extend battery life. And whenever possible, turn the display brightness down, reducing the amount of power that the fluorescent tube needs.

Today's laptops can't live without hard disks, as evidenced by the fact that you just can't run Windows from floppies. Hard disks have a motor that keeps the disk platter spinning (as well as a voice-coil circuit that moves the read/write head) in addition to having to power the electronics on the hard disk itself.

The really big disk amp-sucker, however, is the action of powering up the hard disk. It takes a lot less power to keep a disk spinning than it does to get it spinning in the first place, which makes me leery about the common laptop practice of shutting down the hard disk when inactive. My laptop came out of the box set to shut down the hard disk after one minute of inactivity, a setting that led to near-constant power ups and downs for the hard disk. Not only does that draw power, but it's just plain no good for the hard disk motor, and surely shortens its life. Consequently, I compromised and set my disk timeout to the maximum allowed by my setup program, 15 minutes.

An interesting bit of good news for laptops comes from an examination of what determines how much power is required to get a disk spinning in the first place. The amount of power needed to get a disk spinning is proportional to the cube of the radius of the disk. If that doesn't seem interesting, consider this—notebook hard disks used to have platter diameters of 3½ inches,

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but most now use a 2-inch-diameter platter. This means that the startup power required for a 2-inch disk is smaller by a factor of (3.5/2) cubed, or over 530 percent! 1⅞-inch platters are starting to appear, which will mean even lower power-consumption rates.

Buy laptops with small platters where possible. Don't worry so much about capacity, as that's not as important in power consumption, and from a practical point of view, you should have as much disk space as possible in order to run today's software.

Be careful when you're buying SIMMs.

Experiment a bit to find out the best timeout value for your laptop's hard disk. You don't ever want the hard disk to power down while you're scratching your head looking for the right word. Instead, you want the laptop to power down when you've turned away to answer the phone or chat with the person sitting next to you on the airplane.

The next power purloiner is the system's main memory. My notebook must have 16MB of RAM, as I run Windows NT on it. But more memory needs more power . . . usually. While it depends on how the memory is laid out on your laptop, you'll typically find that the fewer the number of memory chips in your system, the lower the power consumption. For example, suppose you have a laptop that can accommodate eight SIMMs (Single In-line Memory Modules). (These are small circuit boards about the size of a stick of gum that are the typical packaging for memory these days). You need 8MB of RAM, and you can either get those 8MB with eight 1MB SIMMs or two 4MB SIMMs. The two 4MB SIMMs will use significantly less power.

Be careful when you're buying those SIMMs. Use the SIMMs that the manufacturer recommends, or you'll throw away power like crazy. A lot of what makes memory draw power is that it must be refreshed on a regular basis. Think of each memory location as being like a small storage container for colored water. Red colored water represents a 0, and blue colored water represents a 1. A program stores data by putting water of the appropriate color into a container. So far, so good.

Unfortunately, the storage containers are leaky. Many times per second, your memory chips must be refreshed. What I've just described here is a dynamic RAM. The alternative is a static RAM, which is essentially composed of containers that don't leak. You put data in the containers, keep a steady supply of power to those containers, and the data stays there. (Remove the power, and even a static RAM loses its contents.)

The refreshing that the dynamic RAM requires is accomplished by a circuit that constantly rereads the memory, with the resultant side effect that the storage containers get refilled. That process requires a significant amount of power, so many notebooks are built around low-refresh SIMMs, which are memory modules that don't need to be refreshed as often as normal SIMMs. Buy normal SIMMs, and your notebook will run fine, but you'll seriously degrade its battery life. So check with your manufacturer before you buy upgrade memory for your system.

There's not much that can be done about the floppy, as it doesn't require power unless you're accessing it. But what about the CPU and support circuitry? Look once again at the formula relating AC circuits to power consumption. The entire motherboard of your laptop moves to the beat of the central system clock. A clock that runs at 20 MHz has a frequency of 20 million cycles per second, and you recall that the higher the frequency, the higher the power drain. Smart laptops detect idle time and drop the clock or, even better, stop the clock altogether. It's not quite as easy as that, however, as many of the memory components inside the CPU itself are dynamic and require refreshing. You can't just stop the clock on many motherboards and expect the data to remain intact. That's why Intel developed the 386SL, a processor basically intended for laptops. You can stop its clock without any trouble.

To see another way to save power, consider this power-consumption formula for direct current (DC): $P=V^2/R$

Here, Power consumption equals Voltage squared divided by Resistance. Traditionally, chips have run at 5 volts. Some manufacturers reduce voltage by just running the chips at a voltage level a bit below their rated values. For example, a circuit that uses three AA batteries would only have 4.5 volts, leading to a nearly 20-percent savings in power in the circuit. Another approach is to use a chip that draws less power. Intel has a 3.3-volt version of the 386SL available, but it hasn't really caught on because vendors seem to be waiting for the 3.3-volt version of the 486.

I'm running out of space, so here are a few more ideas for the lesser power drains. Many notebooks let you disable the serial ports with the setup program that comes with the notebook. As I only need one serial port for my mouse, I disable the other serial port and the parallel port. If you can live without a math coprocessor, do so, as it runs a bit warm, and you know where the power for that heat comes from—your battery. ❐

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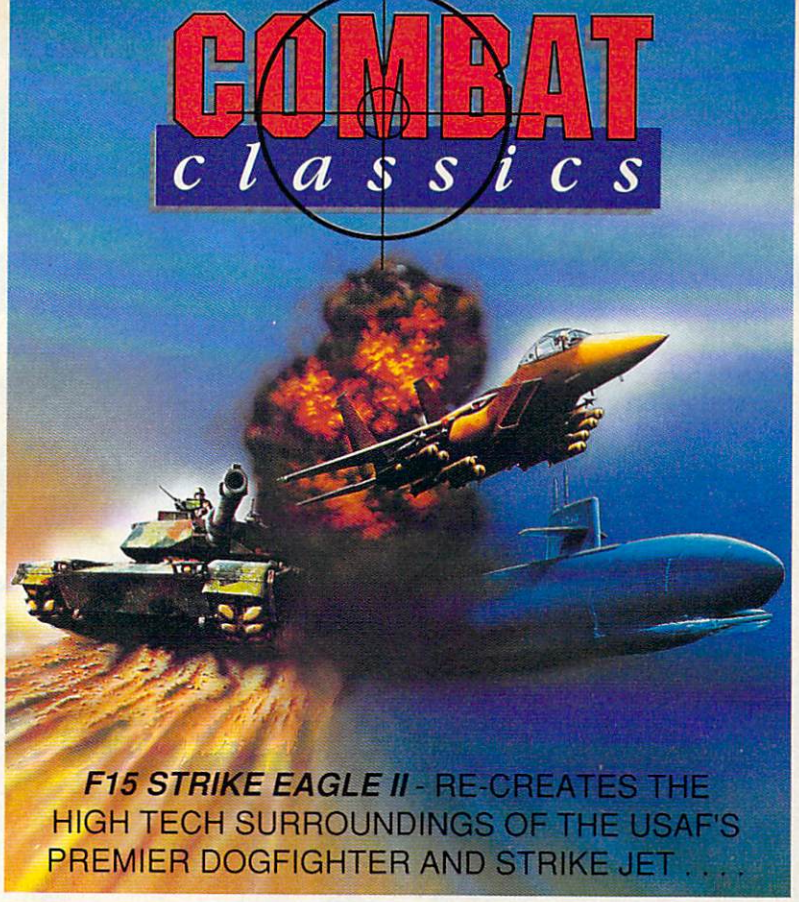

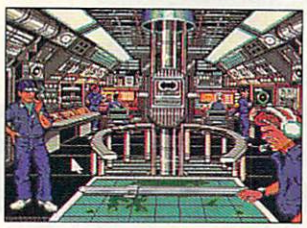

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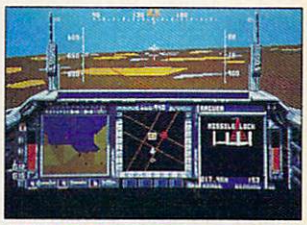

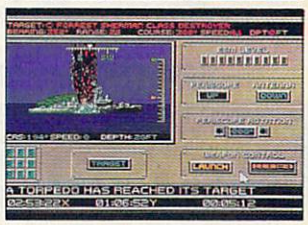

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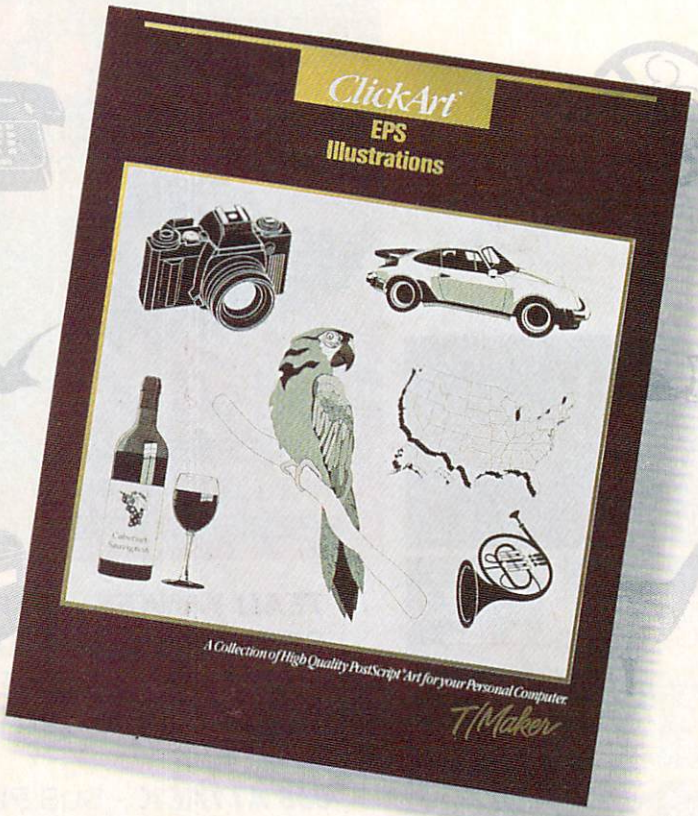

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WINDOWS WORKSHOP

Clifton Karnes

PROGRAMMING WINDOWS IN C

In last issue's article "Windows Programming from Scratch," Tom Campbell says that Microsoft C/C++ 7.0 is the programming deal of the century. I couldn't agree more. For $139 you can get one of the best Windows development environments around, complete with a global optimizing compiler, an integrated development environment, and a suite of excellent Windows programming tools.

Borland's Windows-based IDE is light years ahead of Microsoft's Programmer's Workbench, and Borland's compile times are faster.

But what you won't get, in my opinion at least, is the *best* Windows development environment. For that, you'll need to get Borland C++ 3.1 (Borland International, 1800 Green Hills Road, Box 660001, Scotts Valley, California 95066; 408-438-8400; $495; $749 with Application Frameworks).

Borland C++ 3.1 contains everything you need to create Windows applications—you don't need to buy Microsoft's Windows Software Development Kit. With Borland C++ 3.1, you'll get a Windows-hosted IDE (Integrated Development Environment), a Windows debugger (that unfortunately runs in DOS character mode only), Resource Workshop (for creating and editing everything from dialog boxes to bitmaps), WinSight (an analysis and debugging tool), WinSpector (a postmortem analyzer), and a boxload of other tools.

Let's start with the Windows IDE. Borland C++ 3.0 came with Turbo C++ for Windows, which let you create Windows programs in a Windows IDE. But if you wanted to optimize your code, you had to compile with the DOS version of the product. Borland C++ 3.1 now has a full-blown Windows IDE for the optimizing Windows compiler. Now you can edit, compile, link, and run your programs from Windows. It's worth noting that BC 3.1 is the *only* Windows-hosted optimizing compiler available (QuickC for Windows and Turbo C++ for Windows are not globally optimizing compilers).

One of the IDE's best features is syntax highlighting. This technique (which Borland pioneered) lets you choose colors for language elements. If applied without restraint, syntax highlighting can make your screens look like bad Christmas decorations, but when used creatively, it makes code easier to read and debug.

The IDE also gives you a choice of slightly different interfaces: CUA or Alternate. You'll want to use the Alternate interface, however, because you can customize it with keystroke macros and keyboard reassignments.

You can also map the right mouse button to any of several actions. I've set it to load help and search for the word at the cursor, which is great for checking Windows API functions.

The compiler is full featured, supporting both C and C++, and you can use it and the integrated linker to create both exe and dll files. You can also use precompiled headers, which create a binary symbol table from a header file, so the whole file doesn't need to be recompiled each time you compile your program. With the windows.h header file clocking in at more than 4000 lines, this is a tremendous productivity boost.

In addition to being able to compile Windows exe and dll files, you'll find full support for OLE, multimedia, pen computing, TrueType fonts, and DDE.

As mentioned above, BC 3.1 includes a number of tools that make creating Windows apps easier. First and foremost, there's the Resource Workshop. You can use this resource editor to create and edit dialog boxes, bitmaps, icons, and cursors. And you can edit these resources either as source files or inside exe and dll files. The Resource Workshop also includes several custom controls for placing bitmaps on buttons, creating canvaslike backgrounds, and sculpting a 3-D look for dialogs.

Of the other tools, WinSight is outstanding. In this one tool Borland combines a half-dozen utilities and includes information on window attributes, window messages, and DDE and OLE conversations.

After working for several weeks with both Microsoft and Borland environments, I have to give the nod to Borland. Both compilers produce high-quality code, but Borland's Windows-based IDE is light years ahead of Microsoft's Programmer's Workbench, and Borland's compile times are faster. You can produce great products with either development environment, but with Borland's, you'll get the job done faster, and have much more fun. ❐

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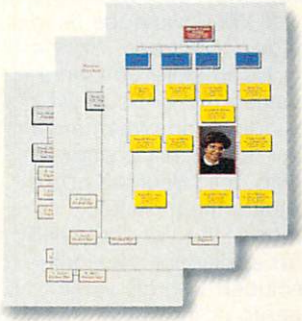

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PROGRAMMING POWER

Tom Campbell

FROM WRITING TO READING

In last month's column, we looked at the Windows routine WritePrivateProfileString, which lets you create init files. Init files are read in when your application starts up and contain system variables in this format: [SectionName] EntryName=AddString.

The section name, which appears in brackets, may have more than one entry line. An entry consists of an entry name (called EntryName in our example above) and a value (called AddString above) for that entry. A typical entry for [Printer] might contain Port=LPT1 if your printer is connected to the first parallel port, and if you use a Hewlett-Packard LaserJet, it would be PrinterName=LaserJet IIIP.

A good reason to avoid text files is that binary files offer more flexibility.

In this month's column, we'll look at the routine GetPrivateProfileString, which reads the value for an entry. For example, if you were to pass it the filename myprog.ini, the section [Printer], and the entry Port, it would pass back LPT1. If there were no init file available, it would return the default value you provided when you called the routine.

The code we'll write this month is straightforward and builds on last the code we wrote last month. As each line of code from the init file is read in, the first character is checked to see if it's a left square bracket. If it is, the entire line is assumed to be a section, such as [Printer]. It's then forced to uppercase.

When the routine first started, the requested section name was also forced to uppercase and surrounded with square brackets. If the two sections match, the SectionFound flag will be set. As long as it's set, incoming lines will be checked for left square brackets. If they are present, the search has failed. If they are absent, the lines are assumed to be entries in the format EntryName=AddString, and the familiar Parse$ is used to halve the line.

If Left Side is the requested entry, a match has succeeded, and whatever is on the right side of the line is returned by the function. If the entry is never found, a default value is returned.

Although this routine is modeled after a Windows API call by the same name, it differs in several ways. First, what is called the section here is called the application name by Windows. Calling it an application is a misnomer; it's a holdout from the old days when all Windows apps used their own sections of the win.ini file to store configuration values. I'm not sure why the Windows documentation doesn't reflect this change in direction, but I decided not to perpetuate the mistake.

Second, the Windows call has an additional parameter not included with my version: the length of the buffer used to hold the string returned by this function. It may seem like a horrible kludge to BASIC programmers—and it is.

Windows is written in C, and C has no concept of strings; they're nothing more than arrays of characters ending with a zero byte. So if you want to copy a string in C, you have to use a runtime library routine to do it (not the handy-dandy = operator of BASIC), and you have to make sure you've dimensioned a character array big enough to hold the copied string. If you haven't dimensioned that array, C will copy the string anyway, assuring at the least that your program will work improperly and typically causing the system to hang.

Finally, the Windows API call requires that you pass it a buffer for the value returned from the init file entry. Its size must be less than or equal to the amount passed in the size argument. Again, this parameter is omitted, and the value is returned by the function. And again, a C programmer wouldn't have this flexibility because C doesn't have a string data type, so it doesn't support functions returning strings.

A side note: Windows NT, the higher-end version of Windows for workstations and non-Intel processors, doesn't use init files. (Technically, it can, but doing so is considered bad form, and they are supported only for compatibility.) Because NT was designed with reliability as its most important feature, text files for the purposes of system configuration were ruled out, and a registration database replaces them. The main reason is that it's easy for a text file to be damaged, yet not appear to be so. Suppose, for example, the last line of a configuration file contained the text Printer=LaserJet IIIP but the file was accidentally truncated to Printer=LaserJe. Windows would look for a printer driver, would not find one matching LaserJe, and would return an error, even if the IIIP were connected and ready to run. Using a more descriptive binary file format, NT is able to detect damaged files and proceed accordingly, by attempting an automatic recover or by notifying the system administrator.

Another reason to avoid text files is that binary files offer more flexibility. In an init file, the line Copies=10 is all text, so you have to use Val to convert the string 10 to computer-readable format. More complex data structures are out of the question. A binary file lets any kind of data be represented in its native format. ❐

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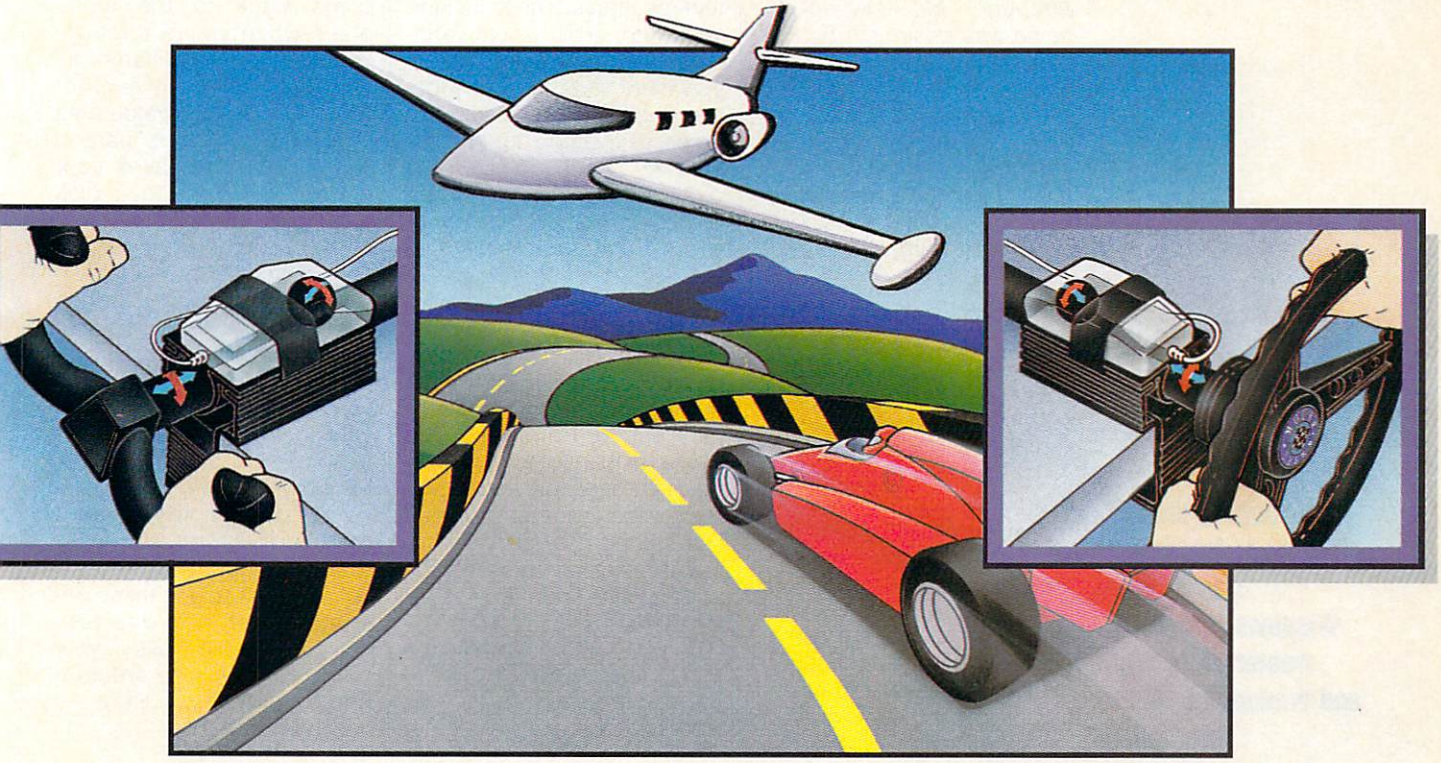

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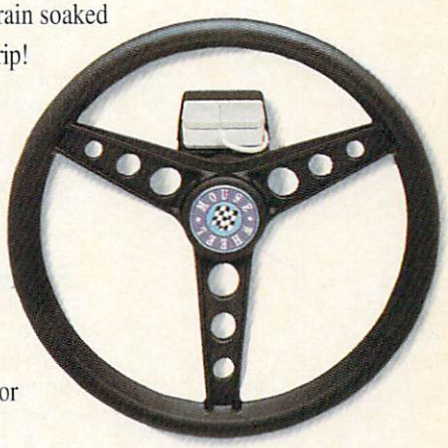

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TIPS & TOOLS

Edited by Richard C. Leinecker

Although Mr. Leinecker's home was destroyed by Hurricane Andrew, he has continued to provide COMPUTE with his "Tips & Tools" column on time. Our heartfelt best wishes to the Leinecker family and to all of the individuals and families affected by recent disasters.

Getting the big cursor, reducing the size of your Windows groups for greater efficiency, and wiping out whole directories in one fell swoop

No-Squint Cursor

Our office uses numerous laptop computers with LCD screens. Unfortunately, the screens are hard to read sometimes due to glare. And the cursor is the hardest thing to see.

We use WordPerfect 5.0 on all of our laptops. I discovered a program in the WP50 directory named cursor.com. It adjusts the size of the cursor. I put a copy of cursor.com in my root directory and added the line

```
cursor /ah
```

to my autoexec.bat file that automatically loads it. Now, the cursor is larger and much easier to see.

The program keeps the cursor set to the new size. This makes it a nice utility that helps with all of my other laptop computing.

ALBERT NICCOLUCCI
HELENA, MT

Regrouping Windows

I enjoy Windows 3.1 and have gotten carried away with buying Windows applications and installing them on my computer. I recently ran into a problem that had me stumped. After I installed my 41st group, Windows would crash when I tried to run it. Clicking on the Ignore button would simply drop me back down to DOS. I called Microsoft technical support, and they helped me out.

Each group consumes system resources. Those include your path, environment variables, files, and buffers. When you have too many groups, they eat up the space that Windows sets aside for the resources. Each computer is different, so while mine had problems at the 41st group, yours might work fine until you add your 60th group.

I edited my ini files and reduced the number of groups to ten. I wouldn't recommend editing your ini files, since the groups may have dependencies and you might end up worse off than when you started. I would recommend grouping things together at install time, though.

Windows works perfectly once again. And it comes up several seconds faster than it did in the old days, now that I have fewer groups.

WILLIAM JAMES WRIGHT
BROOKFIELD, WI

Directory Killer

A handy batch file I've written deletes all of the files in a subdirectory and then deletes the subdirectory. It won't work with embedded subdirectories, but it still saves me a lot of time. To avoid the *Are you sure?* message, I piped a *Y* character into the Del %1 command. Here's deldir.bat.

```
echo off
if "%1"=="" goto noparam
echo y | del %1
rd %1
goto end
:noparam
echo Parameter missing.
echo Usage: deldir
  <directory_name>
:end
```

DENNIS SULLIVAN
DAYTON, OH

Restoring Your Place

Batch files have a major drawback. It's not easy to remember where you are and then come back to the same place when you're through. You might be in a different directory or even on another drive. I have two batch files that'll help. One is named savecd.bat and saves your current directory to a disk file. The other is called savedrv.bat and saves your current drive to a disk file.

Before proceeding, I need to make two assumptions. You've got the DOS Debug program in your path, and you have a directory off of your root in your path called batch. If you don't have Debug in your path, then make sure it's there. If you don't have a directory off of your root in your path called batch, then replace those references with any directory you'd like to use that's in your path. You can also create a batch directory. Here is savecd.bat.

```
echo off
echo cd > c:\batch\restcd.bat
ctty nul
type c:\batch\cdscrpt | debug
  c:\batch\restcd.bat
ctty con
cd >> c:\batch\restcd.bat
```

You'll need a second file to help things along called cdscrpt in your batch directory. Here is cdscrpt.

```
rcx
3
w
q
```

Here's how it works. The batch file starts off by echoing the text string *cd* plus a space to a file called restcd.bat.

What comes next is piping a file into Debug that strips the carriage return off of the end of the file. We have to do that, since we're getting ready to append the current directory onto the file. If we

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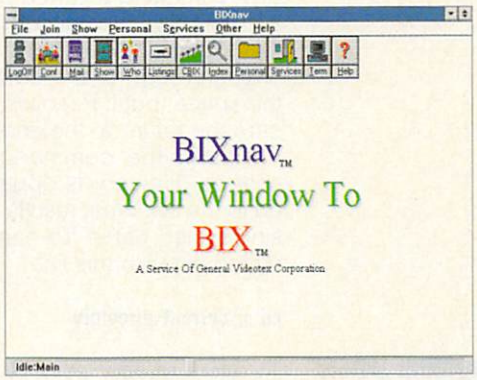

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didn't strip the carriage return, we'd end up with a two-line file that would not set the directory.

The script simply uses the RCX command followed by a 3 to tell Debug to truncate the file to three bytes. That's just enough room for the *cd* and the space, but it removes the carriage return at the end.

Finally, the command to change directory is appended to the file. What results is a single-lined batch file named restcd.bat with this line.

```
cd c:\current\directory
```

Remember where you are in your drive and directory structure, and return there on completion of your program.

To return to your point of origin, you just have to type *restcd*. Since it was created in your batch directory, and that directory is in your path, DOS will find it and execute the change directory command so that you'll return to where you started.

Unfortunately, the savecd scheme doesn't work when you change drives. You'll need an extra pair of files if you want to save and restore your current drive. Here is savedrv.bat.

```
echo off
cd > c:\batch\restdrv.bat
ctty nul
type c:\batch\drvscrpt | debug
  c:\batch\restdrv.bat
ctty con
```

You'll need a second file to help things along called drvscrpt in your batch directory. Here is drvscrpt.

```
e 102
0d
e 103
0a
rcx
4
w
q
```

This pair of files works similarly. You type *savedrv*, and it creates a batch file in your batch directory.

The script simply uses the E (Edit) command to make bytes 3 and 4 (102 and 103) into the two codes that represent a carriage return. The entire directory string is part of the file, but all we want is the drive and colon. The RCX command is used to truncate the file to four bytes.

To get back to the drive you were on, just type *restdrv*.

RICHARD C. LEINECKER
MIAMI, FL

Special Deletes

Very often I find myself in the situation where I want to delete everything from a directory except one type of file. If I could just type *del except *.exe* it would be perfect. Everything but the exe files would be deleted.

Now, you can do just that with Deletex. To use Deletex, put it in your DOS directory. Then, from the directory you're in, just type *deletex filemask* where *filemask* can be any legal DOS filemask that you don't want deleted.

You can type in Deletex using the DOS Debug command. Make sure the DOS program called Debug is in your path or the current directory. In these examples, the italic text is what the computer prints; the roman text is what you should type. One way to be sure you get these programs exactly right is to have someone read the numbers to you as you type them in. Another way suggested by one of our readers is to read the numbers into a tape recorder and then play them back as you enter the program code.

```
debug deletex.com
File not found
-e 100 be 80 00 ac 0a c0 74 64
-e 108 ac 3c 0d 74 5f 3c 20 74
-e 110 f7 8b fe 4f ac 3c 0d 74
-e 118 04 3c 20 75 f7 c6 44 ff
-e 120 00 8b f7 bf 9f 01 b9 0a
-e 128 00 f3 a5 ba 9b 01 bd 70
-e 130 01 b4 2f cd 21 53 2b c9
-e 138 83 c3 1e b4 4e cd 21 72
-e 140 0e 8b d3 ff d5 b4 4f cd
-e 148 21 72 04 ff d5 eb f6 5b
-e 150 81 fd 70 01 75 08 bd 7e
-e 158 01 ba 9f 01 eb d7 81 fd
-e 160 7e 01 75 08 bd 8c 01 ba
-e 168 9b 01 eb c9 b4 4c cd 21
-e 170 b8 00 43 cd 21 80 e1 df
-e 178 b8 01 43 cd 21 c3 b8 00
-e 180 43 cd 21 80 c9 20 b8 01
-e 188 43 cd 21 c3 b8 00 43 cd
-e 190 21 f6 c1 20 75 04 b4 41
-e 198 cd 21 c3 2a 2e 2a 00
-rcx
cx 0000
:9f
-w
Writing 009f bytes
-q
```

If you run Checksum (July 1992 "Tips & Tools") on this com file, 062 should appear on your screen.

RICHARD C. LEINECKER
MIAMI, FL

Missing You

We are looking for the addresses of the following individuals who have had tips published in COMPUTE: Mike Chatel, Winston Wan, Tom Doan, Geoff Bartakovics, and James Steele. If your name is listed, please send your address to Julia Fleming in care of this magazine.

RICHARD C. LEINECKER
MIAMI, FL

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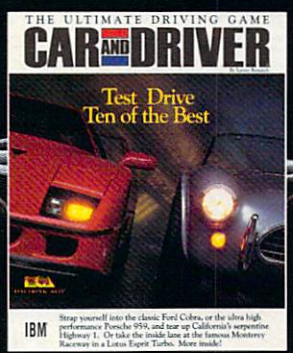

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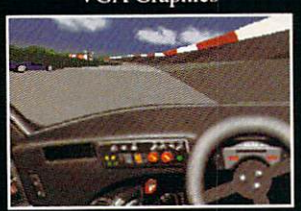

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INTRODOS

Tony Roberts

FOR'S FORTE IS REPETITION

The For command works wonders in batch files and on the command line.

One of my favorite DOS commands is also a power command. The For command lets you perform the same operation several times, or on several files. It's documented in the batch programming section of your DOS manual, so you may think it can only be used in batch files, but that's not so.

Although the syntax is slightly different in each application, For can be used both in batch files and at the command line.

Here's how it works: Let's say you want to list the contents of a set of files—say, your batch files—to the screen. Type *for %f in (*.bat) do type %f.*

The *%f* is a placeholder. When the line is executed, it's replaced in turn by each member of the series indicated by the data in the parentheses. In this case, that series includes every file with a bat extension in the current subdirectory.

You most often see *%f* used as a placeholder, but in practice, any letter will do. When a For command is used in a batch file, the placeholder designation includes two percent signs *(%%f).* When For is used on the command line, only one percent sign *(%f)* is necessary.

For isn't a command you'll use every day, but it's a good option to consider when you're facing a big task. For example, if you want to place a copyright notice at the end of each of 100 text files, you *could* open each file and type in the new line, but that would get old quickly. The For command can have the job finished in a flash.

First, create a file that contains the copyright notice. Save it with the name *notice.* Then, type the following: *for %f in (*.txt) do copy %f+notice.*

This example combines the For and Copy commands to append the text in the notice file to every file with the txt extension in the current subdirectory. The plus sign between the *%f* and the filename *notice* activates Copy's append feature.

Before you use this or any For command to modify your important files, make a set of backups of those files. Also, test the syntax on one or two files first. Just as For is powerful enough to get a lot of work done in a hurry, it can also do heavy damage just as quickly if your command isn't constructed just right.

The For command can be used with programs as well as with other DOS commands. I frequently use the For command to update archive files I've created with the PKZIP utility. For instance, you might type *for %f in (*.zip) do pkzip -f %f.*

This invokes the PKZIP utility for each of the zip files in the current subdirectory. The *-f* switch tells PKZIP to freshen the zip files—to replace any file contained in the archive with a newer file of the same name if such a file exists.

Although most uses of the For command involve a series of filenames, there are other ways the command can be used. For example, the following short batch file might come in handy if you're hooked up to a network and want to know which drive designations are in use.

```
@echo off
for %%f in (C D
  E F G H I J K L M N O P)
  do if exist %%f:\*.* echo
  Drive %%f is online.
```

This batch file cycles through a list of drive names and checks for the existence of files there to determine whether the drive is available. If the drive is available, a message indicating the fact will be printed onscreen.

You can even use the For command to compare text strings entered by the user. This might allow you to set up a simple password system for running various programs. Here's an example of a batch file that requires a password to run the program Fungame.

```
@echo off
  for %%f in (cat
  dog pig) do if %1==%%f
  goto ok
echo Sorry, you didn't
  supply a valid password.
goto end
:OK
fungame
:end
```

This batch file fragment requires the user to enter a valid password (in this case *cat, dog,* or *pig*) as a parameter when running the batch file. The for line compares the user's input (the *%1*) with each of the three words listed in the series. If there's a match, the program jumps to the OK label and runs Fungame. If the password doesn't match up, the batch file prints a message and then ends.

Although this security system won't fool anyone savvy with computers, your kids might get a kick out of having a secret password.

If you have a job for the For command, give it a try, but don't give up if things don't go right the first time. Building a successful For command usually takes experimentation, but if it's set up correctly, it can save you a lot of time.

After you've put in the effort to create a good For command, don't let it go to waste. Document the command—what it does, how to use it, and so on—with rem statements in a batch file, and store it where you can refer to it next time an industrial-strength project crops up. ❐

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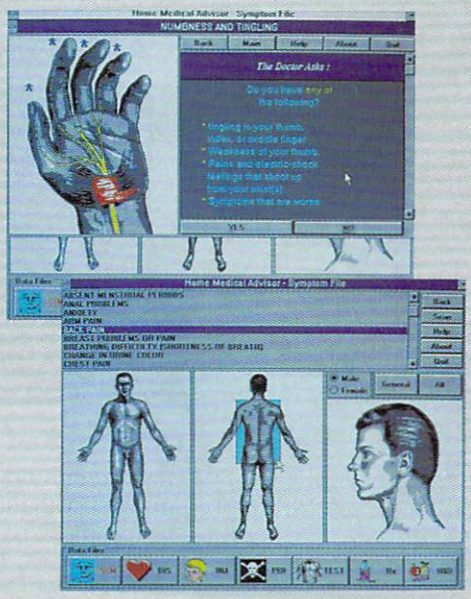

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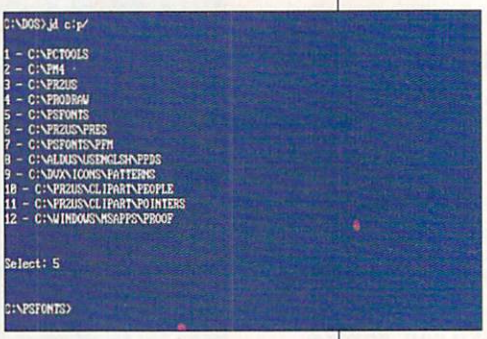
ON DISK

Tony Roberts

DOS REPLACEMENTS AND WINDOWS ADDITIONS

Before I describe this issue's programs, let me remind you that many of the programs included on COMPUTE's PC Disk are shareware. The authors make this software available so that you may try the program to see if you like it before you buy it. If you find the software useful, please remember to pay the registration fee.

JonDir is really quick, and what's more, it won't clutter your disk with index files.



JonDir

Moving around a bulging hard disk with the DOS Chdir command can be quite a challenge. There's got to be a way to get from one subdirectory to another without having to enter long, complicated paths (which are susceptible to typing errors).

JonDir provides a solution. To use this directory changer, simply enter *jd* and the first few letters of the target subdirectory. That's usually all JonDir needs to get you where you want to go. JonDir jumps to the first subdirectory that matches your input. If you have directories with similar names, JonDir can build a menu of matching directories, from which you can select the one you want.

Another feature of JonDir is that it doesn't clutter up your disk with index files. That's what programmer Jon Snyder had in mind when he wrote the program, which he offers as freeware. JonDir can find your target directory and move you there even if it's on another drive.

Since

Since is a handy utility put together by Robert McCormick. With this program, you can get an instant accounting of all files on your drive modified since a given date.

Enter *since* with yesterday's date, and you'll see a list of all the files that have been modified since midnight.

With Since, you can specify times as well as dates. You can use this particular feature to determine whether someone tampered with your computer while you were away from your desk.

Since is shareware, and it has a $5 registration fee.

PCOPY

One of the most frequently used of all DOS commands is Copy. Although it's frequently needed, the Copy command is neither efficient nor safe. While the DOS version of Copy gets the job done, PCOPY, from Patri-Soft, gets the job done correctly.

PCOPY has more features than its DOS counterpart. If you attempt to copy over an existing file, PCOPY can rename and save the older version of the file rather than overwriting it. PCOPY can move files to other disks or subdirectories so you don't have to copy and then delete.

If the target directory for your copy doesn't exist, PCOPY can automatically create it. PCOPY allows files to be selected and processed based on names or dates. You can even instruct PCOPY to begin with a specified file in a subdirectory and continue until it reaches another specified file.

If you're copying files to floppy disks, PCOPY helps there, too. First, it checks to make sure there's enough room on the target disk for the selected file, and if not, it will prompt you for another disk. Second, if you have several files to copy onto several disks, PCOPY can select the most efficient combination of files to go on each disk.

PCOPY includes dozens of switches and options so you can get just the results you want. If you're not sure that you've specified everything correctly, though, run PCOPY in test mode, and the program will show you how it interprets your command. If everything is as expected, you can actually execute the command; otherwise, refine your command and try again.

PCOPY has been around for several years, so it's been tested and polished. The program is shareware and carries a registration fee of $20.

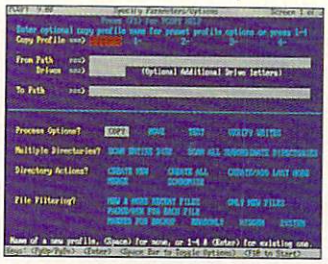
Red Button

When trying to exit from Microsoft Windows, you're always confronted with one of computing's little annoyances: one last dialog box asking if you're sure you want to exit.

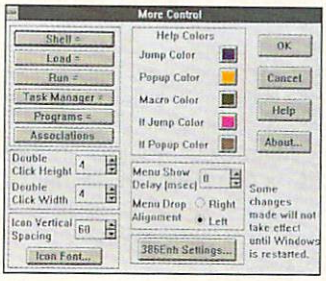
Red Button lets you close up your Windows show in a hurry. The bright red icon sits minimized at the bottom of your screen. When it's time to quit, a simple double-click will get you out of Windows and back to DOS.

If any of the active Windows applications have unsaved files, you'll be given the option of saving those files.

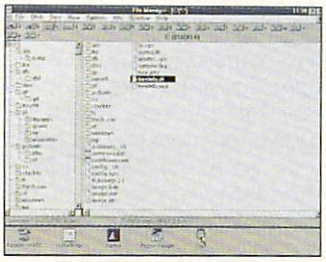
Besides being a faster exit



PCOPY



More Control



Trash Manager

Speaker Driver

from Windows, the iconic Red Button is much easier to access than the Close entry on the Control Menu. Red Button is shareware and carries a $15 registration fee.

More Control

Helpful as the Control Panel is, it doesn't provide access to all functions.

With More Control, you can easily change the colors used by the Windows help engine in displaying hypertext; the alignment of drop-down menus; the vertical spacing between icons; the font used to display icon titles; the contents of the run=, load=, and shell= lines; plus many other settings.

More Control is freeware from Sloop Software.

Trash Manager

Trash Manager works hand in hand with the Windows 3.1 File Manager to make your disk cleanup chores safer and easier.

Simply drag files to the Trash Manager icon, where they're stored until you either restore them or empty the trash. If files are in the trash can, the program displays a bloated trash can icon as a reminder. Trash Manager will keep track of your deleted files even after a reboot.

If your system has sound capabilities, Trash Manager can associate waveform sounds with each of its three specific events: deleting a file, restoring a file, or emptying the trash.

Trash Manager, distributed by Checkbox Software, carries a $25 registration fee.

Speaker Driver

In Windows 3.1, Microsoft ramped up its support for hardware and software that make use of sound. Even if you don't have a sound board, it's still possible to tap into some of the excitement of Windows 3.1 sound.

ICOM Simulations has created a speaker driver that lets you play waveform sounds through your PC's internal speaker. ICOM, the creator of the popular Intermission screen saver program, requires no registration fee for the speaker driver. ❐

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SHAREPAK

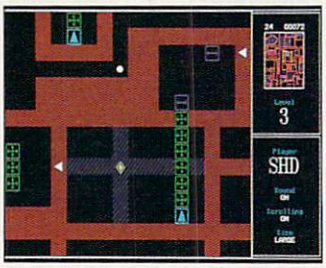
Steve Draper

NEW RESOLUTIONS

January's SharePak offers three programs that are guaranteed to please. First, Sand Storm gives you the opportunity to use Patriot and Tomahawk missiles to stop the tyrannical Saddam Hussein and sharpens your reflexes at the same time. MicroCAD combines the ease of use of a paint program with the power of a CAD package to bring out your creative powers. Finally, Cyberbox II will give puzzle lovers all the addictive fun they can handle while raising their level of reasoning.

Sharpen your wits and reflexes with January's SharePak.

Kick sand in Saddam's face in Sand Storm.



Cyberbox II is the ultimate in mental exercise.

COMPUTE's monthly SharePak disk contains the best of PC shareware. We look at hundreds of titles, select programs with reader appeal, test them, and pick only the very best.

Sand Storm

Here's the chance you've been waiting for: the chance to go head to head with the Bully of Baghdad himself, Saddam Hussein. This is the fully functional shareware version of the popular commercial game by MVP Software.

Your mission is to protect potential enemy targets such as hospitals, oil refineries, and ships from Iraqi Scud and bomber attacks. Your only weapon against these threats is the untested Patriot missile. The alarm sounds, and as you take the gunner's position, the sky begins to fill with Scud missiles. On top of that, squadrons of Iraqi jets start dropping bombs on your position. You'll have to have a sharp eye and a quick hand to survive this assignment, and this is just the first scenario!

Sand Storm includes two other scenarios. The Jet scenario is similar to the Scud missions, but you have more jets than before. In the Tomahawk scenario, you must guide Tomahawk cruise missiles through brutal AA fire to strike chemical weapons plants and mobile Scud launchers deep in enemy territory. In all, there are 20 different missions to challenge you for hours on end.

Sand Storm requires an IBM PC or compatible with 384K RAM, VGA or SVGA graphics, and a Microsoft-compatible mouse. The registration price is $15.

MicroCAD

MicroCAD is an easy-to-use CAD program that's packed with all the features you'd expect to find in expensive commercial CAD programs. The main feature of this program is its unusual icon-based interface. MicroCAD has the look and feel of a paint program, and it's just as easy to use. This type of interface eliminates the multiple commands, pull-down menus, and keyboard entries that are required in other graphical design programs.

With MicroCAD, unlike some other programs, *easy* does not mean "less." MicroCAD allows for the creation of detailed two- and three-dimensional objects that can be manipulated in 3-D and shown from any perspective. The list of features in this program is much too extensive to include here, but it's covered in detail in the program documentation. This program packs a lot of power in a small package and is well worth a look.

MicroCAD requires an IBM PC or compatible, DOS or OS/2, VGA graphics, and a mouse. The registration price is $35.

Cyberbox II

If you like to challenge your logic skills more than your reflexes, then Cyberbox II is the game for you. There's not any fast action here, no laser beams or monsters to block your path. All you'll find in this game are some of the most intriguing and addictive puzzles you'll ever encounter.

Each level has several rooms and an exit door. You'll have to find all the gems on one level before you can exit to the next. Finding the gems is the easy part. Getting the gems and getting out is another story. You must slide different types of blocks in order to clear a path to the gem, without trapping yourself in the process. Level 1 has a lot of help to get you started, but by level 3, you'll need to save your game often. And if that's not enough, you can make your own levels with the included editor. To be a success at Cyberbox II, you'll need to plan ahead and get your brain in gear.

Cyberbox II requires an IBM PC or compatible with an EGA or VGA display. The registration price is $7. ❐

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Back Issues Available

DEC 89: *Hearts,* play your computer in hearts; *Bass Tour,* super fishing simulation; *MahJongg,* match and stack colorful tiles; *Ed's Chess,* full-featured chess game. **(#CDSK1289)**

JAN 90: *Directory Master,* customize with this DOS shell; *Quick Type,* improve your typing skills; *Skullduggery,* tricky game of mystery; *MathMagic,* four educational games. **(#CDSK0190)**

MAY 90: *QHELP* and *QHCOMPIL,* create TSRs to give online help; *Levy Adventure Development System,* create your own adventure games; *GEEWHIZ,* TSR BASIC manual; *Sounds Good,* make sounds for programs. **(#CDSK0590)**

OCT 90: *Amado,* match scrambled blocks to the computer pattern; *Captain Comic,* great EGA graphic adventure game; *Funny Face,* Mr. Potato Head–type animation faces; *Fusion,* great game similar to *Tetris; Power Poker,* create poker hands in two dimensions. **(#CDSK1090)**

MAR 91: *Cash Control,* simplify financial recordkeeping; *Personal Inventory* 2.11, maintain a record of household items. **(#CDSK0391)**

APR 91: *Schedule*Master,* manage your daily schedule; *MealMaster,* menu-driven database system for managing recipes; *The Monuments of Mars!,* great graphic arcade/adventure game. **(#CDSK0491)**

AUG 91: *TurboPaint* 1.5, full-featured paint program; *Math Voyager,* guide starship by answering math problems; *EARTHWATCH,* graphically displays 24-hour day-and-night cycles. **(#CDSK0891)**

COMPUTE's *SharePak* disk contains the best of shareware—handpicked and tested by our staff—to complement this month's focus. You'll sample entertainment, learning, and home office software at a great savings. Each *SharePak* disk includes two to five programs plus complete documentation for one low price:

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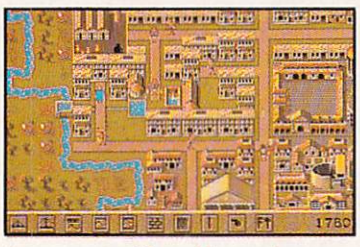

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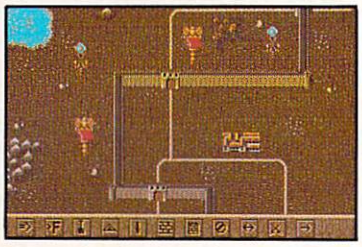

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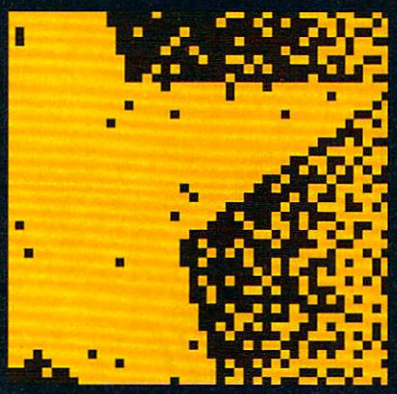
The Best of The Year

THE COMPUTE CHOICE AWARDS

EDITED BY ROBERT BIXBY



Each year, COMPUTE writers and editors confer to select the best PC hardware and software. Selecting the winners for these awards is tough, and just being nominated is an achievement. It means that a computer professional, after using and seeing demonstrations of literally hundreds of products, sees one particular standout. In a sense, a nomination is an award in itself. To find out more about the products mentioned here, circle their numbers on the reader service card and mail it in.

What will you find in this year's field? Languages and databases of extreme power, hardware with advanced design, word processors that could take over all of your desktop publishing tasks, games that put you into the cockpit of aircraft obsolete nearly half a century ago, whole libraries on a disk—in short, many of the dreams of science fiction through the ages.

Two technologies also receive special recognition—the local bus and the new PCMCIA standard, both of which are discussed in this month's feature "Emerging Technologies."

Welcome to the future.

PRODUCTIVITY

Best Operating System/ Environment
Microsoft Windows 3.1

Microsoft Windows 3.1 is clearly the operating system to use. If you're using 3.0, upgrading to 3.1 should be the easiest decision you've ever made. If you're not using Windows yet, 3.1 may be the advance that convinces you to come on board. Windows 3.1 is faster, crashes less often, has superb DOS support, boasts a first-rate File Manager, comes with its own font technology (TrueType), supports drag-and-drop editing, makes compound documents possible with OLE, features a zippier and smarter SMARTDrive, and much more.

Speed. If we had to choose the most important feature of 3.1, speed would be it. There are several reasons for this dramatic speed increase. First, 3.1 sports new video drivers, including an SVGA driver that's faster than the third-party 16-color drivers we've seen. Next, hidden inside the system is Fast Disk, an improved 32-bit hard disk driver that boosts disks driven by Western Digital and compatible controllers.

Besides being faster, 3.1 is also more robust than 3.0. You can say goodbye to almost all the system crashes that plague 3.0.

Windows 3.1 wins the COMPUTE Choice Award for Best Operating System/ Environment because its power, features, versatility, innovation, quality, and DOS compatibility are unmatched achievements.

CLIFTON KARNES

Microsoft—$149.95

Reader Service Number 340

Other nominees:
OS/2, IBM
Reader Service Number 341

Best Word Processor
Microsoft Word for Windows 2.0

In Windows-land, Microsoft Word for Windows has always been the word processor to beat. With Ami Pro 3.0 and WordPerfect 5.1 for Windows, the competition's hot, but for our money, Word for Windows 2.0 is king of the hill.

Since the features accessed by WinWord's toolbar are at the heart of the program, let's take a quick toolbar tour. Going from left to right, you'll find buttons for opening and saving files; cutting, copying, and pasting; undoing; creating numbered and bulleted lists; building tables; creating frames; drawing (WinWord has an on-board drawing program); graphing; printing envelopes; checking your spelling; printing; and zooming between full-page and 100-percent views.

Almost better than these new buttons is the fact that you can add your own. You can map to a button any native WinWord command or any macro you've created.

Looking beyond WinWord's new buttons, you'll find that the ribbon and ruler, familiar from WinWord 1.0, are present in 2.0 but they're combined. The ribbon sports drop-down list boxes for styles, fonts, and font sizes, plus buttons for styles (bold, italic, and underline), justification (left, center, right, and proportional), and tab settings (left, right, center, and decimal), as well as a button to turn paragraph marks on or off.

Word for Windows 2.0 wins the COMPUTE Choice Award for Best Word Processor because it combines an amazing list of features into one of the easiest-to-use packages we've ever seen.
CLIFTON KARNES

Microsoft—$495
Reader Service Number 342

Other nominees:
Ami Pro 3.0, Lotus Development
Reader Service Number 343
WordPerfect 5.1 for Windows, WordPerfect
Reader Service Number 344
WordStar 7.0 for DOS, WordStar International
Reader Service Number 345

Best Spreadsheet
Microsoft Excel 4.0

Last year, we gave Microsoft Excel 3.0 the COMPUTE Choice Award for Best Small Business Program. It seemed then to be an almost perfect program. This year, the COMPUTE Choice Award for Best Spreadsheet goes to Microsoft Excel 4.0. One of the best programs ever written has gotten even better.

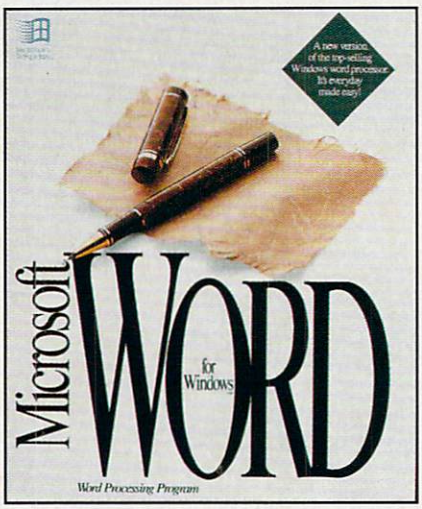
How do you improve one of the best programs ever written? Version 4.0 adds a drag-and-drop feature that lets you quickly move a cell or group of cells from one location on the worksheet to another. In addition, a new autofill feature can intelligently complete a series of labels for you. Type *Jan*, highlight the eleven adjoining cells, and the remaining names of the months will fill in automatically. This is just one example. You can also autofill days of the week and any other natural series of cells commonly used in spreadsheets.

You also get a customizable toolbar that lets you create your own tools and group them the way you want them, a scenario manager that lets you create a variety of what-if scenarios, a view manager that lets you look at a single worksheet in a variety of ways, a built-in spelling checker, complete compatibility with Lotus 1-2-3 macros, additional types of charts, and more.

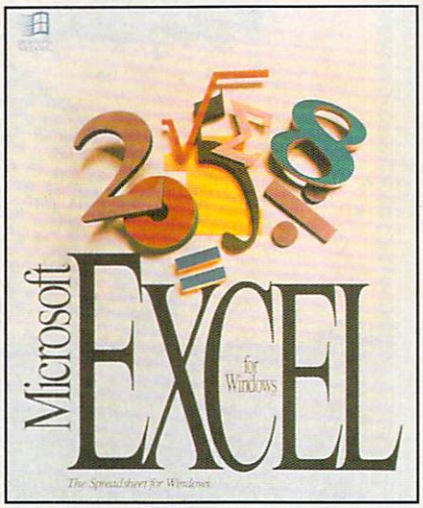
With Borland and Lotus breathing down Microsoft's neck, this could become a very competitive category. But for the moment, Excel continues to live up to its name. It's still top dog.
DAVID ENGLISH

Microsoft—$495
Reader Service Number 346

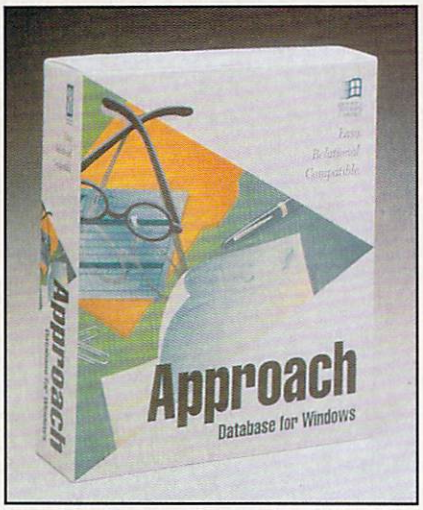
Other nominees:
Lotus 1-2-3, Lotus Development
Reader Service Number 347
Quattro Pro 4.0, Borland International
Reader Service Number 348
Quattro Pro for Windows, Borland International
Reader Service Number 349



Microsoft Word for Windows 2.0



Microsoft Excel 4.0



Approach for Windows

Best Database
Approach for Windows

Does a relational Windows database that fully supports dBASE, Paradox, and SQL files; lets you use all your Windows fonts; and is easy to use sound too good to be true? If it does, you haven't seen Approach. This modern database miracle takes the most popular database formats and allows you to create custom data entry forms and reports as well as search your data 20 different ways.

Using Approach is easy. The program has two modes: Design and Browse. In Browse mode, you enter or search data. In Design mode, you design either a form or a report. Forms are screen based, and the best example of one is the classic data entry form. Approach gives you an array of drawing tools to help you get your

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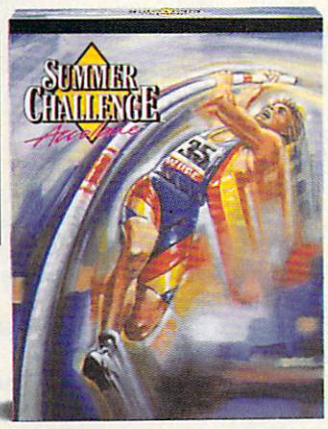
So you didn't bring home a medal this past summer? Don't sweat it. The greatest name in sports simulations gives you another shot. Accolade's *Summer Challenge*™ pits you against the world's greatest athletes in eight remarkably realistic events. Represent your country in the hurdles, pole vault, high jump, cycling, kayaking, javelin, archery and equestrian events. Play by yourself or at a party—*Summer Challenge* allows up to 10 players to compete for the gold, silver or bronze.



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Circle Reader Service Number 202

form just right. Also included are controls like list boxes and buttons, the latter of which can be mapped to macros. You move between Browse and Design modes by simply clicking on a button on the program's toolbar.

Reports are usually designed for the printer as an output device, and they are as easy to design as forms. You can incorporate text, date, memo, time, Boolean, number, calculated, and picture data types in both forms and reports.

Approach wins the COMPUTE Choice Award for Best Database because it's a masterful example of a powerful and feature-packed program that is simple to use. With Approach, you'll be productive within a few hours, not days or weeks.

CLIFTON KARNES

Approach Software—$279
Reader Service Number 350

Other nominees:
dBASE IV 1.5, Borland International
Reader Service Number 351
FoxPro 2.0, Microsoft
Reader Service Number 352

Best Communications Program
Procomm Plus for Windows

In 1985, Datastorm Technologies set the standard in PC communications software with the award-winning Procomm. Seven years later, the company does it again with Procomm Plus for Windows, a marvel of design.

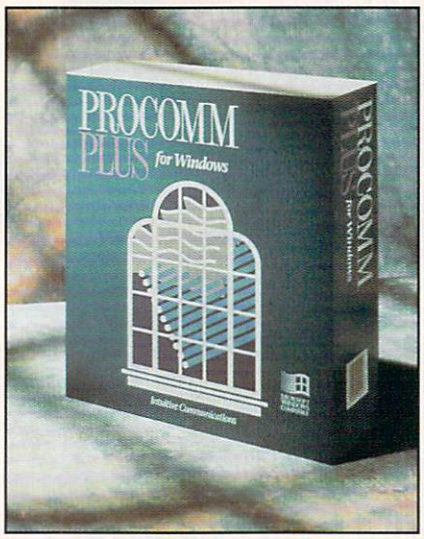
Beyond its clean, user-defined graphical interface, the program offers a bevy of new and improved features: a 250-entry dialing directory, 34 video terminal emulations, a built-in Host mode bulletin board system, 11 transfer protocols, and the ability to view CompuServe GIF pictures as you download them. Also available are 40 programmable Meta keys, capable of sending text strings, running scripts, and launching Windows or DOS applications. The program takes full advantage of Microsoft's Dynamic Data Exchange (DDE), opening a new world of communications abilities to word processing, spreadsheets, and much more.

Datastorm's powerful ASPECT compiled programming language continues to evolve. More than 300 commands are available for writing scripts as simple as automated BBS log-in and file transfers or as complex as DDE-compatible user applications. Automated Record and Compile functions put even nonprogrammers at ease with executable scripts.

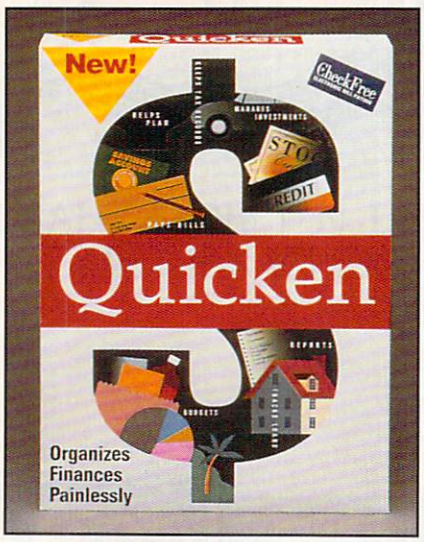
The crowning glory, for many users, is the completely revamped documentation. Previously a nightmare of information disarray, the new manuals are now thoughtfully designed and generously illustrated.

SCOTT A. MAY

Datastorm Technologies—$149
Reader Service Number 353



Procomm Plus for Windows



Quicken for Windows

Other nominees:
Eclipse Fax, Eclipse Systems
Reader Service Number 354
The Sierra Network, Sierra On-Line
Reader Service Number 355

Best Money Management Program
Quicken for Windows

If you thought Quicken for DOS was good, take a look at Quicken for Windows. This is not just a translation of this excellent program; it's a redesign from the ground up that fits Windows like a glove.

Quicken is a personal financial manager that's most famous as an easy-to-use checkbook program that both manages your checkbook and prints checks. It certainly does these things, and does them well, but there's much more to Quicken. It can track your investments and manage credit card accounts and trusts (to name just a few accounts), and it can print reports that include net worth, budgets, income and expenses, and cash flow. It also keeps track of tax-deductible contributions, and it can fill in as a simple accounting package for most small businesses. If you have a small business, though, you ought to take a look at Quicken's companion program, Quick Books, which was designed to meet the specific needs of small businesses.

The fully MDI-compatible interface is easy to navigate and use. With the motto of Safety First, Quicken saves your data with each entry, and it encourages you to back up your files. Add to this the ability to remind you of payments due and the best data entry forms in the business, and you have a terrific program.

Quicken wins the COMPUTE Choice Award for Best Money Management Program because it's one of the best-executed, feature-rich, and downright useful programs of its kind that we've seen.

CLIFTON KARNES

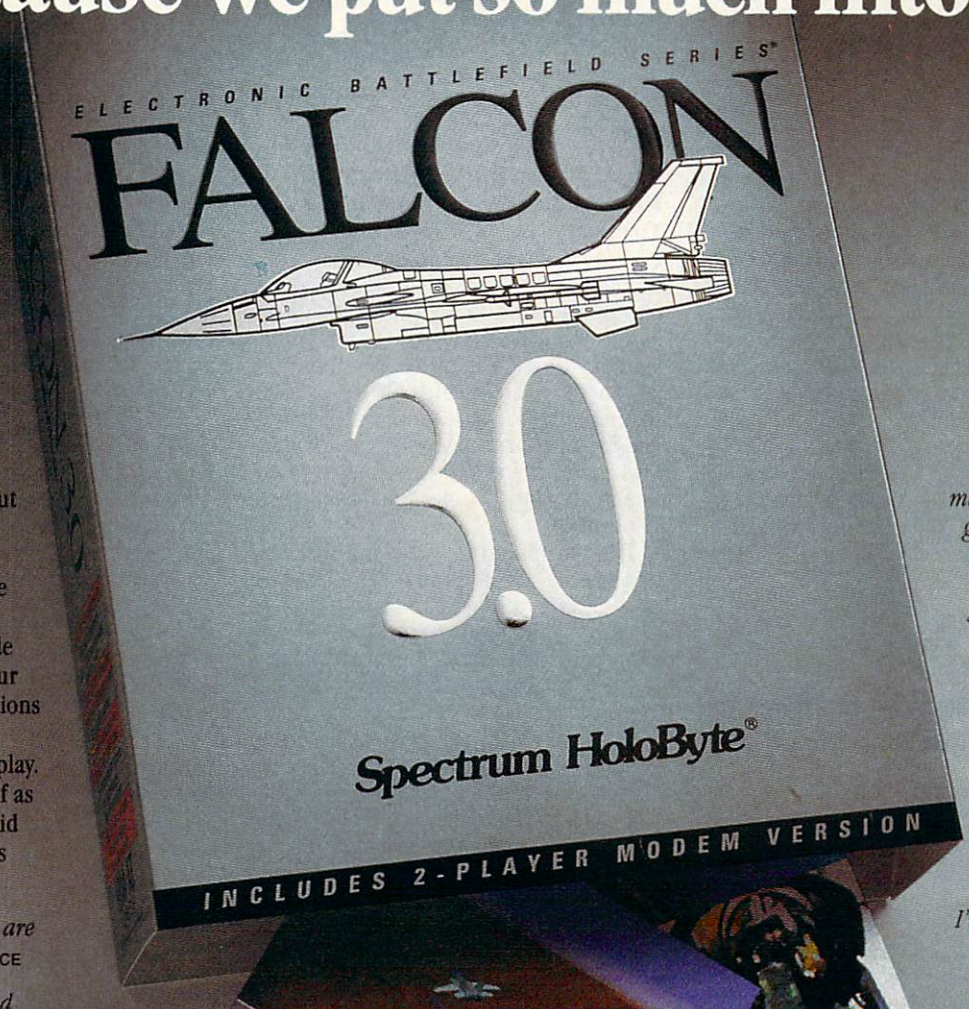
Intuit—$69.95
Reader Service Number 356

Other nominees:
DAC Easy Accounting, DAC Easy
Reader Service Number 357
Microsoft Money 2.0, Microsoft
Reader Service Number 358
QuickBooks, Intuit
Reader Service Number 359
TurboTax for Windows 9.0, ChipSoft
Reader Service Number 360

Best DOS Utility
4DOS 4.01

If you still find yourself doing much of your work from a DOS prompt rather than clicking your way through layer after layer of icons and windows, you'll love JP Software's 4DOS. This replacement command shell brings DOS into the 1990s, adding features found in advanced operating systems such as UNIX and AmigaDOS. On 286 and higher systems, 4DOS can be loaded high, using only 256 bytes of base memory—much less than command.com. And it's fully compatible

You get so much out of it because we put so much into it.



We could tell you about the superb graphics we put into Falcon 3.0™. And the incredibly real F-16 feel. And the sensational scope that delivers everything from Instant Action arcade excitement to plotting your own Red Flag training missions to engaging in a different campaign every time you play. But we couldn't say it half as well as the critics have said it. Look at the high marks they've given Falcon 3.0.

"The visuals during flight are awesome." JIM DOUGLAS, ACE

"If you aren't in the armed services–and maybe even if you are–this is as close as you can come to flying the Falcon."
PETER OLAFSON, COMPUTE

"The graphics are stunning, the sound is incredible and the game play is a rush."
DAVID ETHEL, VIDEO GAMES & COMPUTER ENTERTAINMENT

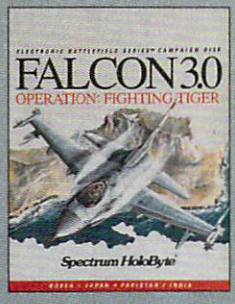
"It's not so much a game system as it is a way of life."
EVAN BROOKS, COMPUTER GAMING WORLD

"Realistic, contoured terrain. Your view from the cockpit is the best in the flight simulator world. And Falcon's user interface is slick and easy to use." PC GAMES EDITORS

"Be excited. Falcon 3.0 makes other efforts in this genre seem like test runs for the real thing."
STRATEGY PLUS EDITORS

"The most complete and accurate jet fighter simulation to be found this side of a security clearance. Period."
RICHARD SHEFFIELD, COMPUTE

"The most appealing aspect is the realism. This is as true to life as I've seen on a computer."
COMPUTER GAME REVIEW EDITORS



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Spectrum HoloByte

Spectrum HoloByte, Inc. 2490 Mariner Square Loop, Alameda, CA 94501

Circle Reader Service Number 108

Available for IBM/compatibles

Operation: Fighting Tiger and Falcon 3.0 are trademarks and Spectrum HoloByte is a registered trademark of Spectrum HoloByte, Inc.

with Windows, DESQview, and task-switching software.

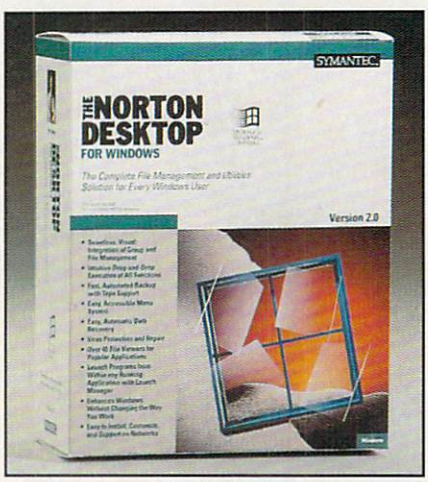
4DOS includes complete context-sensitive online help for all DOS and 4DOS commands. Over two dozen new batch file commands are included, and batch files in 4DOS's custom format execute five to ten times faster than standard batch files by loading the whole batch file into memory before execution. Even if you just use DOS and don't customize it, you'll benefit from 4DOS's enhanced command line history and recall, automatic filename expansion, command aliases, color-coded directories, and point-and-shoot file selection.

You can find a try-before-you-buy version of 4DOS on online networks or your local BBS. When you order the commercial package, you'll get a thorough 350-page manual that caters to novice and expert alike and a handy command reference booklet. A version for OS/2 called 4OS2 is available as well.

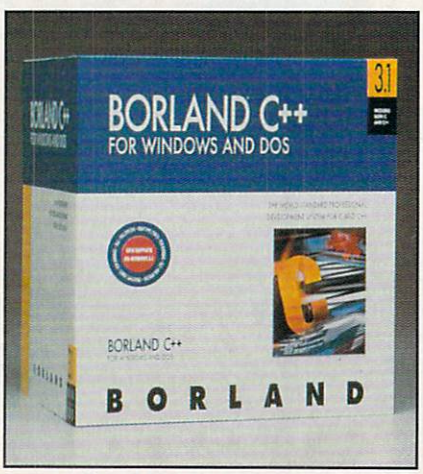
DENNY ATKIN

JP Software—$69

Reader Service Number 361



Norton Desktop for Windows



Borland C++ 3.1

Other nominees:

Commute 2.0, Central Point Software

Reader Service Number 362

File Runner, MBS Technologies

Reader Service Number 363

LapLink Pro 4, Traveling Software

Reader Service Number 364

Norton Desktop for DOS, Symantec

Reader Service Number 365

Best Windows Utility

Norton Desktop for Windows

Tired of the shortcomings of the Windows Program Manager and File Manager? Looking for a slicker, quicker way to manage your hard disk from within Windows? Or perhaps you're looking for a suite of applications that perform such useful functions as examining your disk for viruses, letting you back up automatically, and helping you recover from disaster. If so, you're looking for Norton Desktop for Windows.

The file manager provides the garden-variety commands Copy, Move, and Delete that you can find in File Manager, but it also allows you to view files, providing filters for files created by all of the major applications, including graphics files.

Norton Desktop for Windows includes Norton Backup for Windows (which can back up while you do other work), Norton Disk Doctor for Windows (which can identify and fix problems before you're even aware of them), and SmartErase (which can virtually guarantee that files deleted can be recovered easily).

ROBERT BIXBY

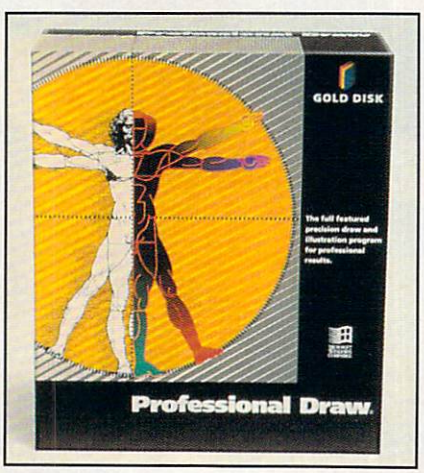
Symantec—$179

Reader Service Number 366

Other nominees:

Adobe Type Manager 2.02, Adobe Systems

Reader Service Number 367



Professional Draw 1.0

After Dark 2.0A, Berkeley Systems

Reader Service Number 368

The Amaze Daily Planner with Far Side Theme Pack 1.0, Amaze

Reader Service Number 369

hDC Power Launcher 2.0, hDC Computer

Reader Service Number 370

Metz Software Task Manager, Metz Software

Reader Service Number 371

NewWave, Hewlett-Packard

Reader Service Number 372

PackRat 4, Polaris Software

Reader Service Number 373

Skylight 2.0, RenaSonce Group

Reader Service Number 374

WinBatch, Wilson WindowWare

Reader Service Number 375

Best Programming Language

Borland C++ 3.1

It's unusual for a company to do almost everything right, but Borland has done just that with Borland C++ 3.1. This package contains everything you need to create DOS or Windows applications, and the tools are almost without exception the best available anywhere. For Windows programming, Borland is the only optimizing Windows C compiler that boasts a Windows-hosted IDE. And this IDE is a programmer's dream, supporting ANSI C and the latest version of C++, multiple undo and redo, a choice of three interfaces, and a quick-access toolbar. The compiler is the fastest we've seen, and advanced features, like precompiled headers, are well integrated and easy to use.

Add to this Borland's Resource Workshop, the resource editor that lapped the competition a year ago, and a special version of Turbo Debugger that debugs Windows apps (but unfortunately doesn't run in a window), and you have a Windows development environment that can do anything.

For DOS fans, there's the best DOS-based IDE and compiler around, plus Turbo Debugger, Turbo Profiler, and Turbo Assembler.

For a little more money, you can get Borland C++ with Application Frameworks, which includes the company's C++ class libraries for DOS and Windows.

But the bottom line for any compiler is the quality of the code it produces, and here Borland outshines its competition in almost every category by producing the smallest and fastest exe files around.

Borland C++ wins the COMPUTE Choice Award for Best Programming Language because its power, ease of use, and superb set of integrated tools

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Circle Reader Service Number 224

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clearly set the standard for C/C++ development environments.
CLIFTON KARNES

Borland International—$495
Reader Service Number 376

Other nominees:
Borland Turbo Pascal for Windows 1.5, Borland International
Reader Service Number 377
Microsoft C/C+ 7.0 with Windows SDK, Microsoft
Reader Service Number 378

Best Desktop Publishing/ Graphics Program

Professional Draw 1.0

Professional Draw, one of the two winners in this category, comes to us from Gold Disk, long the creators of the most important productivity programs for the Amiga. As a pure illustration and drawing program, Professional Draw is without equal. Its COMPUTE's Choice Award crowns many months of cheering from the media for this standout performer. This product is aimed at serious desktop publishers, as is obvious from its ability to perform controlled overprinting and produce color separations and custom crop marks. It supports Corel, PostScript, and TrueType typefaces and provides hyphenation and a spelling checker for work in text. When working with graphics, you have access to style sheets for quickly applying attributes, as well as extrusion with shading and adjustable light source.
ROBERT BIXBY

Gold Disk—$495
Reader Service Number 379

Fractal Design Painter

Each year, we see two or three truly innovative programs for the PC. Fractal Design Painter, the other winner in the category of Best Desktop Publishing/ Graphics Program, is certainly one of them. It's a full-featured paint program that skillfully simulates the tools and textures of natural paint media. With Painter, your brush can act and feel like the real thing: airbrush, pencil, felt pen, crayon, or piece of chalk or charcoal. Combine your brush with the variety of grains and textures of Painter's paper palette, and you can even simulate the appearance of the raised areas that show in a real brush stroke or charcoal drawing.

If you have a pressure-sensitive graphics tablet, such as a Wacom tablet or a CalComp Drawing Board II, Painter can act and feel even more like the traditional painting tools it simulates. My wife, who has a background in art but rarely uses a computer, is fascinated by Painter and our Wacom tablet. I'm from the stick-figure school of art, and I'm equally drawn to Painter's simple elegance.

As you've probably guessed, this kind of graphics power comes at a price. You'll need at least 6MB of RAM, a Super VGA monitor (8-bit graphics required, 16- or 24-bit graphics recommended), and a fast 386 or 486. However, once you have had the opportunity to use Painter, you'll never want to go back to those ordinary one-size-fits-all paint programs.
DAVID ENGLISH

Fractal Design—$399
Reader Service Number 380

Other nominees:
Arts & Letters Apprentice, Computer Support
Reader Service Number 381
CorelDRAW! 3.0, Corel
Reader Service Number 382
FrameMaker 3.0, Frame Technology
Reader Service Number 383
FreeHand 3.1, Aldus
Reader Service Number 384
Freelance for Windows, Lotus Development
Reader Service Number 385
Micrografx Windows Draw, Micrografx
Reader Service Number 386
QuarkXPress, Quark
Reader Service Number 387
Virtual Reality Studio, Accolade
Reader Service Number 388

CorelDRAW! 3.0

Fractal Design Painter

Gateway 2000 486DX2/50

Best Illustration/ Presentation Program

CorelDRAW! 3.0

CorelDRAW! 3.0 has been improved so much that it's in a league by itself. It's still one of the best drawing programs available, with better text handling than before and a more standard drawing interface. Extrude has been much improved, with more shading and positioning options. CorelDRAW! now works with TrueType fonts, eliminating the need for a font conversion utility. But if you want, you can still use

3 Awesome Adventures—$99

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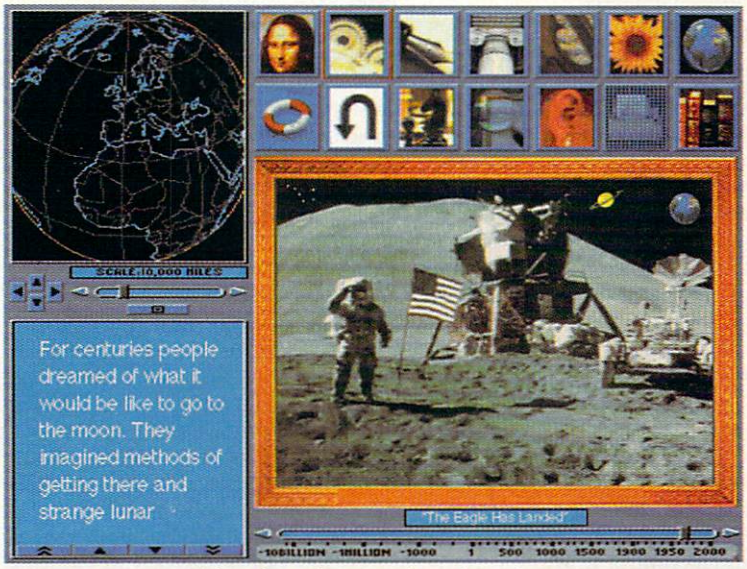

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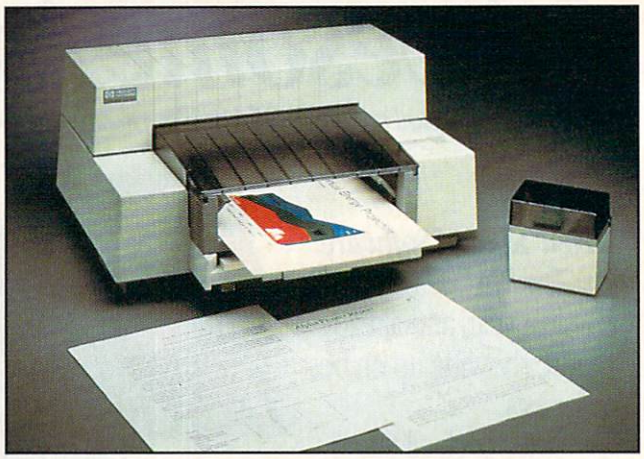
Zenith Z-Note 325L



DeskJet 500C

CorelDRAW! to create your own TrueType or PostScript fonts from scratch or based on existing fonts. CorelPHOTO-PAINT! is capable of performing darkroom magic on scanned photographs. It includes image-editing features like contrast, edge sharpening, and posterizing. You can fill shapes with gradients and patterns. CorelDRAW! now comes with CorelCHART! to generate bar, pie, and area charts; histograms; scattergrams; and many other kinds of charts, including several kinds of shaded 3-D graphs. CorelSHOW! provides a medium for displaying your drawings and charts in presentations. It's an extremely simple presentation program—the easiest presentation package yet.
ROBERT BIXBY

Corel—$595
Reader Service Number 382

Other nominees:
FreeHand 3.1, Aldus
Reader Service Number 384
Freelance for Windows, Lotus Development
Reader Service Number 385
Harvard Graphics for Windows, Software Publishing
Reader Service Number 389
Intellidraw, Aldus
Reader Service Number 390
Micrografx Windows Draw, Micrografx
Reader Service Number 386
Microsoft PowerPoint, Microsoft
Reader Service Number 391
Professional Draw 1.0, Gold Disk
Reader Service Number 379

HARDWARE

Best Desktop Computer
Gateway 2000 486DX2/50

The Gateway 2000 486DX2/50 is a sturdy desktop with a large footprint. The reviewed unit features 8MB of RAM (expandable to 64MB); a standard 200MB hard disk prepacked with Windows, DOS, and a choice of application software; an optional 14,400-/9600-bps fax/modem; and Super VGA (we recommend the 15-inch CrystalScan monitor as an option). This is a real plug-and-play computer. The excellent design, components, and craftsmanship of the 486DX2/50 earned it a COMPUTE Choice Award.
ROBERT BIXBY

Gateway 2000—$2,595 (base unit)
Reader Service Number 392

Other nominees:
Cumulus GLC, Cumulus
Reader Service Number 393

Best Laptop/ Notebook Computer
Zenith Z-Note 325L

Innovation and attractive features make the Z-Note a winner. The Intel 386SL microprocessor delivers all the power most people will need on the go while offering advanced power management features and a nickel-metal-hydride (NiMH) battery pack. In our November lineup of 11 notebooks, the Z-Note came out on top in a test of battery life, regularly delivering about 3 hours under continuous heavy-duty use and 4½–5 hours under average use with all of the power-saving features activated. Because of the modular design, you can upgrade the display to active matrix color, the hard drive to 120MB, the floppy drive to 2.88MB, and the memory to 12MB. If you need more processing power, just add an 80387SL math coprocessor. Need easier access to the company network? The Z-Note provides a connector for interfacing with a LAN adapter card, making networking with a portable easier than ever. And when it's time to hit the road again, you can unplug Zenith's innovative port replicator instead of every peripheral plugged into it. This is such an attractive computer that Zenith has taken the precaution of providing a hardened steel loop, which you can use to protect this prized possession.
MIKE HUDNALL

Zenith Data Systems—$2,949 with 85MB drive; $3,249 with 120MB drive
Reader Service Number 394

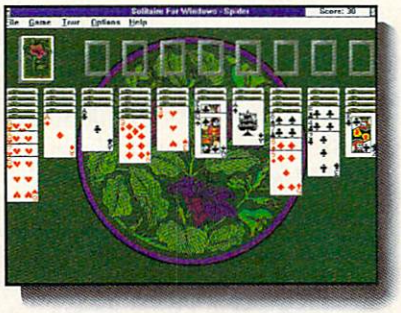
Other nominees:
Nomad, Gateway 2000
Reader Service Number 395
HandBook, Gateway 2000
Reader Service Number 396
NCR 3170, NCR
Reader Service Number 397
Toshiba 4400SXC, Toshiba Computer Systems
Reader Service Number 398
ZEOS 386 Notebook Freestyle, ZEOS International
Reader Service Number 399

Best Printer
DeskJet 500C

Imagine a printer that not only prints laser-quality text and graphics but does so in full 300-dpi color on plain paper. You'd probably expect to pay thousands of dollars, right? How does a street price of about $700 sound?

Hewlett-Packard's DeskJet 500C offers black-and-white printing that's nearly indistinguishable from that of a LaserJet. But this new model adds a second cartridge that contains three colored inks, allowing you to print pictures and documents in full color. Although only three ink colors are provided, the sophisticated printer drivers included in Windows and AmigaDOS can mix and dither these to produce thousands of apparent colors. The resulting color output won't be quite

SOLITARY CONFINEMENT WITH A VIEW.



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Circle Reader Service Number 111

as good as you'd get from a $3,000 thermal transfer printer, but it's quite impressive for a printer in this price range. And because the DeskJet uses ink-jet technology rather than ribbons, you don't get the banding between passes found on inexpensive dot-matrix printers. When you're printing monochrome documents, you can pop in the less expensive standard black DeskJet ink cartridge.

You don't need to use special ink-jet paper with the DeskJet. Any good paper will work, although 25-percent cotton bond works best with text. HP fixed the only major complaint with the DeskJet technology—water-soluble ink—over a year ago. Color television finally knocked black-and-white off the market this year, and the technology and value embodied in the DeskJet 500C promise to go a long way toward doing the same thing to monochrome printers.

DENNY ATKIN

Hewlett-Packard—$1,095

Reader Service Number 400

Other nominees:

Canon BJ20, Canon Computer Systems

Reader Service Number 401

LaserJet IIP Plus, Hewlett-Packard

Reader Service Number 402

Okidata OL830 LED Page Printer, Okidata

Reader Service Number 403

WinPrinter 800, LaserMaster

Reader Service Number 404

WinJet 800, LaserMaster

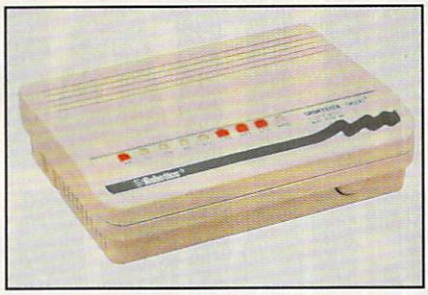
Reader Service Number 405

Best Peripheral

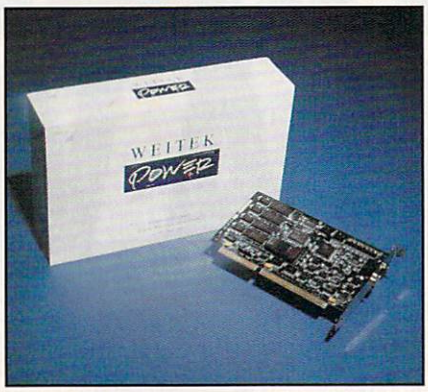
Pro AudioSpectrum 16

Just when you thought it was safe to buy a sound card, companies start touting their new 16-bit sampling cards. If an 8-bit sampling card (like a Pro AudioSpectrum Plus or Sound Blaster Pro) sounds like an inexpensive FM radio, a 16-bit sampling card can sound as good as a CD player.

The Pro AudioSpectrum 16 is currently the best deal available in a 16-bit card. It offers full 16-bit audio sampling for CD-quality recording and playback (though you'll need a fast 386 or a 486 in order to record in stereo at the full 44-kHz rate). As a full-featured multimedia card, it has connectors for a SCSI CD-ROM drive, a joystick, and a MIDI synthesizer, as well as the standard set of audio-in and audio-out jacks. The card is compatible with programs that support the Windows 3.1, MPC, Sound Blaster, Ad Lib, and Pro Audio-



U.S. Robotics 9600 Fax/Modem-Sportster



Weitek Power for Windows

Pro AudioSpectrum 16

Spectrum sound standards.

We've been using this card for months now, and we're very pleased with its performance and the quality of its sound. If you're looking for a one-card multimedia solution, check out the Pro AudioSpectrum 16. It doesn't cost that much more than an 8-bit card, and you'll be ready for applications that support 16-bit sampling.

DAVID ENGLISH

Media Vision—$299

Reader Service Number 406

Other nominees:

NEC CDR-74, NEC Technologies

Reader Service Number 407

Roland SCC-1, Roland

Reader Service Number 408

ScanMan Color for Windows, Logitech

Reader Service Number 409

Best Communications Hardware

U.S. Robotics 9600 Fax/Modem-Sportster

What's so special about this internal modem? It gives you 9600-bps, glitch-free communications. It's a well-engineered piece of hardware that will give you many years of fine-tuned service.

This U.S. Robotics modem (external version shown in photo) is a full-size card that's jam-packed with telecommunications goodies. It has great line-noise rejection, MNP error-control protocols, and MNP5 compression that help the modem communicate more accurately and more efficiently.

The modem comes set for the most common configuration found, COM1 and IRQ4. Most users won't have to touch the switches. But if you do have to make changes, the DIP switches are on the back of the card, which means you don't have to take your computer's case off to change them.

RICHARD C. LEINECKER

U.S. Robotics—$409 ($439 external)

Reader Service Number 410

Other nominees:

The Complete Communicator, The Complete PC

Reader Service Number 411

Supra Fax Modem V.32bis, Supra

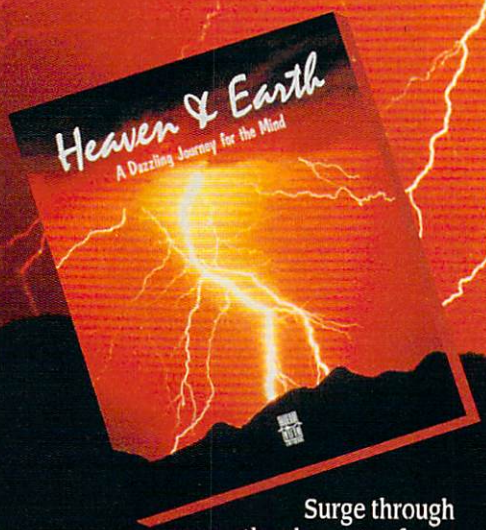
Reader Service Number 412

Best Video Hardware

Weitek Power for Windows

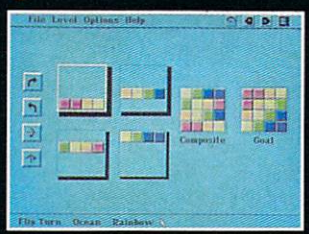
With a list price under $300, this video accelerator card is a great value. But they don't call it Power for nothing: Equipped with 512K of video RAM, this half-slot card outperforms Super VGA cards with double the RAM, even when running DOS applications—thanks to its dedicated W5186 User Interface Controller chip. The W5186 off-loads the PC's CPU operations dealing with certain graphics operations. Under Windows, the card typically runs applications from two to four times faster. With Power for Windows, Weitek supplies drivers for Windows, ADI (Autodesk), and other popular applications such as WordPerfect 5.0 and 5.1, Microsoft Word 5.0 and 5.5, Lotus 1-2-3, and Ventura Publisher (GEM version). An excellent 58-page

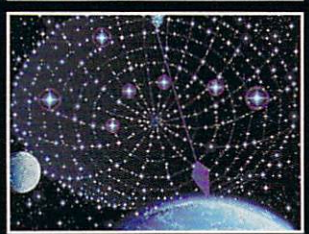
JUMP START YOUR MIND.

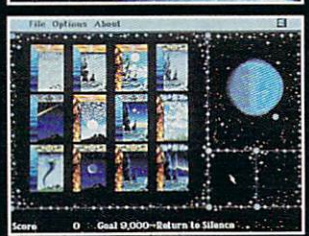


Surge through the elements of Heaven & Earth as three vibrant games flash before your eyes.

Master the brilliant illusions, where more than 575 puzzles test you, and the path you choose rates as highly as the solution. Sweep into the hypnotic and fiery grip of The Pendulum, as slight, controlled movements—not quick reflexes, delicately influence its motion through four geographic arenas. And blend the awesome beauty of the elements and seasons together, as you match suits in The Cards, inspired by ancient Japanese Hanafuda cards.







Once you've ventured past these levels, a fourth awaits. Beckoning you to combine the skills of reason, spatial relation and balance you've acquired into 108 new and electrifying challenges called The Pilgrimage.

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BUENA VISTA SOFTWARE

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Actual VGA screen shots

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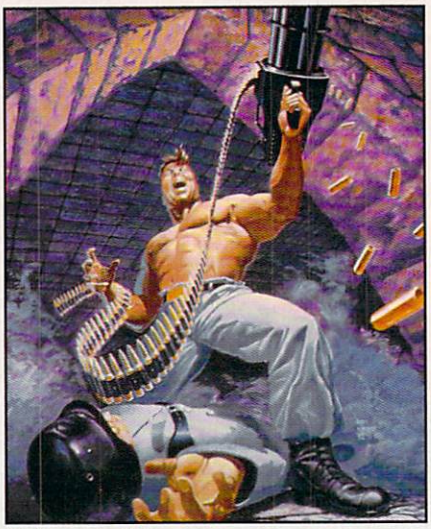
manual provides all of the information you'll need to get optimal performance for all Windows applications. The Weitek board is a joy to use, producing flicker-free displays in 640 × 480, 800 × 600, and 1024 × 768 video modes, with excellent color and image resolution even when used with a relatively inexpensive multifrequency analog monitor. The product lives up to Weitek's claims by producing a speed increase of more than 200 percent in applications used with it.

TOM BENFORD

Weitek will no longer be offering this technology for retail sale, but similar boards are available from the following companies.

Alpha Systems Labs—Price unavailable at press time

Reader Service Number 413



Wolfenstein 3-D

AvTech Development—Price unavailable at press time

Reader Service Number 414

Trigem—Price unavailable at press time

Reader Service Number 415

VidTech Microsystems—$299

Reader Service Number 416

Vistro Computers—$345

Reader Service Number 417

Other nominees:
Radius Multivision 24, Radius USA

Reader Service Number 418

ENTERTAINMENT

Best Arcade Game
Wolfenstein 3-D

Outrageous, controversial, and impeccably programmed, Wolfenstein 3-D blows the cobwebs out of the PC gaming world. Designed by Id Software (Commander Keen), the game features a killer combination of nonstop arcade action and cutting-edge technology. In what is surely the marketing coup of the year, Apogee Software released the first of the game's six episodes as shareware, triggering widespread commotion on local and national bulletin board systems.

Players assume the role of a Schwarzenegger-style WWII hero, blazing a bullet-riddled trail through six Nazi castles in the quest to put a stop to Hitler's bloodthirsty war machine. Each castle consists of nine levels of massive, serpentine mazes, liberally stocked with an assortment of guards, SS officers, killer dogs, mutants, and mad scientists.

Rendered in realistic first-person perspective, this ultraviolent shoot-'em-up appeals to the basic instincts for survival. If you've ever played cops and robbers, capture the flag, or even hide-and-seek, you know the game's undeniable hook.

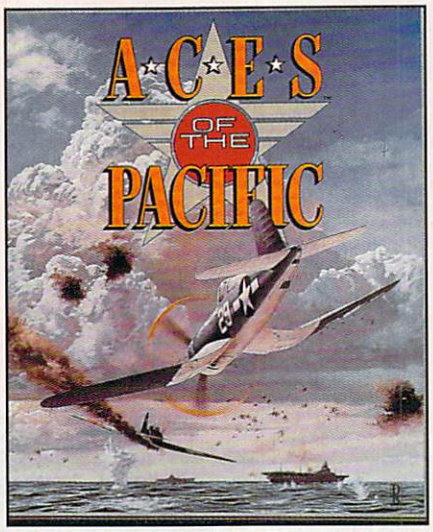
Earmarks of excellence include vibrant 256-color VGA graphics, smooth animation, and one of the fastest 3-D software engines in the industry. Perhaps more impressive than the graphics is the designer's use of sound. Players with computers equipped with Disney's Sound Source, Sound Blaster, or compatible cards will enjoy crisp digitized sound effects: footsteps, talking guards, barking dogs, slamming doors, and ear-shattering gunfire.

Although decidedly not for all tastes or age groups, Wolfenstein 3-D is a showcase of nearly flawless design and challenging gameplay.

SCOTT A. MAY

Apogee Software—$50

Reader Service Number 419



Aces of the Pacific

Other nominees:
Gods, Konami

Reader Service Number 420

Out of This World, Interplay Productions

Reader Service Number 421

RoboSport, Maxis Software

Reader Service Number 422

Super Tetris, Spectrum HoloByte

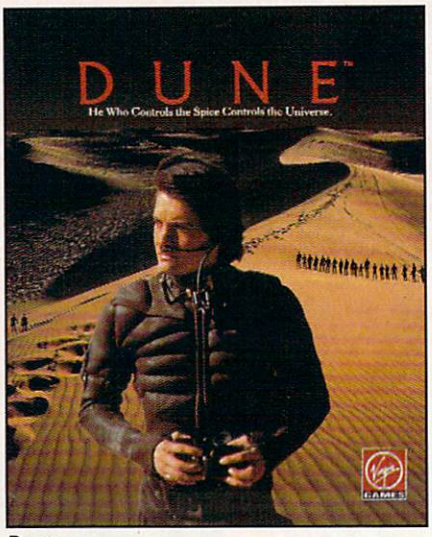
Reader Service Number 423

Tetris Classic, Spectrum HoloByte

Reader Service Number 424

Best Simulation
Aces of the Pacific

For two hours on December 7, 1941, a date which will live in infamy, the skies rained terror upon Oahu. The Japanese Navy's surprise attack on Pearl Harbor left more than 2400 military and civilian casualties. Dive bombers and torpedo planes destroyed or badly damaged more than 300 aircraft and 18 ships of the U.S. Pacific Fleet. A stunned nation officially entered World War II.



Dune

Aces of the Pacific is an incredible air-combat simulation; it may be too realistic for the faint of heart. The vintage bombers are meticulously rendered, complete with sometimes unpredictable power and inherent design flaws. Your opponents show real-life cunning. And the graphics and sound effects are incredibly realistic.

Aces salutes the historic events, budding technology, and heroism of this unique theater of conflict. Designed by Dynamix cofounder Damon Slye, Aces soars above and beyond his best-selling World War I combat simulation, Red Baron. Indeed, this tribute to the Pacific campaigns captures the passion and spirit of a generation better than any previous effort in the genre.

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Circle Reader Service Number 250

The true stars of the show are the more than 30 types of vintage fighters and bombers, each with painstakingly reproduced flight characteristics. Some will amaze you with their innovative craftsmanship and intuitive control; others will ultimately scare the wits out of you with their untamed power.

Dynamix has awed us once again with a historically accurate flight simulator that combines the maximum in thrills, realism, and fun.

SCOTT A. MAY

Dynamix—$69.95

Reader Service Number 425

Other nominees:
A-Train, Maxis Software

Reader Service Number 426

Falcon 3.0, Spectrum HoloByte

Reader Service Number 427

SimAnt, Maxis Software

Reader Service Number 428

Stunt Island, Walt Disney Computer Software

Reader Service Number 429

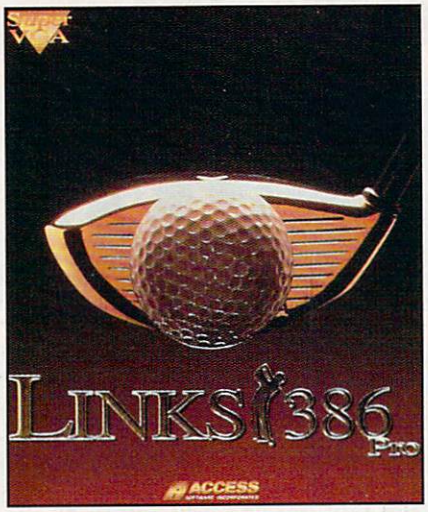
Best Fantasy Role-playing/ Adventure Game

Dune

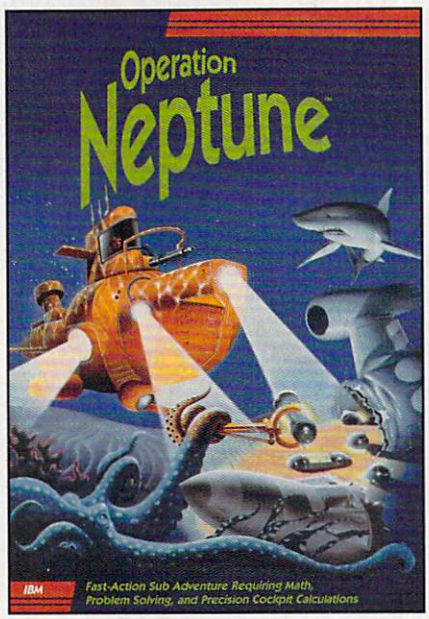
Prophets never lead easy lives, and Paul Atreides finds his duties as galactic revolutionary fearsome. Part messiah, part capitalist, and all determination, Paul intends to free the precious desert planet—the only source of the mind-expanding spice—from vicious Harkonnen rule, and green the desolate sands in the process. With the help of Duncan Idaho, Gurney Halleck, Thurfir Hawat, and Lady Jessica, Paul's jihad stands a fighting chance.

Anyone who saw the movie version of Dune will recognize the characters on sight—Kyle McLaughlin's face figures prominently here. Working for Virgin, design team Cryo managed to capture the expansiveness of the original Frank Herbert novel while adding the urgency of the movie. Through a series of rapid window selections, you can visit any part of Dune in an ornithopter, prowl the royal palace, or order Fremen troops to attack, mine spice, or garden.

Even with only a standard Ad Lib card, Dune's soundtrack is nothing short of amazing. Haunting and always appropriate, the music provides the perfect counterpoint to the gorgeous beige-scale graphics and constant military, social, and economic threats you face. But you are the prophet, the rider of giant sandworms, and this is your private sandbox. Free



Links 386 Pro



Operation Neptune

Dune—it's a challenge, but one no game player should miss.

DAVID SEARS

Virgin Games—$59.99

Reader Service Number 430

Other nominees:
Crisis in the Kremlin, Spectrum HoloByte

Reader Service Number 431

Global Effect, Electronic Arts

Reader Service Number 432

Loom, LucasArts Games

Reader Service Number 433

Monkey Island 2, LucasArts Games

Reader Service Number 434

Planet's Edge, New World Computing

Reader Service Number 435

Robin Hood, Sierra On-Line

Reader Service Number 436

Star Trek: 25th Anniversary, Interplay Productions

Reader Service Number 437

Gateway, Accolade

Reader Service Number 438

Ultima Underworld, Electronic Arts

Reader Service Number 439

Best Sports Game

Links 386 Pro

With 256-color Super VGA graphics and features galore, this new version of Links offers breathtaking realism and remarkable control. The courses are reproduced with so much detail that wherever your ball comes down, it behaves exactly as it would on the real course. If the ball lands on a downhill slope, it'll run farther down the hill. Hit a paved pathway, and you'll get a gigantic bounce. The swing mechanics result in just the right degree of difficulty to make the game as challenging as real golf. Clicking too early or too late gives you a hook or slice and decreases the power of the stroke. You select which views you want in each of the screen's panels. I like the main golfer's-eye view in the left half of the screen, with quarter screens showing the aerial view of the course and the view from the green. The ball's flight and position show simultaneously on all three views. You can record an entire 18-hole round and send that file to a friend, who can load it into his game and play alongside you, or you can take your recording to the tournaments on GEnie and CompuServe. This game is a golfer's nirvana.

RICHARD O. MANN

Access Software—$69.95

Reader Service Number 440

Other nominees:
Earl Weaver Baseball II, Electronic Arts

Reader Service Number 441

Hardball III, Accolade

Reader Service Number 442

John Madden Football II, Electronic Arts

Reader Service Number 443

Mike Ditka Ultimate Football, Accolade

Reader Service Number 444

DISCOVERY

Best Children's Program

Operation Neptune

Your mission: to recover the wreckage and solve the mystery of a secret space mission gone awry. Data canisters containing the logbook and observations of the crew on the space mis-

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Computer Gaming World

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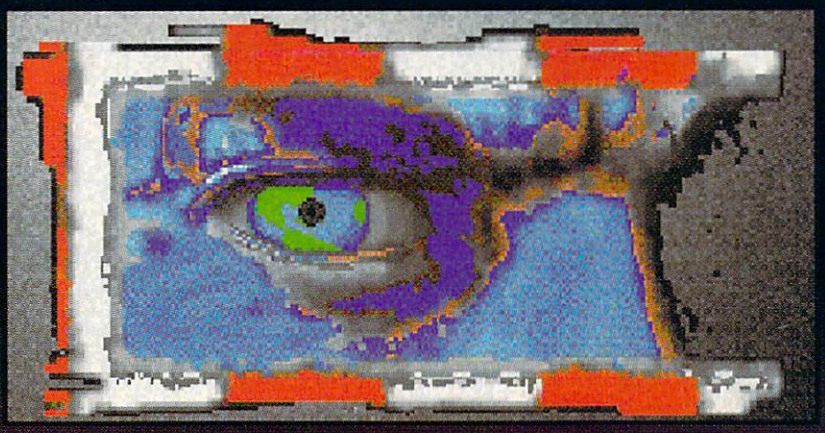
NOVEMBER 1992
PC GAMES
EDITORS' Choice



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PC GAMES

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NBC News/Chicago

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Game Player's PC Entertainment

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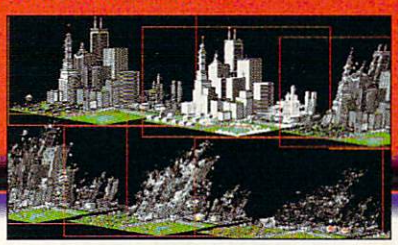

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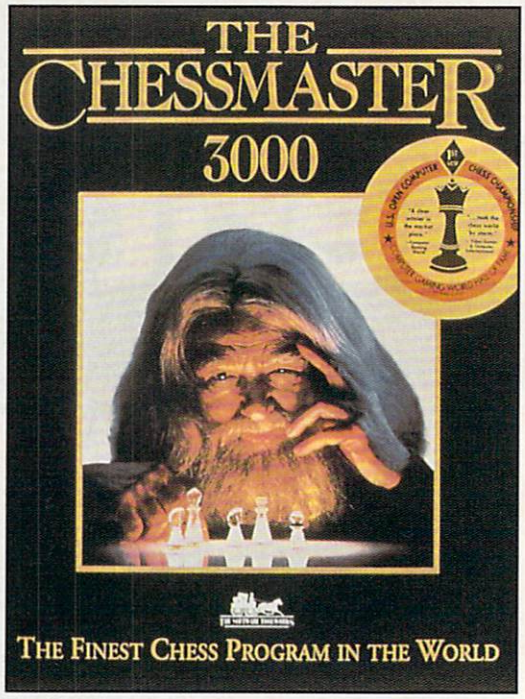
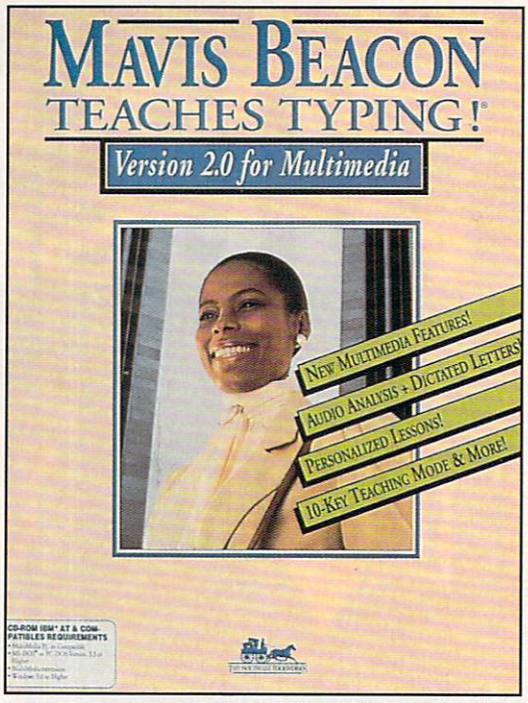
sion were spread throughout inhospitable undersea terrain when they were jettisoned back to earth from beyond the solar system. Once you've collected the canisters and broken their security codes, you not only will reveal the discoveries made by the scientists and astronauts but may also learn whether the toxins found at the crash site are linked to the lost canisters.

This ecologically correct scenario forms the backdrop for the educationally sound Operation Neptune, one of the most ambitious programs to emerge from The Learning Company.



The Chessmaster 3000



Mavis Beacon Teaches Typing! 2.0 Multimedia CD-ROM

Designed for kids 10 and up, Operation Neptune combines fast-paced action and great graphics presentation with well-grounded mathematical principles. The underwater environment is rendered in brilliant pastels in a sea of blue hues, and the animation is smooth and fun to watch. The result is a game that's as addictive as any videogame you're likely to buy. Try to keep its educational benefits a secret. You and your children will have so much fun playing it that you might not realize you're getting a refresher course in math.

PETER SCISCO

The Learning Company—$59.95

Reader Service Number 445

Other nominees:

Disney's Beauty and the Beast, Walt Disney Computer Software

Reader Service Number 446

Ferngully Computerized Coloring Book, Intracorp

Reader Service Number 447

Home Alone Computerized Coloring Book, Intracorp

Reader Service Number 448

Just Grandma and Me, Brøderbund Software

Reader Service Number 449

Kid Works, Davidson and Associates

Reader Service Number 450

Metrognomes Music, The Learning Company

Reader Service Number 451

ROCK A DOODLE Computerized Coloring Book, Intracorp

Reader Service Number 452

Time Riders in American History, The Learning Company

Reader Service Number 453

Best Young Adult Program
The Chessmaster 3000

For a superb chess program, you can't go wrong with the CD-ROM version of The Chessmaster 3000. It's ideal for anyone, from a novice who knows nothing about the game to a U.S. Chess Federation master. For the novice or young adult struggling to learn the game, there's a set of lessons on the rules of chess. The computer reads them to you while illustrating its points onscreen. Another tutorial teaches the finer points to novices who already know the rules. To help beginners during the play, it can shadow all legal moves when you pick up a piece or shade all pieces in jeopardy.

For the serious student of the game, there are 150 classic games from history. You can choose from 16 opponents, all with varying styles and skill levels. Or you can create a new player by adjusting seven characteristics to design a unique opponent.

While playing, you can ask the Chessmaster for advice at any time. He tells you vocally to wait a minute while he studies the situation. He then delivers his spoken (and written) advice, projecting four to six moves ahead on what will happen, explaining in plain English why he thinks it's a sound course of action.

If you love chess or would just like to learn it, The Chessmaster 3000 on CD-ROM is this year's top choice.

RICHARD O. MANN

The Software Toolworks—$99.95

Reader Service Number 435

Other nominees:

EcoQuest, Sierra On-Line

Reader Service Number 454

Knowledge Adventure, Knowledge Adventure

Reader Service Number 455

The Miracle Piano Teaching System, The Software Toolworks

Reader Service Number 456

Orbits, Software Marketing

Reader Service Number 457

Science Adventure, Knowledge Adventure

Reader Service Number 458

The Secret Island of Dr. Quandary, MECC

Reader Service Number 459

Sports Adventure, Knowledge Adventure

Reader Service Number 460

Where in the World Is Carmen Sandiego? Deluxe CD-ROM, Brøderbund Software

Reader Service Number 461

Best Adult Program
Mavis Beacon TeachesTyping! 2.0 Multimedia CD-ROM

Mavis Beacon has long been hailed as the best typing-teacher program. The Windows-based multimedia ver-

SIT DOWN DITKA. MOVE OVER MADDEN.

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The all-or-nothing decisions. The bone-busting action. The thrill of victory. It's all here in the most realistic pro football strategy game ever introduced!

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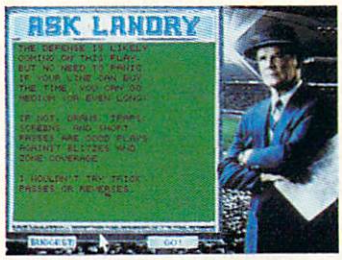


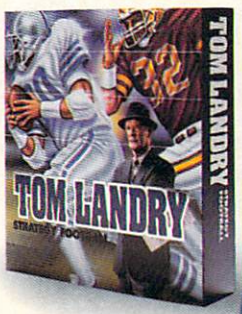
"Ask Landry" for advice from one of the greatest coaches of all time!

Enjoy "point-and-click" menus that make everything fast, fun and easy!

stats and scouting information. Make substitutions. Check weather conditions. Get on-line help, from the basics to advanced coaching tactics. And "Ask Landry" when you want advice from one of the best minds in the game.

Make the right decisions, and you'll coach your team all the way to a Super Bowl victory!

See if you've got what it takes to go the distance. *Order Tom Landry Strategy Football today!*



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IBM® PC and Compatibles 5.25" (1.2 MB) and 3.5" (1.44 MB) disks enclosed. Requires: DOS 3.3 or higher, 286 or higher, 640K RAM, VGA Graphics, Hard Disk, and Mouse. Recommended: DOS 5.0 and 12 MHz or faster. Sound Support: Ad Lib,® Sound Blaster,® PC speaker and more.

Circle Reader Service Number 176

sion on CD-ROM makes this winning program even better. It can be used to train you to type not only what you read but also what you hear. Software Toolworks has added digitized speech and digital audio music, recorded in stereo, with the quality and clarity of CD-ROM–based audio.

The CD-ROM version adds verbal dictation of ten prerecorded letters, with the ability to add your own dictation letters. You simply use a utility program, such as Windows' Sound Recorder, to create a WAVE format file to go with a matching text file of the same name. Stop, go, and rewind controls simulate a dictating machine or tape recorder. The help topic has 14 different voice-overs that let you read and listen to the help files. There's also a self-running spoken overview and demonstration of the program.

Multimedia Mavis adds Windows' task switching and built-in utilities, as well as the enhanced voice, sound, and music capacity of CD-ROM, to this critically acclaimed award-winning program. The latest incarnation of the best computer typing tutor is the best Mavis yet.

ALFRED C. GIOVETTI

The Software Toolworks—$99.95

Reader Service Number 462

Other nominees:
Chemistry Works, Software Marketing

Reader Service Number 463

Doctor Schueler's Home Medical Advisor, Pixel Perfect

Reader Service Number 464

Insight, Three-Sixty

Reader Service Number 465

Mathematica 2.0 for Windows, Wolfram Research

Reader Service Number 466

Science Adventure, Knowledge Adventure

Reader Service Number 458

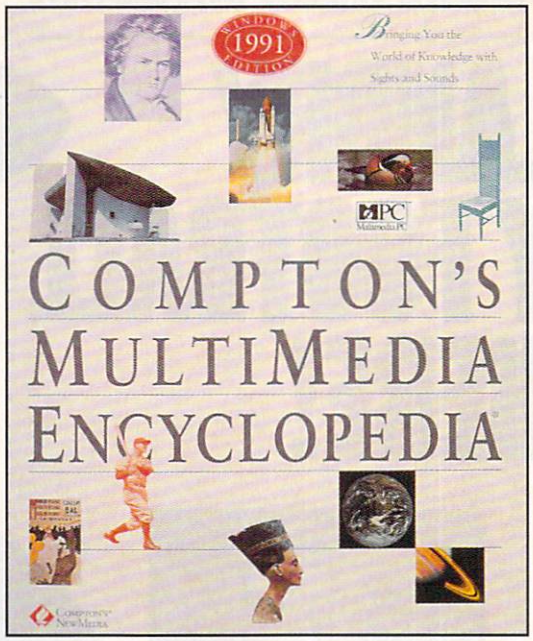
Time Treks, Earthquest

Reader Service Number 467

Best Reference Program
Compton's MultiMedia Encyclopedia, Windows Edition

What has 9 million words in 32,000 articles; 15,000 images, maps, and graphs; 60 minutes of sound, music, and speech; 45 animation sequences; 5000 charts and diagrams; and the complete Webster's Intermediate Dictionary?

It's Compton's MultiMedia Encyclopedia on CD-ROM. The DOS CD-ROM version won a COMPUTE Choice Award two years ago. But as good as the DOS version is, the Windows version is significantly better. While both offer a screen resolution of 640 × 480, the Windows version can have as many as 256 colors instead of just 16 (the DOS version has to switch to 320 × 200 in order to show its photos in 256 colors).



Compton's MultiMedia Encyclopedia

With the Windows version, you can have an article, a high-resolution picture, an animated sequence, and music—all going at the same time. The DOS version contains all of these elements, but it has to stop and switch from one to another.

Is a CD-ROM encyclopedia as good as a printed one? It certainly is a lot less expensive, especially when included in a CD-ROM drive bundle. And while you lose the higher-resolution pictures and immediacy of the printed page, you gain the ability to search on a grand scale—in addition to the music, speeches, sounds, and animation. It's not a bad trade-off—especially when you consider that this 26-volume encyclopedia is considerably smaller in physical size than a paperback novel.

DAVID ENGLISH

Compton's NewMedia—$695 ($595 for the DOS version)

Reader Service Number 468

Other nominees:
Cinemania, Microsoft

Reader Service Number 469

Library of the Future 4.0, World Library

Reader Service Number 330

Microsoft Bookshelf, Microsoft

Reader Service Number 331

Oxford English Dictionary, 2nd Edition, Oxford University Press

Reader Service Number 332

The Presidents: It All Started with George, National Geographic Society

Reader Service Number 333

The Software Toolworks World Atlas, The Software Toolworks

Reader Service Number 334

Special Technology Awards
Local Bus
PCMCIA Standard

Far from a year of stagnation, 1992 saw a number of new technologies appear and begin to be adopted. Two stand out, however, because they will quickly impact the portable and home computer user. Both are bus technologies, offering faster and more convenient access to periphals by the system. Since the creation of the first personal computer, bus architecture has been a subject of much controversy both among users and among manufacturers. Selection of a bus standard could determine whether the overall design succeeded in the marketplace.

The local bus is a technology that allows the CPU of a computer to interact with peripherals at its full clock speed rather than the relatively slow speed of the expansion bus. This technology brings new power and speed to video—at first. Any peripheral device could be placed on the local bus, but since video suffers most of all peripherals from the slow speed of the ISA expansion bus, it's the first application of the local bus. A standard has been set by VESA, and an additional local-bus standard may emerge from Intel by the time this sees print. Be cautious of hardware with nonstandard local-bus architecture, as it is more likely to be unsupported in the future.

PCMCIA is actually a bus standard established for tiny computers—laptops, hand-helds, and others—that bodes well for desktop computers. There is no reason you shouldn't have one or more PCMCIA slots in your next computer, regardless of its size. The first application of this standard will be memory enhancement, but soon after, it should find application in small peripherals (such as pocket modems, diagnostic tools, and mass storage) and software distribution.

To find out more about the local bus and PCMCIA, turn to this month's feature "Emerging Technologies."

ROBERT BIXBY

"The best simulator I've ever seen!"
Rick Zalud, Computer Game Review

"Makes the term 'virtual' redundant!"
Dave Moskowitz, Video Games and Computer Entertainment

"Sets a totally new standard for helicopter simulations!"
Arnie Katz, Electronic Games

"Redefines the state-of-the-art in computer simulation graphics!"
Computer Gaming World

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COMANCHE™ MAXIMUM OVERKILL™ is the promise of 3-D simulation action come true! You command the ultimate in 21st Century Attack Helicopters - the Boeing Sikorsky RAH-66 Comanche, not just over, but *in and around ultra-realistic 3-D terrain.* Can it be true? Absolutely! Thanks to NovaLogic's radical new simulation environment VOXEL SPACE™, which produces graphics *500 times more detailed* than any of those tired old polygon graphic games. You'll dive from mountain peaks, dart through winding canyons, and roar through pulse-pounding combat in stunning cloud-filled skies.

So get ready for awesome graphics, unprecedented speed, and sweat-dripping, teeth-clenching, white-knuckle excitement unlike anything you've ever experienced on a personal computer. Tear out to your nearest software dealer and tear into a new reality!

- *Smoothest, richest terrain graphics ever seen in a real-time simulator*
- *First simulator with real-time controls of RAH-66 Comanche*
- *Unsurpassed speed and maneuverability*
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- *One-minute learning curve*
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Circle Reader Service Number 120

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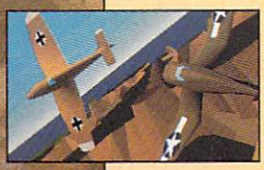

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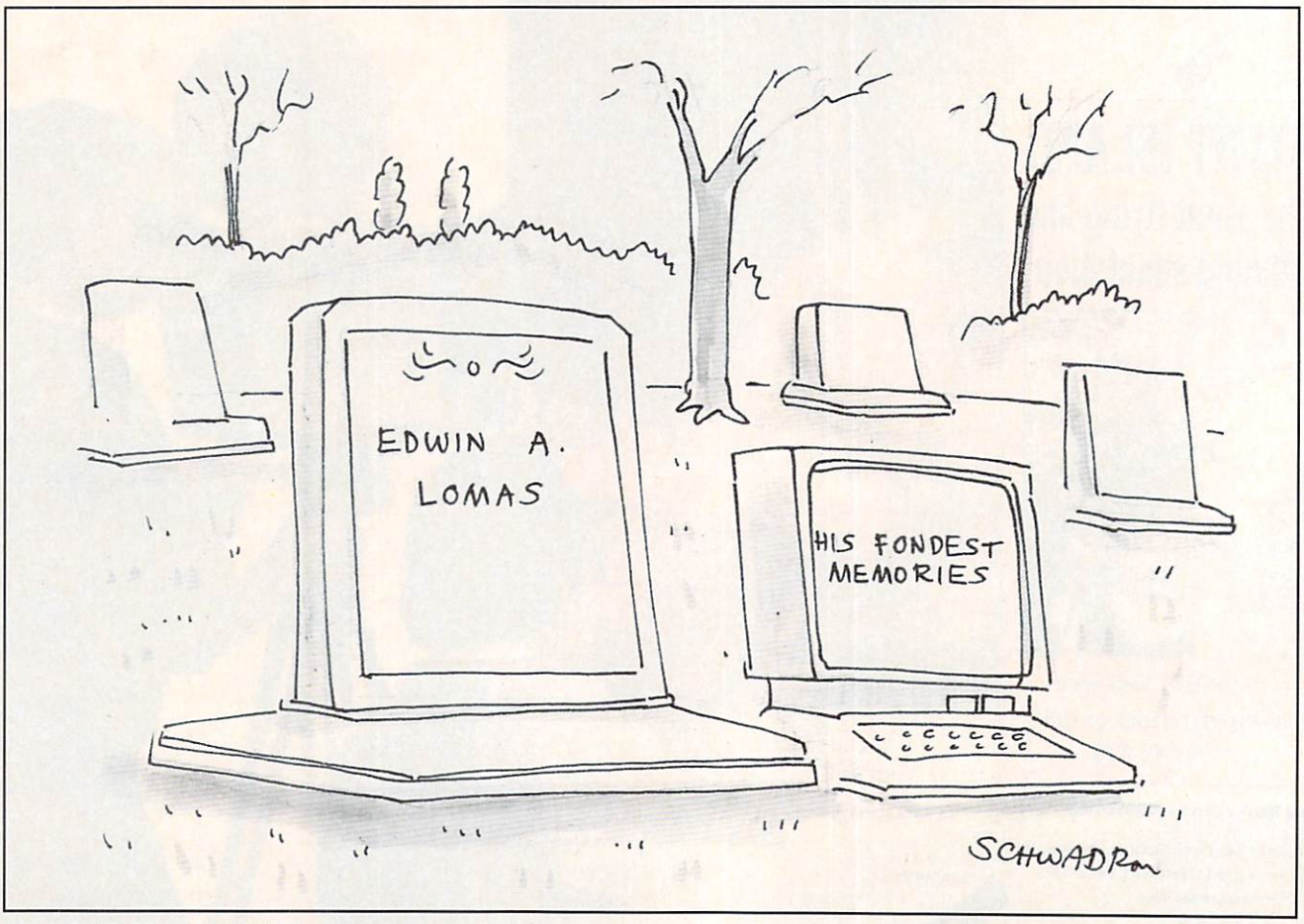

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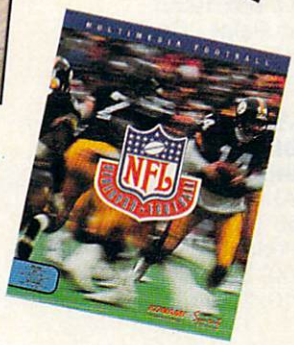

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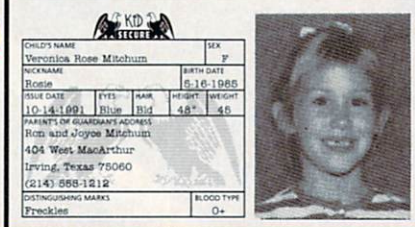

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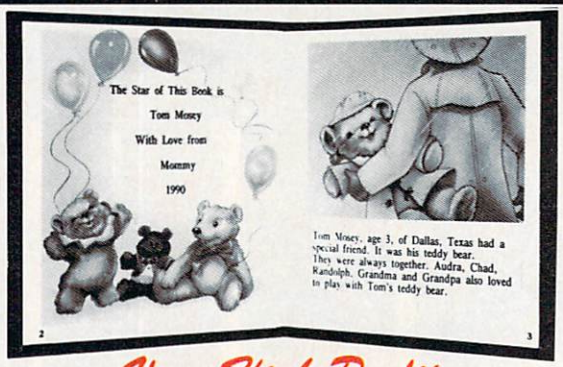

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Mark Minasi

AMI PRO 3.0

Last year, Lotus Development released version 2.0 of its excellent Windows-based word processor, Ami Pro. It was a major upgrade that included an abundance of new features. This year, Lotus does it again with Ami Pro 3.0. Some dull spots have been polished in this version, which is also feature rich and fairly fast—easily packed with enough stuff to warrant upgrading.

Want to move some text? Highlight it, and then click and hold the cursor anywhere in the highlighted area. The cursor becomes a pointer with a scissors. Now move the cursor anywhere, then release the button to move the text. This is without doubt my favorite 3.0 feature.

The SmartIcons just got smarter. In Ami Pro 2.0, you couldn't make your own icons, and modifying the SmartIcon bar was a pain. Version 3.0 has multiple SmartIcon bars, plus icons that are simple BMP-type bitmap files that you can alter or create with Paintbrush. You can also put "spacers" between groups of icons, allowing you to put the cut, copy, and paste group in a different area from the frame create and frame modify group.

Right mouse-button support: You've always wanted it; now, you've got it. If you're like me, you're constantly modifying a style or a frame. Under 2.0, that meant highlighting the item in question and then clicking on some menu item to change it. Now, you just click the right mouse button. It's an improvement, for sure, but why don't vendors follow the lead of Micrografx, which lets you define the right mouse button to do *anything* in its Designer product?

Ami Pro 3.0 lets you see a document now before opening it; it lets you do the same thing with a style sheet. And that style sheet preview is useful, as serious Ami Pro users depend upon style sheets. Trust me: You're wasting your time massively if you're not using style sheets.

Envelope printing is no fun under any circumstances—on a humid day, not only will the laser printer address the envelope but it will also conveniently seal it. But the new envelope-printing function in Ami Pro 3.0 is easy to use. The program also has a new-and-improved mail merge for those of you creating junk mail with your PC.

Ami Pro has always had a spelling checker and a thesaurus. Now, the spelling checker is the unabridged Houghton-Mifflin dictionary. There's also one of those annoying grammar checkers, if you like that sort of thing. They're good for finding some things that spelling checkers can't find, such as when you type *verses* when you meant *versus*.

Today, it seems as if everyone's tweaking programs to use OLE, which enables you to combine the best features of your favorite packages in a single document. Lotus has tried to implement OLE in Ami Pro 3.0, but sadly, it has fallen short of the mark. While Ami Pro is OLE-aware, it's not OLE-smart. For example, it can't start up an OLE server like Excel unless excel.exe is on your PC's path—a totally unacceptable bug shared by no other product that I know of in the industry.

But you will find more helpful help in 3.0. There's a tutorial that will get new users up and running quickly, as well as improved context-sensitive help. For WordPerfect users, there's a SwitchKit that makes Ami Pro respond to the WordPerfect keystrokes.

Of course, with every great new upgrade, there are some

problems. Since version 1.2, Ami Pro has allowed you to anchor frames to paragraphs, something that I do all the time. But now, the default is not to anchor a frame to a paragraph but rather to set it on a particular page and in a particular location. Despite the Set As Default button in its Modify Frame dialog box, Ami Pro 3.0 refuses to remember that I anchor frames to paragraphs. Hence, I've got to click on the Modify Frame and Anchor to Paragraph Above buttons every time I create a frame. Ditto for the graphics scaling of a frame.

And it's totally unacceptable that version 3.0 of a Windows 3.*x* product still has so many crashes. I've typed three-page memos on an 80486 with 16MB of RAM and 300MB of free hard disk space, only to have Ami Pro 3.0 crash—taking my data with it—when I saved the file. Other vendors are stamping out their UAEs; Lotus, you can, too.

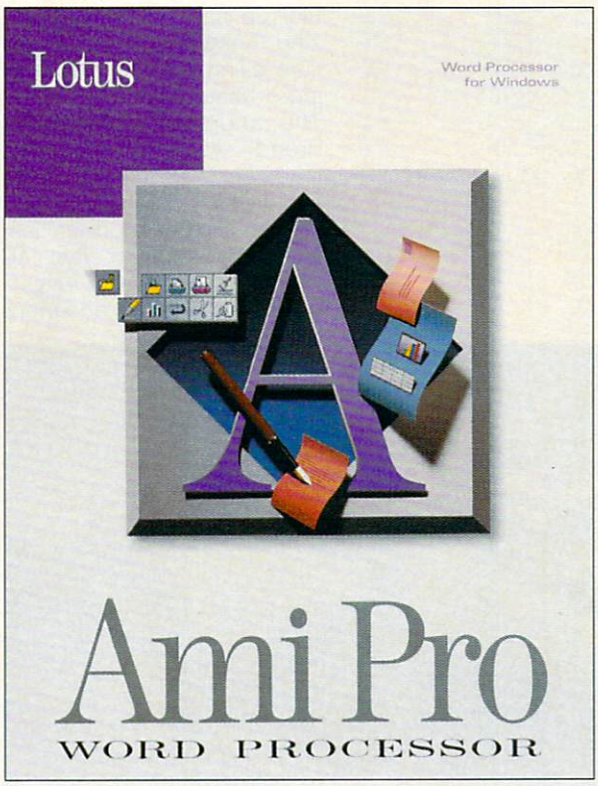
Ami Pro 3.0 also has some bugs that it has suffered from since version 1.2, bugs which have been reported to Lotus but that still have not been fixed. For example, the search-and-replace function will sometimes destroy data in a document; the macro language is limited and buggy; and you can't search for and replace two consecutive carriage returns in a document.

In spite of these shortcomings, if you need a full-featured word processor, Ami Pro 3.0 is every bit as good as Word for Windows. WordPerfect for Windows is a real disappointment and little competition.

But what about the lower- and higher-end parts of the market? What about the person who only needs to write the odd memo, letter, or 10-page report? And what about the person trying to lay out a 200-page book? Is Ami Pro 3.0 the right tool? Possibly. Ami Pro 3.0 comes with a pile of prebuilt style sheets that do much of the work of document preparation for you. There's even a booklet that profiles these style sheets, making it child's play to find the style sheet that's right for you. So I can recommend Ami Pro 3.0 to the busy executive without reservation.

As to Ami Pro's desktop publishing abilities, I can speak from experience, since I've written and laid out two 200+-page books with Ami Pro 2.0 and 3.0. It does 90 percent of what you'll need to get your document looking pretty. The nature of Ami Pro (oriented toward frames and style sheets) appeals strongly to me, as it seems logical and lets me leverage the design work of one document into my future documents.

However, Ami Pro lacks "floating" frames, frames that say, "Let's see—if I can fit right here on the page, then that's where I'll go. But if I can't, then I'll move to the next page and grab the text that originally appeared after me and use it to fill up the previous page." This type of experimentation helps prevent the ugly appearance of large white blocks at the end of a page. Unlike using PageMaker, if you want to change a font or font size throughout a style sheet, then you've got to change each style by hand (there is, however, a macro that will do most of this work for you). There's no way to place text indentations on the left for left-hand pages, but you can put those indents on the right for right-hand pages. Quibbles, yes, but FrameMaker can do those things; perhaps Ami Pro 3.1 will also be able to do them.



If you bought Ami Pro 2.0 after January 31, 1992, you can upgrade to 3.0 for $49. It costs $79 to upgrade if you purchased 2.0 before then. If you want to switch from one of the other word processors on the market to Ami Pro 3.0, you can do that for $129. Buying Ami Pro 3.0 outright costs the usual $495 that all word-processing packages seem to cost these days. No matter what the cost, it will be money well spent. Ami Pro 3.0 is without a doubt the best Windows word processor on the market. ❐

Circle Reader Service Number 271

IBM PC or compatible (80286 or higher), 2MB RAM, hard drive with 6MB free; supports mouse—$495; upgrade from version 2.0 purchased after January 31, 1992—$49; upgrade from version 2.0 purchased before February 1, 1992—$79; competitor's upgrade—$129

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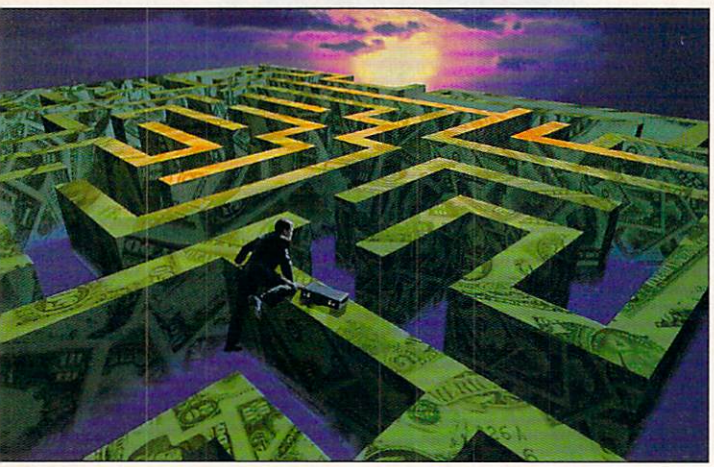
PERSONAL PRODUCTIVITY

Rosalind Resnick

EXPERIENCE AT WORK

Pick up just about any magazine these days, and you're sure to find a story about starting a home-based business. The range of possibilities is broad—word processing, mail order, even termite inspection, just to name a few.

But like most opportunities, launching a business typically requires a sizable investment of time, talent, and money. Even so, if you know your way around a computer and already have a PC at home, there is one home business you can start with only a modicum of trouble, using the same skills you've honed at your office job: a computer consulting firm.



The money maze turns into a map when you view it from above. Freelance consulting has been the solution for many in recessionary times.

With a PC, a portable phone (so your clients can reach you whenever their systems crash), and your valuable expertise, you can quickly turn the same skills that have lined your employer's pockets to making money for you.

Consulting generally pays better than doing the same kind of work for a bank or business—once you get your customers lined up.

Many computer consultants spend years toiling away on mainframes and minicomputers at Fortune 500 corporations before striking out on their own. Consulting wouldn't make much sense if you're still struggling to master DOS 5.0 or your first word processor. But if you have the skills, all that's left to do is to execute the business fundamentals: Zero in on your target market, and make your customers so happy that they'll keep coming back.

Easier said than done? Absolutely. What isn't? But veteran consultants say that with luck and patience, your fledgling home business will begin to soar.

Find your niche. Marketing yourself as a specialist can help you stand out from the crowd. Irvin Feldman, a consultant in Flushing, New York, turned his experience as an accountant and controller into a thriving business developing custom accounting systems. Paul Ferrara, owner of ColumbuSoft in Columbus, Ohio, used to work for a firm that provided management consulting for big companies. Ten years ago, Ferrara took his skills and went out on his own, as a database-language programming consultant writing custom software for corporate customers. "The majority of the successful consultants I've met over the years have been specialists," Ferrara says.

Market, market, market. Few computer consultants are household names, and advertising in journals or the Yellow Pages is often too expensive for budding entrepreneurs. That's why many consultants rely on person-to-person networking, either through industry contacts or logging on to online services and joining bulletin boards.

Ferrara, who says he's never advertised, met a partner in a Big Six accounting firm on CompuServe and soon snared the contact as a client. Feldman, who is also active online, says he maintains a high profile in his community by speaking to civic groups and volunteering computer services at his synagogue.

Don't sell yourself short. Unlike some businesses, consultants can't afford to lowball their rates and make it up on volume. That's because they're selling their time, not some product that rolls off an assembly line. It's important—before you quit your job—to do some serious market research about your customers, competitors, and the average fees paid for the consulting services you'll offer.

But be flexible, especially when you're starting out. Ferrara says he hates to turn down a job for fear of losing out on a long-term customer. "I don't get hung up on a particular rate, what other people are charging," he says. "If somebody came in today and said, 'I can only afford to spend $3,000,' and I thought the project was interesting and it looked like he was going to be a long-term client, I might eat some hours" and take the job.

Keep 'em coming back. The more repeat business you can get from your regular clients, the less time you need to spend hustling for new ones. Keep your promises and never nickel-and-dime a client, Ferrara advises.

Regular clients also help you get new clients. "The bigger your client base, the more repeat business and exposure you have, and that sells new projects," Ferrara says.

But by far the most important ingredient in the recipe for launching a successful computer consulting business (or any business, for that matter) is persistence. As Feldman asserts, "Not knowing when to quit certainly helps." ❐

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NEW WORLD COMPUTING

Circle Reader Service Number 232

EMERGING TECHNOLOGIES

BY TOM CAMPBELL

Two years ago this month, I found a way to overcome my insatiable credit card habit and to upgrade my home computer system in one stroke, conveniently killing two dubious birds with one expensive stone: I bought a 386. With its 1024 x 768 Super VGA, 210MB hard disk, and 4MB of RAM, the machine TKO'd my VISA account at $3,400, but it also made working at home a lot easier. On this anniversary of the blessed event, with 80386 technology on the decline (I could buy the same system today for about a third of the price I paid) and expansion bus–based Super VGA barely adequate for my daily work, I thought I'd take a look at the latest technology and see what will be in the ascendant over the next couple of years. These aren't so much predictions as they are extrapolations of trends that are making the scene at trade shows and popping up in press releases from startup companies you've never heard of. Yet.

Don't Forget Your PIMs, Kids!

In 1995, our two boys, Peter and John, will be halfway through high school and on its cusp, respectively. Brian Dougherty of GeoWorks thinks they'll be slipping personal information managers (PIMs) in their backpacks, along with their well-worn copies of the ANSI C++ standard document, which they'll be using in their Win64 programming classes. Dougherty, who's al-ready earned his place in history for creating GeoWorks, the Windows that should have been, knows as well as the next person just how lucrative it could be if Peter and John were carrying user-friendly palmtops to help them track assignments and bone up for Language Arts, whatever that is. He also knows it'll mean better hardware at a fraction of the current price, and he knows whereof he speaks. Hush-hush deals in the works to develop the next-generation user interface software also tell him that the price will be right: under $500 for a palmtop of the Newton variety.

Looking into Another Window

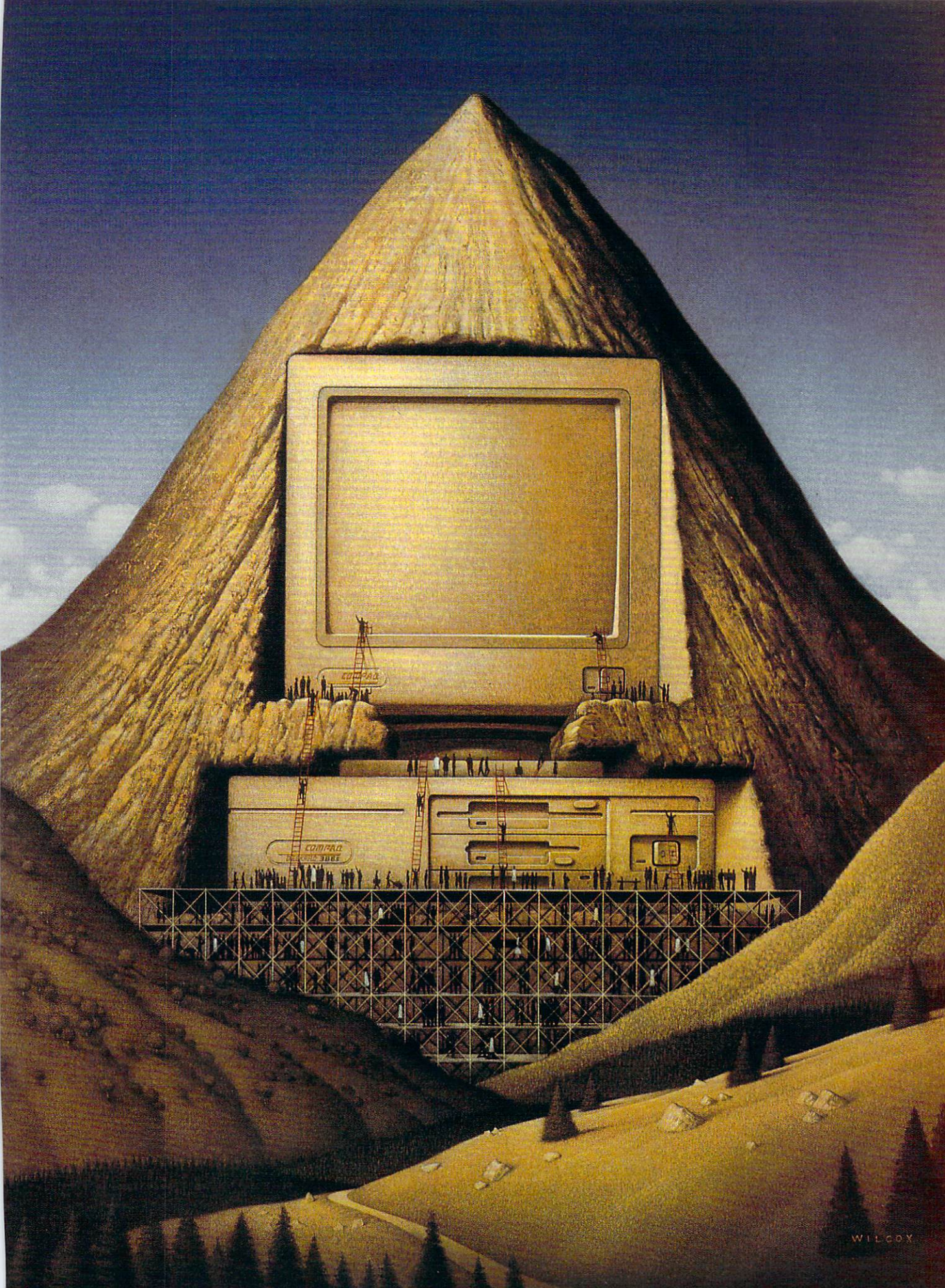
Microsoft may have something to say about that. Its recently announced Modular Windows will appear in none other than VIS (Video Information System), Tandy's new multimedia player. Modular Windows is designed to be legible on TVs from five to ten feet away, and it's been simplified so much that it makes the normal so-called user-friendly interface of Windows 3.1 look like a control program for the Vladivostok Waste Disposal Facility. It also heralds the dawn of Windows NT, a Lego-like operating system that's only 60K at its core. GeoWorks is still the king of lightweight operating systems with heavyweight features, but it isn't the only player in the game. And it doesn't have 20,000 working developers in its court.

You Can Take It with You

On the other hand, maybe my desktop system will soon be able to trade plug-in cards with my kids' palmtops. The Personal Computer Memory Card International Associa-tion (PCMCIA) has sprung up to avert a VHS-versus-Beta–style disaster in the palmtop market. Correctly anticipating the wave of subnotebook computers, the PCMCIA worked with a similar Japanese standards organization to hammer out a standard for the Nintendo-like cartridges palmtops will use for everything from RAM upgrades to portable fax machines to software distribution. Some say the tiny cartridges are good enough to become popular on desktop machines, replacing the space-eating, fingernail-tearing, DIP switch–riddled slot cards we all know and love. Of course, they said the same thing about the PCjr, which employed a similar scheme.

The PCMCIA card standard defines a 52-pin 2- x 3-inch card for laptops and subnotebooks. There's no reason to expect its use will be limited to little computers, though.The card has plenty of room for expansion because only a few of the pins are reserved by the standard (for power, memory bus, data communications, interrupt signals, and the like). This lets the cards work consistently in any PCMCIA-compatible machine, yet it also lets manufacturers add proprietary boosts to distinguish their cards from those of other firms. One

Like the 17-year locust, the computer industry is subject to periodic swarming. Here are the buzzwords and what they mean to your computing future.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yet Apple will have the choice of offering a higher-speed communications link for AppleTalk connection.

Mr. Wizard Returns

Admit it. You have a love/hate relationship with documentation. On the one hand, you decry the state of affairs when you open your latest word processor upgrade and behold five or six good-sized paperback books and half a dozen quick-reference guides. It's got full page-layout capabilities. You won't even need PageMaker anymore. But you have no idea what those hieroglyphics mean on the icon bar. Then you pop over to Crown Books and spend $29.95 for a book that basically recapitulates the contents of all those manuals, only in less detail. How does this come about? People stampede the WordPerfect booth at COMDEX pestering the developers to leapfrog Microsoft Word in the features war and then turn around and hammer WordPerfect for making its products too complicated. Then these same people slip over to the Microsoft booth and do the same. Just for the sheer love of blood sport.

There are three major ways that this is being dealt with by software developers:

- Programs are being developed that integrate the programs you already know.
- Developers are creating invisible helping hands that guide you through your work.
- Companies are getting together and establishing interface and task standards.

At the vanguard of the first technique, you'll find hDC. Its Windows PowerApps utility suite lets you create toolbars for any application—even apps that don't have toolbars of their own. You can design your own icons or steal them from other sources, attach keyboard macros to them, and even customize mouse behavior.

The second trail to helping users make better use of their software is being blazed by Microsoft in its Windows applications. Microsoft is developing interactive tutorial software called wizards that help you with your current task, not just on a demo that has no relationship to real life.

Wizards take you step by step through complex chores such as multicolumn layouts, as if you had a real expert handy. Expect to see wizardlike technology in other Windows programs over the next couple of years.

The third way vendors hope to make software easier is to agree on programming standards that will allow parts of one company's product to attach themselves to parts of another company's program. For example, you might prefer to use the WordPerfect for Windows text-editing module instead of the one that comes with your accounting package, or you might want to use part of Procomm Plus for the communications portion of your integrated Windows package. This concept has been bandied about in the Macintosh world for years, and it has about the same chance of working as a Macintosh clone.

The Slow Catch Up

The new breed of palmtops will boast an astounding screen resolution of 640 x 400—almost as powerful as the six-year-old VGA standard. I've become used to something a bit better, though, as have many of us who own Super VGA systems. On the other hand, most high-resolution screen drivers for Windows are extremely difficult to install.

Soon, that situation will get . . . worse.

If your computer is so fast, why does it take so long to refresh the screen? The most common complaint about Windows is that it's slow. But surprisingly, Windows already works faster than the average VGA video card can push pixels around the screen. In fact, the speed bottleneck is sending video signals through the outdated and comparatively mazelike system of circuits that connect your CPU with your video-out jack. From the days when Steve Wozniak was soldering together his Apple I, video has been the weak link in the chain, slowing down and crippling everything else.

The answer to the video bottleneck is the local bus. Local bus provides an almost direct connection between the CPU and the video card (which will take the form of a video chip in the new design).

Right now, *local bus* applies to anything using this technique, and until very recently there was no standard. Everyone was using different tricks to accomplish the same noble goal, but that means if you buy a local-bus machine today, you might not be able to find drivers for it in a few years. That's one of the continuing problems in the computer age. Fortunately, standards are being established, which should make the future at least a little bit more predictable.

Local bus is normally thought of as a way to speed up video cards, but in fact, it's a general-purpose very high speed data connection to the CPU. A local bus is similar in concept to your PC slots, but its speed isn't limited by the hardware, as the speed of normal ISA slots is. (The original PC card standard was flexible and farsighted, but it imposed a speed limit on data transmission for reliability, a hallmark of IBM architecture at that time.) Your PC slots are usually either 8- or 16-bit slots, immediately guaranteeing that your 32-bit 386 or 486 will suffer a bottleneck in dealing with the outside world, notably video cards. Additionally, the ISA expansion bus operates at a set 8 MHz—an enormous speed when the PC was developed but a snail's crawl today.

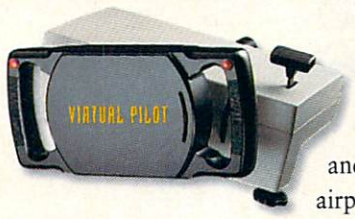
This slowdown isn't noticeable when you're printing, telecommunicating, or using a hard disk. The devices you use for these activities are slower than the normal expansion bus speed. But when you use video intensively, as in animation or drawing, the effect of the bus speed can be seen. Even in mundane matters like scrolling through a document in a Windows word processor, the herky-jerky way most computers advance is caused by the trickle of information from the CPU to the video card, as one part of the system waits for another part of the system to catch up.

Local bus gives your 32-bit processor a means of sending data at processor speed to a receiving device. What's most interesting is that the Super VGA standards group, VESA, does not limit local bus to video. Local- bus video, hardware controllers, and network cards that conform to the VESA standard are already sprouting up. Not even the relatively new 32-bit EISA and Micro Channel can run as fast as local bus, so it's quite possible that it will replace them. For now, if you're shopping for a computer, look for a machine that hews to the VESA standard (VESA's version of the local bus is called VL-Bus) or to the competing Intel standard (called Peripheral Component Interconnect—PCI for short). That way, you'll be prepared for the flood of superfast peripheral devices that will appear over the next couple of years.

In the near future, changing the video standard might simply mean pulling your video chip out of its local-bus socket and replacing it with a new one or upgrading your computer to an as-yet-undreamed-of video technology.

VL-Bus architecture is ready for 64-bit processors when they arrive on the

Fly In The Face Of Reality.



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Old News Flash

The second-most-recent hardware add-on hype is flash memory, which combines the sluggishness of a disk drive with the much-greater expense of RAM. This isn't the breakthrough, however. The breakthrough is that it acts like RAM but holds its contents when you switch your machine off. This news is hauntingly familiar to those of us who remember bubble memory, which was all the rage in 1983 but suffered the same limitations—inferior speed coupled with a record-high price per kilobyte. Hewlett-Packard refused to jump into the flash memory fray, and that's because it came out with . . .

Little-Bitty Hard Disk Drives

Smaller than a half dollar and only $200 per 20MB, Hewlett-Packard's Lilliputian hard drives beat flash memory by a factor of 3 in its dollar-per-megabyte-of-storage ratio. It may not be as flashy, but it will no doubt do what flash memory was supposed to do. The company plans to put these supersmall hard disk drives on PCMCIA cards. This miniaturization leads to an interesting situation. Imagine a 20MB hard card no larger (and perhaps smaller) than the MasterCard you'll use to pay for it.

NT Promises

When the PC came out in 1981, IBM built it with off-the-shelf parts and published all the specifications so that anyone could write software or hardware that worked with the machine. Despite smug posturing by Apple, a company so hubristic that it placed snide ads in the *Wall Street Journal* "welcoming" IBM to the market, IBM instantly achieved world personal computer domination.

In 1987, IBM displayed its intelligence and foresight by building on that success with the Micro Channel machines, which were hardware incompatible with the PC, and OS/2, which was incompatible with DOS.

Despite the warm embrace of a supportive, receptive high-tech community (NOT!), this farsighted ideal collapsed in a few months, and OS/2 and the Micro Channel are still trying to extract themselves from the chaos.

Microsoft gazed upon the carnage and learned. The result was Windows NT. It's everything Windows and OS/2 and UNIX and OS/360 were supposed to be, yet it's still pretty compatible with its predecessors. Microsoft has done an incredibly good job aiding developers in the transition, so its debut will be accompanied by literally thousands of compatible applications.

Windows NT will cost under $500, but hold onto your hat—you'll need at least 12 megabytes of RAM and 100 megabytes free on your hard disk to make good use of it. But boy, will it network.

Speaking of networking, Microsoft has thrown down the gauntlet to makers of network operating systems in the form of Windows for Work Groups, a special version of Windows specifically intended for networking.

Days of Future Past

Whenever people are faced with revolutionary change, they wonder, "What will happen next?" Personal computers seem to be in a state of perpetual revolution. Faster, smaller, and easier seem to be the only sure predictions for the future.

What is coming is a computer that is faster and more powerful, with greater storage and more ease-of-use features. Sound familiar? It should. It's no wild speculation to say that tomorrow's computer will be faster and easier to use.

The predictions made for wizards, Windows NT, the local bus, and the rest represent an ideal toward which the computer industry has been striving since its inception. ❑

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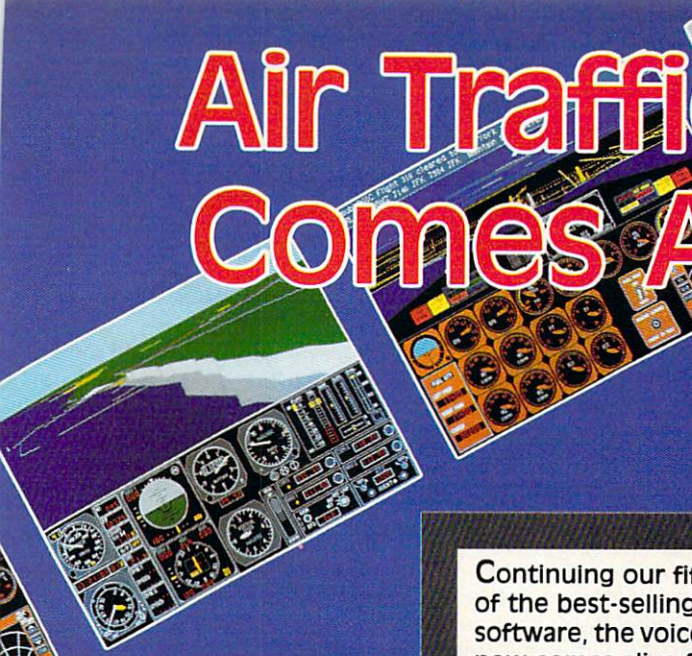

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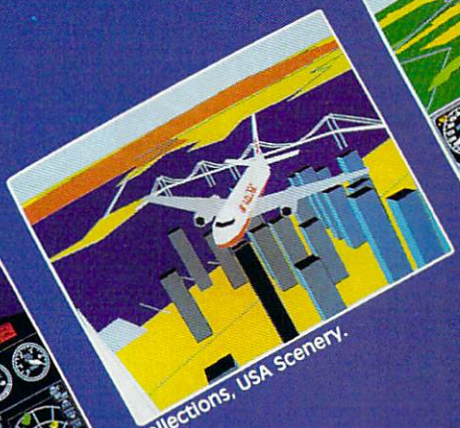

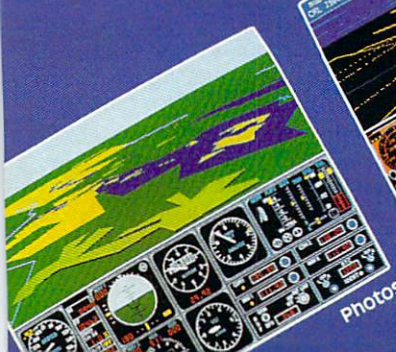

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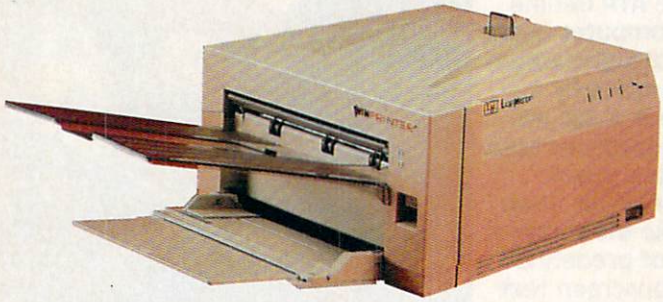
ART WORKS

Robert Bixby

LIGHT TYPESETTING

A couple of years ago, when I first starting receiving mail from LaserMaster (6900 Shady Oak Road, Eden Prairie, Minnesota 55344; 612-944-9457), I couldn't figure out who their market was. The company sells a line of desktop typesetting machines—serious typesetting machines that can handle up to 11- × 17-inch paper and print at up to 1200 dots per inch (dpi). That's the kind of resolution you expect from a low-end Linotronic typesetter, not a laser printer. I thought the prices were a little high in those days for desktop use. It was interesting, but not the kind of thing I'd wring out the family budget to buy.



The affordable LaserMaster WinPrinter 800 brings real typeset-quality printing to the desktop.

Then, about two years ago, LaserMaster began trumpeting something called business-class typesetting. It defined this 800-dpi standard as adequate for business documents. After all, no one needs 1200-dpi typesetting for documents that will be quick-printed or photocopied. You'd lose everything in the printing process that you gained in the typesetting process. But don't think 800 dpi looks shabby. An editor at a publishing house that specializes in computer books told me that she submitted two versions of a book she was working on, one professionally typeset at 1200 dpi on plain paper and the other printed with her LaserMaster WinPrinter 800. The production department preferred the 800-dpi printout. In my own printing, I found that even under a loupe, characters generated by the WinPrinter were free of jaggies.

The WinPrinter line is fast, too. LaserMaster has championed the video interface—sort of a super parallel interface that can shoot information to the print engine many times faster than either a parallel or a serial interface. The printer comes with its own interface card and cable.

You might ask whether the printer is PostScript or PCL. It's both. And neither. You may recall that in last month's column I spoke about TrueType and mentioned several products that make use of it. LaserMaster has incorporated the larger system of which TrueType is a part—TrueImage. TrueImage is a fast PostScript interpreter created by Microsoft to compete with Adobe's PostScript.

WinPrinter is a 4-page-per-minute (ppm) printer, but don't let that fool you. That's just a measure of its paper-handling ability. An 8-ppm printer will rarely churn out 8 pages per minute. The bottleneck for most desktop publishers is the interface and the interpreter, not the paper handler.

The punch line is that the WinPrinter 800 lists for $1,795. That includes the printer itself, interface card, cable, TrueImage software, and 50 TrueType fonts. That's about $100 more than I paid for my 300-dpi laser printer (with PostScript and 17 fonts) six months ago. There will be a short intermission while I kick myself.

There is a downside to the WinPrinter, however. The system requirements of the software are rigorous. You need at least an 80386 with 8MB of RAM (7MB must be free, or printing will be slowed somewhat) and Windows 3.1 in 386-enhanced mode, along with a permanent 8MB swap file. With RAM and hard disk prices as low as they are, the upgrade won't add much to your expense. Also, these printers are especially set up to work with Windows. I've been unsuccessful in my efforts to get the system to work with GeoWorks. It will work with DOS programs operating under Windows, though.

If you're like me and you just bought a laser printer, you might be able to get desktop typesetting even more inexpensively. LaserMaster manufactures upgrade packages called WinJet 300 and WinJet 800. As the names imply, the upgrades are specifically aimed at Hewlett-Packard LaserJets. You can upgrade a LaserJet II, IID, III, or IIID to 800 dpi with the $795 WinJet 800 system. You'll have to get into the guts of your laser printer to do it, though. The $495 WinJet 300 system provides faster printing and PostScript compatibility for your LaserJet without actually boosting resolution.

You can still get the high-end desktop typesetters from LaserMaster (the 1000-dpi Unity 1000 at $6,995 and the 1200-dpi Unity 1200XL at $9,995), and if you're a publishing professional, it would probably pay you to investigate them. After all, it's easier to get work if you can say you have 1200-dpi capability, whether or not the customer can see the difference. But the WinJet 800 and WinPrinter 800 products bring typesetting into the realm of possibility for groups with limited budgets like churches and schools, as well as for artists and hobbyists. If you've been considering a laser printer, you should give LaserMaster a call. ❐

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DISCOVERY CHOICE

Enter a magical world of talking sea creatures and discover real ways to save the earth in this adventure game.

David Sears

ECOQUEST: THE SEARCH FOR CETUS

You can't fool kids today; they watch television and are hip to most of what goes wrong, globally speaking. Sure, they might ask you to explain ozone depletion—and you might even know where to begin—but they probably understand all too clearly that Gaea fights for her life and is losing. They might blame themselves; they might blame you. Thanks to Sierra, though, you and your kids can work things out together. Undertake EcoQuest: The Search for Cetus, and you'll discover more than just a few clever puzzles; you'll grapple with the global malady of pollution and make friends in the animal kingdom along the way.

As Adam, dolphin trainer and ecowarrior, you learn that every creature in the food chain pays for the arrogance of Homo sapiens. What sane species would transport fossil fuels over water routes where the least spill could destroy entire ecosystems? As you work to save a tarred and stunned seagull, you can't help but wonder. This seagull might live, but what about the thousands that Adam can't help? When Adam waters his pet gerbil, the grateful rodent actually goes through a dance routine, obviously overjoyed at that small kindness. No doubt the designers of EcoQuest want you to understand the responsibility we higher mammals hold for our lower-order brethren.

At the same time, not all of this parable in game's clothing comes across so heavy-handed. Like so many sensitive kids, Adam makes friends better with animals than with children his own age, so it's little wonder that he and an injured dolphin bond quickly. Delphineus, as the bottlenosed speedster introduces himself, warily agrees to take Adam along on his hunt for Cetus, the great whale king of Eluria. Not every sea creature talks, of course, but EcoQuest obviously isn't a preachy, hopeless cause; this interactive epic incorporates more than a few classic fantasies.

Before you reach the undersea kingdom, you'll need to master the ubiquitous Sierra interface. If you or your kids have never played a parserless adventure game before, don't worry. You just click the right mouse button to change the nature of the onscreen pointer and then click the left button to use the pointer. To look at something, change the hand to an eye with the right button, for instance, and then place the eye over an object. Click the left button for a description of the object. What could be simpler?

Like derelict Atlantis, Eluria sleeps beneath the sea. Gardens of kelp and coral, Greek-designed buildings and statuary, and loitering schools of prismatic fish welcome you to this world in peril. Eluria can no longer feed her citizens. Without Cetus to sweep away drifting pollutants with his mighty flukes, the water here stagnates and will eventually kill. Worse than any poison, however, the mutated evil of Flesh-Eater, a manta gone bad, prowls the fouled waters searching for prey. No wonder the Elurians stay inside their fish apartments! But by acting locally, Adam can make a difference—and not just by picking up trash. He can find Cetus later; first, he'll have to save Eluria by teaching the citizens to solve their problems together.

In the fish apartments, Adam befriends Gregarious the Manatee, Erroneous the

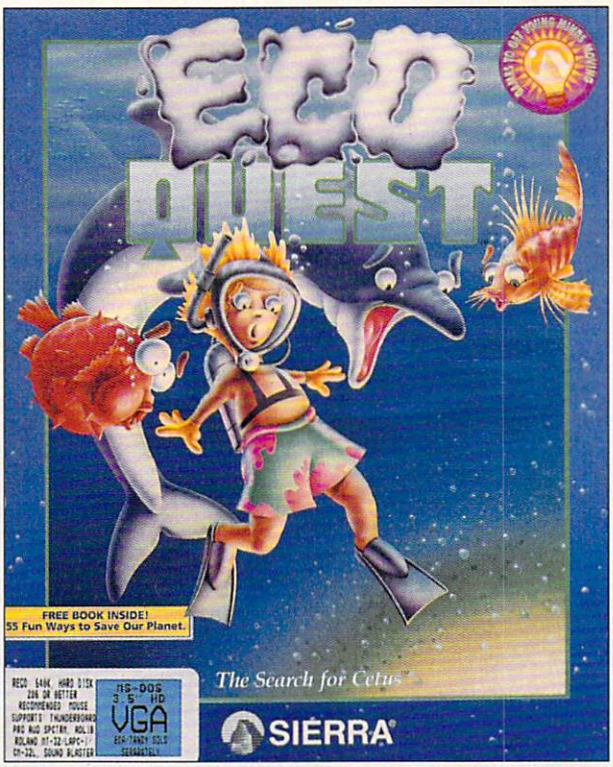
Sea Turtle, and Olympia the Angelfish, among others. Each of these unfortunate sea creatures suffers due to man's ignorance. Gregarious, for instance, refuses to surface for air because he's often injured by whirling propeller blades. Talking manatee or not, he's still a slow-moving fellow and prone to the same accidents as his less communicative cousins. Before Adam can leave the city to face Flesh-Eater and find the lost king, he'll have to work out a compromise between a fisherman and the manatee. EcoQuest has its share of puzzles to solve and objects to find, but instead of meaningless obstacles, they teach valuable lessons while providing readily remembered data. For instance, after you remove the deflated balloons from his throat, Erroneous explains that fish and turtles often mistake floating latex trash for food—food they simply cannot swallow or remove themselves. Delphineus, too, provides informative chatter throughout the game; count on him to point out the high points of the ocean floor.

Fluid animation makes every minute spent on the quest an unusual one; Adam maintains his position onscreen by swimming in place. When he moves, he does so with an unerring grace. The same holds true for Delphineus and a certain hammerhead shark you might encounter late in the game, but not for the many fish of the reefs. Forgive the animators, though—with so much to look at, you probably won't notice repetitive piscine actions. Besides, the environs of Eluria rank among the most beautiful in any undersea kingdom despite the onslaught of pollution, perhaps because the artists deliver such magnificent realism. You may even wish that Sierra would package parts of EcoQuest as a virtual aquarium; few available can compare. The appropriate score never grows tedious, and with a sound card installed, the delightful sounds of the deep will rise from your PC.

For all its potential success as a teacher, EcoQuest makes a few blunders. While in most respects the program respects scientific principles, Adam's air tanks never run out of air. Also, the designers clearly explain Delphineus's sonar click—a way of memorizing objects with sound waves. Later, the vociferous dolphin can't use the same sonar to explore a dark cave. Granted, magic holds some sway in this world, but more rational explanations wouldn't have overtaxed the genuinely inspired designers. Players deserve more than the unconvincing excuses offered.

The Search for Cetus package contains a copy of I Helped Save the Earth, a brief, informative guide for kids who want to rescue the planet. Each page describes a problem and gives a simple solution that any youngster can follow. Just by purchasing EcoQuest, you take a step in the right direction; a portion of the profit goes to the Marine Mammal Center.

For centuries we've pondered the blue-green depths, and the swelling, shifting surface of waves and flotsam still mesmerizes us. Lend water a name, and her siren call sounds long and sweet. Our nets full, we don't worry where the next catch will come from. The sea has always provided.



Ask one small boy named Adam, though, and he'll remark that today the soft voice of the sea chokes on our garbage, our castoffs, our oil spills, our sewage. For him, and the young millions of the next generation, now is the time to clean up our act, halt pollution, and treat the sea as an equal, not a dumping ground—lest we drain all life from her.

But we've all heard that line before, haven't we? Conserve, recycle, replenish? If you've never acted on your good first instincts and taken a stand against pollution, take a long look at EcoQuest: The Search for Cetus. This is one adventure with valuable lessons to impart—lessons that we'd all better learn soon. ❐

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PATHWAYS

Steven Anzovin

NEVER IDLE

Why can't your old PC live forever? Sure, manufacturers want you to trade in your old machine every year. They make more money that way, and that money funds the next important computing advance. But your faithful PC can still crunch numbers for the computationally disadvantaged even after you've moved on to that clock-doubled, warp-speed 486. Just ask Alex Randall, the guru of PC recycling, whose mantra is *Never idle, never idle.*

Most schools are desperate for computers. Your local church, temple, or survival center can likely use a PC, too.

Randall is the founder of the Boston Computer Exchange, the first go-between organization to specialize in buying and selling used PCs. The idea for the BoComEx, he told me, grew out of discussions with his teacher and mentor, the late anthropologist Margaret Mead. What happens to ideas and tools that elites leave behind? Older technologies generally work their way down the economic strata, with the oldest tech ending up in the hands of those with the least money or social status.

But by the early 1980s, it was obvious that the cycle of PC obsolescence (a concept Randall abhors) was to be only a year or two long, and there was no channel for moving older, unwanted PCs to where they were still needed. Randall decided to create that channel. In 1982 he announced the Boston Computer Exchange during a meeting of the Boston Computer Society, and he was immediately deluged by orders.

Randall ran BoComEx for eight years—"not the way to get rich," he jokes—and then turned his attention to a new PC-recycling project, the East West Education Development Foundation. East West solicits donations of PCs with little or no money value from corporations and individuals, whips the PCs into usable shape, and recycles them to charities and nonprofit organizations in the U.S. and abroad.

East West sends half the PCs to schools and other U.S. charities selected by the donor and the remainder to charities in Eastern Europe and elsewhere. "For a Czech computer user," notes Randall, "a 286 PC is not brain-dead. It's a jet-propelled toy of the twenty-first century."

Randall believes East West provides an essential housecleaning service. "This is the necessary background waste elimination process of the computer industry. If old machines are kept by users because they can't get rid of them, fewer new machines are bought. With us, the industry stays healthy; without us, it drowns in its own garbage." The same could be said of other organizations working similar territory. Educational Assistance Limited (EAL) is an organization that donates PCs to colleges for tuition credits that are awarded to underprivileged students; the National Cristina Foundation arranges for donated PCs to be provided to organizations that train the physically challenged to help them get high-tech jobs.

Any of these groups would be glad to have your PC, but you may find a good place to donate it closer to home. Most schools are desperate for IBM personal computers. (Schools may even prefer older PCs, because their rugged steel cases last longer in the school environment, which is probably more brutal on equipment than the dust storms of Saudi Arabia.) Your local church, temple, or survival center can likely use a PC, too. Before you pass on your old PC, clean it up, format the hard disk and reinstall DOS, round up all cables and expansion cards, and bundle it with any old software you think might be useful (original disks and manuals, please).

For further information, contact the Boston Computer Exchange at Box 1177, Boston, Massachusetts 02103; (800) 262-6399, (617) 542-4414. The East West Education Development Foundation is at 49 Temple Place, Boston, Massachusetts 02111; (617) 542-1234 (voice), (617) 542-2345 (fax). Educational Assistance Limited is located at 1275 East Butterfield Road, Suite 108, Wheaton, Illinois 60187; (708) 690-0010. The National Cristina Foundation can be reached at 42 Hillcrest Drive, Pelham Manor, New York 10803; (800) 274-7846. ❐

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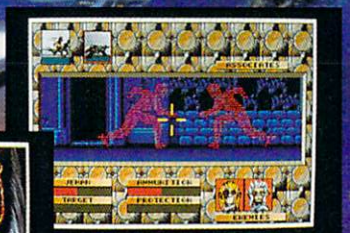

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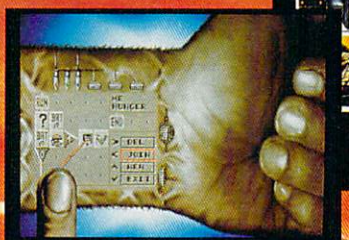

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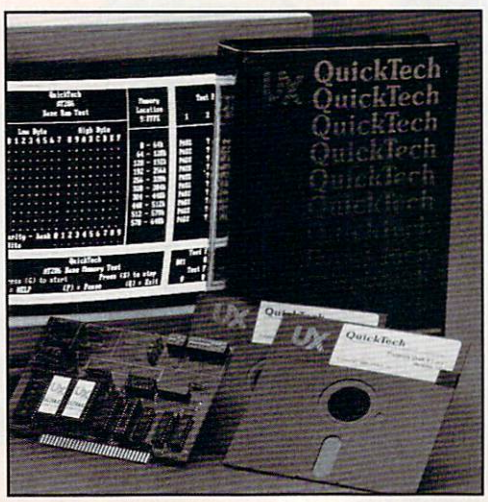

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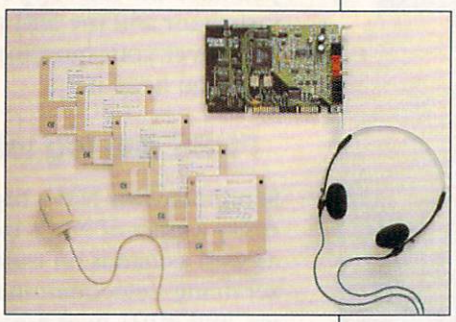
MULTIMEDIA PC

David English

SIGHT AND SOUND

Two new products from Microsoft will significantly advance multimedia's two big growth areas—sound and video. I'm working with beta versions of both products, so the details are still sketchy, but both represent a giant leap forward in Windows technology.

The first product is a package that adds AVI (Audio Video Interleaved) technology to Windows. Essentially what you get is the ability to run video movies from software—no additional hardware is needed, other than a standard sound card if you want to hear AVI's synchronized sound.



With its new AVI and sound card packages, Microsoft is bringing state-of-the-art multimedia solutions to everyday Windows users.

There are some limitations, however. First, a typical AVI movie runs 15 frames per second (half the usual speed of video), so there's a slight flicker. Second, it generally runs in a window that's 160 pixels wide and 120 pixels high (just one-eighth of a standard 640 × 480 screen). You can make the movie take up the entire screen, but it looks so blocky you'll quickly switch back.

The third limitation—a big one—is the size of the file. Even with the built-in compression, a 30-second AVI movie can take up four or five megabytes on your hard drive. (That isn't a problem with CD-ROM, where a single disc can hold as much as 72 minutes of compressed AVI files.)

The AVI package includes VidEdit, a video editor that lets you load, edit, and save video files, and VidCap, a program that lets you capture full-motion video and audio from videotape, videodisc, or video camera (for this, you'll need a video-capture board, such as Creative Labs' Video Blaster). You also get a CD-ROM filled with AVI movies. The AVI standard currently supports 8-, 16-, and 24-bit graphics and 8- and 16-bit sound.

How well will AVI do? If QuickTime is any indication, it should do well. QuickTime is a similar technology on the Macintosh that has become successful in less than a year. Many Mac applications support QuickTime, including business programs such as Word and Excel (cut and paste movies directly into your letter or spreadsheet) and children's programs such as Kid Pix and Kid Works 2. AVI already works with any Windows program that supports OLE. Expect widespread application support in 1993.

The second product is the much-rumored sound card from Microsoft, called Windows Sound System. It's a sound card designed specifically for Windows business users—there's no joystick connector, Ad Lib or Sound Blaster game support, external MIDI support, or even a port for a CD-ROM drive.

On the other hand, Microsoft has provided a comprehensive set of audio utilities—the majority of which work only with this sound card. These new utilities make it easy for just about anyone to add high-quality sound to Windows.

Most dramatically, Windows Sound System features built-in voice recognition through a new Windows utility called Voice Pilot. It ships with menu-command vocabularies for 16 major Windows applications, including 11 of Microsoft's own programs (Word, Excel, PowerPoint, Mail, Write, and so on), as well as Aldus PageMaker 4.0, Lotus 1-2-3 for Windows 1.0, Micrografx Designer 3.1, Norton Desktop for Windows 2.0, and WordPerfect for Windows 5.1. You can change, delete, or retrain any of the existing vocabularies, or create new ones for other applications. Typical commands might be Open, Save, Exit, Up, Down, Move, and Check Box.

The Sound System utilities also include ProofReader, which lets you check your Excel or 1-2-3 for Windows spreadsheets with a talking proofreader; Quick Recorder, which lets you record, edit, and mix your own sounds (a microphone and set of headphones are included in the package); and Sound Finder, a combination sound-file browser, converter, and librarian.

As if that weren't enough, you also get SoundScapes, an audio-based screen saver; Music Box, which lets you listen to audio CDs on your CD-ROM drive; and a newly revised Sound option for your Windows Control Panel that lets you assign sounds to various system events (a generous selection of sounds is included).

It looks like a winning audio package for business and will be priced competitively at $289. The card allows 16-bit sampling, so you can even record CD-quality sound if you have a fast processor and enough room on your hard drive to hold the resulting file.

Both the AVI and sound card packages should be available by the time you read this. Once again, it's Microsoft that's pushing the envelope for multimedia on the PC. ❐

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Circle Reader Service Number 230

BOB GUCCIONE
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"There are many celebrities who became artists. Bob Guccione is an artist who became a celebrity," says Ambassador Galleries' owner, Ellie Miner. Her Manhattan gallery recently held a highly successful first exhibit of art works by Mr. Guccione, founder and chairman of General Media International, Inc., publisher of such well-known magazines as *Penthouse, Omni, Compute,* and *Longevity*.

Because of the overwhelming response to Mr. Guccione's art, Ambassador Galleries began a publishing program featuring four serigraphs of his paintings, which will be sold through key galleries in the United States and worldwide.

"STILL LIFE IN MOTION" IMAGE 22.25" x 28.5"

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The original paintings that the serigraphs were made from were completed in the late 50s and early 60s between productive periods in Rome, Paris and finally, London, where in the spring of 1965, Guccione launched *Penthouse.* His total involvement in all aspects of his company's business curtailed his career as an artist but his passion for art is evident in his magnificent private collection of major works by artists such as El Greco, Botticelli, van Gogh, Renoir, Matisse, Picasso, Degas, Modigliani, Gauguin, Chagall, et cetera.

The critical acclaim Guccione received at the Ambassador Galleries' showing was the impetus for the publishing of his serigraphs. According to Ellie Miner, "Bob Guccione's diverse figuratives and still lifes reveal an introspective and transcendent glimpse of inner worlds. They are expressive, romantic and often intensely poetic. Each work conveys a complete thought by an artist in total control of his medium."

The four serigraphs shown are testimony to the fact that a true artist never ceases to pursue his talent.

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You won't believe your eyes. When you load Links 386 Pro and step up to the first tee at Harbour Town, you simply won't believe the gorgeous picture on your screen. Every detail is there: the houses along the fairway, each individual tree and shrub, the ball washers, even the clouds in the sky. It gives you the breathtaking sensation of looking through your computer screen into reality.

The illusion continues as you tee off. You hear the sound of your stroke and watch the ball soar over the terrain to its eventual resting place. The course is reproduced with so much detail that wherever your ball drops, it behaves exactly as it would on the real course. If it lands on a slope, it will run farther downhill. Hit a paved pathway, and you'll get a gigantic bounce. Land in the deep rough or sand, and the ball dies immediately.

Wherever your ball goes, the program faithfully creates the view from that exact point on the course. In fact, you can choose to look in any direction from any place on the course, whether it makes sense or not. The computer shows you the view you ask for, no matter where you are on the course. It's not a computer game; it's a simulation.

Written completely in 32-bit code, Links 386 Pro is strictly for those with the hardware muscle to run it. You'll need an 80386 or 80486 computer (including SX versions) with a speed of 16 MHz or faster and Super VGA graphics. It requires at least 2MB of RAM, 13MB of free space on your hard disk, and a mouse.

When I bought my faithful Northgate 386/16 years ago, I paid extra for something called VGA Plus. I've never gotten any particular use out of the Plus until now. It turns out that *Plus* means the video card can deliver 256 colors at 640 × 480 resolution, which is all that Links 386 Pro needs. The excellent installation program automatically read my video card and supplied a video driver file. It worked beautifully; suddenly I have 256-color VGA.

The results are spectacular. The game renders the golf courses in near-photographic detail. As it paints each screen, you first see the ground, then the sky, clouds, and backdrop. Then, the buildings appear, followed by the trees and shrubbery, which pop onto the screen one by one, starting from the background and working forward.

The time it takes to paint each screen is the only potential drawback to Links 386 Pro. If you're trying to run it on equipment that meets the minimal requirements, it is unquestionably slow. It's a tossup as to whether Links 386 Pro is too slow to be playable on a 386SX/16 with 2MB of RAM. As the speed and memory of the computer increase, your need for patience decreases. On a 486/50, it takes only a second or two to paint the screens. Those with slower machines can turn off some of the more detailed graphics and sound options to increase performance.

Once it's running, Links 386 Pro is a golfer's nirvana. The swing mechanics result in just the right degree of difficulty to make the game as challenging as real golf. You hold down the mouse button on the backswing until the swing meter registers the desired power, then release it. On the downswing, you must click the mouse again just as the club face strikes the ball. Too early or too late gives you a hook or slice and decreases the stroke's power. Most of the time, you can make decent shots. Occasionally, you'll slip and hit a truly awful shot. But once in a while,

you'll get it just right and make that sweet, clean stroke that golfers live for. The 300-yard drives straight down the fairway are thrilling.

Links 386 Pro is chock-full of new features that help to overcome the limitations of computer simulation and increase the joy of the game. The basic screen can be split into quarters or halves. You select which view you want in each panel. I like the main, golfer's-eye view in the left half of the screen, with quarter screens showing the aerial view of the course and the view from the green. All three views simultaneously show the ball's flight and position. The aerial view is excellent for keeping your orientation. You can zoom in and out, scroll around the aerial photo, and even grab the photo and move it where you want it.

Other possible views are a wide-angle view of the fairway in the upper or lower half of the screen, a graph profile showing the vertical rise and fall between the ball and the hole, the scorecard, a club distance chart, and the setup window, where you can change the details of your golfer's stance and swing to execute a custom shot. You can put any view in any part of the screen, as long as you have a main view (with the golfer) onscreen. To speed up screen painting, don't display the view from the green, which takes as long to draw as the main view.

Your golfer can be male or female—both genders have exactly the same performance characteristics.

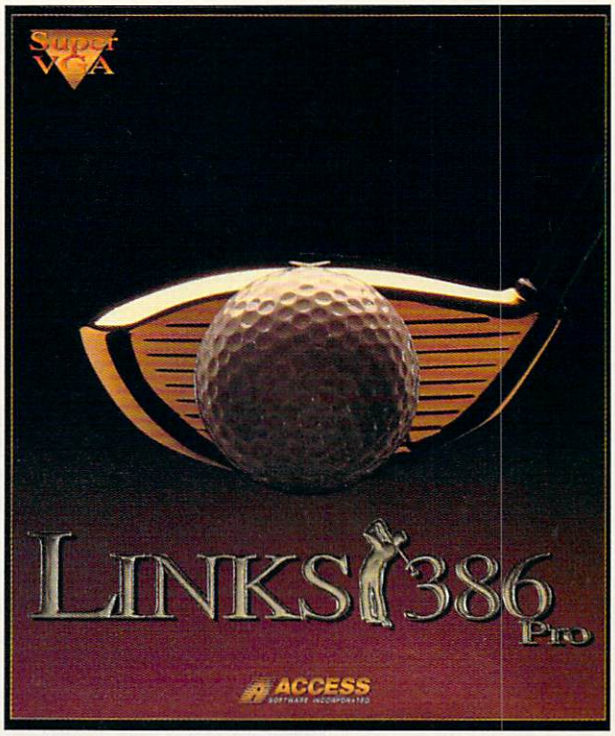
After each shot, you have the option of taking a mulligan—meaning taking the shot over and disregarding the first effort. Unfortunately for those who might want to exaggerate their performance, the number of mulligans taken shows on the scorecard. Putts under two feet can be skipped by clicking the Gimme button.

After each shot, you can replay it from a forward or reverse perspective, or you can save a permanent recording of the shot. Send the file to your friends so they can see that your bragging is justified.

You can record an entire 18-hole round. Send that file to a friend, who can load it and play alongside you, making strokes and watching your recorded performance. There's an active set of tournaments underway on GEnie and CompuServe using recorded games. Plus the game comes with 13 recorded rounds from various people at Access, with scores ranging from incredibly good to a little over par. So you have ample competition if you like to test your skills. Mulligans, by the way, are not allowed in a recorded game.

For the statistically minded, Links 386 Pro keeps detailed stats by player and by course. Review such telling stats as average putts per hole, percentage of drives landing in the fairway, percentage of greens in regulation, and even club-by-club stats on average distance and percentage safe hits (landing on fairway or green). Course stats show percentages of birdies, pars, and so on by hole. You can print the stats at any time.

Links 386 Pro comes with the Harbour Town course, which Access created using high-resolution techniques specifically for Links. Access has created eight earlier courses that are not hi-res for the previous versions of Links, but you can use them with Links 386 Pro by running a simple conversion utility. They show slightly less detail (and run a little faster) but are still excellent courses. Access is now converting all the old courses to hi-res and creating new hi-res courses. The Mauna Kea course from Hawaii will be the next one.



My family's been hooked on Links for two years, eagerly awaiting each new course. Now that we've got Links 386 Pro, I see no hope of breaking the addiction. It's truly an outstanding technical achievement, an unequaled golf simulation, and an unending source of satisfying entertainment—if you have the hardware horsepower to run it. ❐

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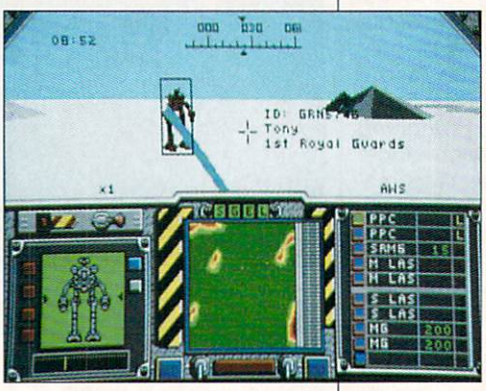
Network games are multiplayer games, once only text-based but now as advanced as the play-at-home VGA software you're used to. You have real live opponents—real people out to compete against you, disarming you with their skill, their speed, their unexpected lunacy. In short, opponents who are too random and exciting to be the product of any algorithm.



In MultiPlayer BattleTech, the armaments of past wars have been replaced by robotic bipeds armed with lasers and missiles.

Using your computer as the medium and your modem and phone line as the means, you have at your disposal a virtually unlimited world of unique opponents of nearly every skill level.

Network games reside in the giant network systems such as CompuServe and GEnie, but new hybrids are popping up on services such as The Sierra Network and the Digital Dreams Network. The options are as diverse as your gaming interests, from text-based fantasy quests to stellar trading to cribbage.

GEnie, working with the software producers at Kesmai, has developed a multiplayer environment called MultiPlayer BattleTech. In this environment the tanks and infantry of past wars have been replaced by gigantic, anthropomorphic robotic bipeds armed with lasers and missiles.

The richly detailed universe of the game (the thirty-first century) sprang from the board games and support material of FASA Corporation. You've probably seen the BattleTech novelizations in your local Waldenbooks store. The BattleTech world is a feudal system of the future, complete with kin or house rivalries. The game consists of two front-end programs that you download from GEnie. One program controls the logistics of all of the players, adds a touch of role-playing, and provides a rudimentary communication program with a forum for game-related correspondence. Behind that is the actual battle simulator: an EGA inside-the-cockpit simulator of your own giant robot.

The Sierra Network is a network set up specifically for modem gaming. The front-end software, available free of charge from Sierra On-Line (though that may change), is a slick 256-color VGA package that allows you to create your own personality (either true-to-life or wildly imaginative): You choose a customized facial icon, hobbies, age, and location. You also indicate your skill levels in the various games. This personality is what the others will see when they play against you.

You can choose from chess, checkers, bridge, cribbage, hearts, and backgammon. The graphics are fresh and rich. Playing these games against real opponents from across the country is as much of a pleasure as it is a challenge (for those who need a high-tech blastfest, The Sierra Network also boasts a multiplayer dogfight game based on Dynamix's excellent World War I flight simulator, Red Baron).

CompuServe offers SNIPER!, a European-theater, squad-level, World War II war game. The game can be played in ASCII, but the text characters are far too cryptic for my tastes. What makes this game shine is the graphical shell which you can download (there's no connect-time fee but there is a $2 flat fee for the software).

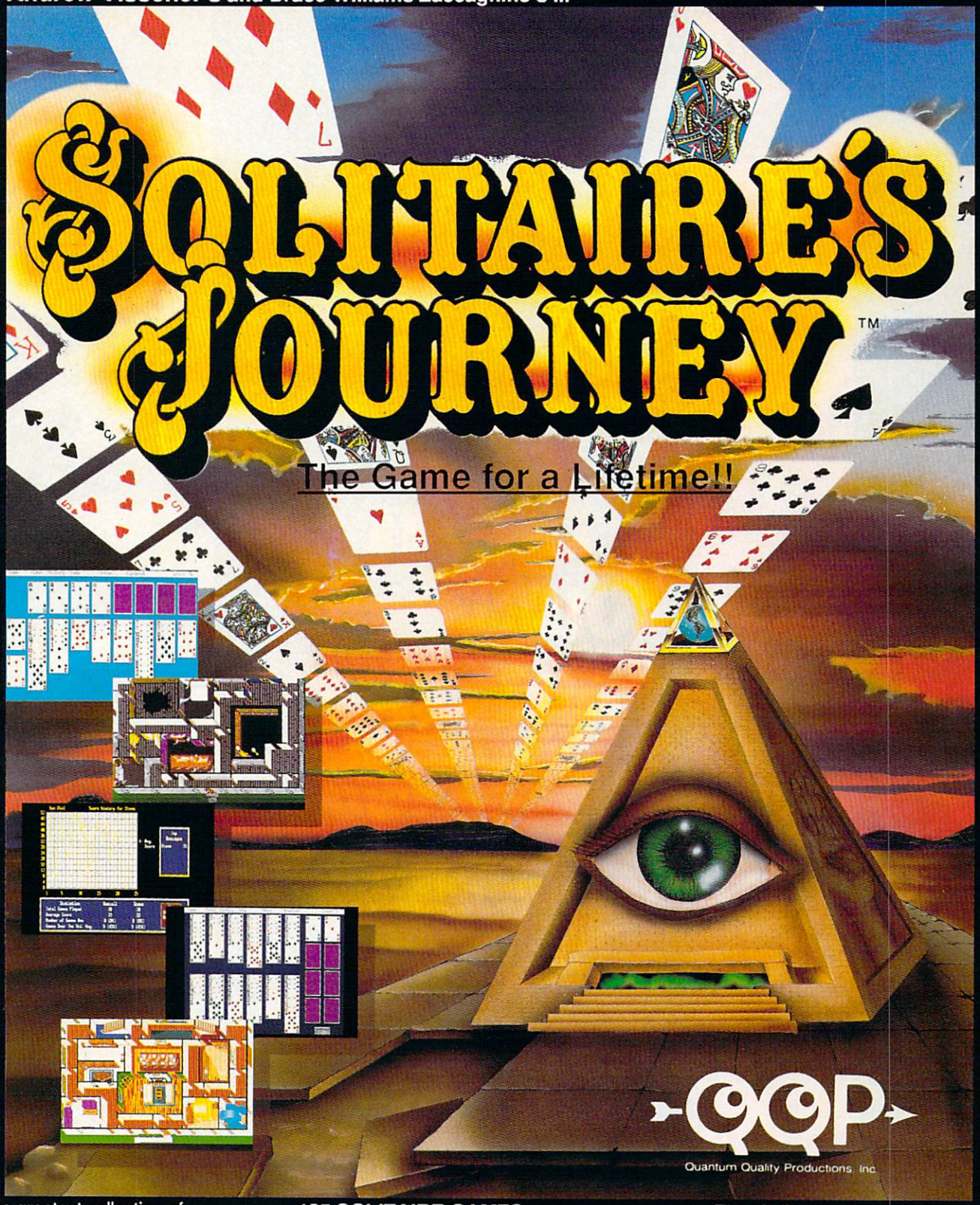
The software gives the player a skewed 3-D view of the battlefields (including building interiors), as well as several information windows displaying the status of the game.

While the game's control logistics seem a little obtuse at first, you can enter a modified boot camp where you explore all of the various commands. Battles are arranged in the game's meeting area, called the saloon. The games are actually missions with set goals for each side.

As I mentioned earlier, these options are only a small sampling of the multitude of multiplayer network games out there. One thing is common to all: They're addictive. There really is nothing like playing against another human opponent. Once you try it, you'll be hooked (nothing fuels a desire for revenge like losing to a real opponent—trust me, you *have* to get even).

Next month we'll explore some games that allow head-to-head play via a modem without a network intervening. And we'll look at strategies for finding worthy opponents. ❐

Andrew Visscher's and Bruce Williams Zaccagnino's ...



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Circle Reader Service Number 238

Where do game designers get their ideas?

Designing Your Fantasies

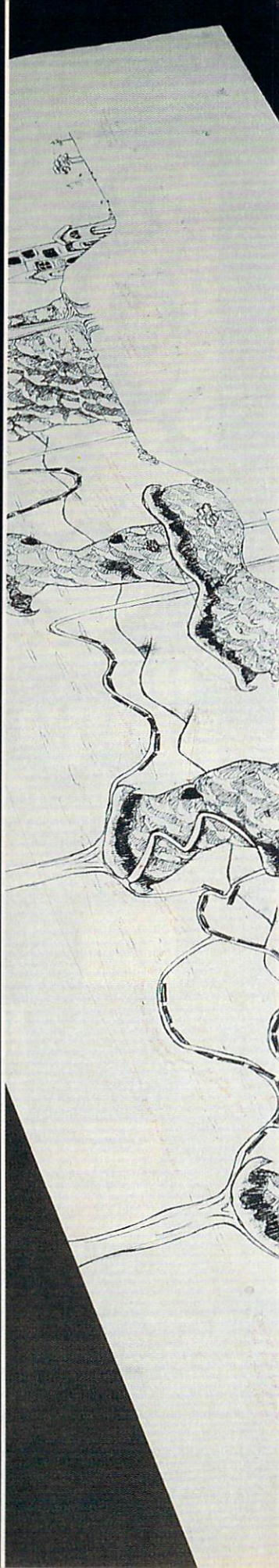
By Danielle Best & Tracy Mygrant

A pear-shaped creature runs across a grid. Bombs cover tile after tile, and you must determine which bombs the creature will blow up. Make the creature go left, then two squares to the right. That's it. The small bombs set off others, clearing part of the field. But watch it—the bigger ones will make the creature explode. Ah, you've got it now. It's running, quickly but carefully, closer, closer to the final bomb. If you knock it out, you'll move on to another level. As the creature dodges the mine fields to approach the final bomb, you . . . wake up.

And then, if you're David Bishop, director of design for Virgin Games (and lead designer of Dune and the upcoming Jungle Book), you grab the notebook and pencil beside your bed and record every detail of your dream. Game ideas can come from anywhere—even from dreams.

But most moments of clarity don't occur in the REM stage. In fact, only 2 out of 24 ideas Bishop has developed solo came to him in dreams. Coming up with the stuff that's fun—or at least what designers hope is fun—is usually a much more technical process.

Imagine trying to spread your creative wings while they're steadily being clipped by limited technology, time constraints, a demanding public, the likes and dislikes of coworkers, and executives who keep one eye on the bottom line.



Game designers, left to right:
Gano Haine, David Bradley, and David Bishop.
Below: Mike Berlyn.

Critical Gatekeeper

Accolade designer Mike Berlyn (Suspended, Altered Destiny, Tass Times in Tone Town) explains that designers generally come up with their ideas using one of two methods: scientific and unscientific.

Going the scientific route means devising better (or at least different) versions of popular games. By contrast, unscientific ideas develop out of pure inspiration—something just as mysterious as dreams—and are usually something completely different from what's already on the market. Products of the unscientific method include SimCity and Tetris. Since inspiration doesn't always come on its own, most designers merge both methods. "Sometimes, you just sit there, and nothing happens. You just sit there. Then the best thing to do is look at other products," Berlyn explains.

In the early stages of nurturing an idea, Berlyn stays home. "I don't care what office you work in . . . it's less conducive to inspirational thought," he says. Once a hot idea is generated, Berlyn takes it to a producer, who may give feedback ranging from "Let's do it" to "Absolutely not." If it's the former, he and the producer write a proposal and take it before a committee to get funding. Then the art director, the producer, Berlyn, and others begin putting in the year or so of work it often takes to create a final product.

Because game design often involves teams, quite a few ideas are

The Artful Dodge

Is it possible for game designers to bridge the gap between giving audiences what they want and creating games as a means of self-expression? To many, the answer is no. You either create for the crowd and expect a decent return or create from the heart and risk bankruptcy.

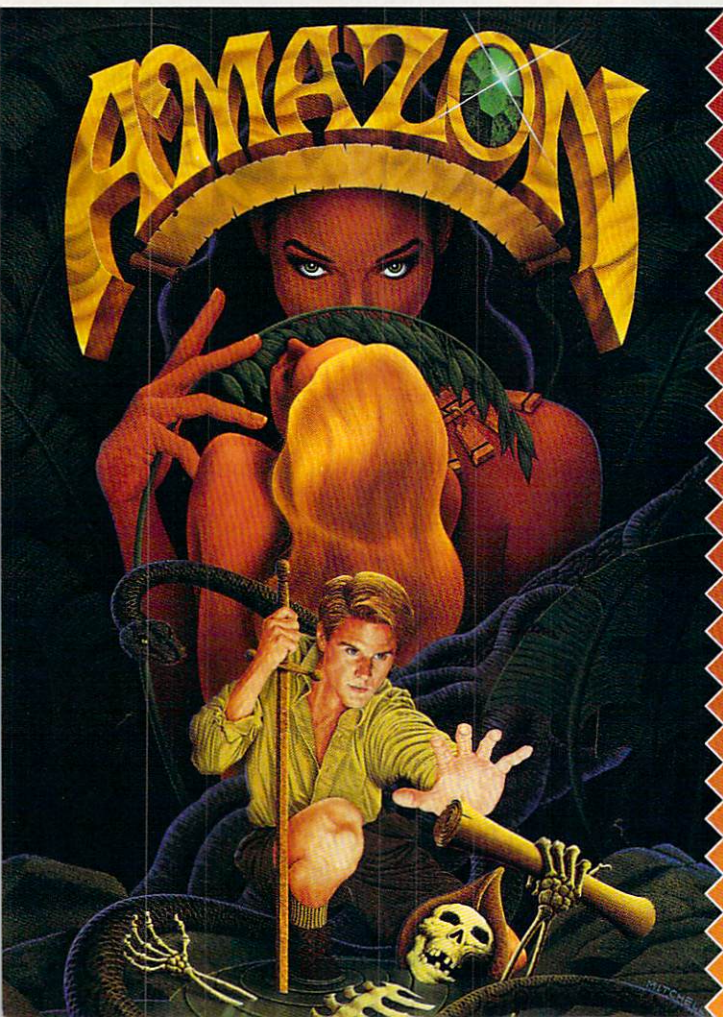
Those who opt to create for the crowd spend a lot of time figuring out what the audience wants, which can be terribly difficult. One reason for this difficulty is that today's average game buyers are very cliquish. They think of themselves as role-players, war gamers, and so forth. They only buy games that fit their categories. Catering to niche-minded gamers limits designers to making better versions of existing games, and some designers feel that isn't worth the effort.

"If you want to cater to these crowds, you can sell a lot of games," says Chris Crawford, who thinks he's writing for an audience that hasn't been born yet. "I design from goals rather than from existing games. I make my games from scratch—most people build their games from previous games.

"I think I'm going to have to ignore the commercial part and pursue it as an artistic imperative. I've been straddling the fence . . . and I've just decided that I have to put both of my feet on one side of the fence."

David Bradley takes the same approach. "If I see something that's extremely pleasurable to other people, I do it. I won't curtail my own vision for the sake of selling a product. I do my own thing. . . . I don't do what I do for money or fame or anything else."

Crawford and Bradley seem to be two of the few designers willing to make original, innovative games because that's all they want to do. It takes a lot of fortitude to go against the very market that might make you rich one day.



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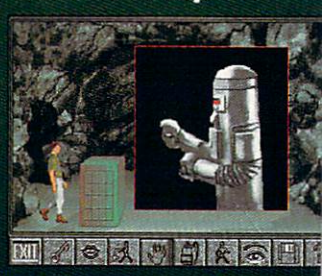

Metal monsters seek your destruction!*

generated in groups. Paul Reiche (Star Control, World Tour Golf, Archon), an independent designer in a group called Toys for Bob, says its method involves almost playing together. "You spend a lot of time talking, and someone will say, 'Oh, wouldn't it be cool if this?' And then someone says, 'Oh, yeah, and this too.' " They play out the games in their minds, adding the neat things as inspiration stikes them, he says.

Accidental Inspiration

Serendipity in everyday life can also spark a great idea. Brian Fargo, the president of Interplay, watched a PBS miniseries on castles one night. When the narrator said that castles are really military machines, bingo! He had an idea for a game that's since been produced: Castles. Or take Josh Mandel's idea for a sushi-bar-in-the-backwoods game. It came during a theatrical tour when he and some partners ended up in the deep woods at a Japanese-style eatery. Mandel (Scarytales, Laura Bow: Dagger of Amon Ra), the director of product design for Sierra On-Line, says he strongly doubts that it will ever became a game, but it's from such offbeat ideas as this that tomorrow's

Breaking In

How do you break into game design? By accident, if some game designers' stories offer any proof. Gano Haine bought an Apple computer for her daughter. Haine ended up playing games more than working and began making comments on CompuServe about the games she played. Eventually, her remarks grew so extensive that she was hired as a consultant. She's since gone on to designing games for Sierra. "I don't think it's something you do to yourself on purpose," she says. "I soon realized that I needed to find a way to make it a profession or I'd starve."

David Bishop's start was just as accidental. As a buyer at a game store in London, he met representatives from game companies. One salesman was offered a job with a design group in Hungary and invited Bishop to join him as a coworker. That was ten years ago. Bishop has spent the last three years heading the design department at Virgin Games.

The stories go on: Paul Reiche, an independent designer with Toys for Bob, met people in the industry through Dungeons & Dragons conventions but put together his first game for an art history class in high school. An independent who works through Sir-Tech Software, David Bradley learned how to program while in college, working with software that helped compose musical arrangements.

So what's the best way to break into the industry on purpose? As Accolade designer Mike Berlyn points out, there are limited openings, and much depends on whom you know or who knows you. If you're really serious, though, he suggests that you do what he did in the early 1980s: Start your own small company to produce a few titles. Even if the company isn't successful, your work may give you enough credibility with other firms to get a job. An alert to interested parties: Bishop says Virgin Games is looking for one or two good designers—and they're not easy to find. Typically, Virgin and others hire talent via word of mouth. Who knows? Your beginning could be anything but accidental.

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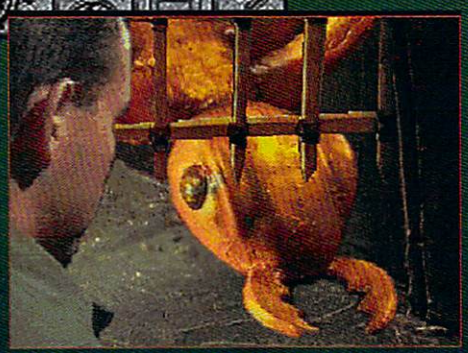
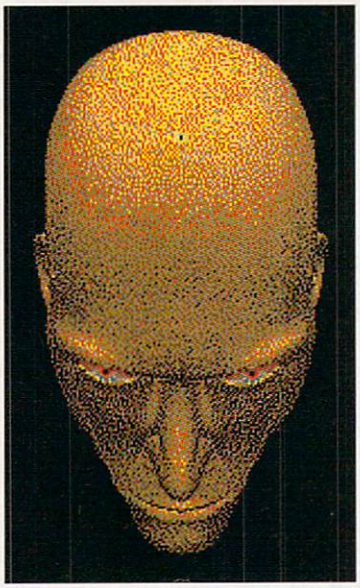


They grow them big in these parts!*

Gasp in disbelief at the lost tribe of Amazon women!*

*Actual Amazon VGA screens.

Puzzled?



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With so many ideas, how do designers know which ones to pursue? Designer Damon Slye (Aces of the Pacific, Red Baron, A-10 Tank Killer) of Dynamix says his formula requires four checks. First, the idea must be something he thinks will be fun or at least engaging. Second, he has to think the public will be interested. Third, he considers whether the technology will allow him to actually put out the product that's in his head. And fourth, it has to be financially feasible. As he explains, eight years ago a game might have cost around $30,000 to produce. Now, some can run a million dollars and more. As a result, he notes, only about one in five ideas becomes a game.

According to Chris Crawford (Balance of Power, Patton Strikes Back, Eastern Front 1941), independent designer and founder of the Computer Game Developer's Conference, "Depending on how you cut the cake, there are about 500 game design people in the world." Mandel says that the small number of designers, combined with the fact that the medium is so new, creates noticeably big differences in styles.

For instance, Gano Haine (Eco-Quest) sees herself as a storyteller. This designer for Sierra says she lived in her imagination from the time she was a little girl. Her natural knack for storytelling, a background in theater, and a passion for improvisation make her designs like fantasy and fairy tales.

Merging Cinema with Verity

F. J. Lennon (Challenge of the Five Realms, MegaTraveler II and III, Guardians of Infinity), producer for MicroProse Greensburg (formerly Paragon Software), is concerned with developing story lines and creating predictable characters. "People enjoy the games themselves, but they're demanding a cinematic side," he says.

While designers theoretically play the biggest roles, a game's personality has strong links to the company that produces it—especially if it's created in-house. According to Jerry Wolosenko, Psygnosis's CEO for North America, straight-laced executives are less inclined to take risks, while creative types are more willing to dabble in the avant-garde. Business types are also more likely to enforce design guidelines that some say seem more like fill-in-the-blanks than anything else. The end result, says one designer, is one game made ten different ways—only embellished with new characters and settings. He likens the situation to being a new writer in Hollywood who expects creative freedom when he writes his first script, but instead is told how each and every one of his characters should act.

Hits and Masses

However, formula-driven spinoffs of current games are what people are buying, meaning those games have greater chances of making it to stores. And since people tend to buy what they know, ideas that don't fit a given niche are a bigger risk. In addition, it's hard to communicate abstract ideas to others. If designers can't pitch their ideas in a language executives can understand, companies aren't likely to back the idea financially, says Reiche.

Although the majority of companies choose to produce "safer" games, Crawford thinks that extreme caution only hurts the industry in the long run. Producing categorically correct games puts the industry in a rut, he says. The chain only breaks, he adds, when someone—usually a freelancer—comes out with a game that defies all the rules, one that doesn't match what's on the market. Companies run out to copy the game, another category is born, and the process starts all over again.

In order to step out of the rut, he says, the industry needs to stop being afraid of innovation. But when the realities are considered, few companies want to risk losing thousands of dollars for the sake of design as an art.

However, Lennon adds, there's still hope. "We're getting to a point where the industry has matured, and we're going to have to take risks in order to advance."

Designers are forced to balance reality with the fantasies they want to create—a task requiring quite a mix of skills. "They have to be passionate about games in general . . . and be passionate about people having fun," says Bishop. They must also have enough imagination, he says, to envision what it's like to play the game after reading about it on paper. "And they must be able to temper their creative juices with commercial reality." But for David Bradley (Wizardry V: Heart of the Maelstrom, Wizardry: Bane of the Cosmic Forge, Wizardry: Crusaders of the Dark Savant, Parthian Kings), an independent designer who publishes primarily with Sir-Tech Software, the bottom line is even simpler: "The two main ingredients for a good designer are inspiration and insanity." You have to be insane, he says, to put up with game designing in a public light as opposed to keeping it as a hobby. ❑

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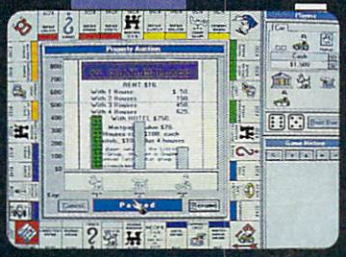

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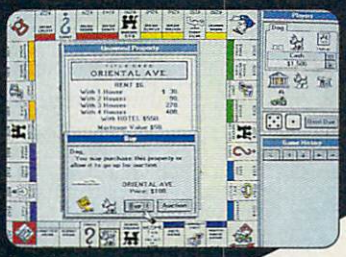

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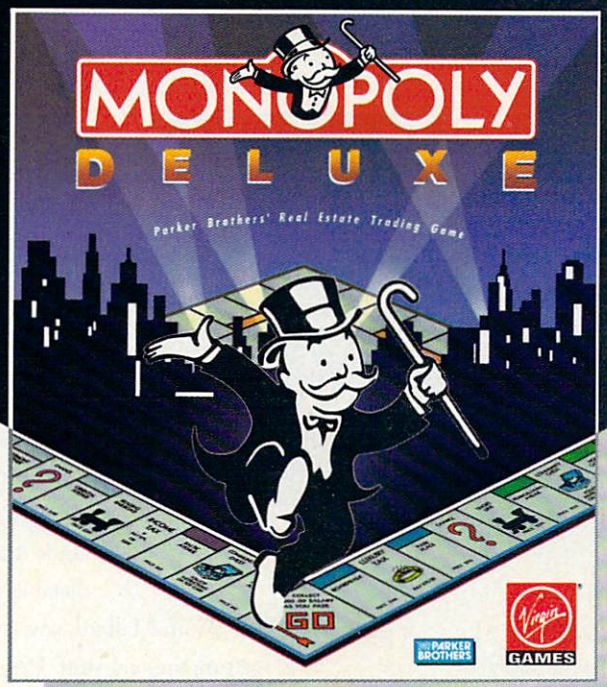

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Circle Reader Service Number 198

64/128 VIEW

Warning: This column contains material that some Commodore users may find disturbing.

Tom Netsel

There's bad news for Commodore users this month: *RUN* magazine is gone!

As I write this column in the middle of October, I've just confirmed that one of the grand old magazines dedicated to the Commodore 64 and 128 has ceased publication. The November/December 1992 issue of *RUN* is its final edition.

"We tried our best. We gave it a good fight," said Dennis Brisson, editor-in-chief of *RUN*. "It was a difficult business decision to make. We regret having to leave. We've made a lot of strong friendships in the Commodore community."

The decision to close the pages on the IDG publication came shortly after the November/December issue went to press, Brisson said. As a result, he was unable to inform the readers of the magazine's demise. In our telephone conversation, Brisson said that IDG, *RUN's* parent company, would send a letter to subscribers to inform them of the magazine's termination and to make an offer to fulfill outstanding subscription obligations.

RUN closes its pages with issue number 99 after ten years of publishing articles, programs, and tips for Commodore 8-bit owners. It joins the ranks of *Ahoy, Commodore, Transactor,* and other publications that once thrived in a robust market of Commodore products, subscribers, and advertisers. But new products and advertisers are in short supply in a computer market dominated by IBM and a host of PC clones. Trying to serve a mature Commodore market in difficult economic times proved to be less than profitable for IDG, a large publishing company that specializes in computer-related magazines.

Just a few years ago when the 8-bit market was the center of computer activity, *RUN,* then a monthly magazine, peaked at 228 pages. As interest in computers tilted more in favor of MS-DOS, *RUN* was forced to cut its number of pages and frequency of publication. In its final stages, *RUN* was reduced to 64 pages, published every two months.

Brisson, who with other staff members will be assuming new duties at IDG's *AmigaWorld* magazine, said no decision had been made as to whether or not *RUN* would maintain its area on QuantumLink, the Commodore-specific information service. Managed by Tim Walsh, the magazine's technical manager, the RUN area has offered programs for downloading, a message base, and a variety of other services. Brisson said he would be talking with Q-Link officials shortly. If the section were to continue, Brisson said he felt that any support he or Walsh could offer would be limited.

RUN and Gazette were competitors—we sought the same advertisers and subscribers. But in a time when Commodore resources are growing thin, I had hoped that there would be room in the Commodore community for both of us. Over the years, *RUN* provided its readers with a wealth of information about the Commodore 64 and 128, and I hate to see it go. It'll be missed. ❐

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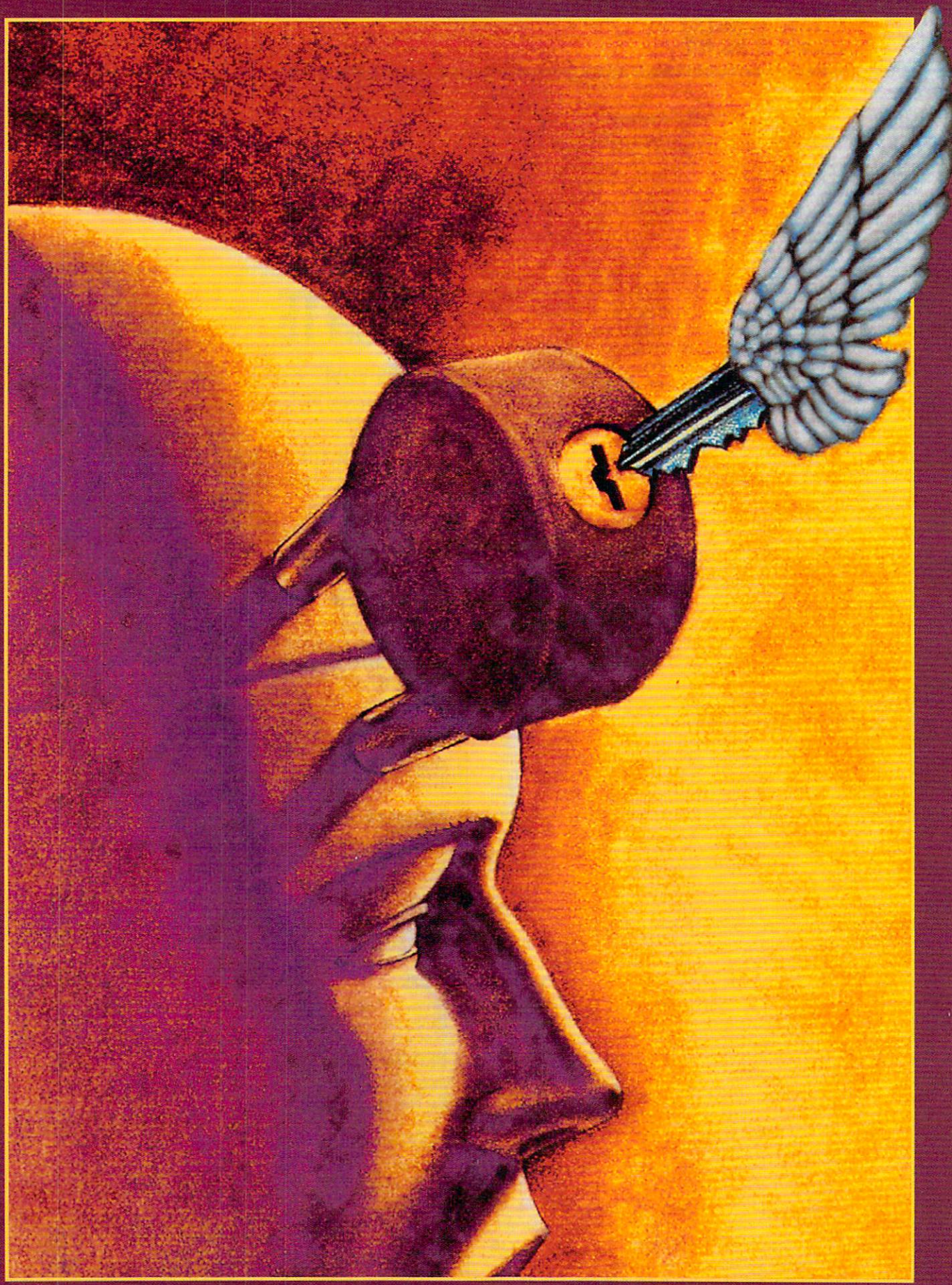

Thanks For The Memory

BY JOHN ELLIOTT

The 64 and 128 work well with their limited usable programming space, but some programs are simply too large to load entirely into memory. Some large programs, such as PaperClip III and GEOS, load sections as needed from disk. This technique is called virtual memory because the information on the floppy is treated as part of the computer's memory. Word processors often use this technique with spelling checkers, comparing the document with a list of words on disk.

The technique is far from ideal because disk drives are slow and, in the case of the 1541, limited in size. Disk access speeds can be boosted with the use of cartridges such as Final Cartridge or chips such as JiffyDOS, but there can still be a lot of disk swapping when using programs such as GEOS and large adventure games.

Imagine how much faster parts of a program could be accessed if they were in memory chips rather than on disk. Instead of the code flowing from the disk through the drive and its serial cable to the CPU, it'd be available for use almost instantly.

That's the idea behind RAM expansion units (REUs). An REU is a collection of memory chips on an external cartridge that plugs into a 64 or 128 and lets you store thousands of additional bytes of data in RAM.

About the time that Commodore introduced the 128, it made available three REUs that function as fast temporary disk drives: the 1700 (128K), the 1750 (512K), and the 1764 (256K). While the 1700 and 1750 were designed to work only with the 128, the 1764 was created for the 64. The power supply for the 128 is more powerful than that of the 64 and will support the load of these RAM expanders, but the 1764 for the 64 comes with its own heavy-duty power supply.

The one problem with these REUs is that Commodore didn't make enough of them. The 1700-series REUs are no longer made, but they still turn up at swap meets and used-computer sales. Other REUs are still available through a number of dealers and sources. Tenex, for example, markets an REU called the 1750 Compatible.

Software Compatibility

The 1700 series has its own disk operating system, which must be loaded from disk. Because such an operating system often overwrites the memory used by software, many REUs are incompatible with programs that haven't been designed with an REU in mind.

The 128 has a larger collection of programs that can use an REU than does the 64. The graphics-oriented programming language, BASIC 8, can store images in an REU. Some 128 programs, such as Digital Artist and MasterPaint for the 128D, use an REU to store either fonts or graphics. Several 128 versions of word processors, such as Fleet System IV and Fontmaster 128, use an REU as a disk drive, which allows for faster spell-checking.

PaperClip III, Pocket Writer III for the 128, and GEOS for the 64 and 128 use the disk drive as virtual memory. When the program is larger than the capacity of the computer, additional layers of the program are loaded from disk, swapping out unused parts. If the disk is an REU, there is no noticeable wait while disk access takes place. ProTerm 128 uses an REU as an extra text buffer. Parsec has a graphic adventure game for the 128D or modified 128 which can use an REU. Newsmaker 128, a desktop publishing program, also puts an REU to good use.

BASIC programmers can use LOAD and SAVE commands if the REU is treated as a second disk drive. The 128 SWAP, FETCH, and STASH commands in BASIC 7.0 allow direct use of an REU, providing the user knows the beginning and ending memory locations of the program to be transferred, both in the computer's and the REU's memory.

Cards and Cartridges

REUs connect via the computer's cartridge port, and they can share an extender card with other cartridges. I first bought a Navaronne cartridge holder, which allows up to four cartridges to be connected at once, although only one can be turned on at a time. I subsequently bought an Aprospand extender card, which allows me to turn on four cartridges at once.

Many cartridges, such as Final Cartridge III, are not compatible with REUs. Other cartridges that are primarily archival devices can use the REU as a second drive for copying purposes. Some of these include Super Card+, Super Snapshot, and Maverick.

JiffyDOS has a DOS wedge, a disk speed-up, and a copy program on a chip.

the 64 and 128 and their drives, it does not use the cartridge port. It can use an REU for copying purposes.

GEOS

GEOS 2.0 for the 64 and 128 recognizes an REU as a RAM disk. Many users place all the programs and files they plan to use for a work session in their REUs and only use their floppy drive to store the results of their work session. GEOS typically takes about two minutes to load itself into memory and its required files into an REU. GEOS uses the REU to store data that would frequently be accessed through the floppy, speeding up disk use.

The shadow RAM option uses an REU to speed the action of the floppy. A RAM reboot option allows rebooting of GEOS after a computer reset, so that whatever was in an REU is preserved. GEOS will recognize the larger two Commodore REUs but not the 1700.

Two third-party programs that allow task switching between GEOS applications and/or accessories require that an REU be present. GeoWizard allows movement from one application or accessory to a second, with an automatic return to the first after the second's closing. It will do this across three disk drives and allow access to accessories not normally available from within that application. GeoWizard requires at least a 512K REU.

The other product, GateWay, permits instant switching between any two accessories and/or applications. Switching among drives does require changing floppies. GateWay with a 1700 REU allows task switching and the use of three drives. With a 1764 it offers a RAM disk but does not allow switching or the use of three drives. The 1750 offers a RAM disk, task switching, and the use of three drives.

The 512K Barrier

The RAMDOS program that comes with Commodore's REUs doesn't recognize memory beyond 512K. Extra memory isn't always helpful, however. Some software works with expanded REUs but doesn't recognize the additional memory. BASIC on a 128 works with up to one megabyte of RAM. The Write Stuff word processor will place files in any REU, up to two megabytes. JiffyDOS also works with expanded cartridges, as will the Super Snapshot v5 cartridges.

GeoRAM

Berkeley, now known as GeoWorks, sells GeoRAM, which is a 512K cartridge that works on both the 64 and 128. Unlike the Commodore 1700 series, it does not require a larger power supply for the 64. Normally, it works only with GEOS. No other hardware or software will recognize it.

Schnedler Systems' Turbo Master replacement CPU in a cartridge runs many 64 programs, including GEOS, at four megahertz instead of one megahertz. When placed on an extender board, it will work with GeoRAM. Turbo Master's designer will soon have a special device available that will directly link the two cartridges.

Quick Brown Box

For several years Brown Boxes has offered battery-backed cartridges that a 64 or 128 can load from and save to. Quick Brown Boxes (QBBs), as they're called, are REUs that contain battery-backed nonvolatile RAM. They can store dictionary and data files for fast access, and they will also work on an extender card. QBBs range in size from 64K to 256K. The cartridge has a reset button and a switch that allows changes between 64 and 128 modes.

Most BASIC programs can be saved to and run from the QBB, as can some machine language programs. Several programs have been specifically designed to take advantage of the box. A patch is available that allows the Easy Working spreadsheet to load from the QBB. More recently, a spreadsheet program was commissioned that not only resides in the box but saves the spreadsheet and data to the box.

There's also a 128 full-featured modem program. The QBB is compatible with JiffyDOS and cooperates on an Aprospand extender card with the 1700-series REUs. The most commonly used program in the QBB is probably The Write Stuff word processor, in both 64 and 128 versions. While there is a version for the 64K box, The Write Stuff for larger boxes includes a modest spelling checker. A larger dictionary is accessible from an REU if the QBB and REU are on an Aprospand extender card. The Write Stuff also uses the REU as a RAM disk for saving and loading files, and allows a reset so that the contents of the REU remain intact.

The manager program for the QBB allows partitioning so that, in addition to storing programs, it will save and replace whatever is being programmed. The newest manager also makes possible direct saving to the box of whatever program is in memory. A DOS wedge is also present.

You can designate one program on the QBB to load and run automatically whenever the computer is turned on. With this autobooting feature, my Write Stuff is so easy to access that I use it even for short notes. With its battery backup on my 64, whatever I have been typing with The Write Stuff remains in memory when the computer is turned off or loses its power. The 128 version allows the writer to save files to the cartridge.

Since the QBB doesn't drain the computer, the standard 64 power supply is sufficient. I am able to carry my typing between home and work by simply carrying the cigarette package–sized box in my jacket.

CMD RAM Devices

Creative Micro Designs (CMD) sells RAMDrive and RAMLink, two devices that allow several megabytes of nonvolatile storage for the 64 and 128. RAMDrive, like the QBB, is portable. It inserts into the cartridge port of a 64 or 128, or it will cooperate with an REU on an extender card. Although

RAM EXPANDERS

Here is a list of some currently available RAM expansion units.

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Bedford, MA 01730
(617) 275-0090
Quick Brown Box
64K—$79
128K—$129
256K—$169

CREATIVE MICRO DESIGNS
P.O. Box 646
East Longmeadow, MA 01028
(800) 638-3263
RAMDrive
512K—$199.95
1MB—$249.95
2MB—$299.95

RAMLink
Expandable up to 16MB with RAMCard
Without RAMCard—$179.95
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1MB SIMM—$42
4MB SIMM—$145

TENEX
56800 Magnetic Dr.
Mishawaka, IN 46545-7481
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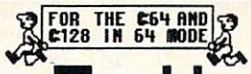

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for several days without external power. I have been able to carry two megabytes of programs and files between the computers at home and at work with this cartridge.

RAMLink also has its own power supply. An optional battery pack allows retention of memory contents for several hours during power disruptions. RAMLink has a pass-through port that accepts cartridges. An REU port accepts RAMDrive, GeoRAM, or the 1700 series. RAMLink can be purchased with configurations of up to 16 megabytes of storage capacity.

Both devices use a special disk operating system that permits most programs to use the RAM devices as permanent RAM disks. Most REUs work in this way only when a program is designed specifically for them. Two programs have been specifically developed for this special operating system so that they will take advantage of the CMD devices. The Write Stuff has a CMD version that blends the speed of its QBB version with the added features of its floppy disk program. It also recognizes the ability of the CMD devices to create partitions and subpartitions. CMD has developed a version of GEOS that will run from either device, recognize partitions, and allow you to perform task switching.

In comparing the two units, be aware that the RAMDrive is designed for portability. Its current maximum capacity is two megabytes. The only cartridge I could get it to recognize on an extender card was my REU. RAMLink is not designed to be removed from the computer once installed, and it will recognize most of my cartridges. Its capacity can be expanded up to 16 megabytes. Both devices will control an REU, but when the computer is turned off, REU memory is lost. RAMLink controls the REU memory, which becomes nonvolatile when the two devices are connected.

The Right Unit

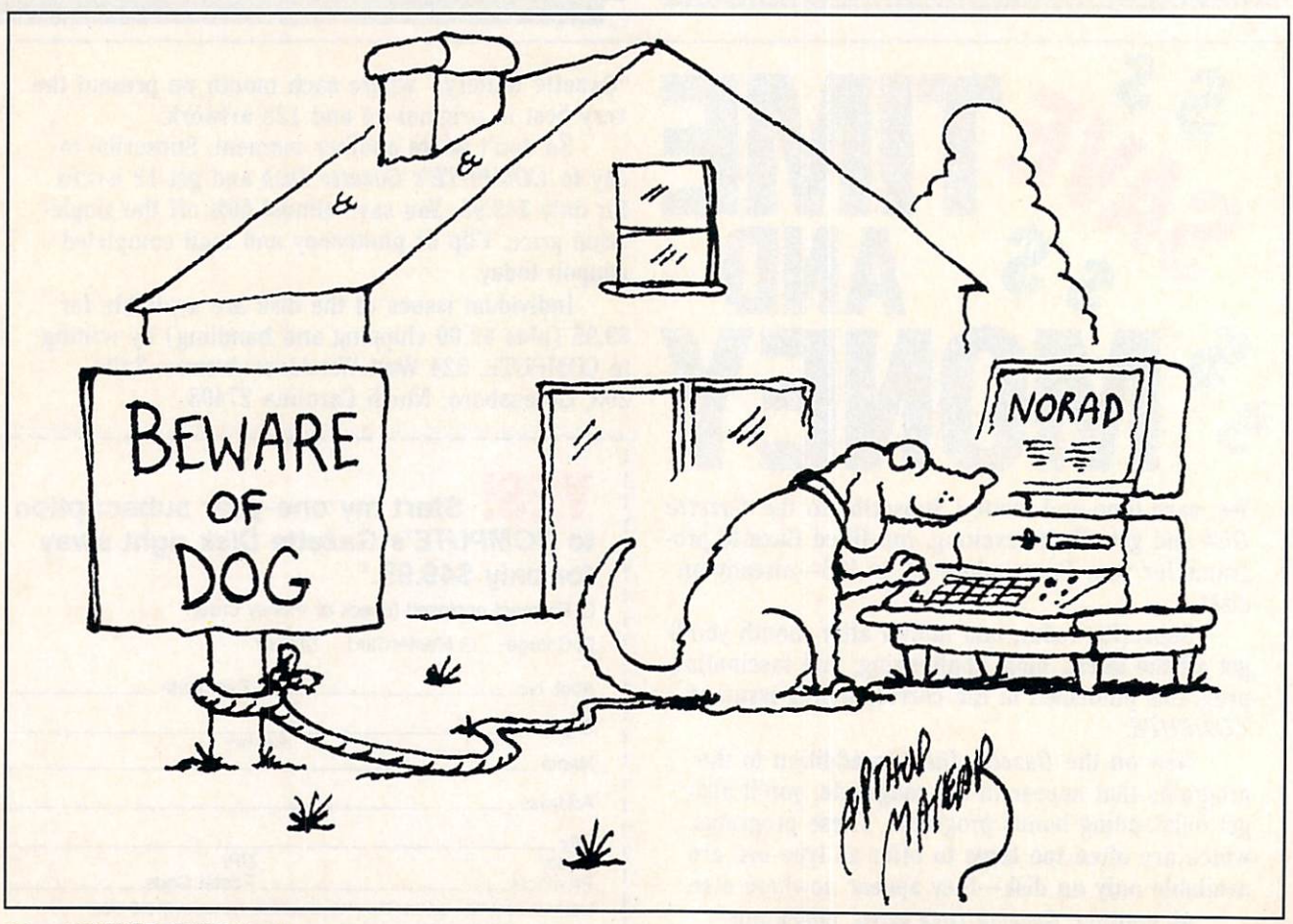
Obviously, this decision must take into account what programs are most often used and whether instant access is important. My own rule of thumb is that if I have to wait to load a program, I will not use it daily. I use The Write Stuff from a QBB every day. I do not use GEOS that frequently. While I can load GEOS instantly from the QBB, I still have to wait two minutes to load related files into my REU. I would also have instant disk storage and retrieval with RAMLink or RAMDrive. If I used only GEOS, I would buy GeoRAM and expand it. It does not require a special power supply below two megabytes, and it is the only RAM device that will work with the Turbo Master CPU.

For my situation, one of the CMD units looks very attractive. To decide whether to choose RAMLink or RAMDrive, I will still need to balance off portability, compatibility with other cartridges, and maximum potential memory capacity.

The 128 has a large number of available programs that use RAM expansion. In addition to GEOS and The Write Stuff, the 64 has several copy programs, cartridges, and bulletin board systems that will recognize or reside within a RAM device.

The CMD devices combine the features of REUs with the permanence of the QBB. They also are compatible with more programs, both as storage mediums and as permanent RAM disks, for the storage of virtually any created files.

Availability may be a problem, but cost shouldn't be when it comes to using a RAM device. An investment of between $50 and $300 for a RAM device will upgrade your Commodore to the point that you can challenge the



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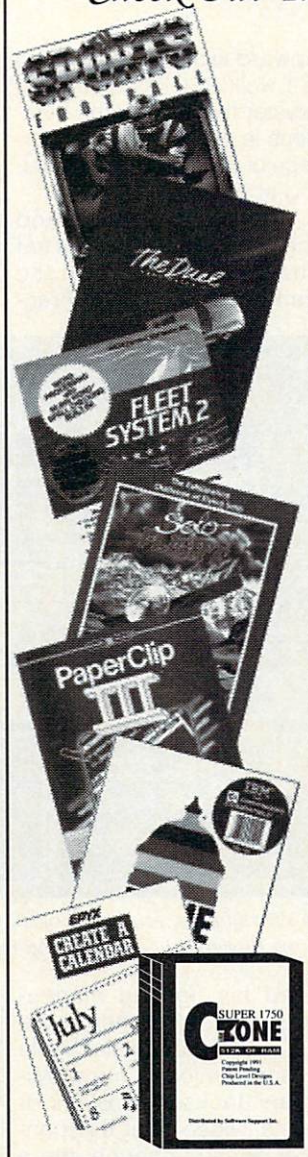

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WILD STREETS

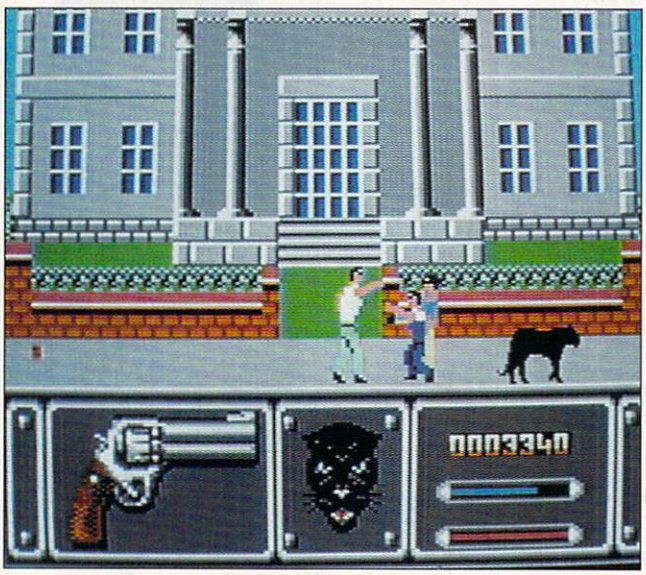
If you like karate, fighting a variety of foes, and rescuing kidnap victims, then grab your joystick and get ready for Titus's new action adventure, Wild Streets.

Set in 1998, the action takes place in and around the wild streets of crime-ridden New York City. Drug lords and arms dealers have turned the city into a combat zone. Honest citizens have fled, and control of the city is in the hands of criminal organizations. These criminal empires have amassed fortunes that are crippling the nation's economy. Something has to be done. Fighting through the rubble and ruins that cover more than half the city, CIA forces launch an effective strike against the criminals. Their success is offset by the kidnapping of the CIA leader, John Stevens (code-named The Boss).

Your mission is to find Stevens and rescue him. You've been trained to accomplish difficult missions at one of the nation's most hush-hush training academies. You're a master of secret and lethal martial arts—but don't forget your trusty .357 magnum. Even though this is a single-player game, you'll have another agent working with you—a 180-pound, eight-foot-long black panther with a mind of her own.

You can control your character with either a joystick or the keyboard. By using combinations of fire button and joystick movements, you'll have quite an array of actions available: high jump, right jump, left jump, crouched punch, regular punch, stomach kick, elbow jab, head butt, uppercut, high kick, stomach punch, upward kick, right walk, and left walk. It takes a while to master the proper combinations in order to take advantage of your character's fighting ability.

As my character walked through the deserted streets of the city with the panther at his side, I practiced his fighting maneuvers. As he punched, kicked, and jabbed, the whole scene reminded me of Michael Jackson's "Black or White" video—but this panther doesn't change into a human. This one is trained to protect you. She slashes, maims, and kills enemies without any effort or control on your part.



In Wild Streets, you and a black panther take on drug lords and arms dealers who have turned the city into a combat zone.

With the game, Titus includes a 28-page manual that provides background to the kidnapping and many of the enemies. The manual has few real tips for playing the game, but it makes interesting reading. The most helpful item is a card that lists maneuvering commands for both the joystick and the keyboard. I found it helpful to prop the card next to the monitor while I was learning the game.

The game has a status box that tracks the score and the energy levels for both you and the panther. Just as you can't control the panther's actions, neither can you restore or conserve her energy levels. As for your own character, he'll expend energy every time he fights or fires his gun.

You can conserve energy by walking quietly between encounters with the bad guys. During a fight with a gang leader or major enemy, the panther's energy bar becomes an indicator of your enemy's strength. I find it more helpful to know the effect of my attack on my foe than to watch the big cat's energy level. After all, I can affect the enemy's energy, but I can't do anything about the panther's.

As you travel through the various parts of the city, seven gangs are out to stop you. The gangs have colorful names like *The Harlem Headcrunchers* and *The Happy Gravediggers*, and each is run by a particularly tough leader. You'll have to fight the leaders in order to make progress. As you advance from level to level, the riffraff opposing you becomes more skilled. In fact, some are so powerful that it'll take more than karate chops to stop them. This is the time to draw your gun.

A word about that weapon. Even though you can use your .357 during fights, it has only six bullets, so use them sparingly. Watch for more ammunition lying on the sidewalks—I told you this was a tough town! Each ammo magazine you pick up contains six more bullets. In the long run you'll find that your hands and feet are the best weapons. They won't run out of ammo in the middle of a fight.

Once you've located and rescued The Boss, your task is only half-finished. You still have to get him back to safety. He's no help, since he's too weak from captivity to defend himself. Wouldn't you know it? This is when you'll encounter the strongest foes, too.

The color and graphics on the Commodore are good, but not as good as the ones printed on the package. If you read the fine print on the box, you'll see that those graphics are from the IBM and Amiga versions. The ones for the Commodore are much less detailed, but the graphics still make good use of color and contrast.

The musical background of the game certainly didn't remind me of Michael Jackson's video. This one occasionally sounds like a 45-rpm record being played at 33⅓. For that reason, I feel the music isn't quite up to

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the standards of the rest of the game. It isn't a major distraction for me; I simply turn off the sound. Players who like musical accompaniment might find it a bit disappointing. On the other hand, they may be like my son and get so wrapped up trying to master the game that they don't notice the flawed music.

Wild Streets is challenging. The multiple movements require practice, and increasingly strong enemies force you to stay alert. In a time when more and more software manufacturers have abandoned Commodore users, it's refreshing to find a new game that offers colorful graphics, multiple levels, and hours of fast-paced computer action.

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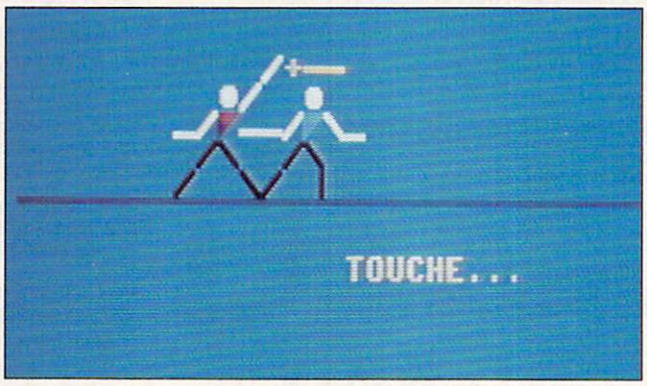
KEYBOARD ANIMATION, CUSTOM TITLES

All hackers, programmers, and self-appointed computer gurus exit here. These two programs are not for you—unless, of course, you'd like to develop a program that serves a function similar to Keyboard Animation and Custom Titles.

When reviewers look at software, they have to keep in mind the target audience as they consider whether or not a program meets its intended goals. If the reviewer is too far removed from the target audience, he or she runs the risk of misjudging the software. That's why Dave Minnick writes reviews of utility programs and sophisticated simulations, while I write about word processors and educational programs. That's why Dave, with his more than ten years of programming experience, wasn't overly impressed with the Andor House tutorials, Keyboard Animation and Custom Titles.



With Keyboard Animation, you learn how to create a variety of action scenes with the graphics characters on the 64's keyboard.

Dave already knows this stuff. On the other hand, I've spent ten years at a keyboard using other people's programs, and I was intrigued, tempted, and finally educated in the programming basics that these two programs offer.

Custom Titles and Keyboard Animation lead you through the steps involved in creating two elements that help make up successful programs: title screens and animated sequences. To create these elements, Don Radler, the programmer behind Andor House, uses PRINT statements and the Commodore keyboard's graphics keys. Each program consists of a disk with a text file that contains a friendly article and instructions for using PRINT statements and graphics keys to create simple animations or custom titles. Additional files on the disks are examples of Radler's work that illustrate what can be accomplished with the instructions.

What Radler does is exceedingly simple in concept; maybe that's why no one has done it before. I've often wished someone would do this sort of thing because it's what I—and probably many others—have needed to crack the barrier of fear that separates the informed user from the beginning hacker.

In his documentation, Radler refers the user to his sample programs. Pointing to his examples, he explains how he went about devising the pertinent sections. The best piece of advice he gives, the keystone of the process, is how to set up a workable "canvas" on which to create an initial drawing. Radler's method calls for you to draw the figures first. You can actually see what you are creating with your PRINT statements when you list the program. Once you have the basic picture, Radler then tells you how to add other elements to enhance the drawing.

Adding the elements of space, sound, and color call for embedded characters in PRINT statements. While these characters enhance the drawing, they also distort the appearance of your program listing. As Radler explains the process, it's easy to understand, particularly for novices who can't make the mental jump from program commands on-screen to what those commands do when executed.

You can load, list, and run the sample files on each disk, and you can examine them thoroughly. You can also play around with them, learning what happens when you add a POKE 53281,9 and lose the drawing of a striped tiger against a brown background.

In Keyboard Animation, you see the gradual changes that are needed to animate a sequence of still drawings. You also learn some programming shortcuts that make the process less tedious.

While I enjoyed Radler's articles, I'd like to see him borrow some of the documentation from Keyboard Animation and add it to Custom Titles. In Keyboard Animation, he tells you the most efficient way to add color commands, and that is something he should also have included in the documentation for Custom Titles.

Along these same lines, I wish he had included tables that list the commands which control color in PRINT statements and the color codes in POKE commands which control screen backgrounds and borders. That would have been the ultimate in handiness for me. As it is, I had to scramble for my *Commodore 64 Programmer's Reference Guide*. My desire for color inspired this formidable feat of motivation; I'd never even opened that manual before. There's nothing wrong with having to do this, but includ-

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REVIEWS

ing those two tables would have made the documentation complete.

I don't think anyone has written tutorials for these simplest of programming techniques before; I don't suppose anyone thought there was a need. I'm sure there are a lot of Commodore users out there who lack only a starting point to begin programming.

The 64 is a great machine for learning. If you're new to programming, you'll find that the Andor House tutorials, Keyboard Animation and Custom Titles, are great ways to learn about these programming niches. Now, the question that comes to mind is, How many other tutorials can be devised to cover other areas of programming? I hope someone responds to this need—maybe Andor House itself.

ROBIN MINNICK

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SWAP

Foiled again by tiny tiles and a time limit—and I'm only on level 29! It's becoming addictive. It's a game from Titus for the 64 called Swap.

Swap's basic concept is simple: Clear a playing board of colored tiles. When you click on adjacent tiles, those tiles swap position. The object of the swap is to place tiles of the same color next to each other. When you succeed in doing this, those tiles disappear from the board.

Play gets even more challenging when you reach level 15. A time limit is introduced. Tiles are smaller, and obstacles called credits make advancing more difficult.

Even with the increasing difficulty, Swap is simple to play. There's a shortcut called an avalanche that helps you complete a level. By clicking on the avalanche feature, all remaining tiles drop down, Tetris-style, to fill any holes on the screen left by removed tiles. Of course, when tiles of the same color fall adjacent to each other, they disappear, clearing more board.

Swap monitors your performance as you play. If you play well enough, you'll move to the next level before you actually clear the board. Your progress is indicated on the right side of the screen in the form of stars. Stars are awarded as you accumulate points. If you earn eight of them, you'll advance to the next level.

Click on the Quit icon at any time to quit. This takes you to the summary screen, where you can read your statistics for the last level played. From this screen you can quit competition, continue the level you were playing, or go on to the next level. Naturally, the next level will be available only if you've earned your eight stars.

You're also given the option of saving a game. This is a great feature if your goal is to reach the highest level possible. By saving your game, you can start out where you left off instead of having to go back to level 1. Believe me, if you're on level 45 and need to leave the game, you don't want to come back and start all over!

When you find a tile sitting all by itself with no chance of disappearing, that's the time to use a supplementary tile. These are available on many of the levels. By clicking on a supplementary tile, you can pick it up and move it anywhere on the board. The point here is to place the supplementary tile next to an isolated tile of the same color in order to remove it. If you use the avalanche feature, you won't have much need for supplementary tiles until you reach the more difficult levels and encounter credits.

Credits make the game harder. They appear as stacks of silver, gold, or diamond ingots on the bottom right of the screen. The silver ingots are worth 1 credit; the gold ingots, 10 credits; and the diamond ingots, 100 credits. At this point, making a single swap costs you 2 credits, while removing a tile from the board earns you 1 credit.

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Therefore, if you make a swap that removes two tiles, you have a net gain of 0. The computer will not allow you to make a move if you can't afford to make it. Using a supplementary tile now costs you 10 credits. And if you use the avalanche feature, be prepared to spend 100 credits!

This is the time to kick the gray matter into high gear and use logic. By the way, there's an undo feature on all levels that allows you to go back and undo the last swap that you've made. It's sort of a built-in lifesaver when your goal is to clear the screen.

Swap gives you not only a competition mode but also a practice mode. The practice mode is great fun on its own. You can set it up any way you want. When you choose the practice mode, you receive a window of icons. From there you can select the number of colors you want, the shape of the tiles, and whether or not you want any of the extra features such as credits, time limits, supplementary tiles, or the avalanche. Here is a chance to pit your mind against difficulties of your own choosing. If you don't like what you've chosen, you can go back and set it up differently.

As you make your way through competition mode, tiles become smaller. Even though the colors and graphics are good, it becomes harder to position the pointer on the spot you want. At one point, my joystick pointer was larger than the tiles on the screen, making placement tricky.

Although the scoring seems to be quite involved, it isn't explained in the manual. So I'm not really sure just how you should approach the game. Should you try to fly through the screens and move on to the next level as quickly as possible, or take your time and use logic? This choice is up to you. If all you want is a challenge to test your mental powers, then focus on exercising your wits and use the practice mode to create the challenge of your choice.

The manual says that the level you proceed to is determined by your performance on the previous level. It assures me that if I play well, I can jump straight to level 90 after level 1! That has yet to happen. It may never happen in my lifetime. But if you want to know where to find me, I'll be sitting at my computer, trying to make that swap that will send me to level 90!

CHERYL TURNEY

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WORLD VIEW

Matthias Matting

VIEW FROM EAST GERMANY

If you hear or read about Germany these days, you probably remember the breakdown of the Berlin Wall, right? But I'm not writing about politics here in Dresden, East Germany (DDR); I'm writing about our little *Brotkasten,* as we call a computer in German. The word means "breadbox" in English.

Unification hasn't turned East Germany into a paradise, but it's not a bad place for 64 fans.

To give you some idea of the 64 scene here in East Germany, I'll first go into a little bit of history of the DDR. I got my first 8-bitter, a Sinclair ZX-81, ten years ago in an Intershop for the small price of DM (German marks) 100. In Intershops, you could buy all kinds of Western items, for Western currencies, of course.

East German computers were produced, based on a clone of the famous Z80 chip. There were two series of home computers. The first one started with 16K of RAM and was expandable to 64K, and the second one had more capabilities for expansion. In the final days of the DDR, a third series was produced—a clone of the Schneider CPC.

How about computer prices? You had to pay at least DDR-M (East German Marks) 3,000 for a computer with datasette. A single double-sided, double-density floppy disk cost at least DDR-M 30. An average worker at this time earned DDR-M 300 a week. If you wished to buy a 64, it was priced at DDR-M 4,000.

For better understanding of the situation here, I have to say that all the necessary things of daily life were very inexpensive, so nobody had to feel hungry. In this situation, it's clear that nobody ever bought programs. They were just too expensive. The only possible way to afford a program was to copy one and then make copies of that.

Well, the times changed. All the events that you heard about occurred, and now we are in a united Germany. There's only a small frontier between the East and the West. Another kind of frontier still exists in the heads of the people because of the different education, experiences, and conditions of life.

The average income in the East is approximately 60 percent of that in the West, but that's a great advantage for the 64. Whereas the Amiga dominates the market for home computers in the West, here in the East most of the young people buy 64s. That's why Commodore increased its sales in Germany by 41 percent in 1991. In all, it sold about 160,000 64s.

Computers, peripherals, and games are mostly sold by mail order, but they're also found in large department stores. The least expensive rate for a 64 with a disk drive now is at DM 550. An average worker now earns DM 500 a week. Luckily for us, there are many companies here producing peripherals. The most important products you should know about are the Pagefox desktop publishing module with 100K of additional RAM, Printfox, and Handyscanner, the world's first scanner for the 64. There are also Videodigitzer, Genlock Interface, Pay-TV Decoder, and so on.

In the software area, there is a great interest in GEOS. Our GEOS user club (GUC) has about 2000 members! Several products have been developed under the label of this club. For example, we have GEOS on EPROM (booting in eight seconds), GEOS-LQ (laserlike printing for 9- or 24-pin printers), and the new TopDesk (supporting four drives, four removable windows, fast copying, subdirectories, and much more). GUC publishes its own magazine called *GEOS User Post,* which is produced with GEOS. Every year, we have a meeting where all the members may participate.

Generally, there are few difficulties in getting foreign 64 products. Many distributors are found in Germany, so we can buy CMD's HD, RAMLink, and RAMDrive here in Germany. The higher prices of these devices in relation to comparable Amiga products make them a little bit unattractive for the normal user to buy. A CMD HD-20 hard drive costs about DM 1,200 ($700).

Unfortunately, electronic communication hasn't progressed here as it has in the U.S. There are no great BBSs for the users of home computers. Of course, you may call mailboxes and so on, but only 10 percent of the users have a modem.

I think the 64 users in Germany can be divided into three groups. First are the game players who want their machines to do more than just play games. As time goes by, they have to decide whether to stay with their 64s or change to larger machines.

Second are the demo programmers. They know their computers very well, and are the future programmers of games and other programs.

Last but not least are the elder users who are accustomed to their 64s and who don't want to leave them. Most of them use their 64s for serious applications, such as business, and have learned that nearly all is possible with 8-bit computers. I think this mix of users guarantees the 64 a good start into the next millennium.

I hope I've given you some idea of what the 64 scene is like here in East Germany. Germany is not a paradise, but it is a good place for the 64. ❐

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FEEDBACK

Questions and answers about SpeedScript files, problems with programs, and more

Wrong File Type

I've just started using SpeedScript, and I'm running into a problem. Whenever I type a letter and print it to disk, the next time I try to recall it, I get a *FILE TYPE MISMATCH* error message. Do I have a defective disk or what?

BOB CLARK
INDIANAPOLIS, IN

Whenever you create a document that you want to save with SpeedScript, you normally press f8 and enter a filename. SpeedScript then saves the information in Commodore screen codes as a program (PRG) file. To load the file back into the word processor, press f7 and enter that filename.

Printing a file to disk is a totally different procedure. To print a file with SpeedScript, press Shift+Ctrl+P simultaneously. At this point you'll see a prompt asking if you want to print to screen, disk, or printer. If you press D for disk and supply a filename, your document will be sent to the disk as a PETSCII sequential file. If you check the disk directory after the process, you'll see the file has SEQ following it, indicating that it's a sequential file.

Some of the SpeedScript companion programs, such as SpeedScript Justified, require sequential files. A sequential file is also a convenient way to upload text to a BBS. It can be read with any sequential file reader or loaded into other word processors. You cannot load a sequential file directly into SpeedScript, however. This is why you're getting that particular error message.

Look on your SpeedScript disk, and you'll find a program called Sequential File Converter. In addition to converting SpeedScript files to PETSCII and to true ASCII, it will also convert sequential files into SpeedScript program (PRG) format.

Bug-Swatters

I was excited to find SpeedSpell—a newer, faster, friendlier spelling checker for SpeedScript—in the October 1992 issue. I was disappointed, however, when I discovered it was checking garbage characters in my documents when no such characters existed. After disassembling the program, I think I have found and solved the problem.

My version of SpeedScript 3.2, which is souped up with Instant-80 (December 1987) and SpeedScript Easy Cursor (November 1989), saves documents starting at 10496 ($2900). The original SpeedScript 3.2 saves at 9472 ($2500), which is where SpeedSpell assumes the text begins. Alternate starting addresses weren't taken into account. The following fix will allow SpeedSpell to load SpeedScript documents at any starting address. It will even load those written by SpeedScript 1.0.

To fix SpeedSpell, load and run it. At the menu, press Q to exit. The 64 will cold boot, but BASIC RAM will not be erased. Enter the following POKE statements in immediate mode.

```
POKE 2049,11: POKE 2050,8:
POKE 3907:0: POKE 3924,0: POKE
3926,37: POKE 45,123: POKE
46,24
```

Save this updated version of SpeedSpell with a new filename.

CHARLES KUNZ
HOLBROOK, NY

Troy Smith of Austin, Texas, informed us that Typewriter Emulator in the October 1992 "Feedback" column has a bug in it. Line 30 should be entered as it appears below.

```
30 PRINT#4,A$;:GOTO 20
```

If you're still interested in typewriter emulators, see the next letter.

More Typewriters

Converting a 64 and a printer into a typewriter might not be worth the effort. The first computer programming course that I took in college involved lab work with such an arrangement. Everyone in the class hated the program—including the instructor.

The following program works, using the tab function on most Commodore printers. I have an Epson MX-80III with a G-WIZ printer interface, but the interface emulates the tab function.

There is one problem with this program: The printhead lags one character behind the keyboard. The last character typed remains in the print buffer until the next character comes along to push it out.

```
EM 10 OPEN4,4,7
BS 20 PRINT#4,CHR$(27)"@";
BA 30 LM=5:RM=70
GQ 40 C=LM
QS 50 PRINT CHR$(14)"{CLR}
      {3 DOWN}"TAB(C);
SC 60 C$=MID$(STR$(C),2)
JX 70 IF C<10 THEN C$="0"+C$
JE 80 GET A$:IF A$=""THEN 80
FE 90 IF A$=CHR$(136)THENPRINT
      #4:PRINT"<":CLOSE4:END
DX 100 IF A$=CHR$(32)THEN A$=C
      HR$(160)
FR 110 IF A$=CHR$(13)THENPRINT
      #4:C=LM:PRINT"<":PRINT
      {SPACE}TAB(C);:GOTO60
QR 120 PRINT#4,CHR$(16)C$A$;
EC 130 PRINTA$;
BD 140 C=C+1
CJ 150 IF C=RM-5 THEN PRINT#4,
      CHR$(7);
RH 160 IF C=RM THEN PRINT#4:C=
      LM:PRINT"<":PRINT TAB(C
      );
RA 170 GOTO 60
```

IRVIN DUNLAP
BARTLESVILLE, OK

Reader to Reader

I recently acquired Mars Saga, an old game from Electronic Arts. It's a great game, but now that I am stuck, I hate it! I've spent hours trying to figure it out. I wrote to EA but

was told the hint book is out of print. Can any fellow Gazette reader tell me where to find one? Please put me out of my misery.

ROBERT COWARD
102 LEVERETTE RD.
HOGANSVILLE, GA

Is there anyone who can tell me where I can find a copy of Kennedy Approach by MicroProse for the 64? I've tried everywhere over here and in the U.K.

P. J. KIERANS
66 NEWFIELD ESTATE
DROGHEDA, COUNTY LOUTH
IRELAND

I am one of the readers of COMPUTE, and I like computers a lot. I have a 128 and a disk drive. I know BASIC and machine language. Because I like to make friends overseas, I would like to have some pen pals.

AHMAD HUSAM MUKHALALATI
P.O. BOX 21935
APEPPO, SYRIA

Saving Files

Is there an easy way that I can edit an existing SpeedScript file and resave it using the same filename?

LINDA DONATH
LOS ANGELES, CA

Thomas Schaefer of St. Petersburg, Florida, wrote and told us that he scratches the old file from disk before he saves the new version. Suppose you have a SpeedScript file called Letter that you want to edit. When ready to resave it, press Ctrl+↑ to enter the command line. Then type S:Letter *and press Return to scratch the old version on disk. You can then press f8 and save the edited version with the original filename.*

A shorter way is to use the SAVE WITH REPLACE (@) command. When ready to resave the file called Letter, press f8 and enter @0:Letter *on the command line. This scratches the old version and saves the new one with the same filename. By including the 0 after the @ symbol, you eliminate the quirky bug that once plagued the SAVE WITH REPLACE command.*

Device Number

For years I've been meaning to write with a suggestion. I have a problem with many of your programs that provide for disk access from within a program. The device number is almost always coded for drive 8. I am sure you are aware that there are many other drives available now and many of us have more than one.

I am a fairly proficient programmer, so I usually am able to make the necessary changes to your programs, but I suspect many readers are not able to do this. I wish that all programmers would be tolerant of any possible device number. Perhaps a better solution would be to allow the program to determine which device is active. A program with this feature would be able to execute from any valid storage device. Here's an example.

```
5 DV=PEEK(186)
100 OPEN1, DV, 2,"0:"+A$+
    ",P,W"
```

Memory location 186 for both the 64 and 128 contains the number of the last device accessed. This works unless other device such as a printer is accessed before the loaded program is executed. A similar routine in machine language would also be easy to implement.

Another simple way to let users select the device they want would be to have a line near the start of a program such as the following. This would let users make a simple change, if desired.

```
5 DV=9:REM DEVICE NUMBER IS 9
```

This statement would eliminate the need to search through the whole program making changes in device numbers. Permitting a program to be adapted to a variety of possible hardware devices should be the goal of all responsible programmers.

BRAD DUMLER
ARLINGTON, TX

That's not a bad suggestion, Brad, especially for programs that save data to disk. What with hard drives, RAM expansion units, and a variety of floppy drives in use, drive 8 is not as lonely as it once was. We would encourage Gazette programmers to incorporate your ideas about multiple device numbers into their future program submissions.

Saving documents with the same filename, using multiple drives, and an overlooked word processor

Clip Omitted

I agree totally with Dorothy Hemme in "Word Processing Without GEOS" (October 1992) that geoWrite is the pits. I would like to inform her, however, that there is another great word processor from Electronic Arts that she didn't mention. PaperClip III is, pardon the expression, the cat's meow for the Commodore.

I had been using an old copy, but when I tried this new version, it just blew my mind. File handling is a breeze. It will support two drives and a RAM cartridge. It has a 40,000 word spelling checker that can be expanded to 50,000 on a 1541 and 100,000 on a 1571.

I've tried most of the word processors that Dorothy suggested, but I'll keep PaperClip III.

OK, enough already. I'll go away.

DAVE WASENDORF
DENVER, CO ❐

MACHINE LANGUAGE

Jim Butterfield

A SIMPLE FILE COUNTER

Build a simple program to read any file and count the bytes.

Let's build a simple program to read a file and count its bytes. Directory listings just give blocks, where a block can hold from 1–254 characters. Thus, a ten-block program could have between 2287 and 2540 bytes. At times, though, it's nice to get an exact byte count for a file.

Filecount will work on any Commodore 8-bit machine. It could be easily modified for earlier machines, such as the PET or CBM; the only difference is in the location of the ST status byte ($90 or 144 on the recent machines, $96 or 150 on the early ones). It works on program (PRG), sequential (SEQ), and user (USR) files. It won't give useful results on relative (REL) files, which need special code to detect end of file.

The program gives you a bonus: It identifies the last character on the file and tells you how many characters of that type are at the end. BASIC programs usually end with three 0 bytes. Data files typically end with a single Return (character 13). And files received from a communications link may have quite a few pad characters stuck on the end.

It's quite practical to open and close files in machine language, but programmers often avoid doing so. These two actions are not time intensive and are often easier to code in BASIC. The BASIC portion of Filecount asks for the filename and opens the file as logical device 1. When the machine language program has completed its work, it gives control back to BASIC, which closes the file.

The subroutines that we use to read the file are as follows: $FFC6 CHKIN (connect the input stream to file X), $FFC9 CHKOUT (connect the output stream to file X), $FFCC CLRCHN (clear input/output streams to normal), $FFE4 GETIN (get a character from the input stream), $FFCF CHRIN (same as $FFE4 for file input), and $FFD2 CHROUT (send a character to the output stream).

Since Filecount is concerned only with reading a file, it uses $FFC6 to connect to the file, $FFE4 to read a character from the file, and $FFCC to disconnect from the file. Status word ST, at $90, will be tested to detect the end of file.

The program provides two bytes for each of the two counters (total byte count at $2050/1 and number of times the last character has repeated at $2052/3). The last character seen is also stored in memory at address $2054.

Our program starts at hex address 2000, decimal 8192. First, it clears the counters with LDX #0, STX $2051, STX $2052, STX $2053. Register X is still at 0, which we bump with INX and then store the last counter value with STX $2050. That initializes the byte counter to 1 instead of 0.

Logical file 1 was opened earlier in the BASIC section of the program. Register X still contains a value of 1, so we connect to this file with JSR $FFC6. We read our first character with a call to $FFE4, and store it at $2054, our last-byte-received address.

At address $2018, we're ready to start the input loop. First, we check ST and exit if we find a value other than 0, and then LDA $90, BNE $2041. At $201C, we read the character and bump the byte counter: JSR $FFE4, INC $2050, BNE $2027, INC $2051. We bump the last-character count: INC $2052, BNE $202F, INC $2053.

Now we check to see if there's a new last character: CMP $2054, BEQ $2018. If we don't branch back to the loop, we have a different last character. STA $2054 logs the character, and then we reset the counter with LDA #$00, STA $2052, STA $2053. The Z flag will always be set at this point, so we branch back to the loop with BEQ $2018.

If we detected end of file earlier, we will have branched out of the loop to address $2041. There, all we need to do is disconnect the input stream and return to BASIC. We do that with a simple JMP $FFCC.

In the BASIC loader, the program pokes the machine language code into place. At line 300, it asks the user for a filename and opens the file. OPEN is checked for validity via the command channel; any problem is reported at line 330.

BASIC calls the machine code with a SYS command; the file work is done very quickly. When it's over, the BASIC program checks for errors at line 350. Then the file is closed, and the statistics are read with PEEK commands.

```
HP 100 DATA 162,0,142,81,32,14
       2,82,32,142,83,32,232,1
       42,80,32
QG 110 DATA 32,198,255,32,228,
       255,141,84,32,165,144,2
       08,37,32,228,255
SE 120 DATA 238,80,32,208,3,23
       8,81,32,238,82,32,208,3
       ,238,83,32
RM 130 DATA 205,84,32,240,228,
       141,84,32,169,0,141,82,
       32,141,83,32
CQ 140 DATA 240,215,76,204,255
AP 200 FOR J=8192 TO 8259
EJ 210 READ X:T=T+X
BP 220 POKE J,X
AE 230 NEXT J
AK 240 IF T<>8286 THEN STOP
XF 300 INPUT "NAME OF FILE";F$
JQ 310 OPEN 15,8,15
BP 320 OPEN 1,8,3,F$
CS 330 INPUT#15,E,E$:IF E<>0 T
       HEN PRINT E$:CLOSE 15:S
       TOP
BH 340 SYS 8192
SB 350 INPUT#15,E,E$,E1,E2:IF
       {SPACE}E<>0 THEN PRINT
       {SPACE}E$:CLOSE 15:STOP
JC 360 CLOSE 1:CLOSE 15
HQ 370 PRINT PEEK(8272)+PEEK(8
       273)*256;"CHARACTERS"
AE 380 N=PEEK(8274)+PEEK(8275)
       *256
PF 390 PRINT "LAST";
FX 400 IF N>0 THEN PRINT N+1;"
       CHARACTERS: ";
XR 410 IF N=0 THEN PRINT " CHA
       RACTER: "
DC 420 PRINT PEEK(8276)
```

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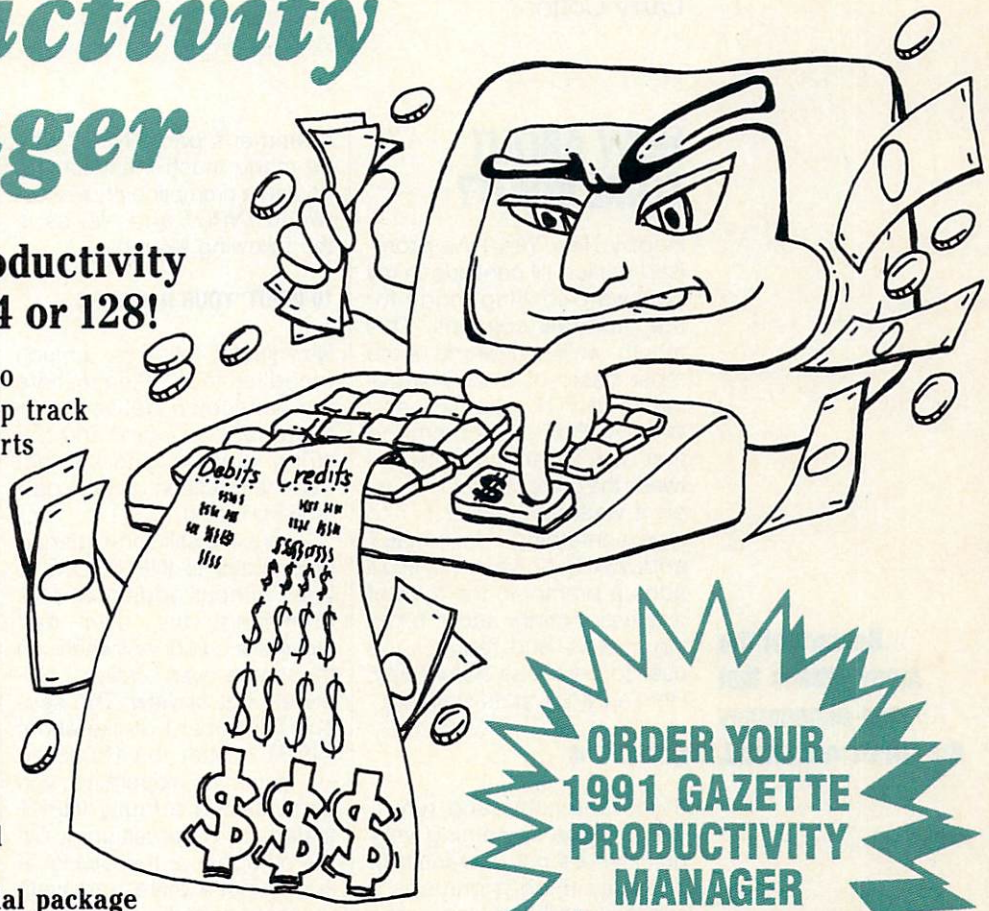

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BEGINNER BASIC

Larry Cotton

HOW ABOUT SOME INPUT?

Beware of the many pitfalls that can accompany the INPUT command.

Happy New Year! As promised earlier, I'll continue in my backward-looking mode for the next few columns. This month, we'll review one of the most basic of BASIC statements: INPUT. Like GET and WAIT, INPUT is a command that acts as an interface between the computer and the user; it waits for him or her to type something. Unlike GET and WAIT, however, INPUT adds a prompt in the form of a question mark and a blinking cursor—and requires the user to press the Return key. Here's INPUT at its simplest.

```
10 INPUT N$
```

If you enter this and run it, you'll notice something very quickly—it's not user-friendly. The only thing it prints is a question mark followed by the cursor. Sure, it works; just type something and press Return. (I recall several computer novices—including myself—dutifully typing whatever INPUT was asking for and then sitting back, expecting that the program would know that we'd finished typing. The only way it knows is for you to press Return.)

Now enter *PRINT N$* and press Return. You'll see an exact duplicate of what you've typed. *N$* is a string variable, which means that each character in the string is treated literally. That is, if you'd entered numbers rather than letters, they would've been treated just like letters—they can't be added, subtracted, multiplied, and so on. Incidentally, *N$* will store that literal string of characters in memory until you replace it with some other information or turn off the computer.

With a little effort on the programmer's part, INPUT can be made much friendlier. Try adding a prompting phrase between *INPUT* and *N$*, as in the following example.

```
10 INPUT"YOUR NAME";N$
```

Now INPUT takes on a much friendlier face. Please note the semicolon between the last quotation mark and the string variable, and the fact that the question mark is part of INPUT itself.

There are still some glaring downsides to INPUT. One is that, without additional programming, the user can move the cursor anywhere on the screen, even scrolling completely out of view. The second thing that I dislike about INPUT is that the Run/Stop key becomes inoperative; you can't debug a faulty INPUT statement by pressing it. On the other hand, the Clr/Home key is quite alive and well. Press it (shifted), and the entire screen goes blank. It can be frustrating when your prompt disappears. Let's rewrite the above line.

```
10 INPUT"WHAT CAN I
   COPY";N$:PRINT"(2
   spaces)"N$
```

Try entering several words or characters, pressing Return after each. Whatever you type each time will be printed below it. However, if you move the cursor, the only thing that the variable *N$* will become is whatever's on the line with the cursor. Run the program again, enter *ABC*, cursor down a couple of lines, then enter *XYZ*, and press Return. You'll find that *N$* contains only *XYZ*.

Circumventing all these pitfalls takes quite a bit of additional programming. I covered that in the "Beginner BASIC" columns of September and October, 1991. If you need a longer prompting line, such as *ENTER YOUR BIRTHDAY IN YY/MM/DD FORMAT*, you may wish to combine PRINT and INPUT.

```
10 PRINT"ENTER YOUR BIRTH-
   DAY IN YY/MM/DD FORMAT"
20 INPUT B$
```

This looks somewhat awkward, because the question mark falls on the line below the prompting statement.

Another pitfall of INPUT is that it's pretty fussy about what's entered. String-variable INPUTs spit out the confusing *EXTRA IGNORED* error message whenever they encounter a colon or comma (but periods and semicolons sail right through). On the other hand, INPUT will accept anything if it's enclosed in quotation marks. Of course, your typical user wouldn't be expected to know or use that fact. Without additional programming, a simple numeric-variable INPUT (such as *INPUT N*) would announce the equally cryptic *REDO FROM START* error message if the user should enter anything but numbers.

I'll leave you for this month with a simple trick that suppresses the question mark that is part of INPUT. This lets you enter your prompting phrase as a statement rather than a question.

```
10 POKE19,64
20 INPUT"{CLR}{DOWN}ENTER
   YOUR FIRST NAME: ";N$
30 POKE19,0
40 PRINT:PRINT:PRINT"IS YOUR
   NAME ACTUALLY "N$"?"
```

Using this method, you must enter something other than just Return. Poking a 64 to register 19 temporarily suppresses the question mark that normally follows; poke 0 to the same register to restore the question mark to normal. ❐

D'IVERSIONS

Fred D'Ignazio

CRAZY FRED'S HIGH-TECH GARAGE SALE

Have you ever wanted to make some money quickly? You might consider holding a high-tech garage sale.

My family and I recently moved from our old house on one side of East Lansing, Michigan, to an even older house on the other side of town. As always, the move was extremely painful for me. I am an incredible pack rat, and moving to a new house forces me to face all the odds and ends that I have packed away, year after year. Even worse, I have to decide their fate!

My son, Eric, coined a name for all these precious items. He calls them jonque (it rhymes with *chonk*).

Eric, another pack rat, claims that he and I are ingenious in the ways we find to squeeze jonque into itty-bitty spaces—all over the house. Eric calls this technique jonque compression. After jonque compression, the jonque stays the same size, but by finding just the right cubbyhole, a jonque expert is able to fit an incredible amount into the same old house.

The jonque compression is successful if it meets the following criteria.

1. The jonque apparently seems to vanish.
2. You immediately forget that you ever had the jonque.
3. You're happy, since you didn't have to throw the jonque away.
4. Your spouse or parents have no idea how much jonque is accumulating invisibly around them.

If you are an especially skilled jonque compressor, this feeling of bliss can continue for years. But one day your bliss bubble has to pop, and then the jonque suddenly decompresses and tumbles back into your life.

In my case, the problem is magnified because not only do I collect the normal kinds of jonque—old magazines, books, T-shirts, mugs, and posters—but I also collect computer jonque. In fact, I might be one of the world's leading collectors of computer jonque.

I've thousands of disks with old programs, freeware, shareware, vaporware, la-la-ware. You name it; I've saved it.

I've got old computer parts: floppy drives, tape drives, backup tape drives, hard drives, CPUs, digitizers, monitors, printers, and keyboards.

And it gets worse—far worse. I guess the whole dirty truth must now be told. I don't just collect computer jonque. I also collect multimedia jonque: cameras, eyepieces, viewfinders, dusty old speakers, miniature musical keyboards, tiny tape recorders, ancient VCR decks, portable phones, and prehistoric Radio Shack TV sets. Add to the list batteries, AC adapters, used cassettes, wires, and cables. Cables? I've got computer cables, lots of cables, truckloads of cables, mountains of cables. I've got big cables, little cables, fat cables, skinny cables, even mystery cables that have weird little ends that don't make sense. (What did they come out of? Where did they go?) And you know? I think my cables have babies. Male cables get with female cables and have adapters.

Having these deep-seated addictions must inevitably lead to one of three outcomes:

1. You get a divorce.
2. You run away from home.
3. You hold a high-tech garage sale.

I chose option 3 recently, and it was a resounding success. I want to report that it saved my marriage and my sanity.

My assistant, Joanne, placed ads for a high-tech garage sale in all the local papers and weekly shopping guides. She also printed fliers on our home computer (the one we wanted to keep), and we hung them on every store, dormitory, and gas station bulletin board within a three-mile radius of our home. We uploaded ads via modem onto every electronic BBS that we could reach. We painted homemade signs and tacked them onto telephone poles at every major intersection near our home. We offered free soda pop to every customer who made a purchase at our sale. Last, we hired two hardy teenagers (Joanne and Tim) to run the sale along with my son Eric.

A pack rat must eventually do one of three things: get a divorce, run away from home, or hold a garage sale.

On the morning of the sale, Eric, Joanne, and Tim showed up at 7:00. Their first customer was waiting at the garage door. The rest is history! Two days later, we said goodbye to our last customer and rolled down the door. We had started the sale with ten eight-foot tables piled high with disks, computer parts, cables, clothes, and baby furniture. We finished the sale, 200 customers later, with a mere eight grocery bags of stuff that we gave to the Salvation Army.

I ran around the driveway during the sale pretending I was Crazy Fred—as in Crazy Fred's High-Tech Garage Sale. I gave away free soda pop. I greeted customers. I wore my pink hat that says Hollywood on the front. And I videotaped the entire event—including the memorable scene where a dozen people were bickering and bargaining over my prize cables.

What a sale! What a show! And we even made money. ❐

GEOS

Steve Vander Ark

ULTIMATE GEOS (PART 3)

Last month, I outlined my difficulty in trying to find the perfect file manager software to accompany my ultimate GEOS system. I have hopes for geoShell and its promise to handle four drives *and* native mode partitions. Unfortunately, I haven't received a copy of the program for testing yet. So while I'm waiting for geoShell, I'll check out the rest of my software choices.

Here are a few software packages that no serious GEOS user should be without.

Probably the best applications for GEOS are the ones put out by GeoWorks itself. GeoWrite, for example, has no serious competitors for the word-processing prize. There are no other spreadsheet programs around for GEOS, so geoCalc is a shoo-in. There are a few card-file databases, but they can't hold a candle to geoFile.

The release of geoCanvas by Creative Micro Designs has given graphics aficionados an exciting alternative to geoPaint. When it comes down to it, though, geoCanvas is more of an add-on program than a replacement. Neither program has all the features a serious graphics user needs, but that's OK. Their files are compatible, and it's not hard to skip back and forth between them. As for desktop publishing, geoPublish has no equal. Its one drawback is that it works only in 40-column mode, but even with that limitation, it's a marvel.

Once you've picked up all the official GEOS products, you'll still need several additional packages. Here's a list of what I feel are essentials.

GeoWizard. It's hard to find an accurate description of geoWizard. Jim Collette, the author, calls it the "ultimate GEOS utility," and he's right. GeoWizard is almost a miniature operating system that's available at a click of a mouse from nearly anywhere in GEOS. GeoWizard temporarily suspends whatever application you're running and offers a menu of choices.

There are several great options, but the one that makes geoWizard so incredible is a dialog box that lets you run any application on any active drive, straight out of your original application. When you quit the new application, you're returned to where you left off in your first task. This task-switching ability quickly becomes indispensable.

Minidesk. This desk accessory is bundled with geoWizard. When you call it up from within an application, you're presented with a control panel that lets you rename or erase files, or copy them from drive to drive. For instance, if you have a current word processor document in an REU, you can copy it to a physical drive for permanent storage.

Perfect Print. Sure, GEOS can do some nifty graphics, and proportional GEOS fonts make your writing look more professional, but you're still stuck with jaggy printouts. That's all changed, thanks to GEOS LQ, the geoWrite printer routine found in the Perfect Print package. The collection of high-definition fonts that GEOS LQ uses prints almost as smoothly as a laser, even from a lowly 9-pin printer.

Scrap Can. If you use graphics, you'll need this small utility that's part of the geoCanvas collection. It provides you with a preview of any geoPaint page, from which you can copy any portion as a photo scrap. Other programs will do this for you, but none as well as Scrap Can. After creating your photo scrap, you can open another geoPaint document and paste it in wherever you like. Even if you don't think you need another paint program, you'll want geoCanvas just to get Scrap Can.

Conversion programs. You probably use GEOS for just about everything, but not everyone does. It's important, therefore, for GEOS to get along with the rest of the Commodore world. Data files from other programs—graphics from The Newsroom, for example, or text files from SpeedScript—have to be accessible and usable for GEOS applications. Conversion programs let you reach out and grab nearly every variety of graphic or text data around, including some non-Commodore types.

For graphics, you'll want Graphics Grabber, Import Runner, Graphic Storm, MacAttack II, and geoGIF, to name a few. Text files require Text Grabber or Wrong Is Write. And, of course, to transmit any GEOS file via modem, you need Convert 2.5 to change the file into Commodore DOS format and back again.

GeoTerm. The only major application not included with GEOS is a terminal program. GeoTerm, an excellent offering from *RUN* magazine's Power Pack II disk, nicely fills the gap. OK, it's not the best terminal program ever written, but it runs under GEOS, has the Convert utility built in, and has a surprisingly large buffer to boot. For people like me who are loathe to leave the world of point and click for the boring command line of Commodore DOS, geoTerm is perfect.

So that's it, right? The ultimate GEOS system? Hardly. *Ultimate* means "the best there can be," and frankly, that term will be up to every user to define. As a matter of fact, I don't own all the fancy equipment I've discussed, but my GEOS system does everything I want, and that's about as ultimate as I need. ❐

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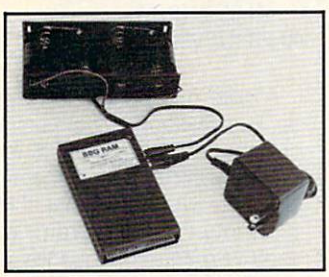

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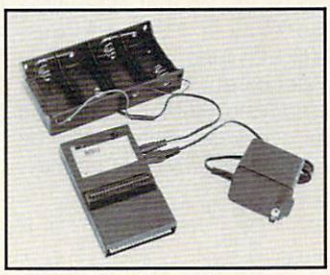

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PROGRAMMER'S PAGE

Randy Thompson

MORE GREAT TIPS

Here are some great programming tips from our readers.

Super Peek

Peek hidden RAM, add FAST and SLOW commands to your 64, and convert decimal to hex.

There are 16K bytes of RAM hiding beneath the 64's ROM: there are 8K at 40960–49151 ($A000–$BFFF) and another 8K at 57344–65535 ($E000–$FFFF). These two blocks, untouched by BASIC, make ideal locations for storing data such as sprite definitions or bitmapped screens. The most convenient way to access memory via BASIC is with the POKE and PEEK commands. While you can poke values into either of these two memory blocks, you cannot peek values stored here. The only values you can read from 40960–49151 and 57344–65535 using PEEK are those stored in ROM, not the underlying RAM.

This program wedges itself into BASIC so that every time you peek a ROM address, the PEEK function temporarily switches out ROM, reads the underlying RAM, and returns the byte value stored there by a previous POKE command.

```
GH 100 REM SUPER PEEK
BP 110 FOR I=680 TO 755:READ D
       :POKE I,D:C=C+D:NEXT
BJ 120 IF C<>8212 THEN PRINT "
       ERROR IN DATA STATEMENT
       S":END
FJ 130 SYS 680
DM 140 DATA 160,205,140,17,3,1
       60,2,140
FP 150 DATA 18,3,169,76,133,12
       4,169,191
MG 160 DATA 133,125,169,2,133,
       126,96,201
DJ 170 DATA 194,208,2,169,183,
       201,58,144
RK 180 DATA 1,96,76,128,0,32,2
       47,183
XE 190 DATA 164,20,165,21,140,
       228,2,141
AM 200 DATA 229,2,162,53,120,1
       69,47,133
DE 210 DATA 0,134,1,172,228,2,
       162,55
AH 220 DATA 120,133,0,134,1,88
       ,169,0
PX 230 DATA 76,145,179,0
```

This program makes accessing hidden RAM much easier.

A. S. BHAGWANDEEN
MARABELLA, TRINIDAD

Faster 64

There are several hacks out there that effectively double the computer's speed by activating the 128's FAST mode while running the 128 as a 64. None, however, are as elegant as the one listed below. After running the following 128 64-mode program, you can activate FAST mode simply by using the previously 128-only command, FAST. To disable FAST mode, just execute the command SLOW.

```
GD 100 REM 64 MODE FAST AND SL
       OW
CX 110 FOR I=828 TO 976:READ D
       :C=C+D:NEXT
SC 120 IF C<>15057 THEN PRINT
       {SPACE}"ERROR IN DATA S
       TATEMENTS":END
PP 130 SYS 945
QX 140 DATA 160,1,177,122,201,
       70,240,7
MP 150 DATA 201,83,240,54,108,
       224,3,200
RP 160 DATA 177,122,201,65,240
       ,3,76,72
PS 170 DATA 3,200,177,122,201,
       83,240,3
KB 180 DATA 76,72,3,200,177,12
       2,201,84
XA 190 DATA 240,3,76,72,3,32,1
       15,0
QA 200 DATA 32,115,0,32,115,0,
       32,115
CA 210 DATA 0,169,3,141,48,208
       ,76,72
XX 220 DATA 3,234,200,177,122,
       201,76,240
HX 230 DATA 3,76,72,3,200,177,
       122,201
QQ 240 DATA 79,240,3,76,72,3,2
       00,177
JD 250 DATA 122,201,87,240,3,7
       6,72,3
ER 260 DATA 32,115,0,32,115,0,
       32,115
QH 270 DATA 0,32,115,0,169,0,1
       41,48
BP 280 DATA 208,76,72,3,234,17
       3,8,3
XX 290 DATA 201,60,240,21,141,
       224,3,173
FB 300 DATA 9,3,141,225,3,169,
       60,141
BR 310 DATA 8,3,169,3,141,9,3,
       96
AX 320 DATA 234,76,208,3,96
```

Due to the manner in which this program adds FAST and SLOW to BASIC's vocabulary, you must follow one simple rule when using either of these two commands in an IF statement: Always precede the command with a colon. For example, IF X<>Y THEN:FAST.

Note that the 64's 40-column screen will go blank whenever you put the computer into FAST mode, just as it would in 128 mode.

KEN MCNICHOLAS
HICKSVILLE, NY

Hex Converters

The next two listings convert a byte value (0–255) from hexadecimal to decimal and from decimal to hexadecimal, respectively. These programs use the variable D to return or store decimal values and the variable H$ to store or return hexadecimal values.

```
10 REM DECIMAL TO HEX
20 INPUT"DECIMAL VALUE";D
30 Y=INT(D/16): Z=16*Y:H$=CHR$
   (Y+55+(7*(Y<10)))+CHR$
   (D-Z+55+(7*((D-Z)<10)))
40 PRINT"HEX VALUE IS $";H$
```

```
10 REM HEX TO DECIMAL
20 INPUT"HEX VALUE $";H$
30 L=ASC(LEFT$(H$,1)):
   R=ASC(RIGHT$(H$,1)):
   D=((L-55-7*(L<57))*16)
   +R-55-7*(R<58)
40 PRINT"DEC VALUE IS ";D
```

A note regarding the hexadecimal-to-decimal conversion program: Be sure that H$ is a two-character string before you convert it to decimal. If H$ is empty, the program will abort with an illegal-quantity error. If H$ contains only one character, that character is duplicated (*F* becomes *FF*, for example). If H$ contains more than two characters, only the first and last characters are considered part of the byte value (*09FAC* becomes *0C*).

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Send your programming tips to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We pay $25–$50 for each tip we publish. ❐

ANCESTRY

By Robert Nellist

Genealogy can quickly become an absorbing, addicting hobby. Here's your chance to start charting your family tree with a minimum of trouble and expense.

Ancestry lets you enter the vital statistics concerning a selected person's parents, grandparents, great-grandparents, and great-great-grandparents. This information can then be searched, corrected, saved to disk, and printed out in family tree form.

Getting Started

Ancestry is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you exit Proofreader.

Creating Records

When you run Ancestry, a menu will present four choices: Initial Entry, Load a File, Disk Directory, and Quit. Since you haven't as yet entered any information, let's press E and start creating some records.

The Entry mode constantly displays command information at the top of the screen. Below this is a heading which changes during entry to help you keep track of whose record you are presently entering. Beneath this is the form that you'll be filling in for each ancestor. The nonblinking cursor can be seen at the start of the Name line.

Use uppercase and lowercase to fill in the person's name (here, the primary individual) and press Return. Repeat the procedure for each line. If you don't as yet have the information that's requested, simply press Return on the blank line, and the cursor will jump to the next one. If you press Return on a blank Name line, the program will skip the present record entirely and proceed to the next person. Use the Inst/Del key to backtrack and make corrections on the current line only. Don't worry if a mistake slips by. You can easily make corrections later. When the fifth and final line is entered, the next person's blank record form will appear. When all 31 records have been completed, or if you press the up-arrow key (↑) on a blank Name line, you'll be returned to the menu, which now contains several additional choices.

Search and Correct

You now have Search and Correction options, which operate in a similar fashion. Pressing f1 starts or halts a numbered listing of all the persons whose records you have entered. Cursor up or down to the desired name, and press Return. If you're in Search mode, that person's entire record will appear. If you're in Correction mode, a blank entry form will appear that is identical to the one in the Entry mode. To change a line, type in the corrections and press Return. To leave a line unaltered, just press Return. To end either option and return to the menu, place the cursor on the word *Menu* at the bottom of the listing and press Return.

Load and Save

Load and Save options are fairly conventional and need little explanation. You can view the disk directory first, if necessary. I recommend saving under the name of the primary individual to avoid confusion. Either option can be canceled by pressing Return alone.

Printouts

Ancestry doesn't use any special printer commands, so there should be no compatibility problems. When you enter the Printout mode, you'll be asked to designate one of three names as the primary individual for current printout purposes only. This is because there is only room for three generations on a single page, although the program permits entry to the fourth generation.

Choose option A for your first printout. If you have entered all 31 records, you'll also want to make printouts using the B and C options. The program will then guide you through the entry of a chart number, letter, and date. If you make a mistake, you still have a final chance to cancel prior to the actual printout.

Random Reminders

It isn't necessary to enter all 31 records at one sitting. You can start and stop at any time. Also, it isn't necessary to complete all the records prior to printout. The program will simply print dotted lines if no information has been provided. This will permit filling in by hand later, if desired.

The Spouse line doesn't appear in the printout. It would be a needless duplication of information already present, and space is limited. Adjust your paper to start your printout as near to the top of the page as possible.

There's room to include a location as well as a date when entering vital statistics. It's OK to use commas and colons while entering data.

ANCESTRY

```
PK 5 REM COPYRIGHT 1993 - COMP
     UTE PUBLICATIONS INTL LTD
     - ALL RIGHTS RESERVED
HB 10 DIM B$(50,5):SP$=".....
     ..................":REM
     {SPACE}** 24 PERIODS
PE 20 DT$="{24 T}":REM ** 24 C
     OMMODORE-T KEY PRESSES
JK 30 PRINT CHR$(14)"{CLR}
     {WHT}{5 DOWN}"TAB(9)"***
      A N C E S T R Y ***":PR
     INTTAB(19)"{DOWN}BY"
AD 40 PRINTTAB(13)"{DOWN}ROBER
     T NELLIST"
XX 50 PRINTTAB(13)"{6 DOWN}PRE
     SS ANY KEY"
DE 60 WAIT 198,15:GET M$
AG 70 PRINT"{CLR}{2 DOWN}"TAB(
     11)"*** MAIN MENU ***"
GF 80 IF K=1 THEN PRINT"
     {2 DOWN}";:GOTO 110
AS 90 PRINTTAB(11)"{2 DOWN}E =
      INITIAL ENTRY"
QJ 100 IF K=0 THEN GOTO 160
MJ 110 PRINTTAB(11)"{DOWN}R =
     {SPACE}RESUME ENTRY"
QG 120 PRINTTAB(11)"{DOWN}S =
     {SPACE}SEARCH"
CJ 130 PRINTTAB(11)"{DOWN}C =
     {SPACE}ENTRY CORRECTION
     "
JE 140 PRINTTAB(11)"{DOWN}P =
     {SPACE}PRINTOUT"
CF 150 PRINTTAB(11)"{DOWN}* =
     {SPACE}SAVE ENTRIES"
QQ 160 PRINTTAB(11)"{DOWN}L =
     {SPACE}LOAD A FILE"
DS 170 PRINTTAB(11)"{DOWN}D =
     {SPACE}DISK DIRECTORY"
KM 180 PRINTTAB(11)"{DOWN}Q =
     {SPACE}QUIT"
BS 185 PRINTCHR$(14)
PA 190 GET M$:IF M$="E"AND K=0
      THEN GOSUB 290:GOTO 70
JE 200 IF M$="R"AND K=1 AND Z<
     31 THEN Z=Z+1:GOSUB 300
     :GOTO 70
SK 210 IF M$="S"AND K=1 THEN P
     =0:GOSUB 550:GOTO 70
RB 220 IF M$="C"AND K=1 THEN P
     =1:GOSUB 550:GOTO 70
BS 230 IF M$="P"AND K=1 THEN G
```

```
      OSUB 1530:GOTO 70
XH 240 IF M$="*"AND K=1 THEN G
      OSUB 1070:GOTO 70
BP 250 IF M$="L"THEN GOSUB 122
      0:GOTO 70
KQ 260 IF M$="D"THEN GOSUB 142
      0:GOTO 70
AF 270 IF M$="Q"THEN GOSUB 213
      0:GOTO 70
FH 280 GOTO 190
KB 290 HE$="PRIMARY INDIVIDUAL
      ":Z=1:A=1:PRINTCHR$(14)
      :GOSUB2020:GOTO310
KH 300 PRINT CHR$(14):GOSUB 20
      20:PRINT"{UP}"G$;GR$;P$
QP 310 PRINT HE$;HD$:PRINT:PRI
      NT"ENTRY #"Z:PRINT
KD 320 FOR Y=1 TO 5
SQ 330 PRINTTAB(9)"{P}{LEFT}";
      :GET A$:IF A$=""THEN 33
      0:REM *** COMMODORE-P +
       CRSR-LEFT
BX 340 IF A$=CHR$(20)AND LEN(B
      $)<1 OR A$=CHR$(34) THE
      N 330
BJ 350 IF A$=CHR$(20)THEN B$=L
      EFT$(B$,LEN(B$)-1):GOTO
       410
SG 360 IF A$=CHR$(13)AND Y=1 A
      ND LEN(B$)<1 THEN GOSUB
       2090:GOTO 440
DG 370 IFA$=CHR$(13)THEN B$=B$
      +SP$:B$=LEFT$(B$,24):B$
      (Z,Y)=B$:B$="":GOTO 430
XD 380 IF ASC(A$)<32 OR ASC(A$
      )>96 AND ASC(A$)<191 TH
      EN 330
SK 390 IF LEN(B$)>23 THEN 330
PG 400 B$=B$+A$
SH 410 PRINT A$;:IF Y=1 AND A$
      ="↑"THEN Y=5:Z=Z-1:B$="
      ":GOTO 440
KR 420 GOTO 330
XX 430 PRINT" {DOWN}"
EA 440 NEXT:IF A$="↑"OR Z=31 T
      HEN 530
AF 450 Z=Z+1
FK 460 IF Z>1 THEN P$="PARENTS
       OF PRIMARY INDIVIDUAL"
RQ 470 IF Z>3 THEN GR$="GRAND"
      :P$="PARENTS OF PRIM.IN
      DIV."
KS 480 IF Z>7 THEN G$="GREAT "
HC 490 IF Z>15 THEN G$="GREAT
      {SPACE}GREAT "
RX 500 IF Z/2=INT(Z/2)THEN HE$
      ="FATHER OF ":HD$=B$(A,
      1):GOTO 520
FF 510 HE$="MOTHER OF ":HD$=B$
      (A,1):A=A+1
JA 520 GOSUB 2020:PRINT"{UP}"G
      $;GR$;P$:GOTO 310
FF 530 IF Z>0 THEN K=1
QJ 540 RETURN
QQ 550 PRINTCHR$(14)"{CLR}
      {2 DOWN}"TAB(3)"PRESS F
      1 TO START OR HALT LIST
      ING"
QH 560 GET L$:IF L$<>CHR$(133)
      THEN 560
GP 570 PRINT"{CLR}";:FOR X=1 T
      O Z
MC 580 IF X=Z+1THEN X=31:GOTO
      {SPACE}670
RP 590 IF X=1THEN PRINT"PRIMAR
      Y INDIVIDUAL
MK 600 IF X=2THEN PRINT"PARENT
      S"
KJ 610 IF X=4THEN PRINT"GRANDP
      ARENTS"
SJ 620 IF X=8THEN PRINT"GREAT
      {SPACE}GRANDPARENTS
RM 630 IF X=16THEN PRINT"GREAT
       GREAT GRANDPARENTS"
SR 640 PRINTTAB(3);X;B$(X,1)
PM 650 FOR T=1 TO 300:NEXT
PQ 660 GET L$:IF L$=CHR$(133)T
      HEN X=Z
FP 670 NEXT
KP 680 PRINTTAB(4)"MAIN MENU"
EE 690 PRINTTAB(4)"RESTART LIS
      TING"
HH 700 PRINT"{2 DOWN}USE UP/DO
      WN CRSR TO SELECT THE N
      UMBER OFA RECORD TO BE
      {SPACE}";
ES 710 IF P=0 THEN PRINT"VIEWE
      D.";
XE 720 IF P=1 THEN PRINT"CORRE
      CTED.";
JP 730 PRINT" PRESS RETURN."
GM 740 PRINT"{HOME}{DOWN}"TAB(
      4):POKE 19,65
XC 750 L$="":INPUT L$
HP 760 L$=LEFT$(L$,2):X=VAL(L$
      ):POKE 19,0
DB 770 IF L$="RE"THEN GOTO550
XJ 780 IF L$="MA"THEN RETURN
CP 790 IF X<1 OR X>31 THEN 740
DE 800 IF P=1 THEN PRINT"{CLR}
      "
GE 810 IF P=0 THEN PRINT"{CLR}
      {4 DOWN}#"X:PRINT
AD 820 FOR Y=1 TO 5
CX 830 IF B$(X,1)=""THEN 550
GB 840 IFY=1 THEN PRINT"NAME
      {3 SPACES}: "B$(X,Y)
KK 850 IFY=2 THEN PRINT"BORN
      {3 SPACES}: "B$(X,Y)
RF 860 IFY=3 THEN PRINT"WED
      {4 SPACES}: "B$(X,Y)
HH 870 IFY=4 THEN PRINT"DIED
      {3 SPACES}: "B$(X,Y)
KF 880 IFY=5 THEN PRINT"SPOUSE
      : "B$(X,Y)
EH 890 NEXT:IF P=1 THEN 920
RJ 900 PRINTTAB(12)"{4 DOWN}PR
      ESS ANY KEY"
RK 910 WAIT 198,15:GET M$:GOTO
       550
KB 920 PRINT"{CYN}{3 DOWN}TYPE
       IN LINE CORRECTLY - PR
      ESS RETURN."
CM 930 PRINT"OR PRESS RETURN A
      LONE TO LEAVE LINE AS
      {2 SPACES}IT APPEARS AB
      OVE."
KQ 940 PRINT"{5 UP}":GOSUB 207
      0:PRINT"{4 DOWN}":FOR Y
      =1 TO 5
KX 950 PRINTTAB(9)"{P}{LEFT}";
      :GET Z$:IF Z$=""THEN 95
      0
KP 960 IF Z$=CHR$(20)AND LEN(Z
      $(Y))<1OR CC$=CHR$(34)T
      HEN 950
QD 970 IF Z$=CHR$(20)THEN Z$(Y
      )=LEFT$(Z$(Y),LEN(Z$(Y)
      )-1):GOTO 1030
CS 980 IF Z$=CHR$(13)AND Z$(Y)
      =""THEN PRINT B$(X,Y):P
      RINT:GOTO 1050
SA 990 IFZ$=CHR$(13)THEN Z$(Y)
      =Z$(Y)+SP$:Z$(Y)=LEFT$(
      Z$(Y),24):GOTO 1040
DA 1000 IF ASC(Z$)<32 OR ASC(Z
      $)>96 AND ASC(Z$)<191
      {SPACE}THEN 950
DE 1010 IF LEN(Z$(Y))>23 THEN
      {SPACE}950
HB 1020 Z$(Y)=Z$(Y)+Z$
CH 1030 PRINT Z$;:GOTO 950
RR 1040 B$(X,Y)=Z$(Y):Z$(Y)=""
      :PRINT" ":PRINT
GG 1050 NEXT:PRINTTAB(12)"PRES
      S ANY KEY"
MD 1060 WAIT 198,15:GET M$:RET
      URN
QP 1070 PRINT"{CLR}{3 DOWN}ENT
      ER FILENAME FOR SAVE.
      {SPACE}USE NAME OF THE
      PRIMARY INDIV. (16 ";
PQ 1080 PRINT"SPACE/LETTER LIM
      IT.)":PRINT"PRESS RETU
      RN TO CANCEL THIS OPTI
      ON.{DOWN}"
HF 1090 INPUT SF$:IF SF$=""THE
      N RETURN
FD 1100 IF LEN(SF$)>16 THEN 10
      70
FG 1110 PRINTTAB(10)"{3 DOWN}S
      AVING: "SF$:CR$=CHR$(1
      3)
FE 1120 OPEN 15,8,15
DJ 1130 OPEN 2,8,2,"@0:"+SF$+"
      ,S,W":GOSUB 1390
MF 1140 PRINT#2,HE$;CR$;HD$;CR
      $;G$;CR$;GR$;CR$;P$:PR
      INT#2,Z;CR$;A
QB 1150 FOR X=1 TO Z:FOR Y=1 T
      O 5
AS 1160 IF B$(X,Y)=""THEN B$(X
      ,Y)=SP$
BE 1170 PRINT#2,CHR$(34);B$(X,
      Y)
SR 1180 NEXT Y:NEXT X
RE 1190 GOSUB 1390
GX 1200 CLOSE 2:CLOSE 15
MD 1210 PRINTTAB(12)"{3 DOWN}S
      AVE COMPLETED":FOR G=1
       TO 2000:NEXT:RETURN
MB 1220 IF K=0 THEN 1270
DE 1230 PRINT"{CLR}"TAB(3)"
      {3 DOWN}A FILE ALREADY
```

```
          EXISTS IN MEMORY"
AF 1240 PRINTTAB(9)"{DOWN}OVER
        WRITE IT?{2 SPACES}Y/N
        "
EQ 1250 GET M$:IF M$="N"THEN R
        ETURN
HM 1260 IF M$<>"Y"THEN 1250
XB 1270 PRINT"{CLR}{3 DOWN}ENT
        ER FILENAME TO BE LOAD
        ED. USE FILES
        {2 SPACES}WITH PRIMARY
         INDIV.";
ER 1280 PRINT" NAMES ONLY.":PR
        INT"PRESS RETURN TO CA
        NCEL THIS OPTION.":PRI
        NT
HJ 1290 LF$="":INPUT LF$:IF LF
        $=""THEN RETURN
JX 1300 PRINTTAB(09)"{3 DOWN}L
        OADING: "LF$
FA 1310 OPEN 15,8,15
KH 1320 OPEN 2,8,2,"0:"+LF$+",
        S,R"
JG 1330 INPUT#2,HE$,HD$,G$,GR$
        ,P$:INPUT#2,Z,A:GOSUB
        {SPACE}1390
SF 1340 FOR X=1 TO Z:FOR Y=1 T
        O 5
BH 1350 INPUT#2,B$(X,Y)
PQ 1360 NEXT Y:NEXT X:GOSUB 13
        90
GP 1370 CLOSE 2:CLOSE 15
HF 1380 PRINTTAB(9)"{3 DOWN}LO
        AD COMPLETE":FOR G=1 T
        O 2000:NEXT:K=1:RETURN
QB 1390 INPUT#15,EN,EM$,ET,ES
RA 1400 IFEN>1THEN PRINT EN,EM
        $,ET,ES:STOP
RK 1410 RETURN
HK 1420 PRINT"{CLR}{DOWN} PRES
        S RETURN TO END LISTIN
        G PRIOR TO{3 SPACES}CO
        MPLETION.{DOWN}"
PX 1430 OPEN 1,8,0,"$":GET#1,A
        A$,AA$
HM 1440 GET#1,AA$,AA$:IF AA$="
        "THEN 1500
FA 1450 GET#1,BB$,CC$
XA 1460 BL=ASC(BB$+CHR$(0)):BH
        =ASC(CC$+CHR$(0))
QF 1470 DD$=MID$(STR$(BL+256*B
        H),2)+CHR$(32)
MD 1480 PRINTTAB(6)DD$;:GET#1,
        DD$:IF DD$<>""THEN 148
        0
SS 1490 PRINT:GET EE$:IF EE$<>
        CHR$(13)THEN1440
FS 1500 CLOSE 1
HF 1510 PRINTTAB(12)"{2 DOWN}P
        RESS ANY KEY"
GH 1520 WAIT 198,15:GET M$:RET
        URN
EC 1530 K$=B$(1,1):H$=B$(2,1):
        J$=B$(3,1)
MF 1540 PRINT CHR$(14)"{CLR}
        {3 DOWN}"TAB(7)"CHOOSE
         PRIMARY INDIVIDUAL":P
        RINTTAB(6)"{DOWN}A = "
        K$
XD 1550 PRINTTAB(6)"B = "H$:PR
        INTTAB(6)"C = "J$
RQ 1560 PRINT"{6 DOWN} NOTE: Y
        OU HAVE ENTERED"Z"RECO
        RDS.":PRINT" A COMPLET
        ELY ";
CA 1570 PRINT"FILLED-IN PRINTO
        UT NEEDS:":PRINTTAB(10
        )"{DOWN}FOR A - 15 REC
        ORDS"
MK 1580 PRINTTAB(10)"FOR B - 2
        3 RECORDS":PRINTTAB(10
        )"FOR C - 31 RECORDS":
        NI=0
KB 1590 GET N$:IF N$="A"THEN N
        I=1
XH 1600 IF N$="B" THEN NI=2
PE 1610 IF N$="C" THEN NI=3
XQ 1620 IF NI=0 THEN 1590
AK 1630 PRINT"{CLR}{3 DOWN}ENT
        ER A NUMBER & LETTER F
        OR YOUR CHART"
AA 1635 INPUT"(EXAMPLE - 1A)";
        C$
KA 1640 IF LEN(C$)<>2THEN 1630
AM 1650 INPUT"{2 DOWN}ENTER DA
        TE (EXAMPLE 2/22/92)""
        ;D$
FG 1660 PRINT CHR$(142)"{CLR}
        {2 DOWN}"SPC(12)"TURN
        {SPACE}PRINTER ON"
DA 1670 PRINTTAB(6)"{2 DOWN}P
        {SPACE}= PRINT"SPC(6)"
        M = MAIN MENU"
SM 1680 GET M$:IF M$="P"THEN 1
        710
JG 1690 IF M$<>"M"THEN 1680
PP 1700 RETURN
HS 1710 PRINT "{CLR}{3 DOWN}"T
        AB(14)"PRINTING...":RE
        STORE
HX 1720 IF NI=1 THEN GOTO 1760
FX 1730 IF NI=2 THEN GOTO 1750
FM 1740 FOR B=1 TO 15:READ X:N
        EXT
CP 1750 FOR B=1 TO 15:READ X:N
        EXT
KF 1760 OPEN4,4,7
CA 1770 D$=D$+"{8 SPACES}":D$=
        LEFT$(D$,8):REM ** 8 S
        PACES
EQ 1780 PP$=B$(NI,1)+"
        {24 SPACES}":PP$=LEFT$
        (PP$,24):REM ** 24 SPA
        CES
QA 1790 V$="":VV$="":V=0:VV=0:
        PV=0
FF 1800 FOR T=1 TO 15:READ X
GG 1810 IF T=1 OR T=15 THEN V=
        46
SR 1820 IF T=2 OR T=14 THEN V=
        30
AE 1830 IF T=3 OR T=13 THEN V=
        30:V$=":":VV=15
AJ 1840 IF T=4 OR T=12 THEN V=
        14
RB 1850 IF T=5 OR T=11 THEN V=
        14:V$=":":VV$=":":VV=1
        5:PV=15
EJ 1860 IF T=6 OR T=10 THEN V=
        14:V$=":":VV=15
PR 1870 IF T=7 OR T=9 THEN V=1
        4:V$=":":VV=31
QK 1880 IF T=8 THEN V=4
BX 1890 FOR Y=1 TO 4:IF B$(X,Y
        )=""THEN B$(X,Y)=SP$
DG 1900 IF Y=1 AND T=1 THEN GO
        SUB2100:GOTO1960
KD 1910 IF Y=1 THEN PRINT#4,""
        SPC(V);V$;""SPC(VV);VV
        $;""SPC(PV)"NAME:
        {2 SPACES}"B$(X,Y)
GF 1920 IF Y=2 THEN PRINT#4,""
        SPC(V);V$;""SPC(VV);VV
        $;""SPC(PV)"BORN:
        {2 SPACES}"B$(X,Y)
EK 1930 IF Y=3 AND T=1 THEN GO
        SUB2110:GOTO1960
DX 1940 IF Y=3 THEN PRINT#4,""
        SPC(V);V$;""SPC(VV);VV
        $;""SPC(PV)"WED :
        {2 SPACES}"B$(X,Y)
BH 1950 IF Y=4 THEN PRINT#4,""
        SPC(V);V$;""SPC(VV);VV
        $;""SPC(PV)"DIED:
        {2 SPACES}"B$(X,Y)
BS 1960 NEXTY:V$="":VV$="":VV=
        0:PV=0:NEXTT
BB 1970 CLOSE 4
DS 1980 PRINT"{CLR}{3 DOWN}"TA
        B(12)"PRINTOUT COMPLET
        E":FOR G=1 TO 2000:NEX
        T:RETURN
BB 1990 DATA 8,4,9,2,10,5,11,1
        ,12,6,13,3,14,7,15
DR 2000 DATA 16,8,17,4,18,9,19
        ,2,20,10,21,5,22,11,23
GX 2010 DATA 24,12,25,6,26,13,
        27,3,28,14,29,7,30,15,
        31
CG 2020 PRINT"{CLR}{CYN}"TAB(8
        )"****{2 SPACES}ENTRY
        {2 SPACES}MODE
        {2 SPACES}****"
KD 2030 PRINT"{2 SPACES}PRESS
        {SPACE}RETURN ON A BLA
        NK NAME LINE TO
        {2 SPACES}SKIP TO THE
        {SPACE}NEXT RECORD. ";
JA 2040 PRINT" PRESS RETURN
        {2 SPACES}ON ANY OTHER
         BLANK LINE TO LEAVE T
        HAT{3 SPACES}LINE";
QF 2050 PRINT" BLANK.
        {2 SPACES}PRESS ↑ ON A
         BLANK NAME{4 SPACES}L
        INE TO TERMINATE THE "
        ;
RD 2060 PRINT"ENTRY MODE.
        {2 SPACES}MAKE CURRENT
        -LINE CORRECTIONS WITH
         INST/DEL."
MJ 2070 PRINT"{WHT}{6 DOWN}NAM
        E{3 SPACES}: {DOWN}"DT
        $:PRINT"BORN{3 SPACES}
```

```
        : {DOWN}"DT$:PRINT"WED
        {4 SPACES}: {DOWN}"DT$
DG 2080 PRINT"DIED{3 SPACES}:
        {SPACE}{DOWN}"DT$:PRIN
        T"SPOUSE : {DOWN}"DT$:
        PRINT"{HOME}{8 DOWN}":
        RETURN
CF 2090 FOR F=1 TO 5:B$(Z,F)=S
        P$:NEXT:Y=5:RETURN
FE 2100 PRINT#4,""SPC(4)"ANCES
        TORS OF "PP$""SPC(5)"N
        AME:{2 SPACES}"B$(X,Y)
        :RETURN
GC 2110 PRINT#4,""SPC(4)"CHART
         "C$""SPC(5)"PRINTED "
        D$""SPC(13)"WED :
        {2 SPACES}"B$(X,Y)
EF 2120 RETURN
QA 2130 PRINT"{CLR}{5 DOWN}"TA
        B(6)"QUIT - ARE YOU SU
        RE?{2 SPACES}Y/N"
MF 2140 GET M$:IF M$="N"THEN R
        ETURN
DQ 2150 IF M$<>"Y"THEN 2140
BQ 2160 SYS 64738
```

Robert Nellist is a retired Sears serviceman who enjoys using graphic fonts with his word processor. He lives in Brockport, NY.

CALCULEASE

By Farid Ahmad

Calculus is an important branch of mathematical science that deals with bodies in motion. An intermediate-to-advanced study of many subjects requires a working knowledge of calculus. Calculus itself can be divided into two main parts: integration and differentiation. Calculease will help students by quickly calculating the definite integral of any valid function.

Typing It In

Calculease is written entirely in BASIC. To help 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 to disk before you exit Proofreader.

Calculease is a snap to use, providing you have a working knowledge of integral calculus. When you first run Calculease, there is a brief delay as some machine language routines are poked into place. You are then presented with a control screen that contains all the default parameters.

You can change any of these parameters by pressing the first letter of each option. When everything is to your liking, press Return, and the result will be displayed. Special graphics make the display similar to what you see in mathematical texts.

Here is a rundown of all the options and what they represent.

Screen Blank

If you turn this option on (by pressing S), the screen will blank out while calculations are being made. This speeds up the computer slightly.

Integration Rule

Calculease uses a numerical method to solve integration problems. Briefly, this involves dividing the required interval into many small parts, evaluating the average value of the function in each part, and then adding all the values to get the final result.

Various rules are available to divide the given interval and to add up the resulting parts. Calculease can use four of these: Weddle, 3/8 Simpson, Simpson, and Trapezium. These methods are listed in decreasing order of accuracy. The more accurate methods give different weight to each division, and so calculations are rather involved. Since we're using a computer, the difficulty of a calculation is not a problem, and the most accurate method (Weddle) should be used. The other three methods will be of interest to students of calculus who want to determine the relative accuracy of the methods.

Number of Divisions

The greater the number of divisions into which the interval is divided, the greater the accuracy—but the longer it takes to calculate the result. A maximum of 500 divisions is possible. Note that each rule places a different restriction on the number of divisions. With Trapezium, any number of divisions can be used; Simpson requires an even number of divisions. The number of divisions must be an even multiple of 3 with 3/8 Simpson, and it must be an even multiple of 6 with Weddle.

If you choose an incorrect number of divisions, the number is rounded off to an acceptable value. Also note that as you change the integration rule (by pressing I) the number of divisions will change accordingly.

Upper Limit

This is the upper limit of the interval. It can be any valid number. You can also use the constant π or its multiples, but remember to indicate the proper mathematical operations. For example, it is conventional to write 2π when you want to indicate multiplication. In Calculease, however, you must enter $2*\pi$, or the results will be unpredictable.

Lower Limit

This is the lower limit of the interval. It is specified in the same manner as the upper limit. Obviously, the lower limit must not exceed the upper limit. If this happens, the program issues a warning when you try to evaluate the integral by pressing Return.

Function

This is the relationship between the two variables *x* and *y*. This means that the function must follow the same rules of mathematical precedence and syntax as normal BASIC expressions. If any errors occur, they are indicated.

To check for such errors, the upper limit is placed in the function, and the function is then evaluated. In some cases the function may not be defined at the upper limit, and you will get an error message. For example, if the upper limit is $\pi/2$ and you try to enter the function *y=tan(x)*, you will get a division-by-zero error, as tan*(x)* is undefined in the expression $x=\pi/2$.

There is one potential error that will not be detected. Since BASIC expressions can include variables, these are not flagged as errors. To Calculease, however, only the variable *x* is valid. Using any other variables will produce unpredictable results. For example, *y=x+z* will be accepted, but it will produce an incorrect result. In short, be careful not to include any variable names by mistake. If you use the constant π as part of the expression, follow the rule mentioned above.

When you have adjusted all parameters as required, press Return to evaluate the integral. A timer will appear at the bottom of the screen to let you know how much of the calculation has been completed. The timer's initial value depends on the number of divisions. The speed at which it counts down depends upon the complexity of

the function.

After the result is displayed, you're returned to the control screen. All settings are retained, and you can change the parameters selectively to watch the effect of each on the final result. You might want to change the number of divisions or the integration rule to see how it affects the accuracy of the result.

CALCULEASE

```
FF 5 REM COPYRIGHT 1993 COMPUT
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PD 10 GOTO80
BJ 20 FORI=0TON
BJ 30 SYSQQ,U1,U2:PRINTN-I;:PR
      INT"{LEFT} "
GA 40 X=L+I*H
MX 50 Y(I)=VAL(RE$)
GJ 60 NEXT
QD 70 RETURN
RD 80 POKE56,48:CLR:RE$="":I=0
      :N=0:X=0:L=0:H=0:DIMY(50
      0):QQ=828:U1=23:U2=25
AP 90 S1=0:S2=0:S3=0
KQ 100 FOR R= 0 TO 35:READ A:P
       OKE QQ+R,A:NEXT:REM REL
       OCATABLE ML FOR CRSR LO
       CATING
EF 110 DATA{2 SPACES}032,253,1
       74,032,158,183,134,002,
       032,253,174,032,158,183
       ,138,168,166
XX 120 DATA{2 SPACES}002,224,0
       25,176,033,192,040,176,
       029,024,032,240,255,096
       ,162,014,076
FA 130 DATA{2 SPACES}139,227
GJ 140 GOSUB1250:REM{4 SPACES}
       TITLE
DA 150 GOSUB1520:REM{4 SPACES}
       SETUP SMARTVAL
RB 160 GOSUB1900:REM{4 SPACES}
       CHARCTER DEFINE
XM 170 GOSUB1370:REM{4 SPACES}
       INITIALIZE
BG 180 GOSUB2110:REM{4 SPACES}
       SETTINGS
CE 190 IFSB=1 THEN POKE53265,P
       EEK(53265)AND239:POKE53
       280,1:REM BLANK SCREEN
AH 200 GOSUB480:REM{5 SPACES}A
       DJUST INTERVEL
RA 210 GOSUB20:REM{6 SPACES}PR
       E CALCULATE
CQ 220 SYSQQ,23,25:PRINT"WAIT.
       ."
MM 230 ON RULE GOSUB610,670,74
       0,820:REM CALCULATIONS
BB 240 IFSB=1 THEN POKE53265,P
       EEK(53265) OR16:POKE532
       80,0
HH 250 GOSUB900:REM{5 SPACES}O
       UTPUT
EF 260 GOTO180
FC 270 :
BD 280 :
RD 290 :
RA 300 REM-LIMITS ETC.
HA 310 PRINT"{CLR}"
QD 320 INPUT"LOWER LIMIT";L$
FQ 330 L=VAL(L$)
QG 340 GOSUB1140:IFEITHEN310
PQ 350 RETURN
QH 360 :
JJ 370 :
DH 380 PRINT"{CLR}"
KS 390 INPUT"UPPER LIMIT";U$
FJ 400 U=VAL(U$)
XE 410 GOSUB1140:IFEITHEN380
KA 420 RETURN
DQ 430 :
XQ 440 :
EA 450 PRINT"{CLR}{2 DOWN}(1 T
       O 500)
JR 460 INPUT"{HOME}NUMBER OF D
       IVISIONS";N$:N1=VAL(N$)
       :IFN1<1{2 SPACES}OR N1>
       500 THEN450
EK 470 N=N1
AX 480 N=INT(N/M)*M
HK 490 IFN<MTHENN=M
BQ 500 H=(U-L)/N:RETURN
KA 510 :
RB 520 :
BS 530 PRINT"{CLR}RELATION BET
       WEEN Y AND X:":PRINT "Y
       =":INPUT RE$
CA 540 X=U:CHECK=VAL(RE$)
RB 550 GOSUB1140:IFEITHEN530
EK 560 RETURN
BF 570 :
FG 580 :
KG 590 :
BB 600 REM-TRAPEZIUM
KX 610 S0=Y(0)+Y(N)
RD 620 FORI=1TON-1:S1=S1+Y(I):
       NEXT
BC 630 AS=(H/2)*(S0+2*S1)
HS 640 RETURN
GM 650 :
HB 660 REM-SIMPSON
AD 670 S0=Y(0)+Y(N)
CM 680 FORI=1TON-1STEP2:S1=S1+
       Y(I):NEXT
AX 690 FORI=2TON-2STEP2:S2=S2+
       Y(I):NEXT
PR 700 AS=(H/3)*(S0+4*S1+2*S2)
KD 710 RETURN
HS 720 :
GP 730 REM-EIGHT SIMPTHENON
DH 740 S0=Y(0)+Y(N)
JP 750 FORI=1TON-1:IF3*INT(I/3
       )=ITHENS1=S1+Y(I):GOTO7
       70
RX 760 S2=S2+Y(I)
BG 770 NEXTI
QM 780 AS=( 3*H/8)*(S0+3*S2+2*
       S1)
KK 790 RETURN
FD 800 :
DR 810 REM-WEDDLE
AB 820 FORI=0TON-1STEP6
EH 830 S=Y(I)+5*Y(I+1)+Y(I+2)+
       6*Y(I+3)+Y(I+4)+5*Y(I+5
       )+Y(I+6):S0=S0+S
AM 840 NEXTI
HE 850 AS=(3*H/10)*S0
MR 860 RETURN
BJ 870 :
FK 880 :
FR 890 REM-OUTPUT
DH 900 PRINT"{CLR}"
SG 910 RP$=" "+RE$+"{2 SPACES}
       {X"+MS$+MS$
HP 920 R1$=LEFT$(RP$,36)
JD 930 R2$=MID$(RP$,37,30)
QH 940 R3$=MID$(RP$,67,30)
QP 950 LL=LEN(L$):LP=5-LL
JH 960 XX=9:YY=1
EX 970 SYSQQ,XX- 1,YY
       {3 SPACES}:PRINT"!"
JK 980 SYSQQ,XX{3 SPACES},YY
       {3 SPACES}:PRINT"A"
FQ 990 SYSQQ,XX+ 1,YY
       {3 SPACES}:PRINT"A"
MM 1000 SYSQQ,XX+ 2,YY
        {3 SPACES}:PRINT"{K}"
JF 1010 SYSQQ,XX- 2,YY+1 :PRIN
        TU$
EA 1020 SYSQQ,XX+ 3,YY-1 :PRIN
        TL$
GK 1030 SYSQQ,XX{3 SPACES},YY+
        1 :PRINTR1$
FQ 1040 SYSQQ,XX+1 ,YY+6 :PRIN
        TR2$
XJ 1050 SYSQQ,XX+2 ,YY+6 :PRIN
        TR3$
HA 1060 AS$="= "+STR$(AS):A0=L
        EN(AS$):A0=(40-A0)/2
XP 1070 SYSQQ,15,A0:PRINT AS$
HA 1080 SYSQQ,23,09:PRINT"
        {RVS}PRESS ANY KEY TO
        {SPACE}GO ON"
SX 1090 POKE198,0:WAIT198,1:PO
        KE198,0:RETURN
GF 1100 :
KF 1110 :
QG 1120 :
KS 1130 REM-CHECK ERROR
XP 1140 Z=PEEK(781)*2:IFZ=0THE
        N1180
PB 1150 EA=PEEK(41766+Z)+PEEK(
        41767+Z)*256:PRINT"
        {RVS}{2 DOWN}";
EQ 1160 C=PEEK(EA):PRINTCHR$(C
        AND127);:IFC<128THENEA
        =EA+1:GOTO1160
XS 1170 PRINT" ERROR":EI=1:GOS
        UB1080:RETURN
KX 1180 EI=0:RETURN:REM NO ERR
        OR
BQ 1190 :
AP 1200 :
DQ 1210 :
GR 1220 :
KR 1230 :
CQ 1240 REM-A
CR 1250 PRINT"{CLR}":POKE53281
        ,0:POKE53280,0:POKE646
```

```
      ,3
MC 1260 SYSQQ,3,15:PRINT"CALCU
        LEASE
PJ 1270 SYSQQ,4,15:PRINT"=====
        ====="
DA 1280 SYSQQ,8,1:PRINT"PROGRA
        M TO EVALUATE DEFINITE
         INTEGRALS"
EG 1290 SYSQQ,10,13:PRINT"BY F
        ARID AHMAD"
CC 1300 SYSQQ,23,14:PRINT"
        {RVS}PLEASE WAIT"
HD 1310 RETURN
XD 1320 :
QE 1330 :
KF 1340 :
GF 1350 :
MX 1360 REM-INITIALIZE
MF 1370 SB$(0)="OFF":SB$(1)="O
        N ":SB=0
AE 1380 RU=4:U$="↑":U=VAL(U$):
        M=6
GG 1390 L$="↑/2":L=VAL(L$)
FH 1400 N$="24":N=VAL(N$):N1=N
XX 1410 RE$="SIN(X) + COS(X) +
         X↑2 + 3*X + 9
XP 1420 GOSUB480
PJ 1430 FOR A =1 TO 4:READIA$(
        A):NEXT
PR 1440 REM DIMY(500)
RP 1450 M1$="{WHT}LOWER LIMIT
        {SPACE}IS GREATER THAN
         UPPER LIMIT{CYN}"
AF 1460 FOR R =1TO39:MS$=MS$+"
         ":MU$=MU$+"-":ML$=ML$
        +"F":NEXT
DQ 1470 RETURN
DS 1480 :
AX 1490 :
BS 1500 :
PS 1510 REM-POKE SMART VAL
SR 1520 SA=49152:REM STARTING
        {SPACE}ADDRESS (RELOCA
        TABLE)
XF 1530 H1=INT((SA+13)/256):L1
        =(SA+13)-H1*256
BX 1540 H2=INT((SA+150)/256):L
        2=(SA+150)-H2*256:CS=0
SS 1550 FORAD=SATOSA+206:READM
        L:CS=CS+ML:POKEAD,ML:N
        EXT
XJ 1560 IFCS<>23175THENPRINTCH
        R$(147)"*** ERROR IN D
        ATA STATEMENTS ***":EN
        D
XD 1570 POKESA+5,L1:POKESA+9,H
        1:POKESA+133,L2:POKESA
        +138,H2:REM RELOCATE M
        L
KB 1580 SYSSA
AE 1590 RETURN
QK 1600 DATA169,076,133,124,16
        9,013,133,125
PM 1610 DATA169,192,133,126,09
        6,141,255,003
EF 1620 DATA104,141,252,003,10
        4,141,253,003
XX 1630 DATA072,173,252,003,07
        2,201,217,208
RP 1640 DATA007,173,253,003,20
        1,183,240,011
SS 1650 DATA{2 SPACES}173,255,
        003,201,058,176,003,07
        6
EP 1660 DATA128,000,096,104,16
        9,220,072,186
DR 1670 DATA142,254,003,165,11
        3,141,248,003
BR 1680 DATA165,114,141,249,00
        3,162,079,189
GD 1690 DATA000,002,157,167,00
        3,202,016,247
BF 1700 DATA056,165,036,229,12
        2,168,162,023
HM 1710 DATA201,081,176,073,16
        9,000,141,013
AQ 1720 DATA003,153,000,002,13
        6,177,122,153
PD 1730 DATA000,002,136,016,24
        8,169,000,133
CM 1740 DATA122,169,002,133,12
        3,032,121,165
DC 1750 DATA173,000,003,141,25
        0,003,173,001
CQ 1760 DATA003,141,251,003,16
        9,150,141,000
KA 1770 DATA003,169,192,141,00
        1,003,032,115
BB 1780 DATA000,032,138,173,16
        2,000,173,250
BP 1790 DATA003,141,000,003,17
        3,251,003,141
EB 1800 DATA001,003,173,013,00
        3,138,141,013
HX 1810 DATA003,240,006,169,00
        0,133,097,133
QJ 1820 DATA102,173,248,003,13
        3,113,173,249
QM 1830 DATA003,133,114,162,07
        9,189,167,003
SC 1840 DATA157,000,002,202,01
        6,247,169,000
RA 1850 DATA133,013,174,254,00
        3,154,096
DG 1860 :
QH 1870 :
KJ 1880 :
GH 1890 REM-NEW CHARACTERS
SC 1900 C=6:POKE53272,(PEEK(53
        272)AND240)OR2*C
GM 1910 S=53248:E=55296:NC=122
        88
KG 1920 POKE56333,127:POKE1,51
EM 1930 L0=E-S:EN=L0+NC
FQ 1940 A%=L0/256:A=L0-256*A%:
        B%=(EN-A)/256:B=EN-256
        *B%-A:C%=(E-A)/256
FQ 1950 C=E-256*C%-A
XB 1960 POKE781,A%+1:POKE782,A
        :POKE90,C:POKE91,C%:PO
        KE88,B:POKE89,B%:SYS41
        964
AB 1970 POKE1,55:POKE56333,129
KA 1980 READA:IFA=-1THEN RETUR
        N:REM----EXIT
CQ 1990 FORI=0TO7:READB
CF 2000 POKE12288+A*8+I,B
GS 2010 NEXT:GOTO1980
SP 2020 DATA033,000,000,014,03
        1,025,024,024,024
EJ 2030 DATA065,024,024,024,02
        4,024,024,024,024
SF 2040 DATA094,000,000,254,12
        4,108,110,231,000
BQ 2050 DATA097,024,024,024,15
        2,248,112,000,000
GF 2060 DATA024,000,000,102,06
        0,024,060,230,000
MP 2070 DATA031,006,006,006,06
        2,102,102,063,000
DR 2080 DATA-1
CE 2090 :
BD 2100 :
SB 2110 REM-Z
SE 2120 S0=0:S1=0:S2=0
FE 2130 PRINT"{CLR}"
SH 2140 XX=6
JH 2150 SYSQQ,00,3:PRINT"{RVS}
        {11 SPACES}CALCULEASE
        {11 SPACES}"
BJ 2160 SYSQQ,XX,3:PRINT"{RVS}
        S{OFF}CREEN BLANK
        {8 SPACES}:"
HH 2170 SYSQQ,XX+1,0:PRINTMU$
PK 2180 SYSQQ,XX+2,3:PRINT"
        {RVS}I{OFF}NTEGRATION
        {SPACE}RULE{4 SPACES}:
        "
JG 2190 SYSQQ,XX+3,3:PRINT"
        {RVS}N{OFF}UMBER OF DI
        VISIONS :"
DA 2200 SYSQQ,XX+4,3:PRINT"
        {RVS}L{OFF}OWER LIMIT
        {9 SPACES}:"
SE 2210 SYSQQ,XX+4,25:PRINTL$
DG 2220 SYSQQ,XX+5,3:PRINT"
        {RVS}U{OFF}PPER LIMIT
        {9 SPACES}:"
RE 2230 SYSQQ,XX+5,25:PRINTU$
CX 2240 SYSQQ,XX+6,0:PRINTMU$
PQ 2250 SYSQQ,XX+7,3:PRINT"
        {RVS}F{OFF}UNCTION..."
MF 2260 SYSQQ,XX+9,00:PRINT"Y=
         ";RE$
RF 2270 REM{3 SPACES}SYSQQ,16,
        00:PRINTMU$
KF 2280 SYSQQ,23,3:PRINT"{RVS}
        PRESS RETURN TO EVALUA
        TE INTEGRAL"
FC 2290 SYSQQ,XX,25:PRINTSB$(S
        B)
PF 2300 SYSQQ,XX+2,25:PRINTIA$
        (RU)
RF 2310 SYSQQ,XX+3,24:PRINT N;
        "{LEFT} "
FC 2320 POKE198,0:WAIT198,1
XA 2330 GET T1$
AB 2340 IF T1$<>"I"THEN2380
KA 2350 RU=RU+1:IFRU>4THENRU=1
GM 2360 M=RU:IF M=4THEN M=6
AB 2370 GOSUB470: GOTO2300
FJ 2380 IFT1$="N"THENGOSUB450:
        GOTO2120
AD 2390 IFT1$="F"THENGOSUB530:
        GOTO2120
```

```
PB 2400 IFT1$="L"THENGOSUB310:
        GOTO2120
FD 2410 IFT1$="U"THENGOSUB380:
        GOTO2120
FP 2420 IFT1$<>"S"THEN2450
JB 2430 SB=SB+1:IFSB=2THENSB=0
DX 2440 GOTO2290
QS 2450 IFT1$<>CHR$(13)THEN232
        0
BK 2460 IF L =<U THEN2500
MK 2470 SYSQQ,21,0:PRINT M1$:S
        YSQQ,23,0:PRINTMS$:GOS
        UB1080
EE 2480 SYSQQ,21,0:PRINT MS$
CA 2490 GOTO2280
DQ 2500 SYSQQ,23,3:PRINT"{RVS}
        {12 SPACES}WORKING...
        {12 SPACES}"
SQ 2510 RETURN
AS 2520 :
ED 2530 DATA "TRAPEZIUM
        {2 SPACES}"
MF 2540 DATA "SIMPSON
        {4 SPACES}"
SF 2550 DATA "3/8 SIMPSON"
EF 2560 DATA "WEDDLE'S
        {3 SPACES}"
AC 2570 :
```

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DIRECTORY AID

By Ondřej Blažek

Have you ever wished you could temporarily remove files from a disk directory, but still keep the files on disk? Have you ever wished you could protect files from being scratched? What about a command that would let you temporarily corrupt a file so that it would become unusable? How about turning unusable splat files to usable files with most of the data intact? Wouldn't it be nice to be able to unscratch scratched files? If you answered yes to any of these questions, then Directory Aid is for you.

Getting Started

Directory Aid is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you exit Proofreader.

Using the Program

Load Directory Aid but do not run it. Insert the disk you wish to alter in the drive, and then run the program.

After a moment of disk access, the computer will display the names of the first eight files on the disk, the location of the files, and their current status (hidden, normal, locked, or splat).

The first filename also appears below the list in a work box, followed by the prompt *H/N/L/S*. These letters correspond to the four possible status conditions of each file. To change a file status, press the corresponding key: H for hidden, N for normal, L for locked, or S for splat.

Hidden Files

Hidden files do not appear in a normal directory and cannot be accessed until they are returned to normal status. Before you hide a file, note the file type (PRG, SEQ, USR, or REL). This information will be needed to return the file to normal.

Warning: If a file is hidden, do not save additional files to the disk or use the VALIDATE command. Such an action could overwrite any hidden files. Return all files to normal with the N option before adding files to the disk.

Normal Files

The N option returns a hidden, locked, or splat file to its original state. Any scratched files that are on disk will appear as hidden files and can be retrieved using the N option.

Locked Files

The L option prevents files from being erased with Commodore's SCRATCH command. If you later want to erase a locked file, use the N option to return it to normal status. Then scratch it. A locked file appears with a < symbol next to its name in the directory.

Splat Files

The S option tricks the computer into believing that a file has not been closed properly. A splat file appears in the directory with an asterisk (*) beside its name. It will not load or run correctly. To reverse the effects of S, use the N option. If a true splat file exists due to improper file closing, use the N option to return the file to a usable format with most of its information intact.

When you first run Directory Aid, most files will be listed as normal. If you decide not to change a file's status, press N to leave it normal and to move on to the next file. Press H to leave a hidden file unchanged, and so on. You can also press a cursor key to leave a file unchanged and move on to the next.

After you've had a chance to change the status of the first eight files (first sector) of the directory, the computer writes the changes to disk and gets the next eight files from the directory. The process continues until there are no more files in the directory.

How It Works

All the functions of this program are based on the first byte of any entry in the directory. Byte 0 of the entry indicates the file type. Bytes 1 and 2 of a directory entry point to the track and sector of the first data block. Bytes 3–18 contain the 16 characters that make up the filename. If the name contains fewer than 16 characters, it's padded with shifted spaces.

Bits 0–2 of byte 0 determine whether a file is deleted (DEL), sequential (SEQ), program (PRG), user (USR), or relative (REL). If bit 6 is 0, then the file is considered normal. Set it to 1, however, and the file becomes locked and cannot be deleted.

By changing the first byte of each entry, you can obtain many variations of the file, including normal, splat, and locked. When you remove the first character and replace it with a 0, the directory entry becomes transparent, and the file seems to have disappeared. If a new directory entry is added to the disk while an entry is hidden, however, the new entry overwrites the original hidden directory entry. The actual file is still on disk, but it cannot be accessed.

The SCRATCH command works like the H option. The file is not actually removed from the disk; just the directory entry is deleted (see above). This enables the N option to retrieve a scratched file if its original directory entry has not been overwritten.

DIRECTORY AID

```
PK 5 REM COPYRIGHT 1993 - COMP
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MH 10 POKE 53280,0
QG 20 POKE 53281,0
XX 30 POKE 646,5
MK 100 TR=18:SE=1
KR 110 PRINT"{CLR}{GRN}U******
       **********************
```

```
         *********I";
RG 115   PRINT"-{RED}{4 SPACES}O
         NDREJ BLAZEK'S DIRECTOR
         Y AID{5 SPACES}{GRN}-";
SR 117   PRINT"J**************
         ********************K
         "
BX 120   PRINT"{RED}{2 SPACES}TR
         K{2 SPACES}SEC
         {6 SPACES}FILENAME
         {8 SPACES}STATUS"
SH 150   PRINT"{HOME}{15 DOWN}
         {GRN}******************
         ********************"
ES 160   PRINT"{GRN}************
         ************************
         *****"
MR 180   PRINT"{HOME}{19 DOWN}
         {RED}H{GRN}...HIDE FILE
          (NOT IN DIRECTORY)
DK 185   PRINT"{RED}L{GRN}...LOC
         K FILE (SCRATCH PROOF)"
QP 187   PRINT"{RED}S{GRN}...SPL
         AT{2 SPACES}FILE (UNUSA
         BLE FORMAT)"
PP 188   PRINT"{RED}N{GRN}...NOR
         MAL FILE (RETURN TO NOR
         MAL)"
PR 199   PRINT"{HOME}{5 DOWN}"
AQ 300   V$=""
AS 330   OPEN 15,8,15
XA 340   OPEN 5,8,5,"#"
BD 350   PRINT#15,"U1:"5;0;TR;SE
HD 355   INPUT#15,E,E$,ET,ES
KX 360   B$="":GET#5,X$:IF X$=""
          THEN X$=CHR$(0)
AK 365   FORL=1TO255
EF 380   GET#5,A$
AG 390   IF A$<>""THEN V$=V$+A$
AM 395   IF A$=""THEN V$=V$+CHR$
         (0)
RJ 400   NEXT:NA=0
HG 410   FORT=(3-1) TO (255-1)ST
         EP 32
JF 415   NA=NA+1
HQ 420   C(NA)=ASC(MID$(V$,T,1))
         :T(NA)=ASC(MID$(V$,T+1,
         1)):S(NA)=ASC(MID$(V$,T
         +2,1))
SP 425   F$(NA)=MID$(V$,T+3,16)
CF 427   C(X)=(C(X)AND3)+(C(X)AN
         D4)
QQ 430   NEXT
HJ 440   FORT=1 TO 8:IF T(T)=0 A
         ND S(T)=0 THEN 450
MA 441   PRINT "{GRN}{2 SPACES}"
          T(T):PRINT"{UP}
         {8 RIGHT}"S(T)
PF 442   PRINT"{UP}"TAB(12)"
         {RED}"CHR$(34);:POKE646
         ,5:PRINTF$(T);:POKE646,
         2:PRINTCHR$(34)
FM 443   PRINT"{UP}"TAB(32);
KA 445   GOSUB 1000:PRINT"{GRN}"
         C$
QR 450   NEXT:PRINT
JE 460   CLOSE 5:CLOSE 15:GOTO 5
         005
BM 1000  IF C(T)=0 THEN C$="HID
         DEN":RETURN
KX 1010  IF C(T)<128 THEN C$="S
         PLAT":RETURN
FM 1020  IF C(T)<135 THEN C$="N
         ORMAL":RETURN
SE 1030  IF C(T)>191 THEN C$="L
         OCKED":RETURN
AX 1040  C$="???":RETURN
FE 5005  PRINT:OPEN 15,8,15
SX 5010  OPEN 5,8,5,"#"
XR 5020  FOR A=1 TO 255
FS 5025  IF A=2 OR (A-2)/32=INT
         ((A-2)/32)THEN GOSUB 5
         100:GOTO 5050
AG 5030  PRINT#5,MID$(V$,A,1);
HQ 5050  NEXT
AH 5055  PRINT#5,X$;
DJ 5060  PRINT#15,"U2:";5;0;TR;
         SE
HF 5070  CLOSE 5:CLOSE 15
MH 5080  SE=ASC(MID$(V$,1,1)):I
         F SE>20 THEN PRINT"
         {CLR}";:GOTO 5500
FP 5090  GOTO 110
CM 5100  X=INT(A/32)+1
GG 5107  C(X)=(C(X)AND3)+(C(X)A
         ND4)
MB 5109  IF T(X)=0 AND S(X)=0 T
         HEN A$="H":GOTO 5141
DH 5110  PRINT"{HOME}{16 DOWN}
         {2 RIGHT}{RED}";CHR$(3
         4)"{16 SPACES}"CHR$(34
         )
KG 5120  PRINT"{HOME}{16 DOWN}
         {3 RIGHT}{GRN}"F$(X);"
         {5 RIGHT}{GRN}({RED}H
         {GRN}/{RED}N{GRN}/
         {RED}L{GRN}/{RED}S
         {GRN})?"
GE 5140  GET A$:IF A$="" THEN 5
         140
EC 5141  IF T(X)>0 THEN PRINT"
         {UP}{37 SPACES}":PRINT
         "{UP}";
KM 5150  IF A$="H" THEN Q$=CHR$
         (0)
BS 5155  IF A$<>"H" AND C(X)=0
         {SPACE}THEN GOSUB 5300
CM 5157  IF A$<>"H" THEN Q$=CHR
         $(C(X)+128)
MQ 5160  IF A$="L" THEN C(X)=C(
         X)+192:Q$=CHR$(C(X))
PX 5170  IF A$="S" THEN C(X)=C(
         X)+32:Q$=CHR$(C(X))
KG 5180  PRINT#5,Q$;
GE 5190  RETURN
CQ 5300  PRINT"1...SEQ 2...PRG
         {SPACE}3...REL 4...USR
         "
RD 5310  GET A$:IF VAL(A$)<1 OR
          VAL(A$)>4 THEN 5310
EX 5320  C(X)=VAL(A$)
AE 5330  PRINT"{UP}{38 SPACES}"
         :PRINT"{UP}";
KQ 5340  RETURN
SF 5500  PRINT"{CLR}";:GOSUB 90
         00
HB 5505  IF E THEN PRINT"{CLR}D
         ISK ERROR:"E;E$;T;S:PR
         INT"{2 DOWN}"
BB 5507  PRINT"{DOWN}{RED}WARNI
         NG:"
HP 5510  PRINT"{DOWN}{GRN}IF AN
         Y FILES ARE HIDDEN, DO
          {RED}NOT{GRN} USE"
PJ 5520  PRINT"THE DISK {RED}VA
         LIDATE{GRN} COMMAND, O
         R ADD"
CS 5530  PRINT"ANY OTHER FILES
         {SPACE}TO THE DISK."
JK 5540  PRINT"{DOWN}TO ADD FIL
         ES TO THIS DISK, UNHID
         E"
FD 5550  PRINT"ALL FILES BEFORE
          SAVING."
PK 5560  PRINT"{2 DOWN}?FILES A
         LTERED";:END
JJ 9000  OPEN 15,8,15:INPUT#15,
         E,E$,T,S:CLOSE 15:RETU
         RN
```

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CATS AND MICE

By Maurice Yanney

You're the mouse in this fast-paced one-player game for the 64, and you try to maneuver through various mazes to reach a number of cheeses. To add a little excitement to the game, the cheeses can also move. To make things more interesting, several cats are chasing you.

The object of this game is quite simple: Eat all the cheese while avoiding the cats. While the object is simple, accomplishing the task requires skill, patience, practice, and a little luck.

Typing It In

Cats and Mice is written entirely in machine language, but it loads and runs like a BASIC program. To type it in, use MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts you, respond with the following values.

Starting address: 0801
Ending address: 1B33

Be sure to save a copy of the program before exiting MLX.

Chase the Cheese

After you load and run Cats and Mice, press the space bar or the joystick fire button to start the game. The object of

this game is to move your mouse around each maze eating the cheese and avoiding the cats.

To move, use the joystick in either port, or use the I, J, K, and M keys to move up, left, right, and down respectively. (I highly recommend using a joystick to play this game.)

When the mouse bites a piece of cheese, the cheese shrinks and moves to a new location. To finish off a piece of cheese, the mouse must hit it five times. When all three pieces of cheese are eaten, the mouse moves on to the next level. Every time you complete two levels, you're presented with a new maze.

As you move the mouse about the maze, you'll notice that the pursuing cats have a speed advantage. You can make the mouse move faster by pressing the joystick button or the space bar. This can help you out of some tight spots, but use the added speed sparingly, as it's used up very quickly. The bottom of the screen shows the amount of speed remaining. When your energy is depleted, pressing the joystick button or the space bar will not increase the speed of the mouse.

Scoring

If one of the four cats touches the mouse, that mouse drops from the screen. You begin with five mice and are awarded a new mouse for every 5000 points. You earn 100 points each time the mouse eats a part of a piece of cheese. You earn 1000 points for completing a level. Bonus points are also given at the end of each level for any unused speed that may remain.

To pause the game, hold down the Shift key or press the Shift Lock key. To continue playing, release the Shift key or press the Shift Lock key again.

CATS AND MICE

```
0801:0B 0B 0A 00 9E 20 32 30 A4
0809:36 32 00 00 00 A9 80 8D F5
0811:91 02 85 A2 A9 01 8D 6D 1F
0819:1B A9 BF A0 18 20 1E AB 4C
0821:A9 0E 8D 20 D0 A9 00 8D F7
0829:21 D0 20 A6 0C 20 3D 0B D2
0831:20 EB 0A 20 8B 09 A9 00 63
0839:8D 15 D0 A9 FF 8D 1B D0 47
0841:A9 F2 85 FD A9 17 85 FE 27
0849:20 1B 17 4C E7 08 A5 C5 48
0851:C9 40 D0 FA AD 00 DC C9 11
0859:7F D0 F3 AD 01 DC C9 FF C5
0861:D0 EC 20 65 0A 20 F3 09 31
0869:AD 01 DC 29 10 F0 0F AD CE
0871:8D 02 29 01 C9 01 D0 06 F7
0879:20 4B 14 4C 69 08 20 F7 57
0881:14 20 EF 0B AD 69 1B F0 8C
0889:09 20 CE 13 20 48 16 20 9F
0891:14 0C 20 7F 0E 20 8F 0A C4
0899:20 0A 15 29 03 D0 06 20 F8
08A1:9A 0E 20 B5 0A AD 1E D0 F5
08A9:8D 6A 1B 29 01 C9 01 D0 13
08B1:03 20 2D 10 AC 39 1B D0 43
08B9:03 4C E7 08 AD 66 1B 18 31
08C1:6D 67 1B 6D 68 1B D0 03 F0
08C9:20 41 11 AD 3A 1B D0 06 1D
08D1:20 BB 13 4C DE 08 AE 3A B6
08D9:1B CA 8E 3A 1B A5 A2 C9 1E
08E1:01 90 FA 4C 69 08 A5 A2 14
08E9:C9 64 90 FA 20 4B 14 A9 B9
08F1:00 8D 6B 1B A9 A0 A0 28 BD
08F9:99 BF 07 88 D0 FA 20 F7 DA
0901:14 AD 6D 1B D0 06 20 7F 46
0909:0E 20 8F 0A 20 0A 15 29 39
0911:03 D0 0B AD 6D 1B D0 06 94
0919:20 9A 0E 20 B5 0A A5 A2 69
0921:C9 01 90 FA AD 00 DC 29 6A
0929:10 F0 10 AD 01 DC 29 10 3A
0931:F0 09 A5 C5 C9 3C F0 03 33
0939:4C 3F 09 4C 4F 08 AD 3D 5A
0941:1B 29 07 D0 B9 A0 00 AE 18
0949:6B 1B BD 20 19 99 C0 07 49
0951:E8 E0 42 D0 02 A2 00 C8 C8
0959:C0 1F D0 EE AD 6B 1B 18 06
0961:69 01 C9 42 D0 02 A9 00 A7
0969:8D 6B 1B 4C FF 08 A0 00 A6
0971:B9 8D 17 99 C0 02 C8 C0 A0
0979:30 D0 F5 60 A0 00 B9 BD D2
0981:17 99 C0 02 C8 C0 30 D0 38
0989:F5 60 A0 3F A9 00 99 3F 76
0991:30 99 7F 30 99 BF 30 88 C9
0999:D0 F4 A0 30 88 A9 FE 20 71
09A1:00 15 88 A9 FF 20 00 15 3A
09A9:88 A9 7F 20 00 15 C0 00 32
09B1:D0 EA A9 C1 8D FD 07 A9 54
09B9:07 8D 2C D0 A9 C2 8D FE B7
09C1:07 A9 07 8D 2D D0 A9 C3 3F
09C9:8D FF 07 A9 07 8D 2E D0 B9
09D1:60 A9 3A 8D 44 1B 8D 46 8E
09D9:1B A9 18 8D 43 1B 8D 47 A8
09E1:1B A9 F8 8D 45 1B 8D 49 DE
09E9:1B A9 DA 8D 48 1B 8D 4A 3C
09F1:1B 60 20 A6 0C 20 8B 09 19
09F9:A9 00 8D 15 D0 20 30 16 61
0A01:A9 23 8D 51 1B A9 04 8D 8E
0A09:42 1B AD 38 1B F0 38 38 83
0A11:E9 01 C9 0A 90 06 38 E9 2B
0A19:0A 4C 13 0A C9 02 B0 06 06
0A21:20 B2 16 4C 48 0A C9 04 7B
0A29:B0 06 20 C6 16 4C 48 0A 04
0A31:C9 06 B0 06 20 D5 16 4C F2
0A39:48 0A C9 08 B0 06 20 E9 75
0A41:16 4C 48 0A 20 F8 16 A9 D7
0A49:05 8D 66 1B 8D 67 1B 8D 8F
0A51:68 1B 20 D2 09 20 DD 0B 21
0A59:20 8F 0A 20 B5 0A A9 FF CD
0A61:8D 15 D0 60 A9 00 8D 36 40
0A69:1B 8D 37 1B 8D 38 1B 8D 18
0A71:3A 1B 8D 3D 1B 8D 10 D0 EE
0A79:8D 63 1B 8D 6D 1B A9 F4 89
0A81:8D 3B 1B A9 01 8D 3C 1B FA
0A89:A9 05 8D 39 1B 60 A2 01 99
0A91:A0 00 8E 41 1B 8C 40 1B 82
0A99:B9 43 1B AA B9 44 1B A8 27
0AA1:AD 41 1B 20 DB 0A AE 41 E7
0AA9:1B AC 40 1B E8 C8 C8 C0 EC
0AB1:08 D0 DF 60 A2 05 A0 00 6A
0AB9:8E 41 1B 8C 40 1B B9 4B BE
0AC1:1B AA B9 4C 1B A8 AD 41 22
0AC9:1B 20 DB 0A AE 41 1B AC EC
0AD1:40 1B E8 C8 C8 C0 06 D0 9C
0AD9:DF 60 0A 8D 33 1B 8A AE D9
0AE1:33 1B 9D 00 D0 98 9D 01 2F
0AE9:D0 60 A0 3F A9 00 99 3F 46
0AF1:03 99 7F 03 99 BF 03 99 79
0AF9:FF 2F 88 D0 F1 A0 2F B9 22
0B01:8F 18 99 40 03 99 80 03 9E
0B09:99 C0 03 99 00 30 88 C0 A8
0B11:FF D0 EC A9 0D 8D F9 07 2D
0B19:A9 0C 8D 28 D0 A9 0E 8D 12
0B21:FA 07 A9 01 8D 29 D0 A9 18
0B29:0F 8D FB 07 A9 07 8D 2A C8
0B31:D0 A9 C0 8D FC 07 A9 0F 71
0B39:8D 2B D0 60 A0 40 A9 00 5A
0B41:99 BF 02 88 D0 FA 20 6F FE
0B49:09 A9 0B 8D F8 07 A9 01 C0
0B51:8D 27 D0 60 AC 3E 1B C8 75
0B59:8C 3E 1B 20 70 0D D0 0C 10
0B61:20 D2 14 20 DD 0B A9 01 30
0B69:8D 57 1B 60 AC 3E 1B 88 A2
0B71:8C 3E 1B A9 00 60 AC 3F 75
0B79:1B C8 8C 3F 1B 20 70 0D 1C
0B81:D0 0B 20 DD 0B A9 03 8D 37
0B89:57 1B A9 01 60 AC 3F 1B A6
0B91:88 8C 3F 1B A9 00 60 AC 63
0B99:3E 1B 88 8C 3E 1B 20 70 7E
0BA1:0D D0 0E 20 C9 14 20 DD F2
0BA9:0B A9 00 8D 57 1B A9 01 04
0BB1:60 AC 3E 1B C8 8C 3E 1B AC
0BB9:A9 00 60 AC 3F 1B 88 8C 7F
0BC1:3F 1B 20 70 0D D0 0B 20 2B
0BC9:DD 0B A9 02 8D 57 1B A9 90
0BD1:01 60 AC 3F 1B C8 8C 3F 5E
0BD9:1B A9 00 60 8E 34 1B AE 18
0BE1:3E 1B AC 3F 1B A9 00 20 07
0BE9:DB 0A AE 34 1B 60 A9 00 37
0BF1:8D 58 1B 8D 69 1B AD 51 85
0BF9:1B F0 18 AD 00 DC 29 10 8D
0C01:D0 05 A9 01 8D 69 1B AD FD
0C09:01 DC 29 10 D0 05 A9 01 ED
0C11:8D 69 1B A5 C5 C9 25 D0 78
0C19:06 20 55 0B F0 6A 60 C9 53
0C21:22 D0 06 20 98 0B F0 60 74
0C29:60 C9 24 D0 06 20 77 0B 20
0C31:F0 56 60 C9 21 D0 06 20 78
0C39:BC 0B F0 4C 60 AD 00 DC EB
0C41:29 0F C9 0F D0 16 A9 7F 8D
0C49:8D 0D DC A9 FF 8D 00 DC B4
0C51:AD 01 DC 29 0F AA A9 81 A6
0C59:8D 0D DC 8A AA 29 01 D0 8C
0C61:06 20 BC 0B F0 22 60 8A 28
0C69:29 02 D0 06 20 77 0B F0 F6
0C71:17 60 8A 29 04 D0 06 20 A0
0C79:98 0B F0 0C 60 8A 29 08 07
0C81:D0 06 20 55 0B F0 01 60 5B
0C89:AD 57 1B D0 04 20 98 0B 9B
0C91:60 C9 01 D0 04 20 55 0B CF
0C99:60 C9 02 D0 04 20 BC 0B C6
0CA1:60 20 77 0B 60 A9 BF A0 5B
0CA9:18 20 1E AB A9 A0 A0 28 8D
```

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0CB1:99 FF 03 99 97 07 99 BF 5C
0CB9:07 88 D0 F4 A0 06 99 48 79
0CC1:04 99 70 04 99 E8 04 99 A2
0CC9:10 05 99 88 05 99 B0 05 DB
0CD1:99 F0 06 99 18 07 99 90 ED
0CD9:07 88 D0 E2 A9 04 85 FC 45
0CE1:A9 28 85 FB A2 16 A9 A0 AA
0CE9:A0 1F 91 FB A0 20 91 FB B0
0CF1:A0 27 91 FB 20 56 14 CA 63
0CF9:D0 EC A2 18 A0 00 18 20 E0
0D01:0A E5 A9 03 A0 19 20 1E C6
0D09:AB A2 03 A0 21 18 20 0A BF
0D11:E5 A9 E1 A0 18 20 1E AB F7
0D19:A2 0C A0 22 18 20 0A E5 F8
0D21:A9 C3 A0 18 20 1E AB A2 0A
0D29:14 A0 21 18 20 0A E5 A9 B9
0D31:DA A0 18 20 1E AB AD 6D 4E
0D39:1B D0 08 A9 00 20 D3 15 ED
0D41:20 83 16 60 20 31 15 AE B3
0D49:55 1B A0 00 E0 00 F0 0B DC
0D51:A9 A0 91 FB 20 56 14 CA A7
0D59:4C 4D 0D 60 20 31 15 AC 31
0D61:55 1B A9 A0 C0 00 F0 06 1A
0D69:88 91 FB 4C 65 0D 60 AD 3E
0D71:3E 1B 20 14 15 AD 3F 1B AF
0D79:20 1E 15 20 64 14 F0 01 26
0D81:60 20 56 14 20 64 14 F0 8B
0D89:01 60 AD 3F 1B 38 E9 02 75
0D91:29 07 D0 03 A9 00 60 20 7A
0D99:56 14 20 64 14 60 BD 43 0F
0DA1:1B 20 14 15 BD 44 1B 20 7A
0DA9:1E 15 20 91 14 F0 01 60 FB
0DB1:20 56 14 20 91 14 F0 01 B5
0DB9:60 AE 41 1B BD 44 1B 38 F6
0DC1:E9 02 29 07 D0 03 A9 00 CC
0DC9:60 20 56 14 20 91 14 60 F7
0DD1:AE 41 1B BD 43 1B 18 69 F2
0DD9:01 9D 43 1B A9 01 AC 40 E0
0DE1:1B 99 5B 1B 60 AE 41 1B 68
0DE9:BD 44 1B 18 69 01 9D 44 A7
0DF1:1B A9 08 AC 40 1B 99 5B CC
0DF9:1B 60 AE 41 1B BD 43 1B 15
0E01:38 E9 01 9D 43 1B A9 02 89
0E09:AC 40 1B 99 5B 1B 60 AE 3F
0E11:41 1B BD 44 1B 38 E9 01 1F
0E19:9D 44 1B A9 04 AC 40 1B 81
0E21:99 5B 1B 60 AE 41 1B BD B8
0E29:44 1B 8D 58 1B 38 E9 01 F3
0E31:9D 44 1B 20 9F 0D A8 AD C2
0E39:58 1B AE 41 1B 9D 44 1B 25
0E41:98 60 AE 41 1B BD 44 1B 1F
0E49:8D 58 1B 18 69 01 4C 31 40
0E51:0E AE 41 1B BD 43 1B 8D B8
0E59:58 1B 38 E9 01 9D 43 1B 2E
0E61:20 9F 0D A8 AD 58 1B AE 55
0E69:41 1B 9D 43 1B 98 60 AE 7F
0E71:41 1B BD 43 1B 8D 58 1B BB
0E79:18 69 01 4C 5E 0E A0 00 4D
0E81:A2 00 8E 41 1B 8C 40 1B 7B
0E89:20 C2 0E AE 41 1B AC 40 23
0E91:1B E8 E8 C8 C0 04 D0 EA C1
0E99:60 A0 04 A2 08 8E 41 1B D0
0EA1:8C 40 1B 8A 38 E9 08 AA 44
0EA9:BD 4B 1B F0 06 AE 41 1B 72
0EB1:20 C2 0E AE 41 1B AC 40 4B
0EB9:1B E8 E8 C8 C0 07 D0 DD E8
0EC1:60 A9 00 8D 59 1B 8D 5A FD
0EC9:1B AC 40 1B B9 5B 1B C9 93
0ED1:01 F0 0D 20 52 0E D0 08 C2
0ED9:A9 01 8D 59 1B 8D 5A 1B 31
0EE1:AC 40 1B B9 5B 1B C9 02 40
0EE9:F0 10 20 70 0E D0 0B AD 05
0EF1:59 1B 09 02 8D 59 1B 20 EA
0EF9:C1 14 AC 40 1B B9 5B 1B 27
0F01:C9 08 F0 10 20 25 0E D0 A7
0F09:0B AD 59 1B 09 04 8D 59 C1
0F11:1B 20 C1 14 AC 40 1B B9 94
0F19:5B 1B C9 04 F0 10 20 43 70
0F21:0E D0 0B AD 59 1B 09 08 08
0F29:8D 59 1B 20 C1 14 AD 5A DD
0F31:1B C9 01 D0 1F AD 59 1B F9
0F39:C9 01 D0 04 20 FB 0D 60 42
0F41:C9 02 D0 04 20 D1 0D 60 E1
0F49:C9 04 D0 04 20 10 0E 60 65
0F51:20 E6 0D 60 AE 41 1B E0 72
0F59:08 B0 06 20 9A 0F F0 04 61
0F61:60 20 13 13 20 97 E0 A5 12
0F69:8F C9 40 B0 09 20 70 0E 8C
0F71:D0 26 20 D1 0D 60 C9 80 A0
0F79:B0 09 20 52 0E D0 19 20 61
0F81:FB 0D 60 C9 C0 B0 09 20 84
0F89:25 0E D0 0C 20 10 0E 60 56
0F91:20 43 0E D0 03 20 E6 0D D2
0F99:60 20 97 E0 A5 8F 29 0F BD
0FA1:F0 3B AE 41 1B BD 43 1B 62
0FA9:ED 3E 1B C9 08 90 31 AD E0
0FB1:3E 1B FD 43 1B C9 08 90 4A
0FB9:27 BD 43 1B CD 3E 1B F0 83
0FC1:1F AD 3F 1B FD 44 1B C9 75
0FC9:09 90 3B BD 44 1B CD 3F 3D
0FD1:1B F0 33 BD 44 1B ED 3F A5
0FD9:1B C9 08 90 29 A9 00 60 52
0FE1:BD 44 1B CD 3F 1B B0 0F 07
0FE9:AD 59 1B 29 08 C9 08 D0 73
0FF1:EC 20 E6 0D A9 01 60 AD FB
0FF9:59 1B 29 04 C9 04 D0 DD CE
1001:20 10 0E A9 01 60 BD 43 D9
1009:1B CD 3E 1B B0 0F AD 59 1A
1011:1B 29 02 C9 02 D0 C6 20 E6
1019:D1 0D A9 01 60 AD 59 1B 32
1021:29 01 C9 01 D0 B7 20 FB 01
1029:0D A9 01 60 AD 6A 1B 29 D6
1031:02 C9 02 D0 07 A2 00 20 F4
1039:6C 12 D0 33 AD 6A 1B 29 D7
1041:04 C9 04 D0 07 A2 02 20 4A
1049:6C 12 D0 23 AD 6A 1B 29 E6
1051:08 C9 08 D0 07 A2 04 20 E0
1059:6C 12 D0 13 AD 6A 1B 29 F5
1061:10 C9 10 D0 07 A2 06 20 F9
1069:6C 12 D0 03 4C D4 10 20 84
1071:A0 16 AC 39 1B D0 01 60 0F
1079:AD 3E 1B 8D 52 1B AD 3F D5
1081:1B 8D 69 1B AD 38 1B 38 2E
1089:E9 01 C9 0A 90 06 38 E9 AF
1091:0A 4C 8B 10 C9 02 B0 06 F9
1099:20 BD 16 4C C0 10 C9 04 9E
10A1:B0 06 20 D1 16 4C C0 10 30
10A9:C9 06 B0 06 20 E0 16 4C A3
10B1:C0 10 C9 08 B0 06 20 F4 C2
10B9:16 4C C0 10 20 03 17 20 6C
10C1:AA 12 20 4B 14 20 53 0A 46
10C9:A9 00 85 A2 A5 A2 C9 4B 30
10D1:90 FA 60 AD 6A 1B 29 20 12
10D9:C9 20 D0 1B A2 08 20 6C 94
10E1:12 F0 14 AC 66 1B 88 8C D1
10E9:66 1B A2 00 A9 40 85 FD AF
10F1:A9 30 85 FE 20 CC 11 AD 97
10F9:6A 1B 29 40 C9 40 D0 1B 4B
1101:A2 0A 20 6C 12 F0 14 AC EA
1109:67 1B 88 8C 67 1B A2 02 6E
1111:A9 80 85 FD A9 30 85 FE D0
1119:20 CC 11 AD 6A 1B 29 80 0E
1121:C9 80 D0 1B A2 0C 20 6C 06
1129:12 F0 14 AC 68 1B 88 8C 2B
1131:68 1B A2 04 A9 C0 85 FD 3C
1139:A9 30 85 FE 20 CC 11 60 93
1141:20 4B 14 A0 09 A2 09 18 CF
1149:20 0A E5 A9 00 8D 15 D0 86
1151:A9 0B A0 19 20 1E AB A0 22
1159:16 A2 09 18 20 0A E5 A9 70
1161:00 AE 38 1B 20 CD BD A2 3E
1169:0A A0 0B 18 20 0A E5 A9 3A
1171:18 A0 19 20 1E AB A9 E8 C8
1179:8D 64 1B A9 03 8D 65 1B AD
1181:A9 63 20 D3 15 4C A2 11 C2
1189:20 48 16 AD 51 1B F0 2D 71
1191:18 AD 64 1B 69 0A 8D 64 5C
1199:1B AD 65 1B 69 00 8D 65 DE
11A1:1B A2 0A A0 12 18 20 0A 80
11A9:E5 AD 65 1B AE 64 1B 20 E5
11B1:CD BD A9 01 20 D3 15 20 0A
11B9:2E 14 4C 89 11 A9 00 85 CE
11C1:A2 A5 A2 C9 DE D0 FA 20 DF
11C9:F3 09 60 8C 6C 1B 8C 40 26
11D1:1B 8E 41 1B A9 0A 20 D3 88
11D9:15 20 DE 13 A9 32 8D 33 FF
11E1:1B 20 72 15 AC 40 1B AE 84
11E9:41 1B C0 00 D0 0E A9 00 9D
11F1:9D 4B 1B 9D 4C 1B 20 B5 B7
11F9:0A 4C 4A 12 E0 00 D0 09 50
1201:A2 08 A0 04 A9 05 4C 1D E3
1209:12 E0 02 D0 09 A2 0A A0 43
1211:05 A9 06 4C 1D 12 A2 0C 2A
1219:A0 06 A9 07 8D 69 1B 8E 8B
1221:41 1B 8C 40 1B A2 00 8E 34
1229:52 1B 20 C2 0E AC 41 1B 2E
1231:B9 43 1B AA B9 44 1B A8 CE
1239:AD 69 1B 20 DB 0A 20 DE 1A
1241:13 AE 52 1B E8 E0 C8 D0 C3
1249:DE 20 6E 13 AC 6C 1B C0 F1
1251:01 D0 04 20 7A 13 60 C0 4E
1259:02 D0 04 20 88 13 60 C0 47
1261:03 D0 04 20 99 13 60 20 B7
1269:AA 13 60 BD 43 1B 8D 58 89
1271:1B BD 44 1B 8D 62 1B AD A6
1279:3E 1B 38 E9 18 CD 58 1B EC
1281:B0 24 AD 58 1B 38 E9 17 E6
1289:CD 3E 1B B0 19 AD 3F 1B AB
1291:38 E9 10 CD 62 1B B0 0E 1A
1299:AD 62 1B 38 E9 10 CD 3F 7E
12A1:1B B0 03 A9 01 60 A9 00 57
12A9:60 A0 00 A2 00 8C 40 1B 1E
12B1:8E 41 1B B9 66 1B D0 08 B5
12B9:A9 00 9D 4B 1B 9D 4C 1B 1E
12C1:C8 E8 E8 E0 06 D0 E6 A9 9A
12C9:23 8D 51 1B A9 04 8D 42 79
12D1:1B AE 3E 1B AD 52 1B 8D 23
12D9:3E 1B 8E 52 1B AE 3F 1B 08
12E1:AD 69 1B 8D 3F 1B 8E 69 60
12E9:1B AC 3F 1B C8 F0 0C 8C 0F
12F1:3F 1B 20 DD 0B 20 10 14 6B
12F9:4C EA 12 AD 52 1B 8D 3E 74
1301:1B AD 69 1B 8D 3F 1B A9 48
1309:A0 A0 23 99 C4 07 88 D0 C9
1311:FA 60 20 97 E0 A5 8F 29 30
1319:03 F0 1A AE 41 1B BD 43 60
1321:1B CD 3E 1B B0 12 AD 59 44
1329:1B 29 01 C9 01 D0 18 20 7F
1331:FB 0D A9 01 60 A9 00 60 E7
1339:AD 59 1B 29 02 C9 02 D0 8E
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1341:06 20 D1 0D A9 01 60 BD 4D
1349:44 1B CD 3F 1B B0 0F AD 6D
1351:59 1B 29 04 C9 04 D0 DD 2E
1359:20 10 0E A9 01 60 AD 59 2E
1361:1B 29 08 C9 08 D0 CE 20 3E
1369:E6 0D A9 01 60 A0 3F A9 39
1371:00 88 91 FD C0 00 D0 F9 6D
1379:60 A0 24 A9 7E 88 88 91 CF
1381:FD 88 C0 0C D0 F7 60 A0 69
1389:27 88 A9 80 20 DB 14 A9 E4
1391:01 91 FD C0 09 D0 F2 60 3A
1399:A0 2A 88 A9 E0 20 DB 14 99
13A1:A9 07 91 FD C0 06 D0 F2 23
13A9:60 A0 2D 88 A9 F8 20 DB A3
13B1:14 A9 1F 91 FD C0 03 D0 13
13B9:F2 60 AD 3D 1B 29 07 D0 57
13C1:08 20 3B 15 A9 0B 8D 18 59
13C9:D4 20 4B 14 60 AD 3D 1B 5C
13D1:29 03 D0 F5 20 3B 15 A9 88
13D9:0F 8D 18 D4 60 A9 37 8D E0
13E1:01 D4 A9 81 8D 04 D4 A9 DA
13E9:09 8D 05 D4 A9 A0 8D 06 D6
13F1:D4 A9 0F 8D 18 D4 60 A9 26
13F9:C8 8D 01 D4 A9 13 8D 04 0E
1401:D4 A9 FF 8D 05 D4 A9 0F B4
1409:8D 06 D4 20 E4 14 60 AD FB
1411:3F 1B 8D 01 D4 A9 13 8D 62
1419:04 D4 A9 00 8D 05 D4 A9 81
1421:F0 8D 06 D4 20 E4 14 A9 99
1429:00 8D 3A 1B 60 A9 58 8D 95
1431:01 D4 A9 81 8D 04 D4 A9 2C
1439:09 8D 05 D4 A9 F0 8D 06 69
1441:D4 A9 0F 8D 18 D4 20 4B 98
1449:14 60 A2 19 A9 00 9D FF 02
1451:D3 CA D0 FA 60 A5 FB 18 89
1459:69 28 85 FB A5 FC 69 00 A4
1461:85 FC 60 A0 00 B1 FB C9 2A
1469:20 D0 22 A0 01 B1 FB C9 B4
1471:20 D0 1A A0 02 B1 FB C9 C3
1479:20 D0 12 AD 3E 1B 29 07 BA
1481:F0 08 A0 03 B1 FB C9 20 99
1489:D0 03 A9 00 60 A9 01 60 1C
1491:A0 00 B1 FB C9 20 D0 25 95
1499:A0 01 B1 FB C9 20 D0 1D D5
14A1:A0 02 B1 FB C9 20 D0 15 16
14A9:AE 41 1B BD 43 1B 29 07 98
14B1:F0 08 A0 03 B1 FB C9 20 C9
14B9:D0 03 A9 00 60 A9 01 60 4C
14C1:AE 5A 1B E8 8E 5A 1B 60 3E
14C9:AD 63 1B D0 03 20 7D 09 AE
14D1:60 AD 63 1B D0 03 20 6F F5
14D9:09 60 91 FD 88 A9 FF 91 2D
14E1:FD 88 60 A9 0F 8D 18 D4 85
14E9:A9 D2 8D 33 1B 20 72 15 D3
14F1:A9 05 8D 3A 1B 60 A9 00 33
14F9:85 A2 85 A1 85 A0 60 99 61
1501:40 30 99 80 30 99 C0 30 2C
1509:60 AD 3D 1B 18 69 01 8D 1E
1511:3D 1B 60 38 E9 18 4A 4A BE
1519:4A 8D 33 1B 60 38 E9 32 CD
1521:4A 4A 4A 8D 34 1B AE 33 C3
1529:1B AC 34 1B 20 50 15 60 11
1531:AE 53 1B AC 54 1B 20 50 55
1539:15 60 A9 16 8D 01 D4 A9 60
1541:41 8D 04 D4 A9 0F 8D 05 E6
1549:D4 A9 F0 8D 06 D4 60 8A 0E
1551:85 FB A9 04 85 FC C0 00 54
1559:F0 11 18 A5 FB 69 28 85 F8
1561:FB A5 FC 69 00 85 FC 88 C1
1569:4C 57 15 60 A9 E8 8D 33 77
1571:1B 69 01 D0 FC AD 33 1B D0
1579:18 69 01 8D 33 1B D0 F1 9C
1581:60 38 A9 0F ED 33 1B 8D 10
1589:35 1B A9 27 ED 34 1B 0D 40
1591:35 1B 90 3D C8 38 A9 E7 65
1599:ED 33 1B 8D 35 1B A9 03 30
15A1:ED 34 1B 0D 35 1B 90 29 64
15A9:C8 38 A9 63 ED 33 1B 8D B1
15B1:35 1B A9 00 ED 34 1B 0D F5
15B9:35 1B 90 15 C8 38 A9 09 2C
15C1:ED 33 1B 8D 35 1B A9 00 55
15C9:ED 34 1B 0D 35 1B 90 01 64
15D1:C8 60 18 6D 36 1B 8D 36 C1
15D9:1B AD 37 1B 69 00 8D 37 33
15E1:1B 20 06 16 A2 04 A0 21 4B
15E9:AD 36 1B 8D 33 1B AD 37 4D
15F1:1B 8D 34 1B 20 82 15 18 92
15F9:20 0A E5 AD 37 1B AE 36 08
1601:1B 20 CD BD 60 38 AD 36 CD
1609:1B ED 3B 1B 8D 33 1B AD 74
1611:37 1B ED 3C 1B 0D 33 1B AF
1619:90 14 18 AD 3B 1B 69 F4 7E
1621:8D 3B 1B AD 3C 1B 69 01 43
1629:8D 3C 1B 20 79 16 60 AC 22
1631:38 1B C8 8C 38 1B A2 15 AA
1639:A0 23 18 20 0A E5 A9 00 BE
1641:AE 38 1B 20 CD BD 60 AE 0D
1649:51 1B F0 2B AC 42 1B 88 E2
1651:8C 42 1B C0 FF D0 10 A9 D0
1659:04 8D 42 1B AE 51 1B F0 C6
1661:16 CA 8E 51 1B F0 10 AC 9B
1669:42 1B B9 ED 17 C9 A0 F0 A5
1671:06 AC 51 1B 99 C4 07 60 F5
1679:20 F8 13 AC 39 1B C8 8C 75
1681:39 1B A2 08 A0 23 18 20 C7
1689:0A E5 A9 00 AE 39 1B 20 1A
1691:CD BD AE 39 1B E0 09 D0 BC
1699:05 A9 20 8D 64 05 60 20 A7
16A1:10 14 AC 39 1B C0 00 F0 D0
16A9:07 88 8C 39 1B 4C 83 16 C7
16B1:60 A9 C3 85 FD A9 19 85 97
16B9:FE 20 1B 17 20 52 17 A9 64
16C1:98 8D 3E 1B 60 A9 62 85 0B
16C9:FD A9 19 85 FE 20 1B 17 A0
16D1:20 52 17 60 A9 18 85 FD 42
16D9:A9 1A 85 FE 20 1B 17 20 BD
16E1:52 17 A9 98 8D 3E 1B 60 B7
16E9:A9 6D 85 FD A9 1A 85 FE 96
16F1:20 1B 17 20 52 17 60 A9 33
16F9:BE 85 FD A9 1A 85 FE 20 46
1701:1B 17 20 52 17 A9 01 8D 9A
1709:57 1B A9 78 8D 3E 1B A9 AB
1711:82 8D 3F 1B A9 CA 8D 4E 5F
1719:1B 60 A9 00 8D 40 1B AC 72
1721:40 1B B1 FD F0 2A 8D 53 EA
1729:1B C8 B1 FD 8D 54 1B C8 E9
1731:B1 FD 8D 55 1B C8 B1 FD 1C
1739:8D 56 1B C8 8C 40 1B AD FC
1741:56 1B D0 06 20 5D 0D 4C B8
1749:20 17 20 45 0D 4C 20 17 96
1751:60 A9 38 8D 4B 1B A9 52 66
1759:8D 4C 1B A9 D8 8D 4D 1B 12
1761:A9 C2 8D 4E 1B A9 18 8D E8
1769:4F 1B A9 DA 8D 50 1B A9 76
1771:01 8D 5F 1B 8D 61 1B A9 F2
1779:02 8D 60 1B A9 88 8D 3E 92
1781:1B A9 8A 8D 3F 1B A9 02 8D
1789:8D 57 1B 60 00 00 20 00 FD
1791:00 28 00 00 28 00 0F A8 D1
1799:00 3F E8 00 7F F8 00 FF 94
17A1:F8 00 FF F8 01 FF FC FF DD
17A9:FF E6 03 FF FE 01 FF FF ED
17B1:01 FF FF 00 90 48 00 90 96
17B9:48 00 90 48 04 00 00 14 D6
17C1:00 00 14 00 00 15 F0 00 A8
17C9:17 FC 00 1F FE 00 1F FF EA
17D1:00 1F FF 00 3F FF FF 67 29
17D9:FF C0 7F FF 80 FF FF 80 AC
17E1:FF FF 80 12 09 00 12 09 B6
17E9:00 12 09 00 20 74 61 E7 3B
17F1:A0 02 02 05 00 02 03 03 92
17F9:01 02 06 05 00 0A 02 03 69
1801:00 0A 04 03 00 09 02 05 91
1809:01 0D 02 05 01 10 02 05 DE
1811:00 12 03 04 01 17 02 05 D3
1819:00 17 03 01 00 17 04 05 E8
1821:00 1B 05 01 00 17 06 05 36
1829:00 07 0B 04 00 07 0C 01 F1
1831:00 0A 0C 01 00 07 0D 05 B0
1839:00 0E 0B 04 00 0E 0C 02 E0
1841:01 11 0C 02 01 14 0B 03 49
1849:00 14 0C 01 00 14 0D 03 7D
1851:00 17 09 05 01 02 10 05 ED
1859:00 02 11 04 01 04 11 02 A8
1861:01 06 11 04 01 09 10 05 47
1869:00 0B 11 03 01 09 14 05 08
1871:00 10 10 05 00 10 11 03 5D
1879:01 10 14 05 00 17 10 05 82
1881:00 17 11 03 01 18 12 02 58
1889:00 17 14 05 00 00 38 7E 41
1891:1C 1D 81 B8 1E 00 78 0C C0
1899:00 30 08 C3 10 C8 C3 13 51
18A1:30 18 0C 1C 18 38 13 18 13
18A9:C8 FF 99 FF 0B 00 D0 0C 77
18B1:C3 30 34 7E 2C C2 00 43 ED
18B9:01 81 80 00 7E 00 8E 9A 86
18C1:93 00 43 41 54 53 11 11 5B
18C9:9D 9D 9D 9D 41 4E 44 11 9A
18D1:11 9D 9D 9D 4D 49 43 45 DA
18D9:00 4C 45 56 45 4C 3A 00 FA
18E1:53 43 4F 52 45 3A 11 9D 6E
18E9:9D 9D 9D 9D 9D 30 30 30 1C
18F1:30 30 30 11 11 11 9D 9D 03
18F9:9D 9D 9D 9D 4D 49 43 45 49
1901:3A 00 12 53 50 45 45 44 2E
1909:92 00 45 4E 44 20 4F 46 99
1911:20 4C 45 56 45 4C 00 42 12
1919:4F 4E 55 53 3A 20 00 14 CC
1921:0F 20 13 14 01 12 14 20 1F
1929:07 01 0D 05 20 10 12 05 7B
1931:13 13 20 13 10 01 03 05 76
1939:20 02 01 12 20 0F 12 20 BE
1941:10 12 05 13 13 20 05 09 FD
1949:14 08 05 12 20 0A 0F 19 A9
1951:13 14 09 03 0B 20 02 15 55
1959:14 14 0F 0E 2E 2E 2E 2E 12
1961:2E 03 03 0B 00 11 03 0B D1
1969:00 03 04 07 01 1B 04 07 D0
1971:01 07 06 07 00 11 06 07 6E
1979:00 07 07 04 01 17 07 04 05
1981:01 0B 09 03 00 0B 0A 03 8B
1989:00 11 09 03 00 11 0A 03 AC
1991:00 0B 0D 03 00 0B 0E 03 A3
1999:00 11 0D 03 00 11 0E 03 45
19A1:00 07 0D 04 01 17 0D 04 F9
19A9:01 07 11 07 00 11 11 07 1E
19B1:00 03 0D 07 01 1B 0D 07 4C
19B9:01 03 14 0B 00 11 14 0B D7
19C1:00 00 03 03 06 01 03 0B C9
19C9:02 01 03 0F 06 01 07 03 D3
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19D1:06 01 07 0B 02 01 07 0F 0A
19D9:06 01 0B 03 06 01 0B 0B 36
19E1:02 01 0B 0F 06 01 0F 03 FC
19E9:06 01 0F 0B 02 01 0F 0F 33
19F1:06 01 13 03 06 01 13 0B 5F
19F9:02 01 13 0F 06 01 17 03 26
1A01:06 01 17 0B 02 01 17 0F 5D
1A09:06 01 1B 03 06 01 1B 0B 89
1A11:02 01 1B 0F 06 01 00 03 12
1A19:03 0B 00 11 03 0B 00 03 E9
1A21:06 05 00 0B 06 03 00 11 97
1A29:06 03 00 17 06 05 00 07 DD
1A31:07 04 01 07 0D 04 01 0B FF
1A39:09 06 01 13 09 06 01 17 3E
1A41:07 04 01 17 0D 04 01 03 09
1A49:09 06 01 0F 09 06 01 1B 12
1A51:09 06 01 03 11 05 00 0B 83
1A59:11 03 00 11 11 03 00 17 93
1A61:11 05 00 03 14 0B 00 11 6D
1A69:14 0B 00 00 07 03 03 00 B4
1A71:15 03 03 00 03 03 08 01 86
1A79:0D 03 08 01 11 03 08 01 AB
1A81:1B 03 08 01 07 06 03 00 6B
1A89:15 06 03 00 07 07 0A 01 93
1A91:09 07 0A 01 15 07 0A 01 37
1A99:17 07 0A 01 03 0D 08 01 C9
1AA1:0D 0D 08 01 11 0D 08 01 7E
1AA9:1B 0D 08 01 07 11 03 00 42
1AB1:15 11 03 00 07 14 03 00 A3
1AB9:15 14 03 00 00 13 01 03 2F
1AC1:01 17 03 04 01 1B 03 07 5E
1AC9:01 03 03 09 00 0F 03 03 75
1AD1:01 03 04 02 01 0B 06 05 2D
1AD9:00 13 06 03 01 07 06 02 F5
1AE1:01 03 08 05 00 0F 09 05 FB
1AE9:00 17 09 03 01 0B 09 02 7D
1AF1:01 03 0B 09 00 03 0C 03 80
1AF9:01 13 0C 05 00 1B 0C 04 CD
1B01:00 0F 0C 02 01 07 0E 09 E5
1B09:00 07 0F 03 01 17 0F 05 9A
1B11:00 13 0F 02 01 03 11 04 48
1B19:01 0B 11 09 00 0B 12 03 98
1B21:01 17 12 02 01 07 14 03 4F
1B29:01 0F 14 09 00 1B 12 03 4A
1B31:01 00 00 00 00 00 00 00 E7
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Maurice Yanney, the author of Balloon Pop (August 1992), lives in Lebanon, Pennsylvania.

FASTBALL

By Daniel Lightner

When you fill a disk with programs, it can be difficult to remember what each program does. Filenames are not always helpful in determining what a program does. Games and utilities can be mixed in with productivity programs and programming aids. Fastball helps you to organize a disk by placing related programs into categories, but that's not all. It's also a menu-driven utility that makes loading and running programs a snap.

With Fastball, you can designate up to nine categories on a disk and assign programs on that disk to those categories. You can designate whatever categories best suit your needs.

Not only does Fastball let you separate your disk programs into different categories, it also stores information about the way the programs load and execute. If a program needs a certain SYS address to run, Fastball stores that information for you and uses it when needed.

Typing It In

Fastball is written in machine language and must be entered using MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

Starting address: 0801
Ending address: 1598

Be sure to save a copy of Fastball before exiting MLX.

Running the Program

Fastball can be loaded and run like any BASIC program. When it's activated, a menu of nine options appears on the screen. Just follow the prompts.

Categories

When you first run the program, you won't have any categories established. Insert a disk that contains a number of programs that you wish to categorize. You can check the disk's directory names by selecting option 8. Directory listings can be stopped and restarted by pressing any key.

Viewing the programs on disk will give you some idea of what category names you'll need. When you have decided upon a category, select option 3 to add the category to your list. If for any reason you have picked an option that you wish to cancel, just hit the Return key.

After you've entered one or more categories, you can start entering program names. Use option 2 from the menu. You'll be prompted for the category you wish to use and then for the program's name.

Other Options

Next, you must indicate whether the program executes from a RUN command or a SYS command. Select RUN if that's all your program requires. If it requires a SYS command, you'll need to know the address that follows the SYS. If you're entering a boot program that loads and executes another program, you'll need to choose the SYS option and enter any five-digit number.

Option 1 allows you to see the program names and how they're arranged under the different categories. Options 4 and 5 make it simple to delete programs and categories. If a category is deleted, the program names under that category will be deleted as well.

After you've finished entering information, you can save the file using option 6. If you want to add or edit programs or categories later, you can edit at any time by using option 7.

Using Fastball

When you're ready to exit Fastball, just choose option 9. Fastball will save your custom menu to the disk with a shifted *Q* character. (Think of this as the fastball shape on your keyboard.) This will be a stand-alone menu program that you can put on any disk. Fastball itself need not be on your disk.

When you're ready to use a disk, you can quickly load the new menu by typing *LOAD* and then holding down the Shift key while typing the quote-Q-quote sequence. When the menu appears, you'll be presented with a list of your categories. By typing the number that corresponds to the category, you can view all of the programs listed under that category. Type the letter that corresponds to a desired program, and that program will load and run.

FASTBALL

```
0801:1E 08 0A 00 9E 32 30 38 B9
0809:38 20 00 00 00 00 00 00 3D
0811:00 00 00 00 00 00 00 00 21
0819:00 00 00 00 00 00 00 00 29
0821:00 00 00 00 00 00 00 20 51
0829:CC FF A9 34 8D 14 03 A9 84
0831:C1 8D 18 03 A9 90 8D B0 14
0839:02 A9 15 8D B1 02 A9 00 19
0841:8D 20 D0 8D 21 D0 A0 00 A0
0849:B9 DE 10 20 D2 FF C8 C0 DA
0851:F7 D0 F5 A9 F1 85 FB A9 32
0859:04 85 FC 20 E4 FF C9 00 29
0861:F0 F9 C9 31 90 F5 C9 3A DE
0869:B0 F1 48 38 E9 30 AA CA 0B
0871:E0 00 F0 09 20 0F 0A 20 12
0879:0F 0A 4C 70 08 A0 00 B1 98
0881:FB 18 69 80 91 FB C8 C0 99
0889:15 D0 F4 68 C9 31 F0 35 A7
```

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0891:C9 32 F0 2B C9 33 F0 18 F8
0899:C9 34 F0 33 C9 35 F0 35 27
08A1:C9 37 F0 37 C9 36 F0 36 35
08A9:C9 38 F0 35 C9 39 F0 3C 6F
08B1:A0 1C 20 88 0E C9 0D F0 48
08B9:30 20 C4 0F 4C 10 0E 20 52
08C1:56 0B 4C 47 08 20 27 0B D7
08C9:C9 00 F0 1D 4C E5 08 20 D8
08D1:F5 0A 4C 47 08 20 31 0A 8A
08D9:4C 47 08 4C F9 08 4C 88 B8
08E1:09 20 23 0F A0 1C 20 88 12
08E9:0E 4C 47 08 A0 1C 20 88 BB
08F1:0E C9 0D F0 F4 4C E2 FC C7
08F9:20 83 0E C9 0D F0 EA A9 05
0901:05 A2 18 A0 10 20 BD FF C7
0909:A9 02 A2 08 A0 02 20 BA 4D
0911:FF 20 C0 FF 20 41 0E AD 13
0919:DC 02 C9 01 F0 5C A2 02 A3
0921:20 C6 FF 20 E4 FF 20 E4 43
0929:FF A9 DA 85 FB A9 14 85 8D
0931:FC A9 01 85 FD A9 08 85 D0
0939:FE A0 00 4C 42 09 20 01 2F
0941:0A 20 E4 FF 8D CF 02 A5 52
0949:FD C9 06 F0 0A 20 B7 FF DC
0951:C9 40 F0 23 4C 3F 09 A5 BF
0959:FE C9 0B F0 03 4C 4E 09 BC
0961:AD CF 02 91 FB 20 1D 0A 3C
0969:20 E4 FF 91 FB 20 B7 FF AD
0971:C9 40 F0 03 4C 66 09 20 F4
0979:E7 0A A2 00 20 C6 FF A9 1C
0981:02 20 C3 FF 4C 47 08 20 C4
0989:83 0E C9 0D F0 F6 AD DA 84
0991:14 C9 00 F0 EF AD 8F 15 99
0999:C9 00 F0 E8 20 06 0F A9 1E
09A1:05 A2 1D A0 10 20 BD FF 09
09A9:A9 08 A2 08 A0 08 20 BA 87
09B1:FF 20 C0 FF 20 41 0E AD B3
09B9:DC 02 C9 01 F0 35 A2 08 AD
09C1:20 C9 FF A9 D5 85 FD A9 5B
09C9:11 85 FE A9 01 20 D2 FF 6E
09D1:A9 08 20 D2 FF A0 00 B1 20
09D9:FD 20 D2 FF 20 01 0A A5 0C
09E1:FD CD B0 02 F0 03 4C D8 A1
09E9:09 A5 FE CD B1 02 F0 03 21
09F1:4C D8 09 A2 00 20 C9 FF BF
09F9:A9 08 20 C3 FF 4C 47 08 EA
0A01:18 A5 FD 69 01 85 FD A5 A0
0A09:FE 69 00 85 FE 60 18 A5 9E
0A11:FB 69 14 85 FB A5 FC 69 32
0A19:00 85 FC 60 18 A5 FB 69 EC
0A21:01 85 FB A5 FC 69 00 85 04
0A29:FC 60 20 CE 0F 4C 06 0C 86
0A31:AD DA 14 C9 00 F0 F3 20 BD
0A39:C4 0F 20 1E 0C 20 C4 0F D2
0A41:20 C4 0F 20 FB 0F 20 09 DF
0A49:0B C9 0D F0 DC 20 78 0C 6A
0A51:A9 41 8D AB 02 AD A9 02 13
0A59:C9 41 F0 0B A9 01 8D AA 88
0A61:02 20 7D 0C 4C 4E 0A 20 BE
0A69:BB 0F AE A8 02 CA E0 00 7C
0A71:F0 06 20 0F 0A 4C 6E 0A DC
0A79:A0 00 A5 FB 85 FD A5 FC BE
0A81:85 FE AD A8 02 C9 09 F0 92
0A89:1E 20 0F 0A 20 B1 0F 20 3D
0A91:1D 0A 20 01 0A A5 FB C9 73
0A99:8F F0 03 4C 8D 0A A5 FC B3
0AA1:C9 15 F0 03 4C 8D 0A A9 84
0AA9:2A 91 FD C8 C0 14 D0 F7 73
0AB1:CE DA 14 20 A8 0F A0 00 2B
0AB9:EE A8 02 B1 FB C9 00 F0 C2
0AC1:25 CD A8 02 B0 18 20 1D 54
0AC9:0A B1 FB C9 80 90 F7 20 C1
0AD1:1D 0A 20 1D 0A 20 1D 0A E1
0AD9:20 1D 0A 4C BC 0A 38 E9 B3
0AE1:01 91 FB 4C C7 0A 20 1D E2
0AE9:0A A5 FB 8D B0 02 A5 FC 9A
0AF1:8D B1 02 60 20 27 0B C9 FC
0AF9:00 F0 2A AD A9 02 C9 41 94
0B01:F0 E4 4C 55 0D 4C 2B 0A A1
0B09:20 E4 FF C9 00 F0 F9 C9 86
0B11:0D F0 12 C9 31 90 F1 CD 46
0B19:A7 02 B0 EC 38 E9 30 8D BF
0B21:AE 02 8D A8 02 60 AD DA 13
0B29:14 C9 00 F0 1C 20 C4 0F C4
0B31:20 1E 0C 20 C4 0F 20 C4 C9
0B39:0F 20 FB 0F 20 09 0B C9 54
0B41:0D F0 09 20 78 0C 4C C4 8E
0B49:0F 20 06 0B 20 C4 0F A9 3C
0B51:00 60 4C 06 0C AD DA 14 4A
0B59:C9 00 F0 A9 20 C4 0F 20 5F
0B61:1E 0C 20 C4 0F 20 C4 0F 6B
0B69:20 FB 0F 20 09 0B C9 0D 87
0B71:F0 B3 AD A8 02 8D FD 02 71
0B79:A9 FF 8D A8 02 20 78 0C 2E
0B81:20 C4 0F 18 AD AF 02 C9 36
0B89:55 B0 C7 20 DF 0F 20 9B 88
0B91:0E CE 34 03 18 AC 34 03 F7
0B99:88 B9 35 03 69 80 99 35 EE
0BA1:03 20 ED 0F 20 E4 FF C9 4E
0BA9:00 F0 F9 C9 31 90 F5 C9 59
0BB1:33 B0 F1 38 E9 30 8D A8 23
0BB9:02 A0 00 AD FD 02 20 B6 C2
0BC1:0F B9 35 03 91 FB C8 CC 7F
0BC9:34 03 D0 F5 18 A0 00 A5 1D
0BD1:FB 6D 34 03 85 FB A5 FC 5C
0BD9:69 00 85 FC AD A8 02 91 CA
0BE1:FB C9 02 F0 32 A9 FF 8D 7D
0BE9:D7 02 8D D8 02 20 1D 0A 80
0BF1:A0 00 AD D7 02 20 B6 0F 98
0BF9:AD D8 02 20 B6 0F A9 00 A4
0C01:91 FB 20 E7 0A 20 C4 0F CC
0C09:A0 1C 4C 88 0E 18 AD DA 91
0C11:14 69 31 8D A7 02 60 20 B2
0C19:70 0D 4C EE 0B 20 BB 0F 84
0C21:A9 00 8D A7 02 AE A7 02 56
0C29:20 C9 0F AE A7 02 8A 18 03
0C31:69 31 20 D2 FF A9 2E 20 9E
0C39:D2 FF 20 C9 0F A0 00 B1 08
0C41:FB C9 2A F0 07 20 D2 FF 7C
0C49:C8 4C 40 0C AE A7 02 E8 A2
0C51:8E A7 02 EC DA 14 F0 B5 68
0C59:C8 B1 FB C9 2A F0 F9 18 7F
0C61:98 65 FB 85 FB A5 FC 69 D0
0C69:00 85 FC 20 C4 0F 4C 26 A5
0C71:0C EE AF 02 4C 94 0C A9 D7
0C79:00 8D AA 02 20 A8 0F A9 D5
0C81:41 8D AF 02 8D A9 02 20 EA
0C89:C4 0F A0 00 B1 FB CD AE A3
0C91:02 F0 DE CD A8 02 F0 1E EC
0C99:C9 00 F0 46 C8 B1 FB C9 E7
0CA1:80 90 F9 C8 C8 C8 C8 98 7D
0CA9:18 65 FB 85 FB A5 FC 69 D8
0CB1:00 85 FC 4C 8B 0C C8 AD 5B
0CB9:AA 02 C9 01 F0 2E 20 C4 36
0CC1:0F 20 C9 0F AD A9 02 20 CB
0CC9:D2 FF EE A9 02 A9 2E 20 F6
0CD1:D2 FF 20 C9 0F B1 FB C9 F4
0CD9:80 B0 08 20 D2 FF C8 4C D5
0CE1:D6 0C 60 38 E9 80 20 D2 5C
0CE9:FF 4C A4 0C AD A9 02 CD 50
0CF1:AB 02 F0 10 EE A9 02 B1 53
0CF9:FB C9 80 B0 04 C8 4C F8 72
0D01:0C 4C A4 0C A0 00 A5 FB D5
0D09:85 FD A5 FC 85 FE 20 1D 6F
0D11:0A B1 FB C9 80 B0 06 20 AB
0D19:1D 0A 4C 12 0D 20 1D 0A 1C
0D21:20 1D 0A 20 1D 0A 20 1D 44
0D29:0A A5 FB CD B0 02 B0 0C 09
0D31:20 B1 0F 20 1D 0A 20 01 FD
0D39:0A 4C 2A 0D A5 FC CD B1 EF
0D41:02 B0 03 4C 31 0D A5 FD B4
0D49:8D B0 02 A5 FE 8D B1 02 84
0D51:20 B1 0F 60 20 E4 FF C9 2E
0D59:00 F0 F9 C9 41 90 F5 CD 91
0D61:A9 02 B0 F0 8D AB 02 A9 BE
0D69:01 8D AA 02 4C 7D 0C 20 6D
0D71:09 10 20 9B 0E CE 34 03 E8
0D79:AD 34 03 C9 05 D0 F0 A0 62
0D81:00 B9 35 03 A2 00 DD 26 D7
0D89:10 F0 08 E8 E0 0A D0 F6 3F
0D91:4C BE 0D C8 CC 34 03 D0 BD
0D99:E8 AD 34 03 C9 05 90 23 F0
0DA1:A0 00 B9 35 03 D9 30 10 86
0DA9:B0 03 4C C4 0D D9 30 10 F2
0DB1:F0 03 4C BE 0D C8 C0 05 8C
0DB9:F0 03 4C A3 0D A9 01 8D 6F
0DC1:D9 02 60 EA A9 00 8D D7 44
0DC9:02 8D D8 02 A0 00 AE 34 1A
0DD1:03 CA BD 35 10 8D DA 02 99
0DD9:BD 3A 10 8D DB 02 B9 35 CB
0DE1:03 8C DC 02 38 E9 30 A8 CE
0DE9:18 C0 00 F0 17 18 AD D7 9B
0DF1:02 6D DA 02 8D D7 02 AD 61
0DF9:D8 02 6D DB 02 8D D8 02 66
0E01:88 4C E9 0D AC DC 02 CA 2A
0E09:C8 CC 34 03 D0 C4 60 20 ED
0E11:BB 0F AE DA 14 E0 09 F0 79
0E19:24 E0 00 F0 07 20 0F 0A 6F
0E21:CA 4C 1A 0E 20 FB 0F 20 09
0E29:9B 0E CE 34 03 A0 00 B9 08
0E31:35 03 91 FB C8 CC 34 03 7F
0E39:D0 F5 EE DA 14 4C 47 08 2F
0E41:A9 00 8D DC 02 A5 BA 20 ED
0E49:B4 FF A9 6F 85 B9 20 96 D5
0E51:FF 20 C4 0F 20 C9 0F A0 E5
0E59:00 20 D2 FF 99 DD 02 C8 E8
0E61:20 A5 FF C9 0D D0 F2 20 45
0E69:D2 FF 20 AB FF AD DE 02 24
0E71:C9 30 D0 08 AD DF 02 C9 D3
0E79:30 D0 01 60 A9 01 8D DC 51
0E81:02 60 A0 00 20 C4 0F B9 B6
0E89:3F 10 20 D2 FF C8 C0 33 52
0E91:D0 F5 20 E4 FF C9 00 F0 FD
0E99:F9 60 A0 00 20 C4 0F 8C 9D
0EA1:34 03 A9 3E 20 D2 FF A0 9E
0EA9:00 20 E4 FF C9 00 F0 F9 94
0EB1:C9 14 F0 34 C9 0D F0 1C 99
0EB9:C9 20 90 ED C9 22 F0 E9 56
0EC1:C9 80 B0 E5 AC 34 03 C0 54
0EC9:14 F0 DE 20 D2 FF 20 DF C0
0ED1:0E 4C AA 0E AC 34 03 C0 3B
0ED9:00 F0 CE 20 C4 0F AC 34 FD
0EE1:03 99 35 03 EE 34 03 60 6B
0EE9:AC 34 03 C0 01 B0 03 4C F2
0EF1:AA 0E A9 9D 20 D2 FF 20 62
0EF9:C9 0F A9 9D 20 D2 FF CE E8
0F01:34 03 4C AA 0E A9 0F A2 06
0F09:08 A0 0F 20 BA FF A9 04 64
0F11:A2 22 A0 10 20 BD FF 20 36
0F19:C0 FF A9 0F 20 C3 FF 4C 1A
```

```
0F21:CC FF A0 00 A9 00 8D 20 42
0F29:D0 8D 21 D0 A9 93 20 D2 F2
0F31:FF A9 01 A2 17 A0 10 20 7F
0F39:BD FF A9 02 A2 08 A0 00 02
0F41:20 BA FF 20 C0 FF A2 02 6D
0F49:20 C6 FF A9 9A 20 D2 FF BE
0F51:A0 00 20 E4 FF 20 E4 FF 5C
0F59:A5 CB C9 40 D0 26 20 E4 BE
0F61:FF 8D C0 02 20 E4 FF 0D BC
0F69:C0 02 F0 31 20 E4 FF AA D8
0F71:20 E4 FF 20 CD BD 20 C9 4A
0F79:0F 20 E4 FF F0 19 20 D2 C2
0F81:FF 4C 7A 0F A5 CB C9 1B FD
0F89:F0 04 C9 40 D0 F6 A5 CB D7
0F91:C9 40 F0 FA 4C 5F 0F 20 90
0F99:C4 0F 4C 59 0F A9 00 20 3C
0FA1:C6 FF A9 02 4C C3 FF A9 93
0FA9:8F 85 FB A9 15 85 FC 60 24
0FB1:B1 FB 91 FD 60 91 FB 4C 47
0FB9:1D 0A A9 DB 85 FB A9 14 5F
0FC1:85 FC 60 A9 0D 4C D2 FF C7
0FC9:A9 20 4C D2 FF 20 C4 0F 94
0FD1:A0 00 B9 BE 10 20 D2 FF 0A
0FD9:C8 C0 0E D0 F5 60 A0 00 CD
0FE1:B9 AB 10 20 D2 FF C8 C0 B4
0FE9:13 D0 F5 60 A0 00 B9 83 86
0FF1:10 20 D2 FF C8 C0 28 D0 E4
0FF9:F5 60 A0 00 B9 72 10 20 17
1001:D2 FF C8 C0 11 D0 F5 60 C7
1009:A0 00 B9 CC 10 20 D2 FF 24
1011:C8 C0 12 D0 F5 60 24 D1 60
1019:2C 50 2C 52 D1 2C 50 2C 1A
1021:57 53 30 3A D1 30 31 32 4F
1029:33 34 35 36 37 38 39 36 3D
1031:35 35 33 36 01 0A 64 E8 E4
1039:10 00 00 00 03 27 20 50 A6
1041:4C 41 43 45 20 43 4F 52 93
1049:52 45 43 54 20 44 49 53 89
1051:4B 20 49 4E 20 44 52 49 2D
1059:56 45 0D 0D 20 20 20 2A 54
1061:2A 20 48 49 54 20 41 4E 30
1069:59 20 4B 45 59 20 2A 2A C5
1071:0D 20 57 48 41 54 20 43 6E
1079:41 54 45 47 4F 52 59 20 03
1081:3F 0D 20 48 4F 57 20 44 69
1089:4F 45 53 20 49 54 20 45 30
1091:58 45 43 55 54 45 20 3F 24
1099:0D 0D 20 31 2E 20 52 55 86
10A1:4E 0D 20 32 2E 20 53 59 45
10A9:53 20 20 4E 41 4D 45 20 4E
10B1:4F 46 20 50 52 4F 47 52 C4
10B9:41 4D 20 3F 0D 20 4E 4F 9A
10C1:20 43 41 54 45 47 4F 52 68
10C9:49 45 53 20 45 4E 54 45 9D
10D1:52 20 53 59 53 20 20 4E CC
10D9:55 4D 42 45 52 0D 98 93 20
10E1:20 46 41 53 54 42 41 4C 7B
10E9:4C 20 43 55 53 54 4F 4D CD
10F1:49 5A 45 52 0D 20 43 4F D9
10F9:50 59 52 49 47 48 54 20 9B
1101:31 39 39 33 20 43 4F 4D 5E
1109:50 55 54 45 0D 20 50 55 66
1111:42 4C 49 43 41 54 49 4F 02
1119:4E 53 20 49 4E 54 4C 20 4C
1121:4C 54 44 0D 20 41 4C 4C C2
1129:20 52 49 47 48 54 53 20 E7
1131:52 45 53 45 52 56 45 44 47
1139:0D 0D 20 31 2E 20 4C 49 10
1141:53 54 20 50 52 4F 47 52 DB
1149:41 4D 53 0D 20 32 2E 20 E0
1151:41 44 44 20 41 20 50 52 2D
1159:4F 47 52 41 4D 0D 20 33 65
1161:2E 20 41 44 44 20 41 20 54
1169:43 41 54 45 47 4F 52 59 D1
1171:0D 20 34 2E 20 44 45 4C 74
1179:45 54 45 20 41 20 50 52 7B
1181:4F 47 52 41 4D 0D 20 35 8F
1189:2E 20 44 45 4C 45 54 45 0D
1191:20 41 20 43 41 54 45 47 79
1199:4F 52 59 0D 20 36 2E 20 4A
11A1:53 41 56 45 20 46 49 4C D5
11A9:45 0D 20 37 2E 20 4C 4F 03
11B1:41 44 20 46 49 4C 45 0D 01
11B9:20 38 2E 20 44 49 53 4B FA
11C1:20 44 49 52 45 43 54 4F 82
11C9:52 59 0D 20 39 2E 20 51 23
11D1:55 49 54 0D 1E 08 0A 00 71
11D9:9E 32 30 38 38 20 00 00 A3
11E1:00 00 00 00 00 00 00 00 04
11E9:00 00 00 00 00 00 00 00 0C
11F1:00 00 00 00 00 00 00 00 14
11F9:00 00 00 20 CC FF A0 00 C5
1201:B9 A5 0A 20 D2 FF C8 C0 97
1209:51 D0 F5 AD 06 0B C9 00 93
1211:F0 69 AD BB 0B C9 FF F0 E9
1219:62 A9 07 85 FB A9 0B 85 34
1221:FC A9 00 8D A7 02 AE A7 51
1229:02 A9 1D 20 D2 FF 20 D2 08
1231:FF AE A7 02 8A 18 69 31 CE
1239:20 D2 FF A9 2E 20 D2 FF 54
1241:A9 1D 20 D2 FF A0 00 B1 E6
1249:FB C9 2A F0 07 20 D2 FF 90
1251:C8 4C 74 08 AE A7 02 E8 FC
1259:8E A7 02 EC 06 0B F0 1E 1A
1261:C8 B1 FB C9 2A F0 F9 18 93
1269:98 65 FB 85 FB A5 FC 69 E4
1271:00 85 FC A9 0D 20 D2 FF BF
1279:4C 53 08 4C 19 09 18 AD 29
1281:06 0B 69 31 8D A7 02 A0 5B
1289:00 B9 9B 0A 20 D2 FF C8 45
1291:C0 0A D0 F5 20 E4 FF C9 70
1299:00 F0 F9 C9 51 F0 4D C9 88
12A1:31 90 F1 CD A7 02 C0 EC 51
12A9:38 E9 30 8D A8 02 A9 00 E3
12B1:8D AA 02 A9 BB 85 FB A9 B7
12B9:0B 85 FC A9 41 8D A9 02 94
12C1:A9 0D 20 D2 FF A0 00 B1 63
12C9:FB CD A8 02 F0 1F C9 00 2C
12D1:F0 50 C8 B1 FB C9 80 90 4F
12D9:F9 C8 C8 C8 C8 98 18 65 11
12E1:FB 85 FB A5 FC 69 00 85 52
12E9:FC 4C F2 08 60 C8 AD AA AA
12F1:02 C9 01 F0 39 A9 0D 20 63
12F9:D2 FF A9 1D 20 D2 FF 20 FA
1301:D2 FF AD A9 02 20 D2 FF 17
1309:EE A9 02 A9 2E 20 D2 FF 83
1311:A9 20 20 D2 FF B1 FB C9 CD
1319:80 B0 0A 20 D2 FF C8 4C 63
1321:42 09 4C A1 09 38 E9 80 CB
1329:20 D2 FF 4C 06 09 AD A9 32
1331:02 CD AB 02 F0 10 EE A9 B0
1339:02 B1 FB C9 80 B0 04 C8 80
1341:4C 66 09 4C 06 09 A2 00 A6
1349:B1 FB C9 80 B0 08 9D 35 9E
1351:03 C8 E8 4C 75 09 38 E9 37
1359:80 9D 35 03 8E 34 03 C8 12
1361:B1 FB 8D A7 02 C8 B1 FB 1E
1369:8D AC 02 C8 B1 FB 8D AD 94
1371:02 4C D1 09 A0 00 B9 F4 E3
1379:0A 20 D2 FF C8 C0 12 D0 45
1381:F5 20 E4 FF C9 00 F0 F9 71
1389:C9 2A F0 15 C9 41 90 F1 F4
1391:CD A9 02 B0 EC 8D AB 02 4B
1399:A9 01 8D AA 02 4C E0 08 3C
13A1:60 4C 2B 08 A0 00 B9 8D F6
13A9:0A 99 77 02 C8 C0 06 D0 70
13B1:F5 A9 06 85 C6 A9 93 20 7A
13B9:D2 FF A9 0D 20 D2 FF 20 BB
13C1:D2 FF 20 D2 FF 20 D2 FF A8
13C9:A0 00 A9 0D 20 D2 FF B9 4C
13D1:93 0A 20 D2 FF C8 C0 05 1F
13D9:D0 F5 A0 00 EE 34 03 B9 02
13E1:35 03 20 D2 FF C8 CC 34 85
13E9:03 D0 F4 A9 22 20 D2 FF 36
13F1:A9 2C 20 D2 FF A9 38 20 60
13F9:D2 FF A9 2C 20 D2 FF AD 7B
1401:A7 02 C9 01 D0 26 A9 30 69
1409:20 D2 FF A9 0D 20 D2 FF 1F
1411:20 D2 FF 20 D2 FF 20 D2 A9
1419:FF 20 D2 FF A0 00 B9 98 B4
1421:0A 20 D2 FF C8 C0 03 D0 D0
1429:F5 4C 87 0A A9 31 20 D2 16
1431:FF A9 0D 20 D2 FF 20 D2 11
1439:FF 20 D2 FF 20 D2 FF 20 30
1441:D2 FF A9 53 20 D2 FF A9 33
1449:59 20 D2 FF A9 53 20 D2 2E
1451:FF AD AD 02 AE AC 02 20 07
1459:CD BD A9 13 20 D2 FF 60 EA
1461:4E 45 57 0D 0D 0D 4C 4F 42
1469:41 44 22 52 55 4E 0D 1D C7
1471:1D 51 20 20 51 55 49 54 49
1479:93 0D 20 46 41 53 54 42 59
1481:41 4C 4C 0D 20 43 4F 50 B4
1489:59 52 49 47 48 54 20 31 95
1491:39 39 33 20 43 4F 4D 50 4F
1499:55 54 45 0D 20 50 55 42 2A
14A1:4C 49 43 41 54 49 4F 4E 73
14A9:53 20 49 4E 54 4C 20 4C F1
14B1:54 44 0D 20 41 4C 4C 20 AC
14B9:52 49 47 48 54 53 20 52 4D
14C1:45 53 45 52 56 45 44 0D 8C
14C9:0D 1D 1D 48 49 54 20 2A ED
14D1:20 54 4F 20 41 42 4F 52 0F
14D9:54 00 2A 2A 2A 2A 2A 2A 8C
14E1:2A 2A 2A 2A 2A 2A 2A 2A 0A
14E9:2A 2A 2A 2A 2A 2A 2A 2A 12
14F1:2A 2A 2A 2A 2A 2A 2A 2A 1A
14F9:2A 2A 2A 2A 2A 2A 2A 2A 22
1501:2A 2A 2A 2A 2A 2A 2A 2A 2B
1509:2A 2A 2A 2A 2A 2A 2A 2A 33
1511:2A 2A 2A 2A 2A 2A 2A 2A 3B
1519:2A 2A 2A 2A 2A 2A 2A 2A 43
1521:2A 2A 2A 2A 2A 2A 2A 2A 4B
1529:2A 2A 2A 2A 2A 2A 2A 2A 53
1531:2A 2A 2A 2A 2A 2A 2A 2A 5B
1539:2A 2A 2A 2A 2A 2A 2A 2A 63
1541:2A 2A 2A 2A 2A 2A 2A 2A 6B
1549:2A 2A 2A 2A 2A 2A 2A 2A 73
1551:2A 2A 2A 2A 2A 2A 2A 2A 7B
1559:2A 2A 2A 2A 2A 2A 2A 2A 83
1561:2A 2A 2A 2A 2A 2A 2A 2A 8B
1569:2A 2A 2A 2A 2A 2A 2A 2A 93
1571:2A 2A 2A 2A 2A 2A 2A 2A 9B
1579:2A 2A 2A 2A 2A 2A 2A 2A A3
1581:2A 2A 2A 2A 2A 2A 2A 2A AB
1589:2A 2A 2A 2A 2A 2A 00 00 35
1591:00 00 00 00 00 00 00 00 BB
```

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THE AUTOMATIC PROOFREADER

Philip I. Nelson

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in Proofreader exactly as listed. Because the program can't check itself, be sure to enter each line carefully to avoid typographical errors or other mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy of the program before running it.

Next, type *RUN* and press Return. After the program displays the message *Proofreader Active,* you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, Proofreader displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line. Also, be sure not to skip any lines.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using Proofreader on the 128, do not perform any GRAPHIC commands while Proofreader is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while Proofreader is in memory.

Though Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

AUTOMATIC PROOFREADER

```
0 CLR
10 VE=PEEK(772)+256*PEEK(773):
   LO=43:HI=44:PRINT"{CLR}
   {WHT}AUTOMATIC PROOFREADER
   {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
   6:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
   6:FOR J=SA TO SA+166:READ B
   :POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
   RROR* CHECK TYPING IN DATA
   {SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
   B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
   RROR* RELOAD PROGRAM AND CH
   ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
   ,22:POKE SA+18,23:POKESA+29
   ,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773):PRINT"
    {CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
    POKE (PEEK(LO)+256*PEEK(HI
    ))-1,0:NEW
120 DATA120,169,73,141,4,3,169
    ,3,141,5,3,88,96,165,20,13
    3,167
130 DATA165,21,133,168,169,0,1
    41,0,255,162,31,181,199,15
    7,227
140 DATA3,202,16,248,169,19,32
    ,210,255,169,18,32,210,255
    ,160
150 DATA0,132,180,132,176,136,
    230,180,200,185,0,2,240,46
    ,201
160 DATA34,208,8,72,165,176,73
    ,255,133,176,104,72,201,32
    ,208
170 DATA7,165,176,208,3,104,20
    8,226,104,166,180,24,165,1
    67
180 DATA121,0,2,133,167,165,16
    8,105,0,133,168,202,208,23
    9,240
190 DATA202,165,167,69,168,72,
    41,15,168,185,211,3,32,210
    ,255
200 DATA104,74,74,74,74,168,18
    5,211,3,32,210,255,162,31,
    189
210 DATA227,3,149,199,202,16,2
    48,169,146,32,210,255,76,8
    6,137
220 DATA65,66,67,68,69,70,71,7
    2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
    116,117,151,128,129,167,13
    6,137
```

❐

ONLY ON DISK

Here are the bonus programs that you'll find on this month's Gazette Disk.

Totalizer
By Randy Clemmons
San Diego, CA

Totalizer is a handy two-field database that lets you enter a descriptive name in one field and a number in the other. These could be inventory items and prices, names and grades, checkbook entries and amounts—anything you like, up to 500 items.

With Totalizer you can sort items, add amounts, compute averages, keep running totals, compute taxes on totals, and more. Once you have created a file, you can edit, insert, delete, move, view, and print your listing at any time. You'll be able to use this flexible utility in numerous ways around the home or office.

Connect the Dots
By Richard Sands
Sandy Springs, GA

The object of this game is to draw the fourth side of a square, thus "owning" that square. The more squares you own, the higher your score.

The game begins with a 5 × 5 grid of 25 dots. You draw a horizontal or vertical line connecting 2 dots, and then the computer draws one. You alternate drawing lines anywhere on the grid until one of you can complete a square. The game continues until all 16 squares are filled. There are five levels of difficulty to challenge the whole family.

You can have these programs and all the others that appear in this issue by ordering the January Gazette Disk. The price is $9.95 plus $2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

HOW TO TYPE IN GAZETTE PROGRAMS

Each month, Gazette publishes programs for the Commodore 128 and 64. Each program is clearly marked as being written for the 128, 64, or both. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

At irregular intervals, we publish two programs designed to make typing in our programs easier: The Automatic Proofreader, for BASIC programs, and a 128 and 64 version of MLX, for entering machine language programs. In order to make more room for programs, we do not print these handy utilities in every issue of the magazine. Copies of these programs are available on every Gazette Disk. If you don't have access to a disk, write us, and we'll send you free copies of both of these programs. Please enclose a stamped, self-addressed envelope. Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

When entering a BASIC program, be especially careful with DATA statements, as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off and then on, erasing what was in memory. This could cause you to lose valuable data, so be sure to *save a program before you run it.* If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from Gazette, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor-down key; {5 SPACES} means to press the space bar five times. {RVS} means to enter Reverse mode by simultaneously pressing the Ctrl key and the 9 key.

To indicate that a key should be shifted (hold down the Shift key while pressing another key), the character is underlined. For example, A means hold down the Shift key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight shifted A's).

If a key is enclosed in special brackets, [<>], hold down the Commodore key (at the lower left corner of the keyboard) and at the same time press the indicated character.

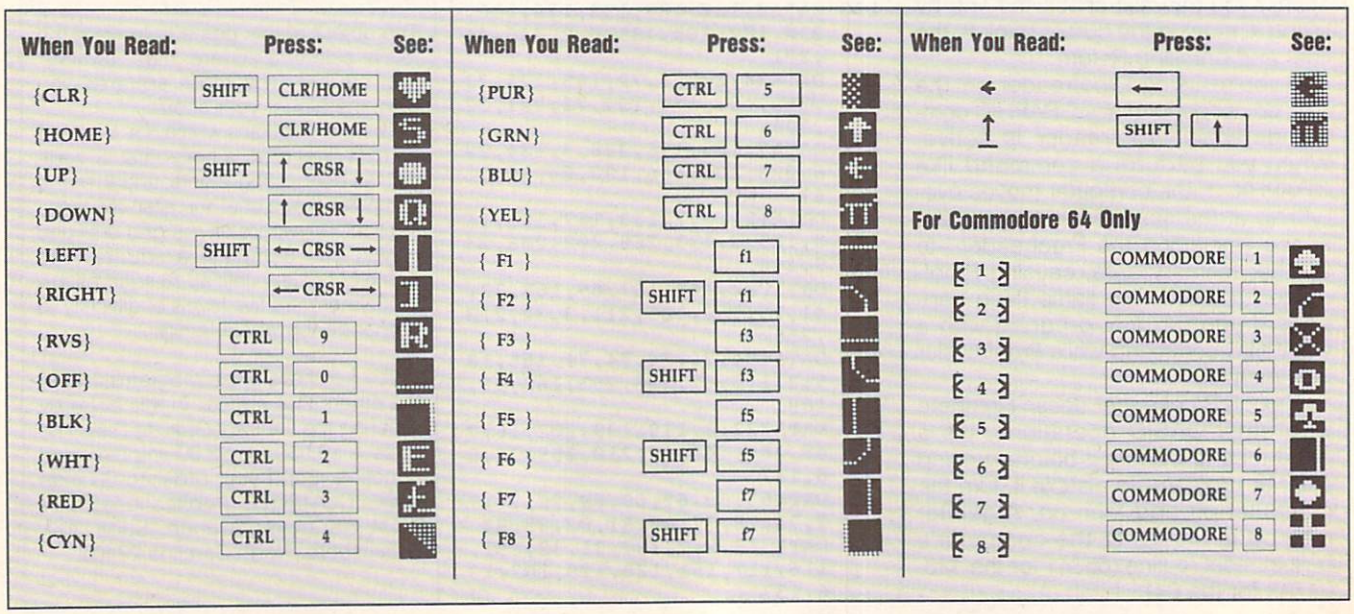
Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the Ctrl key while typing the letter in braces. For example, {A} means to press Ctrl-A.

The Quote Mode

You can move the cursor around the screen with the Crsr keys, but you may want to move it under program control, as in examples like {LEFT} and {HOME} in the listings. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote key, you're in quote mode. It can be confusing when you are in this mode if you mistype a character and cursor left to change it. You'll see a graphics symbol for cursor left. Use the delete key to back up and edit the line from the beginning. Type another quotation mark to get out of quote mode.

If things get too confusing, exit quote mode by pressing Return; then cursor up to the mistyped line and fix it. If the mistake involves cursor movement, however, you must press the quote key to reenter quote mode. ❐



EXPRESS PUBLISHER FOR WINDOWS

Power Up Software is trying to keep up with the Joneses. Its Express Publisher for Windows takes desktop publishing a few steps closer to the company's high-end desktop publishing competitors, making it a useful product at a lower price.

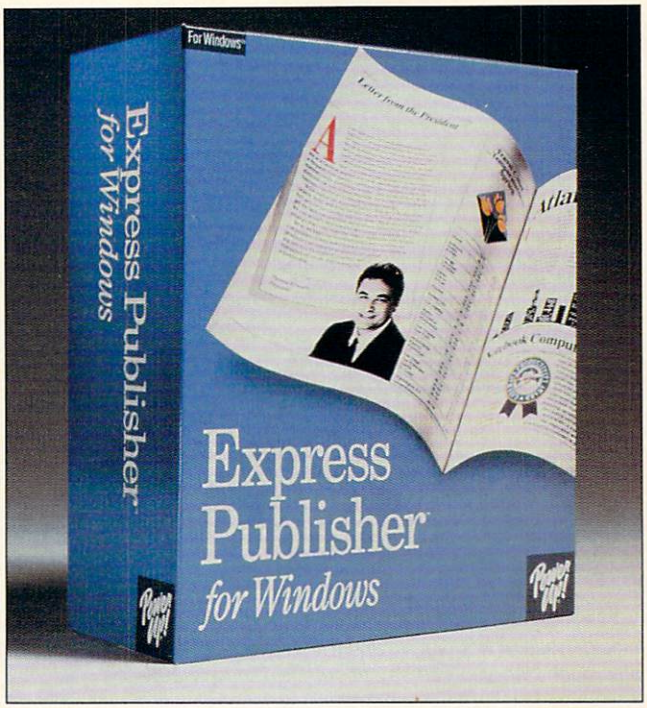
Express Publisher for Windows shouldn't be overlooked as a means of small business or home desktop publishing. It's cost-effective when compared to the desktop publishing biggies.

And in addition to all the special features packed into the DOS version, the new Windows version includes such features as the Paste Link command, a spelling checker with two dictionaries, a thesaurus, a realtime macro creation option, an Insert Tags command, and lots more.

Differences between the DOS version and the Windows version include selecting the text-related options first in the Windows version. There's no end-of-story marker in the new version, and text and objects can be rotated (the DOS version only allows object rotation).

There's no need to worry about whether Express Publisher DOS documents will work in the Windows version. I converted my résumé from DOS to Windows and started printing the new version in no time. I had to reformat the text fonts, however, since the conversion process eliminated my original fonts from the document.

One option that's missing in the Windows version is the Edit Object command. I used this option in the DOS version quite a lot to alter graphics, but since the graphics in the Windows version can be linked to a graphics program and updated automatically, I can deal with it. There's also no Export Picture command. Since an object can't be edited, there's no need for it.



Express Publisher for Windows offers an inexpensive desktop publishing option, though you give up some things for its low price.

Text Appeal is an add-on program that works with Express Publisher. It offers 9 basic tools plus 40 custom tools. The DOS version supplied only 5 tools. The drawing tools are easier to use in the new version. To draw a polygon, you enter the number of sides. New additions to the tool box are the Bézier (free-form) curve and the Star (3–100 points with varying depths).

The Object/Crop Image command works better than the same command in the DOS version. The cropped portion of the image can be retrieved. With the additional changes in the Box command, it's simple to alter the color of the border, the box interior, and its shadow. There's only one box tool, but it can be changed to a rounded or shadowed box. The manuals include easy-to-follow tutorials, and installing the program is a fairly simple process.

Unlike its predecessor, this version includes two types of text—column and free. Column text is contained in a text frame, and it can be linked to other frames. Free text is best used for headlines and titles. This type of text can't be linked. I was slightly confused when I first began using the different types of text, but it didn't take long to catch on.

The Pasteboard is new to the Windows version. It's the blank area beyond the edge of the page where objects can be stored but not printed. The function of the Express Publisher Pasteboard is similar to that of the one in Aldus PageMaker.

I'd hoped to see additional PageMaker-like options, including the page icons located at the bottom of the window that allow the user to move to any page in the document by clicking on the page's icon. Express Publisher for Windows makes a more or less feeble attempt at providing this option. I had to choose the Thumbnails Display option in the Page menu and click on an object on a page to move to that page.

Even with its limitations, I'm still an Express Publisher fan. After working with the DOS version and the Windows version, I have no plans to move up to the high-end packages with their prohibitive prices. Express Publisher is easy to use, and it's an old friend.

JOYCE SIDES

IBM PC or compatible (80286 compatible, 80386 compatible recommended); 3MB RAM (2MB for 386-enhanced mode, 4MB recommended for 286); EGA, VGA, or higher-resolution monitor; hard drive with 8MB free; Microsoft or compatible mouse; Windows 3.0 or higher—$149.95

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Circle Reader Service Number 293

TANDY 3830 SL

Tandy was the first large-scale marketer to provide personal computers for the masses nationwide. Over the years Tandy has continued to be an innovator in bringing appealing products to market, and this is evident in its 3830SL notebook computer—a stylish, feature-laden ma-

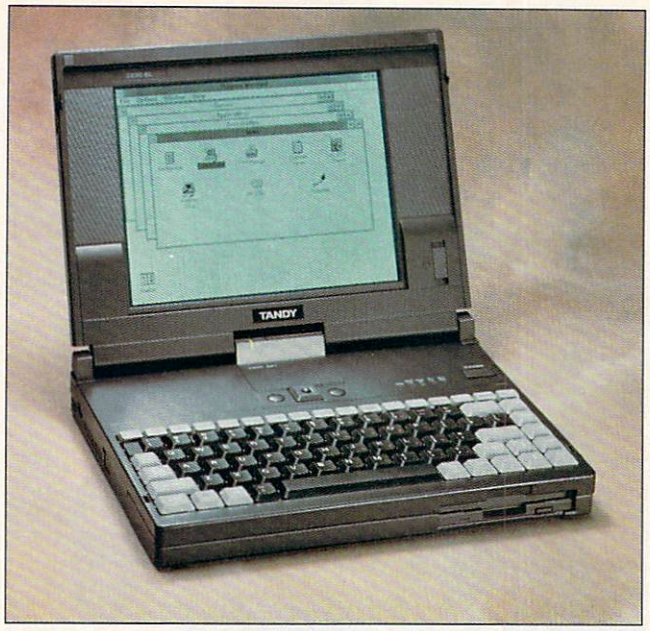
chine with lots of appeal.

An Intel 80386SL microprocessor provides the computing power for the 3830SL running at 25 MHz. The standard RAM configuration is 2MB, and you can expand memory to 8MB. For those heavy applications which require additional computing power, you can install an 80387SX or 80387SL math coprocessor. An 80MB hard drive and a front-mounted high-density floppy drive are also standard equipment on this model.

The 80386SL chip draws less current than an 80386SX CPU running at the same speed, and the SL chip has several power-saving features built into it as well. The 3830SL exemplifies how efficient this technology is, since it regularly yields charge lives of 2½ hours under constant heavy use and in excess of 4 hours under normal use with all the power-saving features enabled.

Physically, the 3830SL is pleasing to the eye, finished in an almost-black gray finish. The unit is very thin (under 1¾ inches when closed) and just under six pounds, making it easy to tote under your arm or in a briefcase.

Beneath a drop-down door at the rear of the unit can be found a proprietary expansion bus, a 9-pin serial port, a parallel port, and a 15-pin external VGA port. Mini-DIN jacks are provided for a PS/2 mouse and an extension keyboard at the right side of the machine. The inclusion of the dedicated mouse port is a good feature, although with the 3830SL it isn't really necessary; a PS/2 minitrackball is built into the notebook. The device is located in the center of the machine, just above the keyboard. While this isn't the optimal position for it (a detachable side-mounted device like the Microsoft BallPoint mouse is a better idea), it certainly is convenient to have mouse capability already built in and available every time you use the machine without the need to physically attach a pointing device.



It looks good, it works well, and it's loaded with features—there just isn't much bad you can say about the Tandy 3830SL.

All controls and indicators are flush mounted on the 3830SL, adding to the clean, uncluttered appearance of the machine while preventing accidental disturbances to the control settings.

The keyboard is a joy to use, featuring excellent key spacing and firm action. An inverted-T cursor pad is provided, along with an embedded numeric keypad. All of the 12 function keys occupy the topmost row of this 84-key keyboard, and LED indicators are provided for displaying the condition of the Scroll Lock, Caps Lock, and Num Lock. LEDs are also used to denote hard disk activity, keypad activity, and power or battery status.

As with all of Tandy's products, the documentation is excellent. All of the information is provided in a clear, easy-to-understand manner with generous use of illustrations. The organization of the user's manual and other documentation (reference guide, setup booklet) is also topnotch, so even novice notebook users will feel right at home with the 3830SL in no time at all after reading these publications.

The Tandy 3830SL is an excellent notebook that will serve the needs of most of today's users while still providing plenty of expansion capabilities and options for those of tomorrow.

TOM BENFORD

Tandy 3830 SL—$2,499

TANDY
700 One Tandy Ctr.
Fort Worth, TX 76102
(817) 390-3001

Circle Reader Service Number 294

WINDFORM

Forms, forms. Every business, large or small, needs forms for everyday operations. In today's world of desktop publishing, we see a trend toward forms with logos and fancy effects. Windform's purpose is to help you design your own form and fill in the data, or fill in the data for the forms in its library. Unfortunately, it does a good job of neither.

I have come to expect very little from program documentation, and the Windform user's guide is no exception. To learn the program, I embarked upon the tutorial, and crashed. And crashed again. The program is object oriented, in the manner of most draw programs, but it has trouble maintaining the integrity of the objects. For example, if you create an object such as a box, draw lines for data entry, add some text, and then decide to put a shadow effect on the box, you lose all your work on the objects within the box.

With grim determination and a Columbus mind-set, I made my way through the tutorial and had a form of sorts. One problem arose with the alignment of text. The alignment changes with each of the three zoom views, and the printed version differs from any screen view. Also, some of the extolled aids simply failed to work. The program boasts a Distribute feature, for instance. You're making a table and wish to draw a vertical line to separate a field. You draw the line and call Distribute, which is supposed to duplicate the vertical line in every line of the table. It seems to do so very nicely, but when you leave the Distribute menu and

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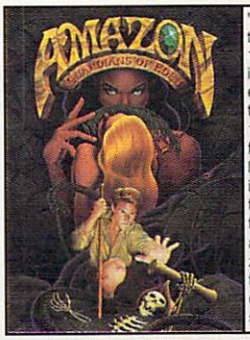

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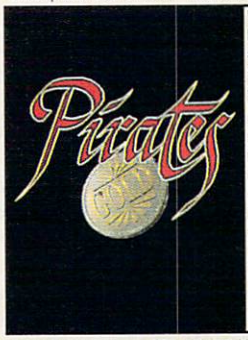

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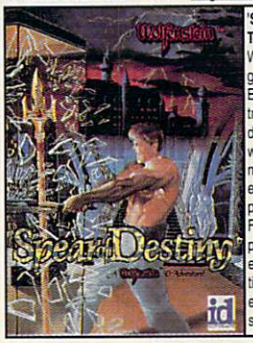

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'SPACEWARD HO!' takes you to the stars as you explore and conquer the galaxy. You allocate funds & resources to build armadas, inhabit & terraform planets, research new technologies. Features an adjustable galaxy size, number of players up to 19, network and modem play. **$38**

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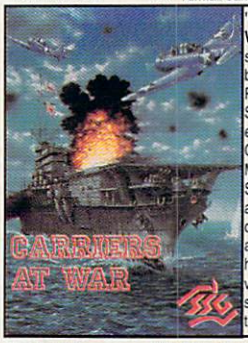

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view the form, the duplicated lines have vanished.

To explore the other capabilities of the program, I brought up a form from the program library and entered data into the fields of the form. To do this, you must enter the Fill mode, where you are offered options for the fill procedure. The default—and fastest—is to fill in fields in the order of their definition when the form was designed. Another is "point and shoot," where you click on the desired field. No field modification is possible in the Fill mode.

To save your work, you create a data file and copy the form with the data in the fields to it. You may interrupt the form-filling operation, save your work, and return to it later, but to do so, you must remember both the name of the form file and the name of the data file. The default mode of filling doesn't remember where you were on the form, so you must work your way down field by field. If the form was designed to be filled by column (a poor idea, but used in some library forms), the default mode forces you to the bottom line of the form before you change columns. You cannot change the sequence by point-and-shoot intervention.

I happened to choose an invoice form from the library, which called for entries of unit price, number of units, and total price. I may be spoiled, but when I'm filling out such a form on a computer, I expect the program to perform such helpful functions as multiplying unit price by number of units to obtain the total. Not so with Windform. The program knows nothing about numbers and cannot perform simple arithmetic operations. All entries are text, and mathematics is left as an exercise for the user.

I found little to be said for Windform. To put it bluntly, the program is rather slow, dumb, and user-hostile.

CHARLES IDOL

IBM PC or compatible (80286 compatible), 2MB RAM (4MB recommended), hard drive with 1MB free, mouse, Windows 3.0 or higher—$179.95

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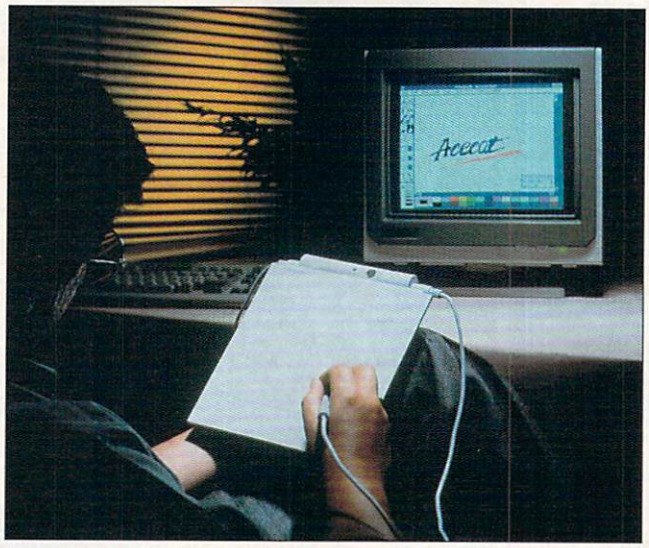

Drawing will seem more natural with the AceCat tablet.

ACECAT

If you've ever tried to draw with a mouse or trackball, you've probably noticed how unnatural it feels. Graphics designers, desktop publishers, and computer-aided design (CAD) operators have complained for years about the hindrance these types of pointers have posed to their professions.

A while back, the computer industry responded with pen tablets—devices that use stylus pens and tablet-like drawing areas that operate much like the pad and pencil we all grew up with. Until now, though, the price put them out of the reach of the average computer user. Pen tablets have been confined to high-end graphics applications, such as engineering and architecture.

Enter AceCAD's AceCat graphics tablet. At $129, it's much easier to step up to this relatively new technology. AceCat's 5- × 5-inch tablet size (most others are 9 × 6) is also easier to find room for on a crowded desktop.

What's the difference? Now that you've mastered your mouse or trackball, why change? Pen tablets provide absolute precision placement. This means that you point to an area on the tablet that corresponds to an area of your monitor.

Mice and trackballs provide relative placement, meaning that the pointer moves relative to the speed and distance you move the device, no matter where you start on the mouse pad or desktop. Once you get used to the change, absolute positioning makes much more sense, especially when drawing in graphics programs.

A breeze to install, AceCat connects to both your keyboard and RS232C serial interface port, with little or no compatibility fuss. Older computers with serial ports that don't meet the RS232C conventions (most do) will also need an optional AC power adapter. Drivers for DOS applications and Windows are included, as well as one for emulating a Microsoft mouse. To change the tablet from pen to mouse, you simply flip a switch on the back. A Windows utility allows you to adjust the sensitivity of the tablet and customize button configurations on the pen stylus or optional cursor puck.

The optional four-button cursor puck ($49.95) lets you trace images into any paint or draw program. The puck's crosshairs make it ideal for mapping. There's also a Velcro hand strap available for palm-based cursor control, which is great for walking about during presentations.

The tablet also gives you the freedom to point from anywhere—leaning back in a chair with the tablet on your lap, for example, instead of being confined to the desktop. This makes it more comfortable to use for certain tasks, such as drawing or playing games.

Once you've tried the AceCat graphics tablet, you may never let your mouse out of its hole again.

WILLIAM D. HARREL

AceCat—$129.00 (optional cursor puck—$49.95)

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Dragon's Lair III: The Curse of Mordread brings the classical animation style of Don Bluth to your computer featuring full-screen animation, digitized sound and new animations not included in the original laser disc arcade game.

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Circle Reader Service Number 246

THE NORTON BACKUP FOR DOS 2.0

The road to hard disk Hades is paved with good intentions. Good intentions to back up your hard disk data and programs. Good intentions to replace DOS's anemic Backup and Restore functions with a high-quality, easy-to-use program. Good intentions to make backups on a regular, frequent schedule.

Too many of us never convert these intentions into action. When the inevitable crisis comes, we arrive all too quickly at that place the road leads to. The crisis can be as small as an accidentally erased file or as cataclysmic as a hard disk crash.

One reason these good intentions remain unfilled is that backup programs just aren't very friendly. If that's your excuse, consider The Norton Backup for DOS 2.0.

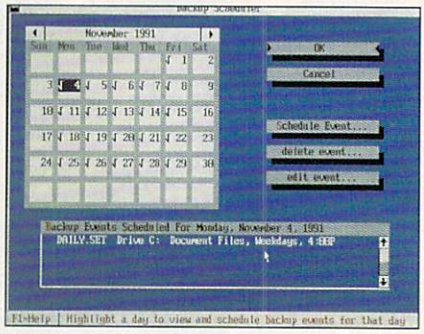
This version adds a robust set of easily accessible features to an already impressive program. Norton Backup is equally at home backing up large networks on quarter-inch tape and protecting a home system's 20MB of precious data and programs.

Norton software tends to be well designed with all levels of users in mind. Installing Norton Backup is a snap. The small Installation Guide—a separate manual—tells you how to start the installation process. From there, just follow the onscreen instructions. The process even includes built-in compatibility tests to ensure that everything works as intended.

The program is unfortunately testy about TSRs—programs which usually start when you boot the computer and stay running in the background. The troubleshooting advice in the read.me file tells you to remove TSRs and optional device drivers for nearly all problems. (Be sure to study the read.me file—it's full of essential information.)

TSR conflicts caused me some trouble. My system runs 14 separate TSRs and device drivers, all necessary to support the hardware configuration. I have an external hard disk, a parallel port doubling device, a multimedia sound board, and a CD-ROM drive. Add Stacker, 386Max, and a mouse, and I've got a dozen TSRs and device drivers. I can boot with the multimedia stuff disabled, but since I want to back up the external drive, its drivers and Stacker must stay loaded.

The read.me file strongly advises that you test the program by running Compare on your first two backups. Good advice. I backed up my external hard drive, ran Compare, and found that the 11th disk contained an error, making it unusable, even though there was no hint of trouble when creating the backup. A TSR conflict was the culprit.



Take an exit ramp off the road to hard disk Hades with The Norton Backup for DOS 2.0.

Once you get the program installed, tested, and running successfully, Norton Backup is easy to use. The main menu screen offers six buttons: Backup, Compare, Restore, Backup Scheduler, Configure, and Exit.

The Backup function is extremely flexible. You can back up whole drives, directories, or a file at a time. It offers five backup types: full, incremental, differential, full copy, and incremental copy. (The last two are for transferring data between computers.) The excellent manual helps you understand the differences between these systems and how you would use them in designing a backup strategy.

Using the Backup Scheduler, you can even set up automatic backup sessions for future times.

When you're selecting files one by one, you can navigate through the directories easily and look at the contents of individual files with the built-in file viewers. The program displays the contents of files in more than 35 file formats.

Norton Backup automates the backup process through setup files, which record all the options you set for a particular backup. Include and exclude functions let you specify classes of files to include or exclude. You could include all wk1 files, for instance, or exclude all bak files. With a few include and exclude statements, you can build a specific file set much faster than by selecting them individually. These features make Norton Backup an especially useful tool for corporate PC administrators.

Other features include password protection, reports listing backup media contents by file, awareness of network

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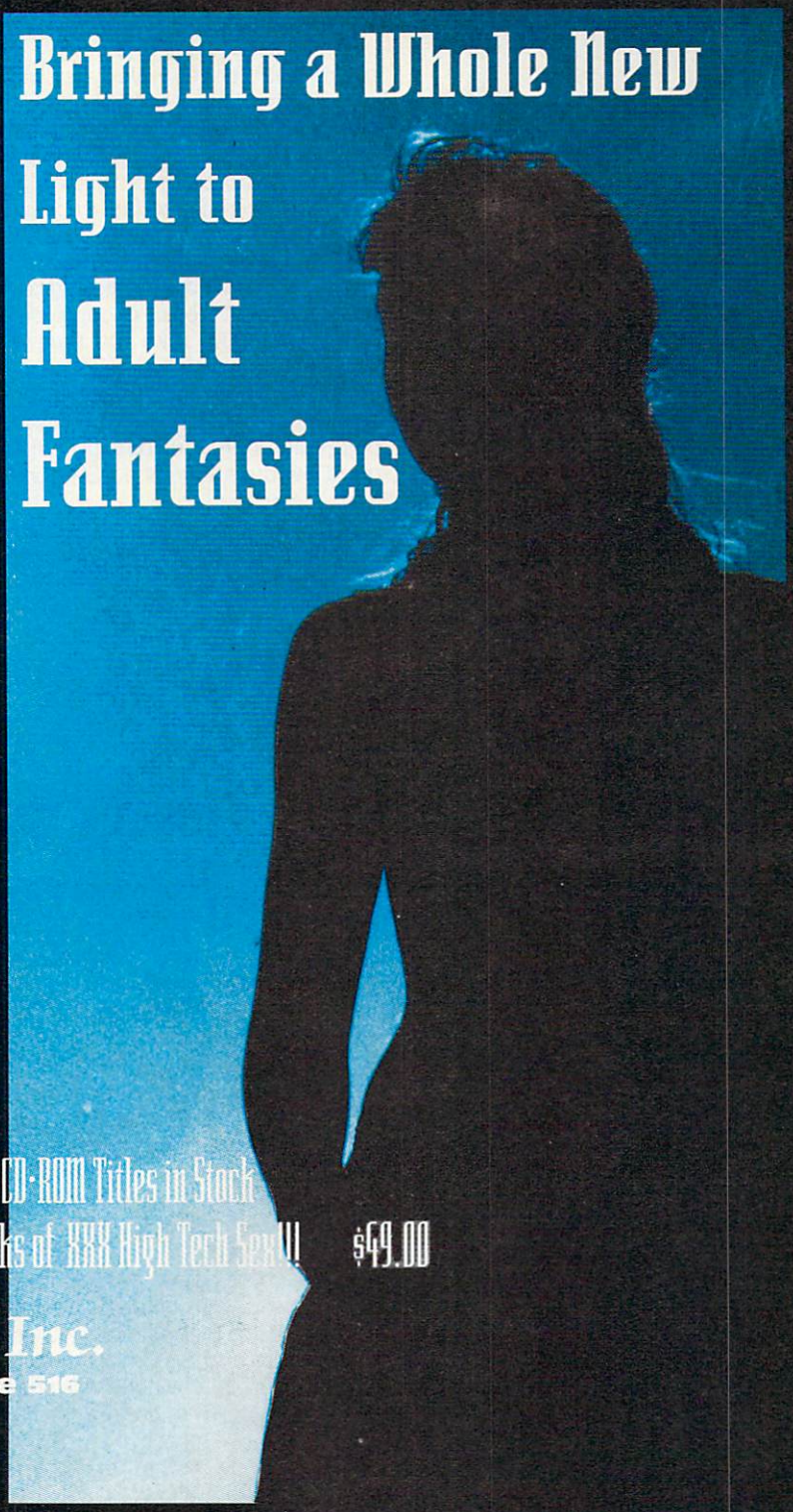

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REVIEWS

operations (it'll retry files that were in use the first time it tried to back them up, for instance), on-the-fly disk formatting, and dynamic backup statistics.

Norton Backup is an exceptionally flexible, powerful, and fast backup system—at home on modern networks and with tape backup hardware. Yet, once it's installed and debugged for your system, it's easy enough for anyone to use. But take the time to be sure you get it installed and configured correctly; it's no fun to be told by the program after a half an hour of swapping disks that your backup set is no good because there's a TSR conflict.

RICHARD O. MANN

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THE TWO TOWERS: THE LORD OF THE RINGS, VOLUME II

J. R. R. Tolkien's epic trilogy has seen many licensees come and go. Interplay is one that seems to be making the most of the rights to these classic books; it has just translated the second book into a computer role-playing adventure game called The Two Towers.

The Two Towers is much improved over the first Interplay interpretation of the masterpiece, The Fellowship of the Ring. Many of the users' criticisms of the first game have been addressed in the second game, though it maintains the excellent planning and story skills exhibited in the first work. Use of skills, items, and spells is much easier, since you can switch from character to character within the appropriate subdirectory.

The Two Towers has an automapping system that allows game players to orient themselves to their surroundings. The scale of the game has been reduced to 40 percent of that of the first game, making it easier to get around and to identify landmarks. Combat now provides background action to the main plot of the story and characterization.

The Two Towers is the story of the journey of the members of the fellowship after the death of Boromir. Frodo and Sam venture on from the Falls of Rauros to Cirith Ungol, the gates of Mordor. The other characters from the original fellowship unite the Ents, a race of tree-men; the Rohirrim, the riders of Middle Earth; and the inhabitants of the other lands that border Mordor in the fight against the evil wizard Sauron. Interplay has incorporated virtually every Tolkien character, town, fortress, and geographical feature to give the sto-

With The Two Towers, Interplay continues to make the most of Tolkien's trilogy.

ry a rich and detailed set of circumstances and choices for the game player's enjoyment. Cliffhangers give the game more suspense by switching among the three groups of adventurers. When one group reaches a particular place on the maps, the story picks up with another group. The cliffhangers go a long way toward making the story more interesting, but they can disorient the game player, who has no control over when the game will shift to another group.

The third-person, overhead, oblique perspective maps were drawn with terrain tiles. The animation gives much detail to the characters as they move over the landscape and participate in combat. Rounded combat adds dynamic commands of swing, block, aim, and dodge. Character portraits are more personalized than those in the first game. Nonplayer characters no longer run away; they wait for you to engage them in the keyboard-input keyword conversation. Some replies are contained in 42 pages of paragraphs in the well-written game manual. The interface is driven by both hot key and icon. The small ten-item inventory requires careful planning, since dropped items and items offered the group when there are no open inventory slots are lost forever.

The richness of detail, plot, and characterization of Tolkien's classic work is just as likely to receive accolades from those who recognize the beauty of Interplay's interpretation as it is to receive criticism from those Tolkien purists who can accept no variation from the original work. The intuitive interface

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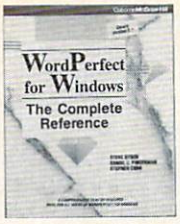

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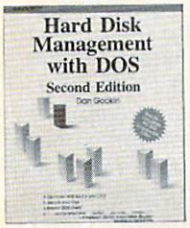

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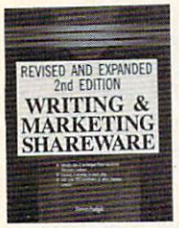

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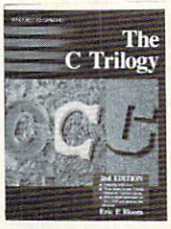

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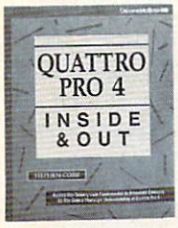

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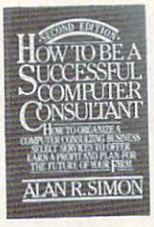

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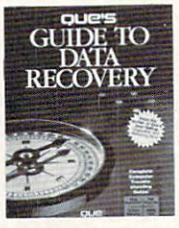

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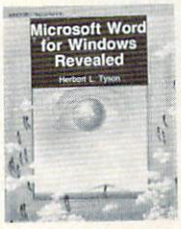

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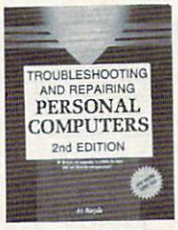

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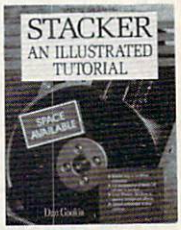

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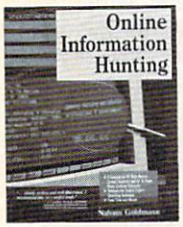

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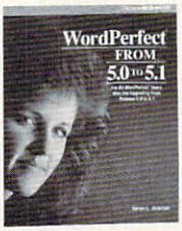

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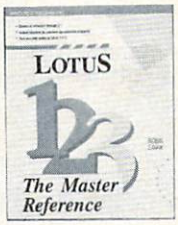

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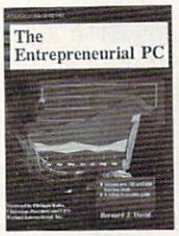

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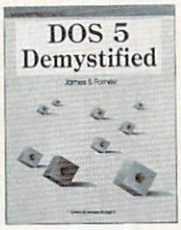

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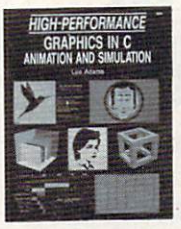

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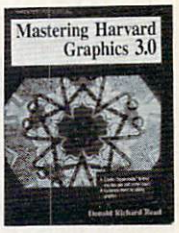

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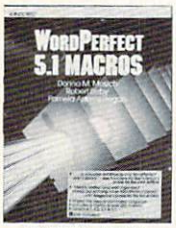

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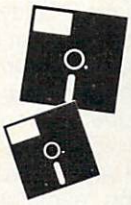

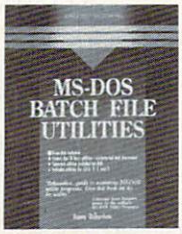

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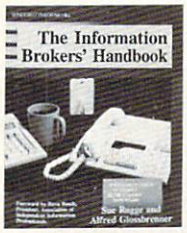

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REVIEWS

works well. The music incorporates more than 45 minutes of an entertaining musical score. The graphics for The Two Towers are well done, if not state-of-the-art.

Interplay has a likable adaptation of a masterwork, which I hope will lead to a computer version of the last book of the trilogy.

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SAMSUNG SYNCMASTER 3

Samsung has blended functionality with form, and the result is known as the CVM4967 SyncMaster 3. The principal distinction between the SyncMaster 2 and 3 is the dot pitch: The SyncMaster 2 has a coarser 0.31-mm dot pitch, while the SyncMaster 3 sports the finer 0.28-mm dot pitch, which makes it particularly easy on the eyes at resolutions above 640 × 480.

The design and layout of the SyncMaster 3 reflect a fair amount of thought with regard to ergonomics. The user-accessible controls are all front mounted and within easy reach for adjustment. The power switch and illuminated indicator are located at the lower right of the machine, with adjustment knobs for brightness and contrast located to the left of the LED.

A drop-down panel extends from the left side of the unit to about midscreen and conceals additional controls for adjusting the display. Beneath this panel are the horizontal and vertical position controls, the horizontal and vertical size controls, and a unique knob called the side-pin control.

The manual, which is well intended but poorly written with regard to grammatical translation, explains that the side-pin control is used to correct the side pincushion of the image on the screen. That description does little for me; however, actually adjusting the knob makes its effect visible. When you turn the side-pin control counterclockwise, the sides of the video image bow in to compensate for the curvature of the video screen. Turning the knob clockwise negates the bowing effect and restores square sides to the image. While this control might be useful for adjusting the video in some applications, I found the factory default setting to be quite adequate while using the monitor.

Another unique feature of this monitor is the click-stop position of the vertical size control. A click in the middle of the adjustment range selects the proper vertical size for VGA mode, although this may not be the optimal size for some of the extended modes.

A detachable tilt-swivel stand is supplied with the monitor and snaps on and off with minimal effort. At the rear of the monitor, a female AC power connector accepts the detachable power cable supplied with the monitor. The video connector cable is permanently attached to the monitor and is terminated with a 15-pin D connector.

I was pleasantly surprised at the overall image quality on the SyncMaster 3, although the curvature of the screen seems to be somewhat more noticeable than on other monitors. As with many other monitors, the SyncMaster 3 displays a tendency toward defocusing and blooming with certain screen images, and it exhibits some slight moiré patterning with some dot patterns. The moirés are quite slight, however, and the overall resolution and registration of the video image make extended viewing without eyestrain possible.

The SyncMaster 3 proves itself a capable performer in all of the standard VGA and higher-resolution modes including 1024 × 768 with 256 colors. It's a good choice for average users who want to explore the higher resolutions of Super VGA.

TOM BENFORD

Samsung SyncMaster 3—$549

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SAMSUNG SYNCMASTER 4 PLUS

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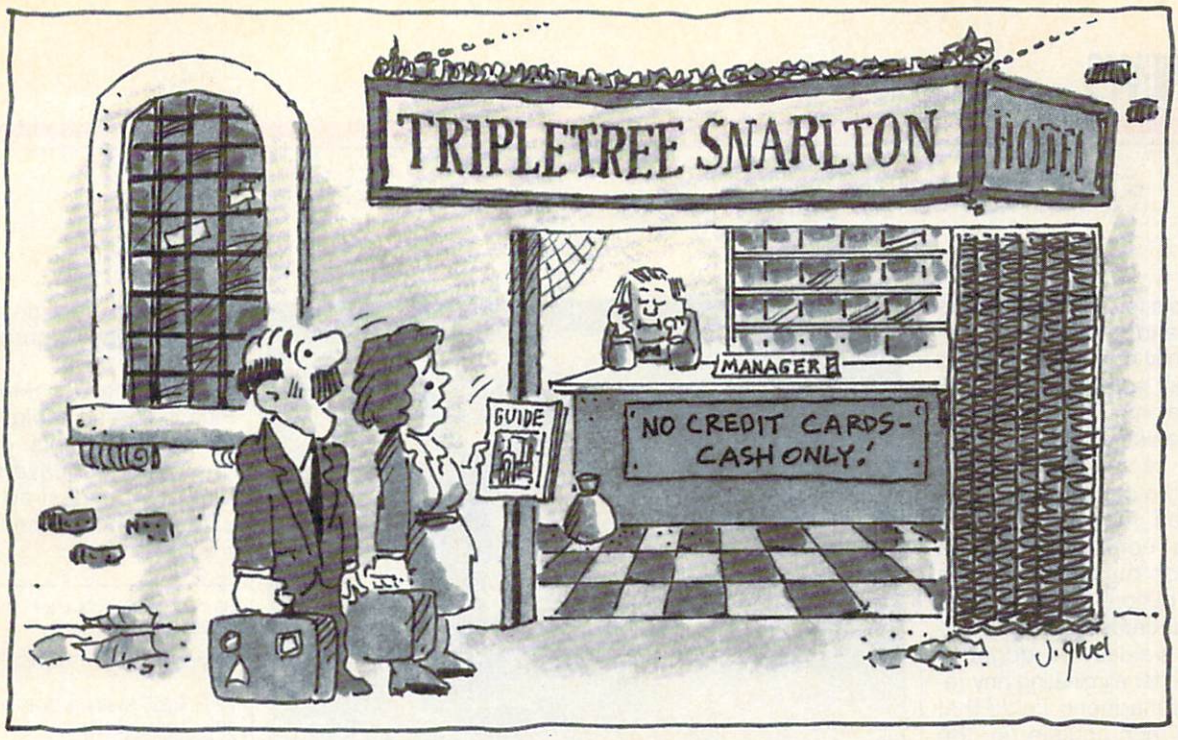

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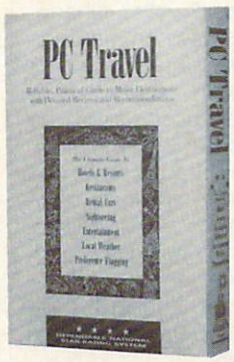

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controls for adjusting brightness and contrast are conveniently mounted under the display screen at the right side, along with an illuminated power switch. A soft-touch control panel resides behind a drop-down door at the left front of the unit. These controls include a function button, along with push buttons for increasing and decreasing the adjustment values. A degauss switch (for eliminating any residual magnetic fields that might accumulate in the CRT over a period of time) and a memory save switch are also located here, along with a selector button for activating either the BNC or D-pin inputs.

In addition to the standard 15-pin VGA monitor connection, four discrete BNC connectors (one each for red, green, and blue screen drivers, as well as one for horizontal and vertical sync) are also provided for use with advanced-function video equipment, such as high-end frame grabbers and video compression cards that require this type of input. A two-position slide switch is also located at the rear of the unit for selecting the termination setting (either high or 75-ohm) as well as another dual-position slide switch for selecting the input signal level (either 1.0 or .7 volts). Changing these switch settings from their defaults (75 ohms and .7 volts respectively) wasn't necessary, since the defaults worked fine.

The monitor is mounted on a sturdy tilt-swivel base that permits easy adjustment for obtaining the optimal viewing angle, and the 15-pin video connector cable is fully detachable from the monitor.

In addition to running dozens of application packages on the SyncMaster 4 Plus, I also ran Sonera Technologies' DisplayMate Video Display Utilities program to help me assess the monitor's display capabilities. I noticed softening of the edges at the upper left and right corners of the screen when running Windows 3.1 in 256-color 1024 × 768 mode with a Truevision VGA with Overlay video card (my standard configuration), as well as some edge wavering that was quite noticeable.

Is it better for a computer to look good than to operate well? The NCR System 3200 Model 3220 manages to do both.

My observations were confirmed by the tests in the DisplayMate Video Obstacle Course, and some other shortcomings also became evident using these tests, as well. Less than optimal results were experienced with the monitor in the geometric linearity test, which showed a marked tendency for bowing in at the upper corners of the screen; in the corner resolution test the edges (also at the upper left and right corners of the screen) appeared blurry rather than crisp as at the center of the screen. The monitor also had a propensity for streaking and ghosting. The overall score for the SyncMaster 4 Plus was 25 out of a possible 33 for the tests (29–30 is the average score, with any score over 30 indicating a truly superlative monitor).

Another oddity was a "rouge spot" present in the lower right quarter of the screen, which could not be eliminated regardless of how the controls were set. I call it a rouge spot because it looked like someone had hit the screen with a powder puff dipped in rouge—a lightly tinged red area that was particularly noticeable (and distracting) any time a light-colored background was displayed.

While the SyncMaster 4 Plus is indeed a big, bright monitor with lots of features, it does leave something to be desired in its display performance.

TOM BENFORD

Samsung SyncMaster 4 Plus—$1,299

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NCR SYSTEM 3200 MODEL 3220

With the NCR 3220, not only do you get a small footprint for an affordable and upgradable workstation, but you also get an attractively built computer.

The monitor—with its gray outer shell coloring—is pleasing to the eye. Looks aren't everything, but I noticed the dark gray surrounding the NCR's monitor screen was less distracting than the color of any other monitor I've used, and the small footprint unit—with its 15- × 15.4- × 3.3-inch frame—fits just about anywhere on a desk.

It took approximately five minutes to set up the 3220. The 80MB hard drive was already formatted, and Microsoft Windows was installed. I simply checked the user's guide for anything unusual, plugged in the appropriate cables and power cord, and turned it on.

Installing the i486SX upgrade was another story, though. The upgrade to the unit I reviewed needed a

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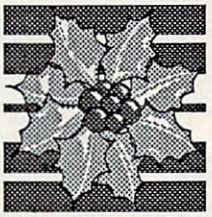

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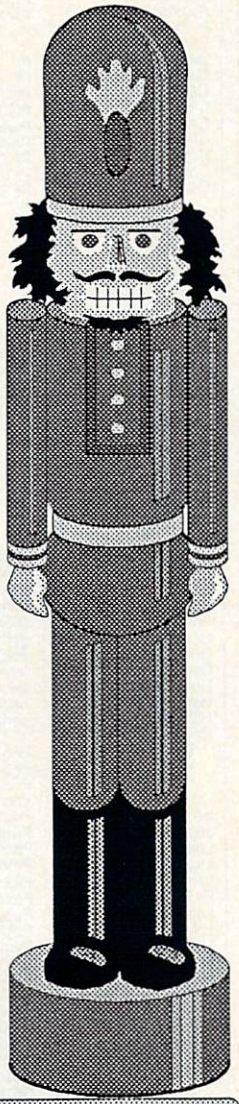

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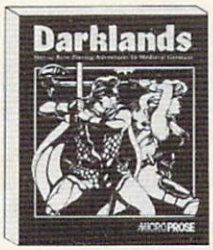

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ROM BIOS upgrade as well as a chip replacement and an added board. Any customer who wants the chip upgrade can install it without special help but will need a tool called a chip puller to remove the 386SX chip. If the unit requires a BIOS upgrade as well, NCR says that change can also be made by the user.

Designed to function in a local area network (LAN), in a wide area network (WAN), or as a stand-alone workstation, the 3220 is moderately priced with tons of features. It has a 15-inch Super VGA monitor with a removable tilt-swivel base, a 16-bit data bus, 4MB of SIMM memory (expandable to 16MB), an 80MB SCSI hard drive, a single 3½-inch 2.88MB flexible disk drive, a math coprocessor socket, an external SCSI device connector, and three open expansion slots. For a modest price, the system can be upgraded from a 20-MHz 386SX to a 20-MHz i486SX unit.

The NCR unit supports MS-DOS, OS/2, OS/2 EE, and SCO UNIX operating systems. Special features include password protection with a keyboard password and a physical cabinet lock to provide security against unauthorized access, an essential ingredient to any business dealing with sensitive information.

The 3220 user's guide provides information on system and optional component installation, guides to using support software and reference disks, and technical data about the system, as well as helpful illustrations and troubleshooting information. Other documentation included is the MS-DOS 5.0 Operating System Guide, the Microsoft Windows User's Guide, and an operations manual for the monitor.

I ran a variety of applications both before and after the i486SX upgrade installation to compare the difference in operating speed. Processor-intensive applications ran much faster after the upgrade, and all the utilities, games, and Windows applications I installed ran more smoothly and quickly. The Windows applications I ran included Express Publisher for Windows, FormWorx for Windows, and Microsoft Word, Excel, and PowerPoint for Windows.

My husband is the expert game technician in the family. He played Star Trek: 25th Anniversary before and after the upgrade. The animated graphics were noticeably smoother afterward.

The three expansion slots are stacked top to bottom beside the hard drive. Access is fairly easy to all the components inside the unit. The 3½-inch disk drive had to be removed to install the upgrade, but that caused no problems, since the drive is held in place by clamps instead of screws. What a refreshingly simple idea!

Vents along the upper sides of the unit should be adequate to keep the system's power supply from overheating. Since there's no conventional fan, the noise level is practically nonexistent. The SIMM RAM chips are easily accessible. Two empty sockets are available to add more memory—up to 16MB RAM.

The monitor provides a flicker-free, antiglare picture tube that reduces eye fatigue. Conveniently located at the front of the monitor are the brightness, contrast, horizontal size and phase, vertical size and phase, and degauss (for adjusting color disturbance) controls, while the pincushion control (controls cushion or barrel shape of the picture) can be found on the back of the unit.

The 101-key keyboard supplied with the 3220 offers the same gray color as the CPU and monitor. The keys are light gray with a medium-to-dark gray background. The keys don't have the quick click of a typewriter, but many users prefer the quieter, softer feel.

Warranties usually consist of a one-year contract. NCR has boosted its warranty package to one year of on-site service and one year of

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free depot maintenance. The user can opt for an upgrade to on-site service for the second year at a nominal charge. Optional service agreements are also available after the warranty expires.

There are only a couple of small chinks in the 3220's armor. I was surprised that there is no Reset button, but the On/Off button is conveniently located on the front of the unit. This isn't a major consideration, but it's worth noting.

The only other drawback I noticed is the single disk drive; there is only one internal drive bay. There is an external SCSI device connector where another drive can be added if it's needed, however, and up to six more peripherals can be daisychained to it.

Instead of alkaline batteries to keep the CMOS intact, the NCR unit maintains CMOS with a plug-in integrated circuit chip that can be replaced easily. These RTC/battery modules last several years. A warning message appears on the screen at boot-up if the battery is failing. If the battery can't be replaced immediately, the user can boot with the reference disk at each power-up.

The 3220 is a solid, easy-to-use computer. Small businesses looking for a system with a low entry cost and the possibility of moving to a higher-performance system in the future shouldn't overlook the value and service provided by NCR's newest product.

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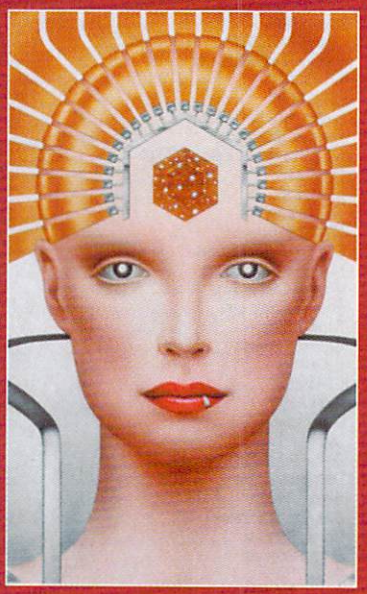

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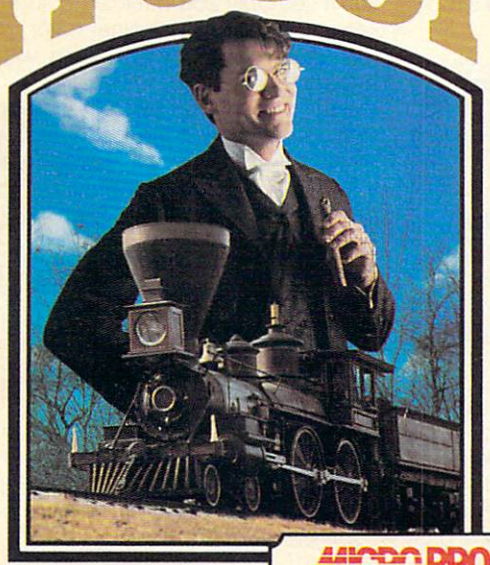

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REVIEWS

PhotoFinish, a new Windows editor for 256-color, gray-scale, and true-color 24-bit scans, makes working with scans almost simple. It's geared to beginners, but it has enough tools to satisfy more experienced users who simply want to save time and effort.

If your computer's fast enough, Photofinish is a powerful, easy-to-learn scan editor.

PhotoFinish incorporates drivers for most popular flatbed and hand-held scanners and video frame grabbers, so you can scan art directly into the program. Unlike the "lite" scanning programs bundled with scanner hardware, PhotoFinish has a robust preview feature and lets you make corrections and apply halftone screens and other effects to the scan before you capture it. You can also automatically stitch together partial scans of a large image. Once you've calibrated PhotoFinish for your particular needs, chances are you won't have to choose more than image size in future scans—a great help for people who need to grab a scan and get on with their work.

Captured scans are loaded directly into PhotoFinish's main work area. There you'll find a wide range of clickable image-editing and retouching tools, including softening and sharpening brushes and tools for tinting and cloning areas. Image-processing filters allow you to adjust brightness and contrast, modify individual color levels, add or remove noise, enhance edges and shadows, and add motion blur. Filters can be applied to the whole image or selected areas and colors. You can even display multiple versions of the same image and cut and paste between them—something few such programs on any platform can do. Even if you never used the scanning features, PhotoFinish would still be a standout paint program. If all you want is simplicity, however, you can just apply a clean-up filter to get rid of stray pixels and save the scan as any of several file types that work with popular presentation and publishing programs.

Sometimes you have to work with a variety of images, both color and monochrome. It's no problem for PhotoFinish to convert between gray-scale, 256-color, and true-color images. You can edit any image even if your video adapter doesn't support a particular color mode. For example, you can edit true-color scans in 256-color Super VGA; you'll see only 256 dithered colors on-screen, but all the original color information in the true-color scan will be preserved.

PhotoFinish's feature set is impressive, but the program becomes even more attractive when you consider that many other scan editors cost two to three times as much. But don't assume you can run this program—or, for that matter, any 24-bit, 300-dpi, full-page scan-editing program—on a plain-vanilla AT. PhotoFinish snailed along on my 25-MHz 386 with 2MB of RAM, especially when editing 24-bit files.

The main bottleneck seemed to be PhotoFinish's own virtual memory scheme. The program stores large picture files and some of the program code on your hard disk; then it swaps parts of them into RAM as needed. That allows you to work with pictures too big to fit in memory, but it also means the program is constantly reading from the hard disk. Screen refreshes crawl, and you might as well go out for a cup of java while applying a complicated filter. If you have more RAM to work with, however, things speed up considerably. I wouldn't want to run PhotoFinish on anything less than a 25-MHz 386 with 4MB of RAM—8MB would be better. A fast hard disk is a necessity.

If you want to produce good-looking scans with minimal effort and expense and you've got the hardware to handle it, PhotoFinish definitely does the job at a better price than any competitor.

STEVEN ANZOVIN

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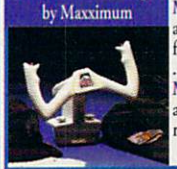

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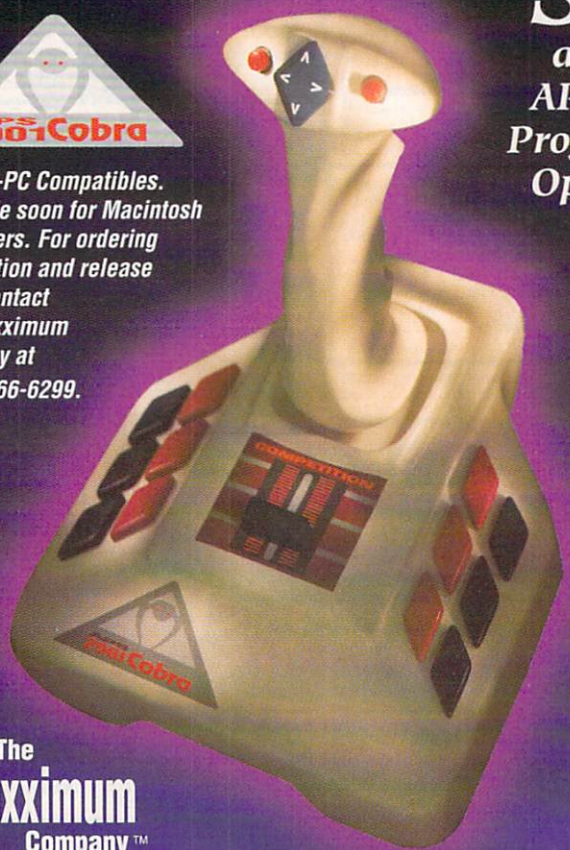

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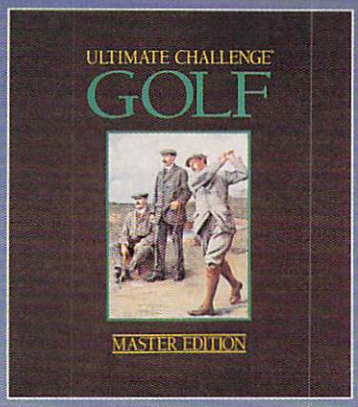

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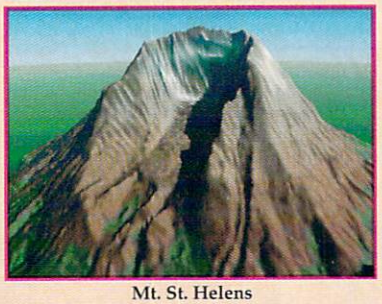

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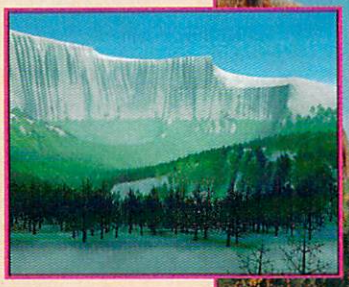

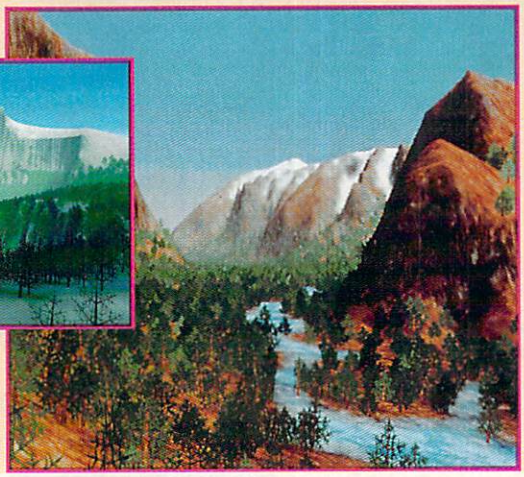

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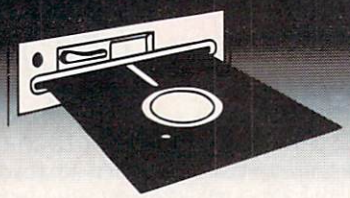

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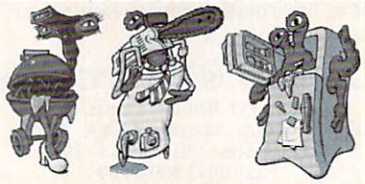

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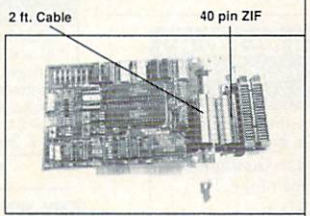

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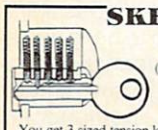

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NEWS BITS

Jill Champion

ANSI asked to free up exchange of standards, Hurricane Andrew survivors get relief, VESA takes the bus, and ergonomics finds a home.

ANSI May Change

More than 500 computer- and communications-industry professionals recently signed a petition to ANSI, the American National Standards Institute, requesting that all technical standards documents be available in electronic form.

Petition signers included all members of the Internet Architecture Board, the key technical body guiding the evolution of the emerging global Internet, and other prominent members of the community, such as Mitch Kapor of the Electronic Freedom Foundation and David Clark of MIT's Laboratory for Computer Science. Individual employees from almost every significant participant in the computer and communications field—Apple, 3Com, AT&T, IBM, Mead Data Central, and Vision Quest, to name a few—signed the petition.

ANSI, a private organization and the self-designated national coordinating body for U.S. standards development, has come under increasing pressure to make key technical documents more widely available at lower costs. ANSI charges up to $10 per page for a large body of crucial documents. High-priced standards mean that college students and young professionals are unlikely to ever read the documents, which are a crucial part of their education as professionals, and lack of access leads inevitably to lack of knowledge.

Databases Aid Relief

There's a database somewhere with your name in it—and a lot more. The information is constantly being gathered and compiled when you perform the most innocent of tasks, such as subscribing to a magazine or writing a check at your local grocery store. But don't think those stats are just wasting away in some computer's data banks; someday they could save your life. Thanks to one company's demographic resources, the Federal Emergency Management Agency (FEMA) received some relief of its own during the Hurricane Andrew relief efforts.

FEMA was allowed free use of CONQUEST, a PC-based geodemographic marketing information system that provides access to demographic, economic, and geographic databases supplied by Donnelley Marketing Information Services. Each day during relief efforts, FEMA used the CONQUEST system to produce a key facilities map, which contained both English and Spanish legends and showed the location of tent cities, water, food, disaster applications centers, and more. Copies of the map were then distributed to all relevant government agencies. FEMA also correlated maps of damaged areas with its own geographic information system databases to identify what existed in the areas—the number of trailers, businesses, and so on—all of which helped pinpoint where and what type of disaster relief was needed most. For example, knowing that 18 percent of Florida City's residences are unoccupied most of the year helped FEMA identify the number of residences there that needed to be searched after the hurricane. The U.S. military also used the system to determine where garbage needed to be picked up and the location of burn sites for debris.

On the Bus

The Video Electronics Standards Association (VESA), a nonprofit organization that sets and supports video graphics standards for the benefit of end users, announced that the VESA Local Bus (VL-Bus) standard has been ratified by VESA's general membership. Under development since November 1991, the VL-Bus standard is designed to bring workstation-level performance to a standard PC platform, removing numerous bottlenecks that have hampered PCs for several years. On the VL-Bus, peripherals operate at the computer's speed, thus enabling data transfer between peripherals and the system at maximum speed. Such performance is critical for bandwidth-constrained devices like video, multimedia, mass storage, and networking adapters. The low-cost, extendible, portable local-bus design allows systems and peripherals from different manufacturers to work seamlessly together.

Ergo Storehouse

Looking for that perfect ergonomic gift for the computer user on your list? The Ergonix catalog carries a complete line of chiropractor-recommended ergonomic products, including wrist rests, eye-care software programs, monitor extension arms, antiglare and antiradiation screens, footrests, ergonomic computer mice, books, videos, and more. The catalog is devoted exclusively to the ergonomic workstation.

Cofounder Amy Marks says, "We believe there's a strong market niche for these products, and not just from a health and comfort standpoint. As even more ergonomic laws are passed, these items will also help employers avoid costly workers' compensation lawsuits by giving their employees the absolute best environment in which to work. That's what Ergonix has set out to address."

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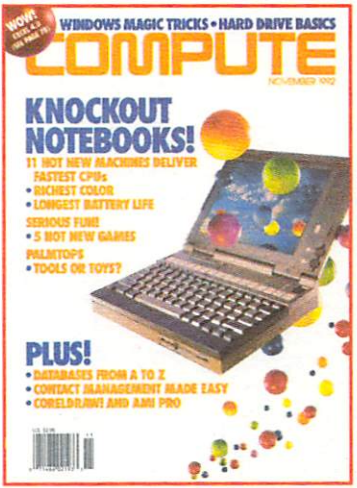

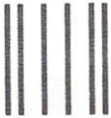

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□ Entertainment (9) □ All of the Above (10)

C. Would you classify yourself as a(n) □ Entrepreneur (11) □ Telecommuter (12) □ Moonlighter (13)
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□ Computer Gaming World (21) □ Home Office Computing (22) □ PC Magazine (23) □ PC World (24)

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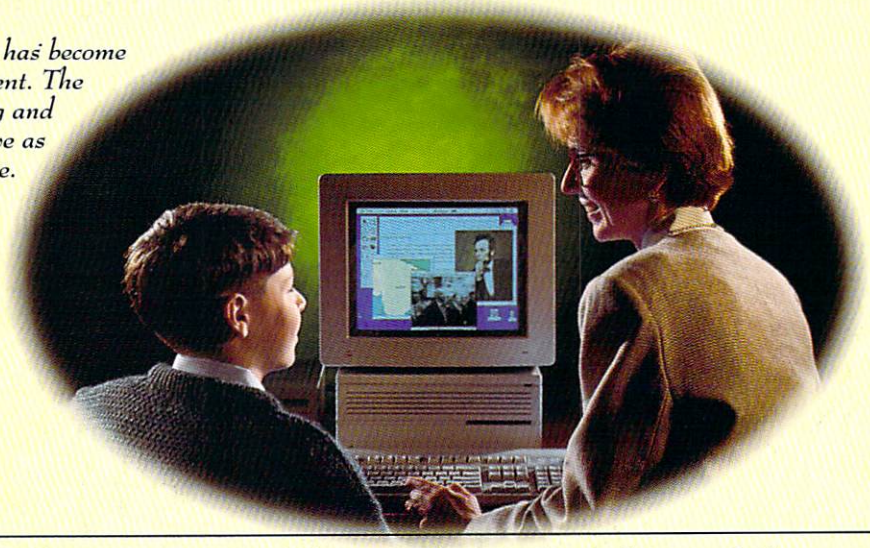

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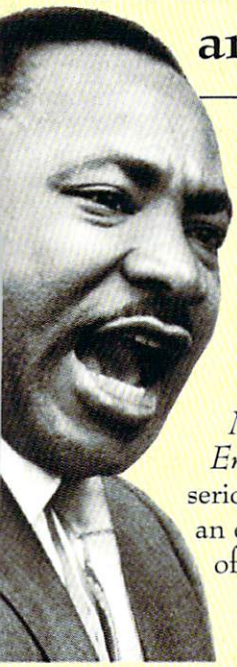

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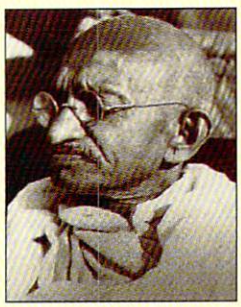

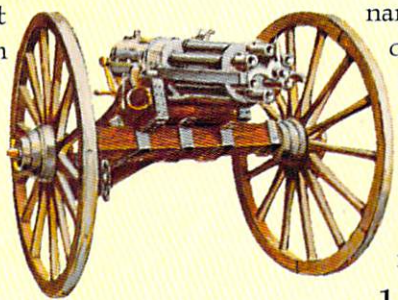

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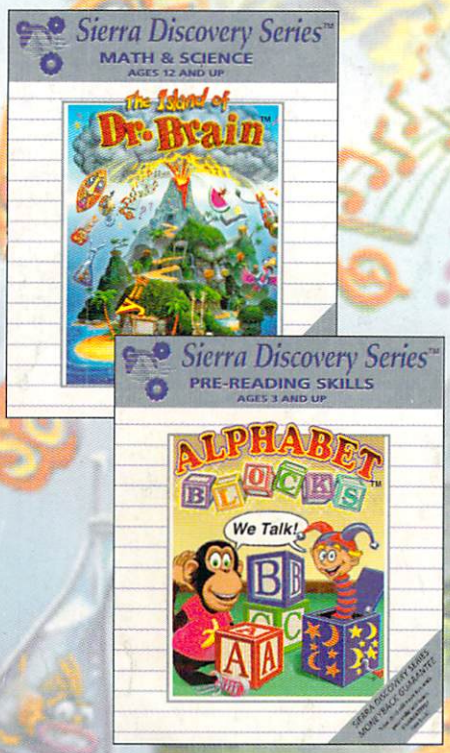

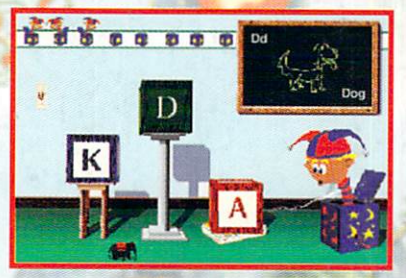

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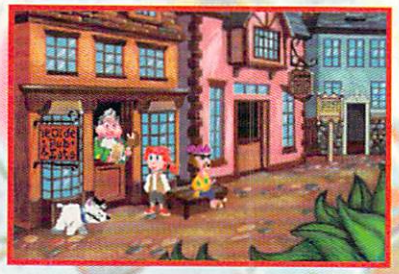

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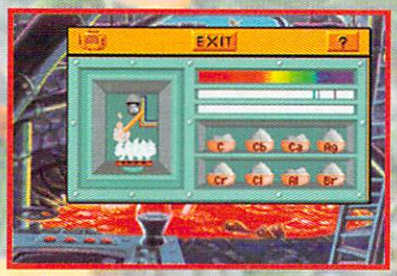

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