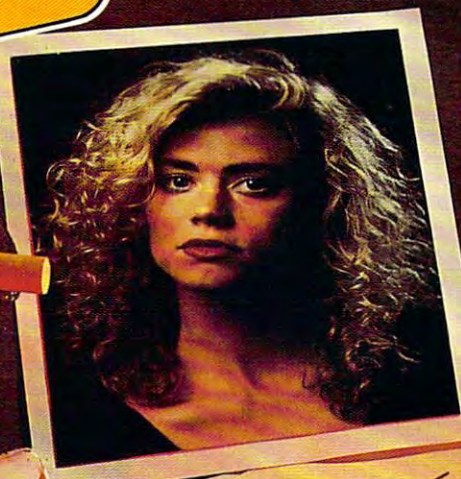


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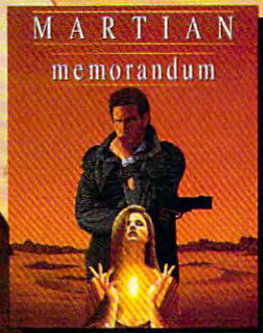
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ple on TSN, 'This is a play; you are the actors.'"

Brenda Laurel should know about actors. She holds an M.F.A. and a Ph.D. in theater from Ohio State and has worked in the personal computer business for 15 years. Laurel consults on interactive entertainment for people such as LucasArts and Apple Computer. Here's her take on online role-playing: "A lot of the punch of gaming is empathy—being someone other than yourself. It's a new way to learn . . . a real life what-if."

This what-if often goes well beyond assuming the identity of an adventurer, air ace, or some powerful and mysterious sorceress. Often it ventures into the forbidden realm of what sex we are.

To pursue this matter further, it really helps to try to understand reality as it exists online. If you think about it, there you are chatting and/or playing a game with several folks. You are all together, but where are you all? You're no place physical—that's for sure. But there is no denying the reality of the place. Welcome to cyberspace.

Author Bruce Sterling is one of the founders of the form of science fiction known as cyberpunk, a genre in which people plug their brains directly into electronic networks.

Sterling defines cyberspace as "electronic spaces within which people interact with one another." When you're online, you're in cyberspace, and (if you'd like to) you can think of each individual online service as a different cyberspace. With each a new frontier for you to explore, this diversity of non-spaces encourages you to experiment with new roles for yourself and even allows you

to be sexually neutral. Needless to say, these environments are difficult to find anywhere else.

For example, online, a person named COMPUTE has no apparent gender identity and must be related to as a person, as opposed to a male or female person. Opinions and friendships are formed based on what people say and do, and not on how many X chromosomes they possess. Gender roles disappear, and equality of the sexes is theoretically achieved. A meeting in cyberspace can be a true meeting of minds.

It should come as no surprise, then, that when sex is clearly identified online, the old male-female games get played along with the online games. As a result, contends CompuServe's Jim Pasqua, "women get more help playing games than men, and men play less aggressively against women."

So much for equality. The joke may be on the chivalrous, though. Online, it's sometimes impossible to tell the boys from the girls. Gender switching occurs more often than you think.

Rick Mulligan, one of GENIE's game gurus, says such role reversal is quite common there. "Eighty percent of our subscribers are male, but in our games and chat areas . . . if you just look at the names . . . it's closer to 50-50." Spokespersons from CompuServe and America Online both admit that a lot of gender switching goes on, although not to the extent GENIE observes. And while everyone in the online community admits it happens (and often), very few will admit to having experimented with it. One person who gender-switches as part of the job on one of the services ("I

check out reports of guys hitting on women.") asked to remain anonymous because of the embarrassment of making the gender switch public. It doesn't stop there. Tell someone that you gender-switch online, and you're likely to be asked if it's the same as being a transvestite. And are you one? It's as if this one particular form of role-playing is somehow dirty, or worse. I took the gender-switch challenge, and I admit that it was quite a kick. The question is, was I a sicko? Or was I looking into a future where being online

is merely an excuse to play more significant games?

Brenda Laurel is sure it's the future. "Mutability of gender is more acceptable now, especially to younger people, and in ten years, things will be a whole lot different. Cyberspace will change us; we're only two inches into it now. As we penetrate the landscape, we will change the land, just as it changes us. Later we could change into something new."

She might very well be right. But what would Ken Williams's grandmother think?

—PETER SPEAR

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STRANGE NEW WORLDS OF ENTERTAINMENT

Glimpse the future of cyberspace game worlds on this virtual reality safari.



These days, the term *virtual reality* (VR) likely evokes either a blank stare or a cynical smirk. For many who have been exposed to the hype of the last two years, VR may seem to be just another one of those crazy ideas from California—who really thinks a computer could make you believe you're somewhere else? Most of us in the business have squirmed under the glare of press attention, wishing the idea weren't quite so sexy and the implementation weren't quite so tough. The truth is that VR is still an embryonic medium, and most folks would probably find something lack-

ing if they stuck their heads into today's systems. But people are going to start seeing things that impress them in the next couple of years, and within this decade, VR techniques and technologies will be standard features of many entertainment, business, and communications environments.

Be There Here

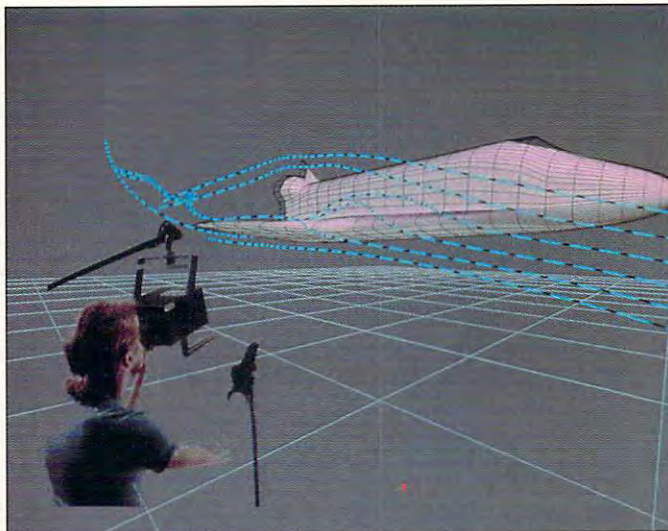
For those of you who have not been exposed to the VR hype, here are some definitions. *Telepresence* is a somewhat more descriptive (and less oxymoronic) term for the popular idea of virtual reality. Telepresence refers to a me-

di-um or technology that can give a person the sense of physically being in a different place or time, either real or imagined. One could argue that a good film or a good computer game can create the sense of being in another world, through the forces of empathy and imagination—the "willing suspension of disbelief." But telepresence means something significantly more: It means that you take your body with you into another world; you experience it from the inside. When you watch a good movie or play a good game, you're apt to forget about your body al-

together. In telepresence, your body's right there, experiencing sensory immersion. And through a variety of interface techniques, you are also able to do things with your body in virtual environments like walk, fly, or manipulate virtual objects—all good news for the game player seeking more believable simulations.

A central component of telepresence technology is the ability to track a person's movements, especially head and hands and possibly eyes and other body parts, depending on what you're doing. Head tracking allows the computer to adjust what you see and hear according to where you're looking—the technical term is *viewpoint-dependent imaging*. For instance, as you turn your head toward a virtual window, the window moves into the center of your field of view; as you move toward the window, the sound of the dog barking outside gets louder. Telepresence systems usually include three-dimensional video and audio displays. In certain applications, other senses like touch and smell may enhance the telepresence effect. Although the popular image of virtual reality is a person wearing a funny glove with an alien strapped to his or her face, in fact, many different kinds of interfaces can create a telepresence experience. Researchers are working on a variety of less encumbering interfaces that will allow people to have greater physical freedom and comfort in telepresence environments.

Telepresence enables access to two different kinds of environments: virtual and remote. Virtual environments are computer-generated, usually involving 3-D computer graphics and 3-D sound. *Remote presence* is the term for the ability to experience a



real location that is remote in space and/or time, typically employing video instead of computer graphics. In real-time systems, robots with cameras for eyes stand in for humans in places where they can't or wouldn't want to be—on the surface of the moon or under a few miles of water, for example. Both flavors of telepresence are in development for entertainment applications, and eventually they will be integrated—Roger Rabbit style—in worlds where imagination and reality can intermingle in unprecedented ways. But what about the home computerist? Are you really moving any closer to the days of integrating your entertainment environment with your real one? Both your mind and your body will share the experience of electronic play, finally, through the conduit of your personal computer. Home computers may need some more time to evolve, however, to allow for the speed and flexibility that VR demands.

Taking One Step Beyond

Stand-alone telepresence systems, especially the virtual-environment flavor, are a nat-

ural for arcade-type environments. Atari's *Hard Drivin'* is probably their closest ancestor. New VR companies like Division, Ltd. and W Industries in the U.K. are currently selling systems that can be used in superarcade environments. Leading arcade-game companies are also developing advanced systems that feature VR and motion-platform technologies, at prices that routinely top \$100,000 per system—an order of magnitude more expensive than the average arcade cabinet in 1989. By the summer of 1992, you can expect to see several examples of systems that incorporate telepresence technology in superarcades in large cities like Tokyo and New York.

At the high end, limited forms of telepresence are finding their way into large-scale amusement parks and mass-audience installations in the U.S., Japan, and Europe. Ancestors are the current crop of motion-platform rides, beginning with Star Tours at Disneyland. More recent attractions, like the Back to the Future ride at Universal Studios in Florida and UCC Spaceport 2045 in Tokyo, feature a bevy of smaller motion-plat-

form-based systems, each carrying a handful of people through a preplanned course of events. Interactivity—personal viewpoint control and significant choice-making ability—is largely absent, but the overwhelming visceral effects produced by video, motion, and sound in such rides provide a strong sense of you-are-there-ness. You can expect to see more flavors of the motion-platform-based rides with continuing improvements in 3-D audio and video (including high-definition), but don't expect any big breakthroughs in interactivity before the spring of 1993—and remember that the degree of interactivity is always going to be inversely related to the number of people that a system has to accommodate, either at one time or in rapid succession (the theme-park jargon is *throughput*).

Somewhere between arcades and amusement parks lies a new class of attractions called location-based entertainment (LBE). LBE systems are typically larger and more expensive than arcades, and they are often networked. *Photon* was an ancestor; *Battletech* in Chicago is a contemporary pioneer. LBEs provide a good solution to several problems: They can command a higher ticket price than arcade games but can survive on a lower throughput requirement than theme-park rides; they can piggyback on permanent public attractions (like urban shopping areas, national monuments, and large museums) or temporary ones (like Olympic Games and world's fairs); and they can help real estate developers turn losses into profits by revitalizing ailing shopping malls (a strat-

egy popularized by Atari founder Nolan Bushnell). Because of the economics involved, the investment climate, and the current players, the most interesting developments in telepresence are likely to take the form of LBEs, at least over the next few years.

Changing Face

Most of the roots of telepresence technology, including viewpoint-dependent imaging and motion-platform technology, lie in military and aerospace applications, so it's no wonder that flight simulation is predominant in today's VR systems—and it's a no-brainer to predict that the trend will continue. But an awareness that some of us have promoted since the early days of computer games is finally dawning on entertainment industry executives: Shoot-'em-ups appeal to an extremely limited demographic.

As people come to see more connections between computer-based entertainment and film, the classical idea of games (with scores, clocks, winners, and losers) is called into question. After all, you can't win a movie. You're more likely to want to be a character in it or to explore its world. The focus of content design in VR is likely to move away from classical game structures and toward dramatically interesting environments and characters. Designers will discover and capitalize on the special powers of telepresence to enhance the relatively simple activity of exploration. In three to five years, intelligent systems utilizing advances in both computer hardware and software techniques will support increasingly complex, dynamic, and responsive virtual worlds.

Getting Personal

If all of this sounds like Las Vegas-scale entertainment, just turn the telescope around and look through the other end. For personal access to cyberspace, the key components are the same as for big systems—3-D video and audio displays, head tracking and some degree of system intelligence. You need low-cost interface peripherals and more processing power for the buck in order to achieve acceptable frame rates on small systems.

Technology is moving in an orderly incremental way toward these goals, and we can expect to see low-cost game systems that approximate telepresence experience within 12 months—possibly sooner. One lesson to be learned from the PowerGlove (a Mattel peripheral for Nintendo systems), however, is that without great implementation and a critical mass of compelling applications, the most sensuous concepts may wither and die. And the notion of cyberspace seems to suggest that a solitary VR experience is not the Holy Grail—rather, it's human-to-human interaction in a computer-augmented matrix that captures our imaginations.

Already, a lot of lowly little PCs and game machines are boring holes into cyberspace. When this army of personal moles breaks through to the underground fiber-optic rivers of Japan, colonization will spread very quickly. Cyberspace is a literally endless frontier, and we all know how much humans enjoy exploring and settling frontiers. The action on the the cyberspace frontier is already being documented. *Habitat*, a graphical networked world devel-

oped by Lucasfilm and sold in Japan by Fujitsu, provides excellent examples.

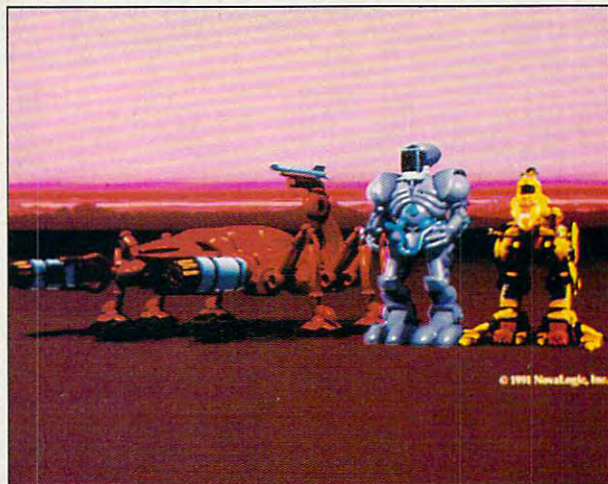
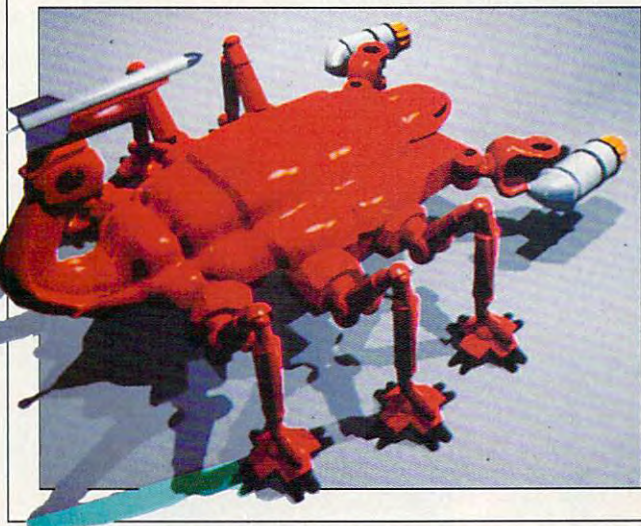
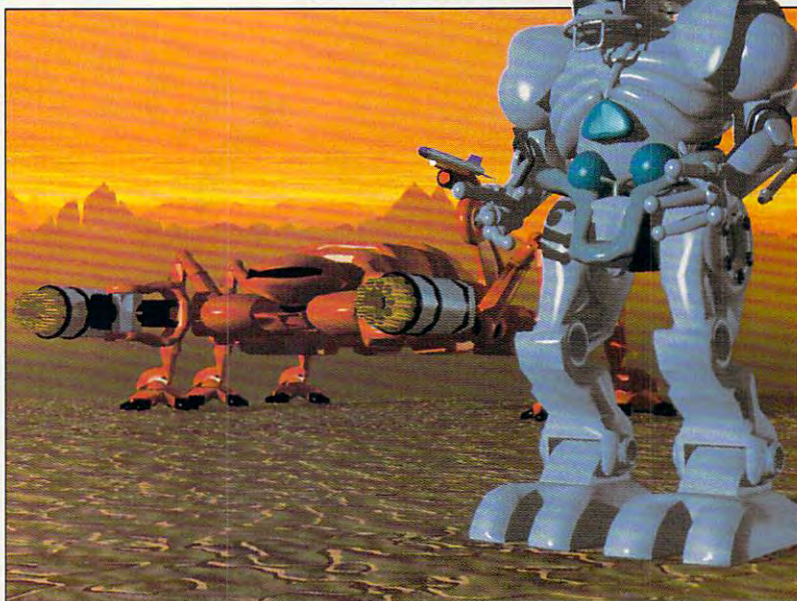
Chip Morningstar and Randy Farmer, *Habitat's* principal designers, report tales of crime and exploitation, followed by self-organizing and self-governing activities on the net that are strongly reminiscent of the American West. Citizens of text-based cyberspace communities have organized revolts against corporate overlords that would make an East European proud. Cyberspace re-creates the grand adventure of people coming together in new places, deciding what to do and how to live.

Networked telepresence systems introduce a whole new set of issues into the design of interactive entertainment. The medium allows us to move well beyond clothing, makeup, and personal mannerisms in the ways that we represent ourselves to others. We may create self-representations that are radically different from our physical bodies, and we may present different versions of ourselves to different people simultaneously. A central design task will be to invent landscapes in which we may interact with others as well as to provide the means for people to collaboratively shape cyberspace environments and objects for their own purposes.

Through telepresence we are diving into a strange new sea, at the confluence of information, sensation, and communication. No one can predict what new forms, styles, and genres will emerge; the medium is still too young. But after a few more years of obligatory imitations of the past, interesting games are bound to happen.

—BRENDA LAUREL

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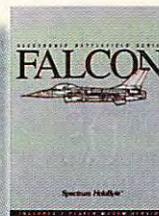


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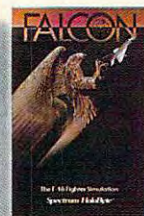
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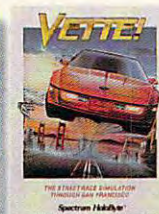
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GAME CONSOLES NOUVEAU

After a day at the office with only *Lotus Agenda* and a desktop PC for company, many punchy adults would like to ignite a few beatific explosions. What better venue for relieving this tension than a dedicated game machine? More than rivaling the PC in sound and animation capabilities, these arcade wonders now offer a respectable body of adventures, sports games, and even flight simulators.

Four machines vie for the Christmas shopping season top spot: the NEC TurboGrafx-16, the Sega Genesis, the SNK NEO-GEO, and the Nintendo Super NES. All these machines have their selling points and their fans, but just as the PC was catapulted to "industry standard" by its spreadsheets, the future sales of consoles will be determined by the quality of their cartridge games.

but alongside other consoles, TurboGrafx-16's digitized speech comes up a bit hollow and raspy.

With its humble list price of \$99.00, though, this machine's the least expensive of the 16-bit giants and not a bad deal. Pair your TurboGrafx-16 with bracing games such as the demonic pinball simulator *Devil's Crush* or the absurdly engaging *Ninja Spirit*, a story of revenge and swordplay. Typical of the TurboGrafx-16 library, these games do a lot with the hardware and will deliver hours of excitement. Games for the TurboGrafx-16 range from \$19.99 to \$76.99—not that expensive when compared to the lineups of some of the other consoles.

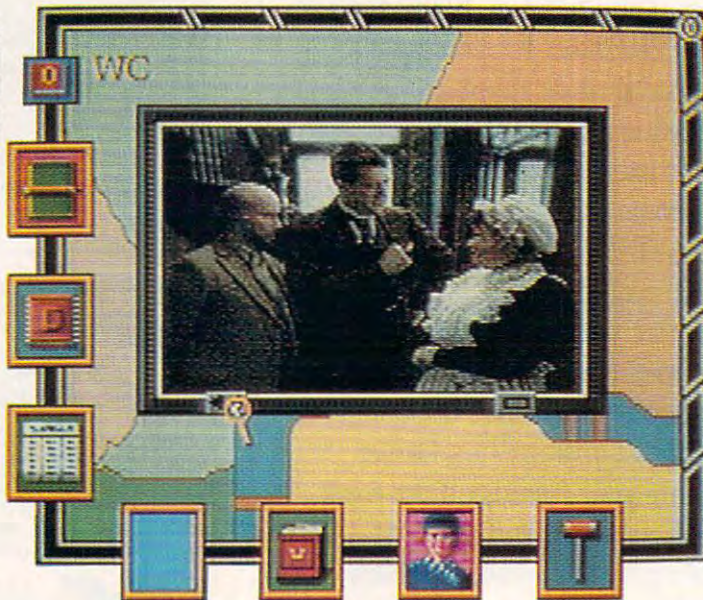
For under \$300, add the TurboGrafx-CD and empower your TurboGrafx-16 to play the sophisticated and expansive *Sherlock Holmes, Consulting Detective*. ICOM Simulations, better known as a PC software developer, brings digitized actors and vocals to this Victorian mystery trilogy and uses the prodigious capacity of the CD to support full motion video.

Consider the current availability of the CD-ROM drive and the third-party interest in software development, and the TurboGrafx-16 emerges as a contender. There's enough juice in this system to warrant a look from jaded PC owners wanting just a bit of cerebral diversion along with their video violence.

Genesis

Third-party interest doesn't stop with the TurboGrafx-16, of course. Electronic Arts turns out a startling number of titles for the Sega Genesis, and high-quality products at that. *Centurion of Rome*, a great game on any platform, takes to the Genesis almost by di-

Sherlock Holmes comes to you via CD-ROM and courtesy of the TurboGrafx-16 and TurboGrafx-CD.



16-Bitter Rivals

At the heart of current game consoles beat powerful 16-bit processors—68000-series chips well known for their graphic capabilities. Alongside these pulse a variety of coprocessors for added speed. Joysticks, most in the form of ergonomic pads, come with the machines. Game machines are maturing, and prices are generally low. You can purchase impressive graphics technology at yesterday's prices. No kidding. The problem, however, remains: Which machine should you take home?

TurboGrafx-16

NEC's veteran TurboGrafx-16 still holds its own in most head-to-head comparisons. With its respectable palette of 512 colors and the ability to manipulate up to 64 sprites, the TurboGrafx-16 can pull some surprising video stunts, but when compared to other consoles, the graphics seem just a bit muddy. When it comes to sound, the TurboGrafx-16 falters with its six-channel stereo sound. Only six channels? True, that's a veritable chorus when compared to the sound channels available on most home computers,

vine right. Disney's in the 16-bit race with *Fantasia*, featuring the lovable Mickey Mouse. Under Accolade's Ballistix label, you'll find a noteworthy version of *Star Control*, too.

Implementation of PC games for consoles underscores a fundamental problem with the game machines: They don't come with a keyboard attached. While the Sega controller pad outclasses any other similar interface, it lacks a suitable number of buttons for a solid PC-to-console conversion. Games that have traditionally been thought best left to PCs (and their keyboards) include flight simulators, role-playing adventures, and anything else that uses the keyboard heavily. Coming from a market where most PCs don't have joysticks, that's a considerable challenge for programmers to surmount. When planning for the PC, game designers exploit the keyboard wherever possible. The situation is reversed for console designers who have only the pad. The interface problems seem to be diminishing as programmers work out the kinks and more involved, more playable adventures emerge. For the moment, consoles really shine when they focus on arcade screamers that require few buttons and emphasize the superhuman reflexes common to arcade addicts.

You've probably heard at least some of the hype about Sega's *Sonic the Hedgehog*, the "fastest" game available for any console. *Sonic* not only scrolls more smoothly than any game on console but also is quite possibly the most absorbing game available on any platform, PCs included.

The Genesis can't compete with the NEO-GEO when it comes to sound or number of colors; Sega's 64 colors onscreen at one time





Sega's *Sonic the Hedgehog* defines the cutting edge of loveability.

pale next to the NEO-GEO's 4096. In the category of sound, the Genesis has 10 channels stereo; the NEO-GEO has 15 with 7 dedicated to digitized speech alone—striking superiority. Yet *Sonic the Hedgehog* possesses much more replay value than the NEO-GEO games tested because it pushes the Genesis to the edge. There are times when all 80 sprites seem active, and only rarely does a programming glitch show. Factor in the thoughtfulness behind the levels, and Sega has an instant classic.

The Sega Genesis sells for \$149, and games range from \$39–\$59, with the exception of *Phantasy Star III*, which sells for \$79. In all, an economical way to game.

NEO-GEO

At the moment, no console can touch SNK's NEO-GEO in terms of sheer power. This console displays more colors onscreen than any other game machine, handles more sprites (380), and sports the largest palette—65,536 in all.

The responsive NEO-GEO joystick controller (as opposed to the push pad

ubiquitous on other machines) encourages you to play through the wee hours of the morning and has well-placed action buttons. For an ego boost, use the memory card to save your high score games at home and then continue play in public—the console game you play at home is identical to the version in stand-alone units you find in arcades and cinemplex lobbies.

Right out of the box, NEO-GEO's *Magician Lord* will wow your friends and family. With a hard-hitting soundtrack that never grows tiresome and more than a few loathsome monsters, *Magician Lord* casts you as the last hope for a mystic valley. You'll have your fill of fire breathing, spell tossing, and shape changing in this sorcerous slugfest. This superficial description also sums up the feel, if not the specific contents, of most NEO-GEO games. Light on plot and heavy on action, these shoot-and-run fiestas bring the standards of coinops to your very own living room.

NEO-GEO cartridges harbor considerably more ROM than any other console car-

tridges. That equates to larger games, of course, though larger doesn't necessarily mean better. Divide megabits by 8 to yield megabytes, and you have some basis of comparison of console software size to PC software size. Unless you're talking about NEO-GEO games, the PC equivalents run on the huge side. With their relatively vast storage capacity, NEO-GEO carts should compete favorably with PC games and stomp Genesis and TurboGrafx-16 games, right? Actually, the answer depends on what you're looking for in a game. Since we're talking about arcade games here, the more involved PC games don't really invite direct comparison; they have their own, higher-brow merits. But to bring the arcade into your home, we must ask if size makes any difference.

The prodigious 46-megabit motorcycle-racing game *Riding Hero* dwarfs the 12-megabit Genesis version of *Star Control*, currently the largest game available for that platform. After a few hours of play, you realize that the comparatively minuscule Sega game devotes a

significant amount of memory to game mechanics. NEO-GEO software, on the other hand, favors the graphic and audio side of entertainment, with lush backgrounds that scroll seemingly to infinity and striking, detailed animations. Here the arcade addicts and the merely devoted gamers will draw their lines. For a thrill a minute but strategically shallow gameplay, NEO-GEO's the titan. With respectable, but slightly less than astonishing graphics, the Sega Genesis library of games outclasses NEO-GEO's in both number and variety.

The last consideration for prospective NEO-GEO purchasers is price. The \$649 retail price is more than three times the amount you pay for any other console; games cost around \$200 each. On the other hand, NEO-GEO owners can be certain that their machines are the most powerful on the market. This feeling of certain hardware superiority only adds to the satisfaction that playing a handful of roaring, pulse-pounding NEO-GEO games provides. If SNK software developers concentrate more on game-



Magician Lord invokes mystic warfare on the NEO-GEO.

play, while maintaining the high standards of current NEO-GEO games, Sega's only advantage will be price.

Whither Super NES?

After overseas success in Japan, the Super NES promises to be the next winner in the 16-bit sweepstakes. The Super NES can display up to 2048 colors on-screen at any given time, control up to 128 sprites, and sound off with eight-channel sound—an interesting mix of characteristics when compared to the other 16-bit game machines. The NEO-GEO tops each category but more than doubles the Nintendo machine's sprite-handling capability with the ability to manipulate a startling 380 sprites. Even the Sega Genesis manages to nudge out the Super NES in at least one category—sound channels. So why all the furor?

Arcade devotees can carry the banner of Nintendo Super NES for one simple reason: animation. The Super NES comes to developers hard-wired for 3-D environments. Since they needn't worry over where the next scroll-and-rotate routine's coming from, game designers can concentrate on orchestrating play instead of coming up with high-speed animation code from scratch.

In *Pilotwings*, you'll see this prebuilt modeling system put to good use. As you try to earn your wings, you must pass a series of tests that involve piloting a biplane, maneuvering an experimental rocket pack, and skydiving. The Super NES rotates the world flawlessly and at a shocking rate but to allow for the smooth scaling this game showcases, a certain amount of detail

seems to have been sacrificed. Still, if not for the blocky, 8-bit look of the landscape, you'd feel as if you were in the air.

When considering the Super NES for your holiday festivities, bear in mind that the quality of games for this machine will improve, possibly dramatically. For the moment, though, the \$199.95 you spend on the fledgling Super NES could welcome you into the Sega Genesis family with its burgeoning library of over 100 appealing games.

If you don't have the cash to buy into existing software libraries wholesale but instead plan to buy as you go—the tried-and-true method of expansion since the invention of the game cartridge—pay special attention to the game packaged with the machine. In the case of the Nintendo, you'll get *Super Mario World*, another in the long line of Mario games. With the NEO-GEO you'll receive *Magician Lord*, *Baseball Stars Professional*, or *Nam-1975*, certainly some of the top NEO-GEO games. With the TurboGrafx-16, you'll play yourself silly on *Keith Courage In Alpha Zones* as you struggle to prevail over the forces of B.A.D. (Beastly Alien Dudes). Of course, the Genesis offers you *Sonic the Hedgehog*, an inexhaustible, energizing race full of ramps, springs, and killer machines.

Consoles Triumphant

What should you buy? The best all-around value is the Sega Genesis, with its vast library and vanguard *Sonic the Hedgehog*, sure to set new industry standards. If you've got the money and want all the dazzle you can handle, go for the NEO-



Super Mario World brings the little guy back for more.

GEO. For diversionary action with machine guns, explosions, and frightening noises, no other console comes close. The more thoughtful among us may want to consider the NEC TurboGrafx-16 because of its CD-ROM drive, though that accessory puts it close to the NEO-GEO in price. Still, individual games for the TurboGrafx-16 retail for a fraction of what NEO-GEO games go for, and that gives you a chance to run the gamut of game genres, from solving mysteries to playing ninjas.

No one needs to tell you that all these game engines outpower your PC from a shoot-'em-up perspective; it's their job to look good and throw sprites around, while the PC is a multipurpose computer. If you want the thrills that cost a quarter per ride anywhere else, bring one of these consoles home. In the end you'll save money on sound cards and other PC upgrades, and you can trust the 16-bit game market to grow. That means pyrotechnic new games will be arriving monthly. For the kid in you—and for the kids that live in your house—

these powerful but economical game consoles will readily indulge the fiercest appetite for sensational play.

—DAVID SEARS

PRODUCT LIST

Genesis—\$149.00
SEGA OF AMERICA
573 Forbes Blvd.
S. San Francisco, CA
94080
(515) 742-9300

NEO-GEO (two controllers)—\$649.00
SNK HOME
ENTERTAINMENT
22301 S. Western Ave.,
Ste. 107
Torrance, CA 90501
(213) 787-0990

Super NES—\$199.95
NINTENDO OF
AMERICA
4820—150th Ave. NE
Redmond, WA 98052
(206) 882-2040

TurboGrafx-16—\$99.00
NEC TECHNOLOGIES
1255 Michael Dr.
Wood Dale, IL 60191
(708) 860-9500

Laugh along with this tour de force games retrospective and see what you've been missing.

RECREATIONAL AND REDEEMING: GAMES

You didn't learn everything you needed to know in kindergarten or sixth grade or even college. Until computer games were invented, where else, for instance, could you learn to slay drug-crazed zombies, pilot death-dealing anti-gravity fighters, or see truth and justice triumph over greed? Only in the storied world of silicon. Look at the statistics. Since the introduction of computer games, we have had 68 percent fewer wars, 35 percent less brawls at hockey games, and an amazing 28-percent increase in the number of plastic Valentine hearts sold. Why? Because recreational software provides a safe, socially acceptable outlet for repressed hostility while teaching valuable survival skills.

Hit the Streets

Take, for example, Accolade's *Hoverforce*. Equipped with superhuman powers conferred on all test-tube cops in the year 2050, you fly around the city defying gravity, fate, and common sense by blasting heavily armed drug dealers, thugs, and brain-dead drug zombies. Gratuitous violence? Rage inducing antisocial behavior? A monomaniacal lust for power? No way! Simply wise preparations for a weekend visit to Manhattan.

Instead of packing routine big-city tourist items such as Mace and a screech whistle, your arsenal includes laser-guided slide missiles, belly-pumping machine guns, and other devices guaranteed to end unwanted conversations. Granted, Manhattan's not yet ruled by drug-crazed slime-lords, but *Hoverforce* is, after all, a

futuristic fantasy. That's somewhat unfortunate, since the *Hovercraft's* Quick Pulse Cannon would be just dandy to open a path through rush-hour traffic.

Access Software's *Mean Streets* provides additional big-city survival skills. It's 2033 in San Francisco, and you're the death-defying private investigator Tex Murphy. Sylvia Linsky, the beautiful daughter of a very dead college professor, hires you to investigate her father's suspicious demise. As you sort out the convoluted case, you uncover a conspiracy to rule the world. Now, guess what. Right! You single-handedly must save everyone from ruthless domination by bringing to justice an unholy assortment of murderous mutants, cyborg crooks, and titans of industry. The first challenge is for you to distinguish one group from the other.

Mean Streets' realistic digitized graphics and audio add intrigue to Murphy's and Linsky's misadventures. Hopefully, Access combined legal advice with technical wizardry when designing the "look and feel" of Murphy's Lotus-class speeder.

Both *Hoverforce* and *Mean Streets* paint a bleak picture of a future society where technology's advances result in improved drugs and weapons (which indirectly translate into more downtown parking spaces). With the future looking so gloomy, maybe the past is preferable.

Set in Stones

DSD (Dank Smelly Dungeon) computer games provide the chance to safely battle demons drawn from your worst nightmares or best blind dates. Accolade's *Elvira, Mistress of the Dark* elevates sili-

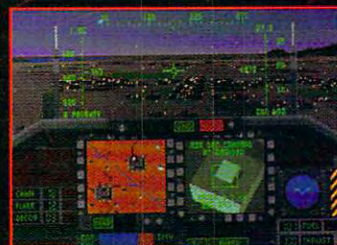
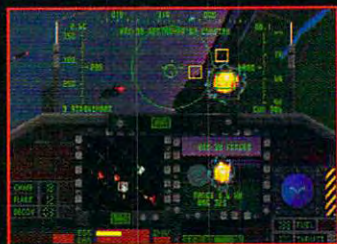
con sorcery to a black art as you battle nether world ghouls and ghosts from hell accidentally loosed in Elvira's favorite castle. Complete with slashing, hacking, and blood-curdling howls of heart-wrenching agony, this game will prepare any student of politics for a visit to Washington during budget hearings.

While male and female demon destroyers who strive to rid Elvira's DSD of its denizens require both strong stomachs and nose clips, guys in particular will need to exercise self-control. Based on the revealing package photo of Elvira, some men could unconsciously choose to let the demons run amok and happily spend the last of their days fervently guarding Elvira's personal assets.

If Elvira can own a castle, why can't you? After all, computer gaming is a world built of dreams and fantasies. Interplay's recently released *Castles* enables you to build the castle of your dreams. In addition to playing surveyor, architect, and builder, you get to parry paranoia and persecute the peasants (great for relieving boredom).

Castles' action takes place 700 years ago, predating pesky present-day concerns like planning boards and building inspectors. Indeed, if your neighbors objected to your castle, they leveled it, scattered the workers, ripped you to pieces, and ate your horses. When they got really angry, they did even meaner things like making you bathe between rainstorms. Several historians claim these murderous rampages had nothing to do with power, gluttony, and greed but were incited by Stone Age Software's futuristic adventure game, *Saddam in the Eye of the Storm*.

Rule the Desert Skies

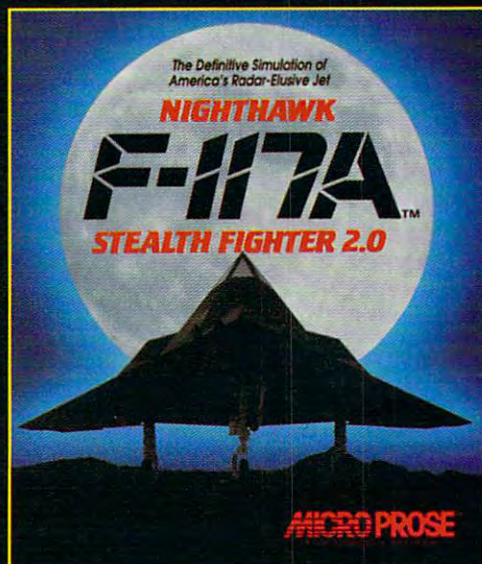


Like some sleek, metallic bird of prey, it slices through the thin air of the desert night. Below, the enemy's radar frantically scans, searching for a sign. But the only warning is the deafening roar of ordnance demolishing its target. Before fighters can scramble, this airborne apparition vanishes, like a ghostly dream.

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But Seriously, Folks

Would you rather preserve life than destroy it? No matter how much the vicious drug-dealing, flag-burning, opera-loving thugs deserve annihilation? Computer games resolve that dilemma, too. Software Toolworks' *Life & Death* provides an introduction to do-

ing when you should rush the patient into the operating room (appendicitis) or outside (intestinal gas).

Gamers who successfully complete their software residency face an unparalleled challenge in completing the forthcoming addition to the *Life & Death* line. Reportedly

ing free-form, forever-changing behavior patterns in an uncharted universe lying beyond the limits of present-day science. Now, finally, you will understand that no matter which line you're in at the toll booth or the supermarket, the other one always moves faster. I recommend *Chaos* as a required survival technique for anyone who works for the military, directs traffic, or books airline flights.

CA Lab, also employing eye-popping graphics, appears better suited for creating computer animations of strictly real world events such as the complex interactions between chemical, thermal, and biological processes. One typical application might be modeling the exotic life forms unearthed by janitors in college dormitories. Aside from its significance to researchers, CA Lab's implied educational value holds considerable appeal to science-minded computerists. Capable of unlimited visualizations, it will reportedly provide the graphics in a upcoming juvenile TV science special, "How to Decode a Frog's DNA Using Your Mom's Blender." Unquestionably, this special promises to be an example of computer-aided learning at its finest.

A view from the cockpit in *Mean Streets*, right, and the mix and match celebrities of *Faces*, below.



it-yourself medicine that far surpasses the typically shallow home study course in surgery hawked on matchbook covers. Striving for realism (including vivid graphics of non-gender-specific anatomy), *Life & Death* prepares you for that inevitable midnight call from Smalltown General pleading for you to perform emergency surgery. As one of its first lessons, *Life & Death* explains

named *Managing Your Shekels*, the sequel takes realism to the limits and focuses exclusively on learning how to drive a five-speed Jaguar, pilot a Cessna, and lower your golf handicap.

Scientific Breakdowns

Recreational software provides diversions beyond the visceral with games that demand as fast an intellect as a scalpel or trigger finger. Heading this cerebral genre are two programs from Autodesk, *Chaos* and *Cellular Automata Lab*. Both programs masquerade as eye-catching sources of mesmerizing graphics while actually illustrating the mysterious order underlying seemingly random events such as the shape of clouds, raindrop patterns, or the origin of Chicken McNuggets. *Chaos*, as the name promises, concerns itself with find-

Get Down, Get Funky

Should you overdose on cerebral software, Sir-Tech offers a superb remedy—*Freakin' Funky Fuzzballs*. Particularly recommended for players who suffer from rampant self-assurance, this if-the-shoe-fits game has you play the part of a dirtball. Strictly for arcade game players, *Freakin' Funky Fuzzballs* will provide valuable field training should you ever need to survive getting sucked through a vacuum cleaner. Possessing this sort of skill, while it's not in great demand, would certain-

ly distinguish you from mainstream America. Boast about it to your friends and the mental health authorities will cheerfully separate you from the rest of society.

You have heard people accused of being two-faced. Well, how about 60-faced? Spectrum HoloByte's *Faces*

challenges you to assemble horizontal slices of 60 famous and not so famous faces as they drift (*Tetris*-like) down the screen. If you accidentally create a face that's a hybrid between a plow horse and a beauty queen, remember we all make mistakes (Noah even took mosquitoes on the ark).

pretend they're comatose. Studying Larry's techniques will provide you with skills in superficial small talk, feigning interest, and controlling drool.

From practicing safe sex to slaying slimelords, dodging demons, or coping with chaos, the endless variety of computer games transport you to

PRODUCT LIST

Mean Streets

ACCESS SOFTWARE
545 West 550 S, Ste. 130
Bountiful, UT 84010
(800) 824-2549

Elvira, Mistress of the Dark;

Hoverforce
ACCOLADE
500 S. Winchester Blvd.,
Ste. 200
San Jose, CA 95128
(408) 985-1700

Cellular Automata Lab, Chaos

AUTODESK
2320 Marinship Way
Sausalito, CA 94965
(415) 332-2344

Castles

INTERPLAY PRODUCTIONS
3710 S. Susan
Santa Ana, CA 92704
(714) 545-9001

Leisure Suit Larry

SIERRA ON-LINE
P.O. Box 485
Coarsegold, CA 93614
(800) 326-6654

Freakin' Funky Fuzzballs

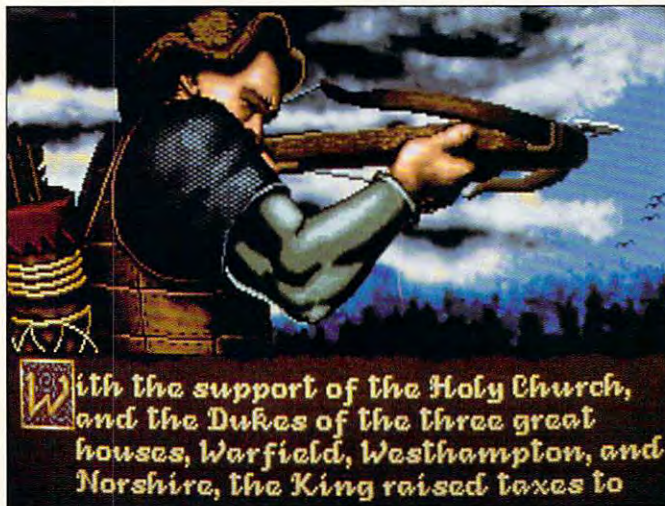
SIR-TECH
58 Noble St.
Ogdensburg, NY 13669
(315) 393-6633

Life & Death

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Novata, CA 94949
(415) 883-3000

Faces

SPECTRUM HOLOBYTE
2061 Challenger Dr.
Alameda, CA 94501
(415) 522-3584



Castles, left, puts you in some difficult political situations, while the hawk in Elvira, below, just wants you dead.

Wrap It Up; I'll Take It

After cleansing city streets of slimelords, ridding dungeons of demons, building castles in the past, and satisfying intellectual curiosity, what's left? SEX! In what truly deserves the designation "fantasy role-playing" software, so-called adult-oriented games range from naughty to lewd. Unlike other simulations that encourage the pursuit of power, truth, or magic crystals, sex-oriented games capitalize on the world's oldest pastime.

One of the best known in this category is Sierra On-Line's *Leisure Suit Larry* series. Featuring a choose-your-own level of ribald humor, enduring dork Larry Laffer continues to spend eight days a week measuring the appeal of every woman he sees. Alas, Larry never learns. He still wonders why the women he approaches immediately



mythical worlds peopled with sorcerers, heroes, nerds, and geniuses. And in these imaginary worlds you can practice exotic skills—skills that you will hopefully never have to use in the real world. Best of all though, these carefully nurtured talents and hard-won abilities will make you more than a match for the next generation of computer games.

—HOWARD MILLMAN

GAMES ADDICTION: THE TROUBLES I'VE SEEN

Hackers and videogames have had an intimate relationship from the early days of computers. As an ex-hacker, I know; I was seduced by the idea that entire worlds could exist just beyond a VDT. My first experience with all-consuming games was with an Atari 2600, a bottom-of-the-line no-nonsense machine. I purchased a cartridge called *Pitfall* and ensured my descent into the life of the hopelessly and altogether too happily addicted.

The basic premise of the game was that a small pixoid hero ran through about 50 screens' worth of jungle. He picked up treasure, avoided snakes, and jumped over large pits. That was it, pretty absurd by today's standards.

A reformed hacker and redeemed game fiend makes some dark disclosures.



But I spent every waking hour playing that game.

"Why do you spend so much time on that machine?" my father fumed. I didn't know. It felt good, so I played. But I never had much money, so I couldn't get many more cartridges for my machine. I tired of playing the game and stopped dreaming about dodging logs and snakes in two lackluster dimensions.

I visited the Lawrence Hall of Science at Berkeley and played with an Apple II acting as a terminal to a mainframe. *Eliza* was online. It glibly responded to whatever I typed. Recharged and back on edge, I went to my mother and told her I wanted a computer. Amazingly, I got one.

I learned BASIC first but moved directly from there to copying software. Tons of disks filled my drawers, and I again learned of the power of addiction. I'd moved beyond the lure of console games to the more sophisticated and sensory world of the home computer. And about this time, for the first time in my life, I noticed girls.

In particular, one girl, but she might as well have been a tag-team wrestler. She and her best friend were never apart, so I couldn't move closer. Then I introduced her friend to my IBM PC and *Zork*. We couldn't get her away from it; she fit the profile of the instant addict. We left her sitting there, oblivious. Hours later, we had to scream at her to provoke a response.

I had encountered a game junkie's nightmare. Another addict had stolen my computer, and I panicked. I almost got violent. I never saw those girls again, and I didn't care. I had my computer back; each breath came easier after the fear of losing my machine left

me. Why do we obsess over things like these?

I had a girlfriend dump me over an *Ultima* game. I think that was the start of my hacking. I spent too much time with my computer, she said. So to save time, I began to look for a way around winning. With a hex editor I changed character files so that I was the most powerful character in the game. Then I went out and skragged everything in sight. I cheated myself. I subverted an urge to win and discovered the strange rush of power that comes from manipulating a game outside of its context. Games grew old quickly then, maybe because I began to grow up. Girls became part of my life, and I slowly pulled myself away from my other addictions. I came out of my shell. Unfortunately, this sort of recovery never happens for a lot of addicts.

I didn't turn out all that badly. I came away with an obsessive tendency to pay attention to any sentence with the words *game* or *computer* in it, but that's about it. I no longer pirate games; I no longer spend sleepless nights cracking machine code so that I can play my favorite games and cheat. I try to set an example so that the human race won't devolve into amorphous blobs of flesh with no more urge to leave their terminals than a beached whale has to swim to sea.

That vision scares me. Sure, I still play videogames, and I love them, but life's about balance. Play the games you love and share them with someone you love. Just don't play them to the exclusion of everything else. Take it from a reformed software junkie: Know and respect the power of games.

—DARREN MCKEEMAN

The Lost Admiral

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"The Perfect General" computer game is IBM PC and Amiga compatible. It can be obtained through your favorite retailer or ordered direct by calling:

1-908-788-2799.

GAMEPLAY

Orson Scott Card

IN THE COURSE OF HUMAN EVENTS

All one-player computer games are like golf. You aren't playing against another player—what he does has no effect on where your ball lies. Instead, you're playing against the course designer. When you face a sand trap or a water hazard, these obstacles were set in place by the person who plotted the course. However, despite the similarities between good golf courses and good computer games, there aren't that many really good golf simulations around. One obvious reason is that there's no way the computer can give you the sun on your back; the wind in your hair; the feel of the club swinging, dragging your arms along; the thwack of the club on the ball; and the sense of public humiliation or exultation when you see how close you have landed to the green.

Links may be the most realistic simulation I've ever seen on a computer. This is the standard for everybody to meet from now on.

The best computer golf simulation right now is *Links*, from Access. From the way *Links* got the built-in IBM speaker to sound like birds chirping and your player-figure to say things to the caddy like "I think that'll play" to the gor-

geous real-world golf courses and the lifelike swing of the golfer, the illusion of playing golf is as good as it gets on the computer screen.

Pretty pictures are often offered as a substitute for quality gameplay, but not here. The simulation is excellent, and the computer does all the hard work, leaving the fun decisions and the final hand-eye coordination to you. You get help when you want it, but then, as in the real thing, during the swing itself you have to be focused and hit *now*, with just the right force.

By contrast, even on the Amiga (where I played it), Accolade's *Jack Nicklaus: Greatest 18 Holes of Major Championship Golf* is just not up to the competition. While the Amiga's sound capabilities allow *Nicklaus* to offer real speech, *Links* makes better use of the miserable IBM speaker for speech and everything else. Much more important, while the *Nicklaus* graphics are good and the play of the game is easy to learn, once you've played with *Links*, you'll feel positively crippled going back to the simpler game.

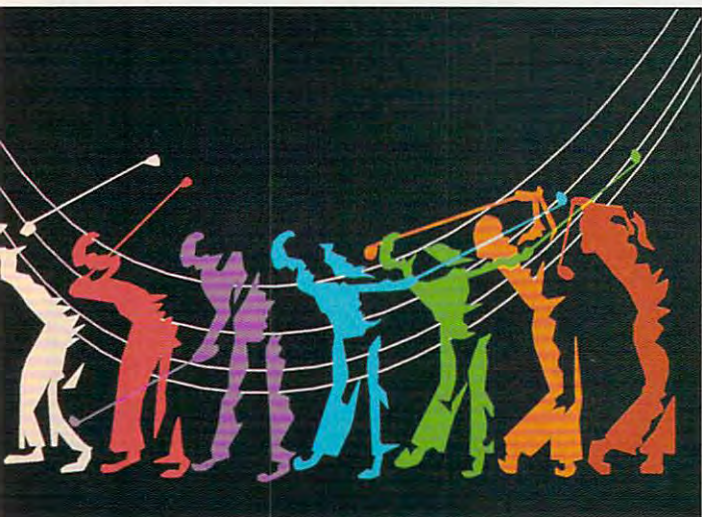
For instance, *Links* handles aiming with a stick that you actually move around the course and lets you switch to a top-down map whenever you want; *Nicklaus* gives you the top-down view only at the beginning of each stroke, and you aim with a little ball along the top of the screen. This makes putting artificially hard because the ball is so far above the hole itself that you can't be sure, as you could on a real course, whether you're lined up properly.

Even the way the two games handle the stroke is telling. Both of them graphically represent the backswing, the forward swing, and the moment of striking the ball—you click to start, click (or release)

at the top of the swing, and then try to click again *exactly* when the club reaches the original ball position. Quite a hand-eye feat, but learnable on both. However, where *Nicklaus* uses a vertical bar, on which your stroke rises straight up and comes straight down, *Links* uses a C-shaped graph that gives far more of the illusion of the movement of the head of the club during an actual swing.

Both games offer several excellent courses, and *Nicklaus* allows you to create your own courses, even offering trees and other features as clip art to make course construction easier and more realistic. But even the best of the *Nicklaus* courses pale beside the *Links* courses, which were not only videotaped, but also analyzed by computer so that when you shoot through foliage, the game can tell whether the ball was deflected by a major branch or just slowed in the leaves. Indeed, *Links* may be the most realistic simulation I've ever seen on a computer. This is the standard for everybody to meet from now on.

My son Geoffrey has pointed out that *Nicklaus* is easier to learn and play and win. He is almost always under par in that game, whereas *Links* is still tough after many plays. Maybe, then, you could use *Nicklaus* as an intermediate golf game, for kids who have outgrown Digitek's delightful *Hole in One Miniature Golf*, with its wonderful courses (including the insane Fantasy course). The three games do make a good progression—my daughter likes *Hole in One*, and her big brother likes *Nicklaus*, in large part because they can often beat par. But *Links* gives me everything I want from golf: endless challenge and beautiful scenery, without sunburn, bugs, lost golf balls, or weariness. □



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9th RECORD-BREAKING YEAR!

64/128 VIEW

Most software works as advertised, but some programs do their jobs with elegance.

Tom Netsel

Recently, Larry Cotton, in his "Beginner BASIC" column, offered a two-part series on making programs user-friendly. He discussed ways programs could be designed so computer novices could enter data without crashing the program, entering invalid characters, or becoming confused. That's quite a programming challenge.

It reminded me of a program that was the basis of a computer course I took in college in 1985. The course used a newly released integrated PC program that contained a word processor, spreadsheet, and database management system.

The program wasn't bad. It was reasonably priced, the word processor was great, and I still use the spreadsheet. The database, however, was something else entirely. Does the term *user-hostile* ring a bell?

Let's say you have a database called PEOPLE that consists of a list of friends and relatives and their ages. You also have a field called Holiday. This field has a Y in it if you send the person a card on holidays and an N if you don't send one.

Now, let's say you want to find all the people on your list who get cards and who are older than 20 years old. With this program, you had to go into Edit mode and enter `PEOPLE,HOLIDAY='Y' AND AGE>20,NAME`.

Any BASIC programmer can see the logic behind this command, but you had to know the syntax. You got no prompts, and the punctuation marks were tricky.

Now let's talk user-friendly. In that same year Brøder-

bund released *Bank Street Filer* for the 64.

With its prompts, help screens, and menus, this database program is a snap to use. To conduct a test, I created a similar database on my 64. I then requested a report listing all the people who got cards and who were over 20 years old.

Filer walks you through the process using prompts that are in English. To prepare a report, the program starts *Print every record where* and presents your fields: Name, Holiday, Age. I selected Holiday.

The program then asks *Is, Is Not, Is Before, Is After, Starts With, Ends With, or Contains?* I selected *Is*. The next prompt asks *Is What?* I entered *Y* for *Yes*.

Filer then asks *Stop, And, or Or?* Since I had more conditions, I selected *And*. The program then listed my fields for further selection. This time I selected *Age*, which is a number.

The next prompt offers these choices for numbers: *Is Equal To, Is Not Equal To, Is Less Than, Is Greater Than, Is Zero, Is Not Zero*. I selected *Is Greater Than* and typed 20 at the prompt.

At the top of the screen, my search equation was presented in English: *Print every record where the Holiday field is Y and the Age field is greater than 20*. The program then sorts and prints the report in a variety of possible formats to screen, disk, or printer. It's simple, elegant, and friendly.

When anyone mentions a user-friendly program, I give *Bank Street Filer* a plug. Too bad more programmers haven't copied it. □

GAZETTE

64/128 VIEW

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Why can't more programs be as user-friendly as *Bank Street Filer*?

By Tom Netsel.

LASER PRINTING ON A BUDGET

G-2

Here are some tips on printing *GEOS* documents on a laser printer, even if you don't own one.

By Carlos Amezaga.

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The Untouchables, B.A.T., Metal Gear, and gateWay 64.

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By Jim Butterfield.

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Even fans find *geoWrite* tough to love, but here are some tips that can help.

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Here are some tips
on how to print GEOS documents
on a laser printer—
without owning a laser printer.

LASER PRINTING ON A BUDGET

BY CARLOS AMEZAGA

Desktop publishing really took off when the laser printer arrived.

This advance in printer technology took desktop publishing to new heights, and Macintosh, IBM, and Amiga owners were quick to take full advantage of it. But 64 and 128 owners haven't moved as fast.

Many owners of 8-bit Commodores have been slow to embrace laser technology because they are reluctant to spend ten times the price of their computer for a printer. What many of them don't know is that they can take advantage of laser printing without going to the expense of owning a laser printer. This article will explain how.

Setting Standards

To understand what laser printing is all about, you must remember that when these printers first appeared on the market, they didn't follow any standard. This led to the development of a page description language called PostScript.

This language instruction set tells the laser printer how your image should be printed, what it should look like, and where it should be on the paper. PostScript soon became the standard for most laser printers.

That was great, especially if you were a Commodore GEOS user. When GEOS first came out, Berkeley Softworks provided drivers and fonts so you could buy a laser printer, connect it to your 64, and print. Berkeley published *geoLaser* and special fonts with *geoWrite*. It also released *geoPubLaser* and special fonts with *geoPublish*.

Lasers on a Budget

The technology and software are available for 8-bit Commodores, but there's still one main hurdle blocking the path to laser printing. That problem is price. Laser printers are expensive, and the typical 64 owner does not have that kind of money to pay for a printer. But even on a budget, there's still a way to laser printouts.

The solution was provided by Jim Collette, known as GeoRep Jim on QuantumLink, the Commodore-specific online service. Jim has contributed many programs, both public domain and shareware, as well as his own commercial releases. One of his shareware releases is called *PS.Patch 2.0* and can be found on Q-Link. Rather than being a stand-alone program, this product is a patch, a program that alters another program. It modifies either *geoLaser* or *geoPubLaser* so that instead of sending the required PostScript information to a laser printer, it prints the information to a floppy disk.

Do Me a Favor?

With this information on disk, you no longer need to own a laser printer. If you have a friend who has a PC that's hooked to a PostScript laser printer, all you have to do is transfer the PostScript file from your Commodore disk to an IBM-formatted disk. You can do this with either *Big Blue Reader*, sold commercially by SOGWAP Software, or *Xlink*, which is 128-specific public domain software.

In order to read or write to an IBM-formatted disk, however, you need a 1571 or 1581 disk drive. These are the only two Commodore disk drives that can accomplish such a task. If you don't have either of these drives, there's still a way around this problem. If you have a modem, you can transfer the Commodore file to any other modem-equipped PC.

Check the Yellow Pages

If you're not fortunate enough to have a friend with a laser printer, look in the yellow pages under Desktop Publishing or Printing. In my area there are about four dozen publishers who have IBM equipment at their shops. Some even have a 24-hour bulletin board so you can upload your PostScript file for

printing. They do charge a reasonable fee, but it all depends on the number of pages you're printing out.

How to Do It

Now that you know it can be done, it's time I told you how to create a PostScript file with GEOS. First, we want to check a couple of applications to make sure they are up-to-date. To do this, select the following files from the Desktop, and then select the INFO option from the FILE entry on the top menu. Now make sure that *geoPublish* and the two laser printing applications, *geoPubLaser* and *geoLaser*, have the following dates stamped in their info boxes. Earlier versions have problems.

geoPublish 1.0 10/4/88
geoPubLaser 1.8 8/22/88
geoLaser 2.1 3/10/88

I haven't heard of any problems with *geoLaser* and different dates, but version 2.1 seems to be the most current.

**Laser printers
are expensive, but
there's still
a way 64 owners on
a budget can
get laser printouts.**

If you don't have this latest version of *geoPublish*, you can obtain the most current version of this two-disk program by sending in your disk to Berkeley Softworks, now renamed GeoWorks, and asking for the updated *geoPublish*. You can obtain *geoLaser* or *geoPubLaser*, the 11 laser fonts, and the patch program *PS.Patch 2.0* from Q-Link's software libraries.

Once you obtain *PS.Patch 2.0*, put it on the same disk as either *geoLaser* or *geoPubLaser*. Execute the patch, and you'll get a menu with the option to modify either of the laser drivers. Select the laser driver you wish to modify, and follow the prompts. Once *Patch* has finished running, you'll find a new version of the selected driver on your disk.

Once you have these files patched, all you have to do is load the proper laser printing application. If you created your document with *geoWrite*, then you should use the patched version of *geoLaser*. If you created your document with *geoPublish*, then you must use the

patched version of *geoPubLaser*.

You can use any of the 11 laser fonts within your document. By using these fonts, you'll achieve print comparable to that used in textbooks and magazines. You can also use your regular GEOS fonts, but they'll look jagged in most cases. You can, however, have your GEOS fonts and graphics smoothed as an option to improve their appearance when printed.

Convert to PostScript

Making the PostScript file takes a few minutes. The longer your document is, the longer it'll take to create the PostScript file. You'll also need plenty of free disk space. PostScript files can be very big, possibly taking up your entire 1571 disk or half your 1581 disk, depending on how complex the document is. Since PostScript is a structured language and has about 250 operators, *geoLaser* and *geoPubLaser* have the task of creating another program with this language that the laser printer will understand.

Once you've created your PostScript file and moved it to a PC or Macintosh (which can read IBM disks) by either disk or modem, it's time to print. Dump this file directly to the printer. Do not—I repeat—do not load your file into a word processor! The PostScript file would be corrupted, and it probably wouldn't fit in memory anyway.

Boot a Terminal Program

If you're using an IBM or PC clone, use a terminal program to send the PostScript file to the printer. This will establish a two-way communication channel in case the laser printer encounters any PostScript command errors. If such errors occur, they'll be printed on the terminal screen.

A terminal program such as *Proterm*, *Comterm*, *Procomm*, or *Freeterm* may be used on any IBM or PC clone. Set your communication parameters as follows: 9600 baud, 8 Bits, 1 Stop, No parity, Half-duplex, and Xon/Xoff activated.

Do not under any circumstances use either of the following commands from DOS:

COPY A:filename LPT1

or

COPY A:filename COM1

This doesn't establish a two-way environment and is therefore undesirable.

Dump from a Mac

If you have access to a Macintosh that can read IBM-formatted disks, you

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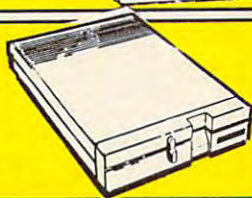
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have the option of dumping the file with a font utility, a program designed to send a PostScript file to a laser printer. There are two that I know of. One is called *SendPS*, and the other is *Font Downloader* from Adobe. *Font Downloader* can be found on font disks that Adobe distributes commercially. *SendPS* is public domain and can be found on GEnie's Desktop Publishing RoundTable. Either of these will do the job for you. You can also use a terminal program on the Mac with the same parameters described earlier. You also have the option of using the Macintosh version of *PageMaker* sold by Aldus.

With an ingenious program by Roger Eller (RogerE5 on Q-Link), we can also load this file into *PageMaker* as an Encapsulated PostScript File (EPF), which is an object oriented graphic file rather than a text file. He discovered that if you add a short list of commands at the beginning of the PostScript file, *PageMaker* will recognize the file as an EPF. By doing so, you can create some stunning effects with commands such as Place, Resize, Condense, and Stretch.

You'll need to play with the PostScript file a bit first. You'll need the *GEOS Text Manager*, a text scrap called EPS Insert Text, and *Wrong Is Write*. *Wrong Is Write* is an application

which will turn your PostScript file into a *geoWrite* document and back again. It can be found on Q-Link, and a more advanced version is sold by Storm Systems. EPS Insert Text can also be found in Q-Link's *GEOS* library.

What you do is convert this true ASCII PostScript file to *geoWrite*. Once it's converted, paste the short text scrap at the beginning of the document; then convert the file back to true ASCII using *Wrong Is Write*. You can then load this modified PostScript file into the Mac version of *PageMaker* and create your own effects. You can then print directly from *PageMaker* instead of dumping the PostScript file to a printer.

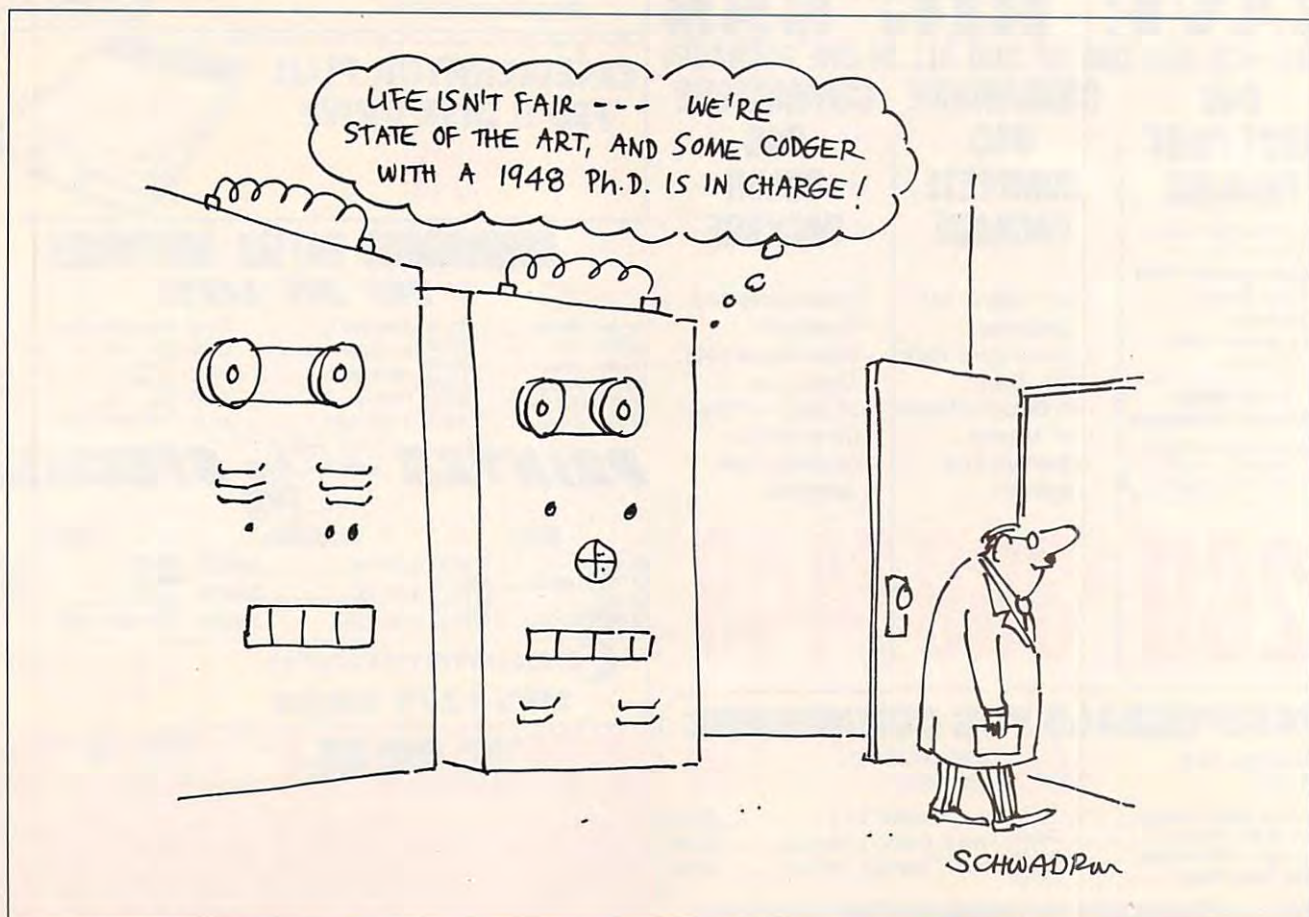
The world of laser printers is within reach of the average 64 or 128 user. Documents generated with *geoPublish* and *geoWrite* are comparable to those created on high-end systems that use gigabytes of memory. With a little time and effort, we can get high-end results on a low-end budget.

Carlos Amezaga invites your comments or questions. His address is 1330 SW 97th Avenue, Miami, Florida 33174. He can also be reached online. He is The Smee on Quantum-Link, C.Amezaga on GEnie, and Carlos Amezaga 135/10 on Fidonet. □

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REVIEWS

THE UNTOUCHABLES

Chicago, 1931. The dark streets of this city are not a safe place to be! Al Capone and the Mob have invaded this area for their own unscrupulous and illegal dealings. It's up to you to free this city from their control.

Ocean of America's *Untouchables* (distributed by Electronic Arts) puts you in control of Elliot Ness and his team of crimebusters. Get plenty of rest now, because you'll need your strength and your mission won't be easy!

Like the popular movie of the same name, this arcade game is full of action and danger. You must complete six very difficult levels to win this game. These levels are called Warehouse, Bridge, Alleys, Train Station, Hostage, and Rooftop. At each level, you must accumulate points and evidence. This is not easy. For example, at the Warehouse level, gangsters are trying to kill you as you search for the Mob's bookkeepers. You want their books, but they're armed and not about to cooperate.

Time is another factor that can affect your success. Each level must be completed in a certain amount of time. Using the Warehouse level once again as an example, once you kill a bookkeeper or make him drop his evidence, you have only a short amount of time to pick it up.

As the game begins, you are at the bottom level of the Warehouse. You must engage in a surprise attack on Al Capone's bootlegging operation to get the necessary damaging evidence from his bookkeepers' ledger pages. An arrow displayed at the top of the screen tells which direction to move to find

these bookkeepers with the evidence. But watch out! Gangsters move in quickly to stop you as you chase these fast-moving bookkeepers.

Station, has your Untouchable character guiding a runaway baby carriage away from gunfire and dangerous obstacles. If innocent civil-

the second or third level.

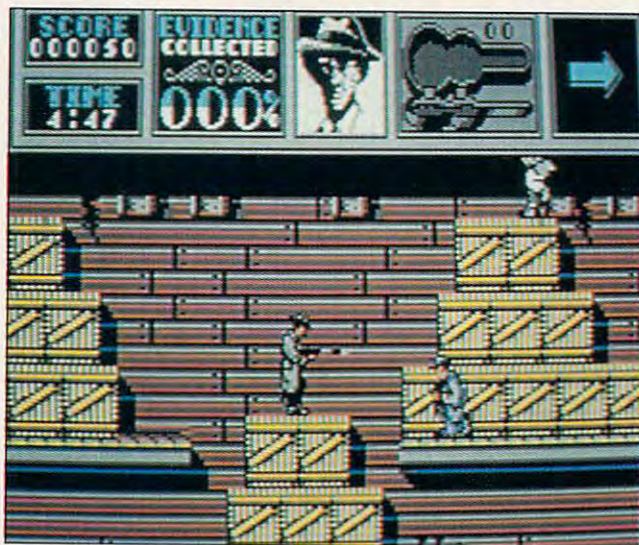
The documentation for this game is brief, but it provides you with all the information you need to begin playing. Instructions are straightforward and easy to comprehend. Each level of play is described in enough detail to help you understand what you will be up against. This documentation also includes some useful tips on playing. The game's main idea is not that original; it's simply good guys versus bad guys. However, I liked the challenge involved in defending myself against the gangsters while searching for the evidence, as opposed to just worrying about being shot.

The Untouchables also makes good use of the 64's graphics and sound capabilities. Graphics were displayed on the screen in much detail. The background music was pleasant and set the mood for action.

This game is entertaining, and its level of difficulty only makes it more of a challenge to play. So, if you like a real challenge, this game will give you hours of enjoyment as you visit Al Capone's Chicago of the 1930s.

Chicago, 1991. Sixty years have gone by, and the streets are much safer now. Al Capone's reign of terror is but a distant, unpleasant memory. Unfortunately, Elliot Ness and his brave heroes are also relegated to the past, but with your 64, you can go back to the era of the *Untouchables* and relive their fight against crime.

CHRIS STAWASZ



Help Elliot Ness get the goods on Al Capone and his Mob.

You get points for killing gangsters. You can also acquire additional weapons and ammunition or extra energy in some cases. However, cornering the bookkeepers is more important, since you collect a certain percentage of the necessary evidence from each one. If you accumulate 100 percent of the evidence before the time limit expires, you move to the next level, the Bridge.

At the Bridge, Capone's men are attempting to cross the Canadian border to safety and must be stopped. Again, you must kill the gangsters to collect the necessary evidence. At this level, you should probably select a different Untouchable character, since your current one is getting weak.

In the next stage, the Alleys, you must collar Capone's accountant with the evidence before he skips town on a fast train.

The fourth level, the Train

Station, has your Untouchable character guiding a runaway baby carriage away from gunfire and dangerous obstacles. If innocent civil-

ians are accidentally shot, your character loses energy. At the fifth level, only one of Capone's men is left, and he decides to take someone hostage. React quickly, since you only have five seconds to kill the gangster.

The final level is the Rooftop. With all the evidence you have collected against Capone, he has been indicted. However, you must now dispose of Capone's hitman. Manage this, and you'll win the game.

The Untouchables is easy to understand. There's no problem figuring out what moves to make and how to play it. However, I did find it very difficult to get to the higher levels of the game. With practice, my score gradually improved. This game definitely takes a lot of practice to reach the upper levels. Learning the detailed layout of each level can help, but I think the average player will have problems just getting to

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B.A.T.

If you're looking for a science fiction role-playing game that takes the genre to its limits of creativity, originality, and fun, then check out *B.A.T.* I've never played a stranger sci-fi game.

The designers of *B.A.T.* worked hard to produce a game that's unique in every aspect. They succeeded and went beyond this goal to create a game that's as much fun to explore as it is to solve. Although *B.A.T.* takes many hours to finish, it's also fun just to explore the game's more than 1000 locations that vary from bars and offices to apartments and caves. *B.A.T.* comes from UBI Soft in France, and its European feel contributes a great deal to the game's effect on its players.

First of all, *B.A.T.* stands for the Bureau of Astral Troubleshooters, a group of galactic police officers whose job is to investigate problems and maintain order. Just don't make the mistake of pronouncing the acronym *bat*.

Your character is a new agent brought into the *B.A.T.* organization to capture Vrangor, a dangerous scientist, and his sidekick Merigo. Both of them recently broke out of prison. The two troublemakers have threatened to destroy the large city of Terropolis on the planet Selenia if their demands are not met. Although you have to work fast to find and neutralize Vrangor and Merigo, the story moves you along so you can perform crucial actions at the right times. There is plenty of time to explore Selenia, and it's important to look for clues and to familiarize yourself with the game.

The first step in *B.A.T.* is to create a character. Your persona can have many charac-

teristics and abilities to accurately represent you in the game. The development of characters in *B.A.T.* is one of the most comprehensive and complete systems in the RPG field. Your character possesses various competencies and aptitudes, some of which are modifiable during character creation.



Menus and windows in *B.A.T.* simplify gameplay and help you explore more than 1000 different locations.

Six areas of competence which may not be modified are life percentage remaining, level of knowledge, experience, calorie requirements, hydration requirements, and credits (money). The six modifiable characteristics are force, intelligence, charisma, perception, vitality, and reflexes. Various aptitudes include such skills as climbing, vigilance, and psychology. As you can see, a character in *B.A.T.* can be well developed.

There are enough places to visit and enough mini-quests to solve in *B.A.T.* so that all of your character's competencies and aptitudes gain real meaning at one time or another. Another nice touch is the chart that visually represents these characteristics and abilities on the character screen.

B.A.T. uses menus and icons for gameplay. You can select the main menu with the cursor to access the necessary commands and also click directly on the screen to gain information about objects, talk with characters, and use exits. The interface is dynamic and combines the menu commands and

clickable icons to make gameplay effortless. The manual explains all of the menu commands and subcommands and shows the menu levels in detail. There are only a few main commands, but they cover everything your character does in the game.

Two other parts of the interface further confirm the uniqueness of *B.A.T.* These are B.O.B., a bidirectional organic bioputer, and the DRAG, a vehicle you use to travel around Selenia.

B.O.B. is attached to your character's arm, and it performs several important functions. It can list your alter ego's characteristics and physical condition and can modify heart rate. Perhaps more important, B.O.B. can be programmed with a simple command language to perform some functions auto-

matically, such as alerting you when Vrangor or another enemy is near or automatically translating languages of aliens during conversations. B.O.B. is very useful in *B.A.T.* and further develops the game universe.

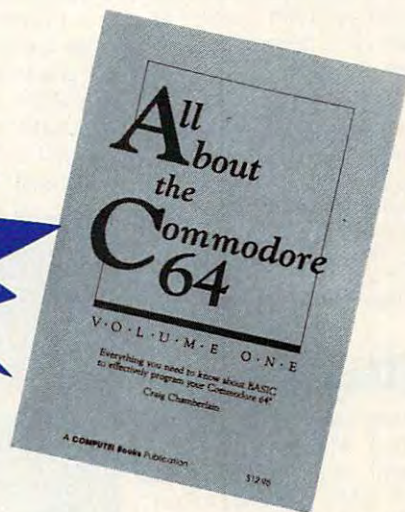
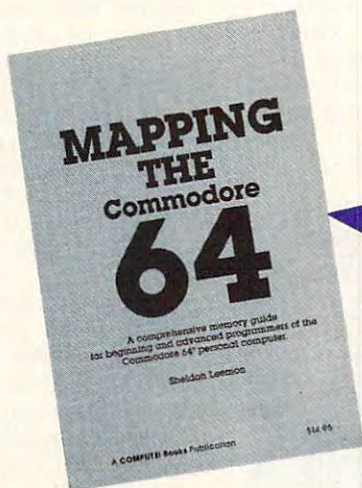
The DRAG is a simple flying machine that adds 3-D flight simulation to *B.A.T.*'s already complete interface. It's tough to fly, but it does carry some formidable weaponry. You need DRAG to reach certain locations in the game, and it expands your character's mobility.

The graphics in *B.A.T.* are impressive. The locations are detailed and colorful, and you can access most areas of the picture with the menu commands. When you enter small rooms or other locations, *B.A.T.* pops up a window for that location rather than clearing the screen. This windowing trick maintains itself because there are only a few windows on-screen at any time. This feature provides the player with a partial view of previous locations and simplifies visualization of the game world. The 3-D view from the DRAG ship works well on the 64.

Movement is fluid, and the flying machine adds yet another level of fun to this game. *B.A.T.* is one of those gems that you might normally miss because it comes from a small software company and has a strange name and box cover. The game presents science fiction in a way that any fan will devour. The variety of weapons, alien races, locations, and objects populating the game adds the finishing touch of realism to this future world.

B.A.T. lets you move at your own pace to explore the game world and enjoy all that it has to offer. You can continue to enjoy the game

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even after you eliminate Vran-gor and Merigo. With its dynamic environment, *B.A.T.* offers the sci-fi fan a world as detailed as a book and as visual as a motion picture.

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METAL GEAR

Rockets, rations, handguns, oh my! *Metal Gear* from Konami has all this and more. This arcade/action game tosses you into the heat of combat as a one-man army sent to stop the insane Col. Vermon CaTaffy from taking over the world. Here's a chance to see if you've learned anything from all those Stallone and Schwarzenegger movies.

CaTaffy has set up a vast compound in Outer Heaven, a small nation in Africa that houses his worst creation, the ultimate weapon—Metal Gear. As Solid Snake of the covert unit Fox Hound, you must infiltrate the enemy compound; collect weapons, ammunition, and other useful objects; and then destroy CaTaffy's powerful device.

Metal Gear is an average game that doesn't excel in any particular area, except perhaps fun. For its price, the game is an absolute steal and will keep you occupied for hours.

Metal Gear's main screen has a three-quarter perspective view through which your character moves. If you hit any key other than the space bar, a menu pops up providing you with various choices for the weapons screen, equipment screen,

or communications screen.

The first two screens show pictures of all the weapons and objects that you possess. Select one of them or a blank position with a cursor to exit the screen. The communications screen provides access to your transceiver, the means to communicate

fisted variety in *Metal Gear*.

The graphics are average for a 64 game. You can easily distinguish the objects and floor layout, but the colors on most screens are a drab green-blue. What *Metal Gear* lacks in splashy graphics, however, it more than makes up for in music

ward. The save-game feature is very important for a game as large as this one. However, *Metal Gear* saves directly to the program disk, and I often had problems restoring games. In the end, I had to start all over. For this reason, I decided to play *Metal Gear* in one sitting rather than chance losing my place. It's always a bad idea to save games to the program disk.

The variety of neat objects and compound rooms kept my interest in *Metal Gear*. From a bomb blast suit and compass to an oxygen tank and flashlight, you intelligently use objects to conquer the terrain and traps. This element of *Metal Gear* elevates the game above the bevy of military shoot-'em-up clones to a category reserved for better action games.

One hint to keep you awash in ammunition is to take note of all places where you find bullets and such. When you leave the room and reenter, you'll find a fresh supply of ammo in the same place. I don't know if this is a glitch in the program, but it certainly keeps me from running out of both rations and ammo.

If you like games with a lot of action and strategy to boot, *Metal Gear* is worth your money and efforts. The game lasts longer than its monetary equivalent in movies and puts you in charge of all the action.

Now go get CaTaffy before he eliminates what's left of the world! And watch out for those land mines!

RUSS CECCOLA



You must capture weapons and equipment if you hope to foil Col. Vermon CaTaffy's evil plan to conquer the world.

with home base for helpful hints and messages. The space bar switches between your fist and the current weapon. The gameplay in *Metal Gear* is simple. You move around the buildings and outdoor areas of the compound, trying to find better weapons and special objects that'll get you past obstacles and traps.

Konami includes a map of all game screens along with the well-written manual in the package. Although it felt like cheating to use the map, I found it very helpful in some places. Even with the map, *Metal Gear* is still challenging and fun. Your heart will still be pounding by the time you get to the final level of buildings. With well over 100 screens, there's a lot of two-

and sound effects. The music is catchy and fast and continues throughout the entire game. Sound effects are not as impressive, but the explosions and gunfire still get the point across. The music heightens the intensity in the game more than any other feature.

One big problem with *Metal Gear* is disk access. Every two or three screens and every time you go into a room or other enclosure, the screen blanks, and the drive starts spinning. This becomes so annoying that I frequently take a break and leave the game. Other arcade games of the same complexity have tackled this problem in the past.

Metal Gear's method of saving games is also awk-

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REVIEWS

GATEWAY 64

CMD says *gateWay* represents a "new philosophy with working with GEOS." It's not kidding.

Unlike some alternative deskTops, *gateWay* is a full *GEOS* replacement. The first thing you do is create a new boot disk customized to your setup. This includes a device driver for each of your disk drives, your printer, and your input device. Once you've done this, you boot up into a different world.

Fortunately, this world runs by familiar *GEOS* rules. Gadgets on the screen are intuitively designed. Files are listed by name in a resizable window from which they can be selected and maneuvered with a mouse click.

On one side of the filenames is a slider to move quickly through a directory. On the other side a "fuel gauge" shows how much of the disk is filled. If you need to be more exact, a click on the gauge opens a window of disk information. Keyboard shortcuts are pretty much the same as with *GEOS*. *gateWay* operates with exceptional smoothness; the entire directory is in memory at once, which speeds up scrolling.

Basically, these changes are cosmetic, but there are some real improvements that make *gateWay* shine. The program supports three active drives at one time if you have a RAM expansion unit (REU). It also has a trash can system which allows you to toss unwanted files into an alternate menu, but if you change your mind, they can be reinstated. But *gateWay* really jumps ahead of the deskTop and stock *GEOS* when it comes to supporting disk drives. It offers device drivers not only for 1500-series drives, but for CMD hard drives, all REUs (including geoRAM and the 1700), and CMD's new RAMDrive and RAMLink systems.

Also included is a RAM disk driver which takes advantage of any extra memory you may have installed. If you operate *GEOS* with anything more than a floppy drive or two, *gateWay* will finally allow your system to run instead of walk. If you have at least 512K RAM on board, *gateWay* flies. Using a 64K area of RAM, the system offers a task-switching device called the Switcher. Press two keys, and you can jump instantly between two applications. This



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is one of the most exciting features of *gateWay*, but it works only if you have a lot of extra RAM installed.

Features like full three-drive support also require an REU. This program is designed for the user with an expanded system. If that's you, *gateWay* is a must.

The more you have for *gateWay* to play with, the more powerful the system becomes. You can modify your version of *gateWay* with a new file type called a *GateWay Document*. This is essentially a separate but compatible program which can be integrated into *gateWay* to provide additional options. Several such documents are provided as examples.

You'll find *gateWay* works

well with various disk drive combinations. Without extra RAM, however, different models can only communicate for basic file copying.

GateWay cheerfully runs almost any application or desk accessory written for *GEOS*. To ensure compatibility, CMD has provided a driver which configures the REU to emulate the 1541/1571 drive supported by *GEOS* itself. The manual is well written, despite a few errors resulting from last-minute changes in the software.

STEVE VANDER ARK

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Plotting Equations

Is it possible to get a hi-res program with a PLOT X,Y function for the 64, which will rapidly plot equations on x- and y-coordinate axes?

FRANK GORDON
ORONO, ME

Here's a very simple routine in 64 BASIC that will plot a sine function. The program asks for upper and lower bounds which are the amplitude of the sine wave. No matter what amplitude you select, the program will scale the sine wave to fill the screen. For brevity, finer points (such as adding values and tick marks to the axes, providing text on the screen, and error checking for infinities) have been omitted.

When you run the program, it asks for a lower and upper bound. For a demonstration, enter -6 and 6 and then experiment with other values. Press any key when the program finishes. Type RUN for another plot. A machine language routine lets you go to bitmap mode (clearing the bitmap screen as it does so), return to text mode, and clear the bitmapped screen independently of modes.

```
SH 100 AD=49152
CX 110 READ XX:IF XX>=0
{SPACE}THEN POKE
{SPACE}AD,XX:AD=A
D+1:GOTO110
JJ 120 INPUT"WHAT IS THE
LOWER BOUND";X1
FC 130 INPUT"WHAT IS THE
UPPER BOUND";X2
CJ 140 PRINT:PRINT"PLEAS
E WAIT";
DX 150 XX=X1:GOSUB 310:Y
1=YY:Y2=YY:RX=319
/(X2-X1)
KF 160 FOR XX=X1 TO X2 S
TEP 1/RX:PRINT"."
::GOSUB 310
MJ 170 IF YY<Y1 THEN Y1=
YY
EQ 180 IF YY>Y2 THEN Y2=
YY
AE 190 NEXT:RY=199/(Y2-Y
1)
CJ 200 SYS 49152:REM GO
{SPACE}TO BITMAP
```

```
SJ 210 IF X1<0 AND X2>0
{SPACE}THEN XX=-X
1*RX:FOR YY=0 TO
{SPACE}199:GOSUB
{SPACE}290:NEXT
SC 220 IF Y1<0 AND Y2>0
{SPACE}THEN YY=-Y
1*RY:FOR XX=0 TO
{SPACE}319:GOSUB
{SPACE}290:NEXT
KF 230 FOR X0=X1 TO X2 S
TEP 1/RX
BB 240 XX=X0:GOSUB 310:X
X=(XX-X1)*RX:YY=(
YY-Y1)*RY:GOSUB29
0
MB 250 NEXT
KS 260 GET A$:IF A$="" T
HEN 260
DB 270 SYS 49152+3:REM R
ECOVER THE TEXT S
CREEN
MH 280 END
EX 290 Y0=199-YY:AD=8192
+INT(Y0/8)*320+IN
T(XX/8)*8+(INT(Y0
) AND 7)
PE 300 POKE AD,PEEK(AD)
{SPACE}OR(2↑(7-(
INT(XX) AND 7))):
RETURN
FX 310 YY=SIN(XX):RETURN
XH 320 DATA 76,13,192,76
,74,192,76,83,192
,6,7
ER 330 DATA 0,0,32,108,1
92,32,83,192,173,
9,192
KS 340 DATA 141,32,208,1
62,4,134,252,162,
0,134,251
BD 350 DATA 160,0,173,10
,192,10,10,10,10,
13,9
RX 360 DATA 192,145,251,
200,166,252,224,7
,240,9,192
CG 370 DATA 0,208,243,23
0,252,76,45,192,1
40,11,192
XQ 380 DATA 174,11,192,2
24,232,208,228,96
,32,139,192
GH 390 DATA 169,147,32,2
10,255,96,169,0,1
33,251,169
DJ 400 DATA 32,133,252,1
69,0,168,145,251,
200,208,251
HC 410 DATA 230,252,166,
252,224,64,208,24
3,96,173,17
QB 420 DATA 208,9,32,9,1
6,141,17,208,173,
22,208
XX 430 DATA 24,41,223,14
1,22,208,173,24,2
08,24,41
HB 440 DATA 240,9,8,141,
24,208,96,173,17,
208,24
```

```
GG 450 DATA 41,223,141,1
7,208,24,173,24,2
08,24,41
DE 460 DATA 240,9,6,141,
24,208,24,173,22,
208,41
AC 470 DATA 239,141,22,2
08,96,-99
```

Lines 100 and 110 poke the machine code into the RAM window above BASIC. Lines 120 through 190 do scaling calculations based upon the starting and ending values of the functional argument. Line 200 sets the bitmap screen with SYS 49152.

Lines 210 and 220 draw the axes if they're part of the region being examined. Lines 230-250 construct the actual plot. Lines 260-280 wait for a keypress, return to the text screen with a SYS 49152+3, and end the program.

Lines 290 and 300 are a subroutine for setting the pixels pointed to by variables XX and YY. Line 310 is the actual location of the function where YY receives the value of the function when XX is used as the argument.

The remainder is machine code data. If you want to clear the bitmap, type SYS 49152+6. If you want to change the background color, type POKE 49152+9, backcolor. To change the foreground (plot) color, use POKE 49152+10, forecolor. Backcolor and forecolor represent the numeric values (0-15) of the 64's 16 colors. Pick the combination you prefer.

In addition to writing your own code, many programs are available which do graphing as a specialized talent or as an enhancement to BASIC. These can be obtained commercially, from the public domain, and as shareware. Check software stores, mail-order houses, user groups, on-line networks, and, of course, COMPUTE magazine.

Questions and answers about plotting equations, computer uses, and more

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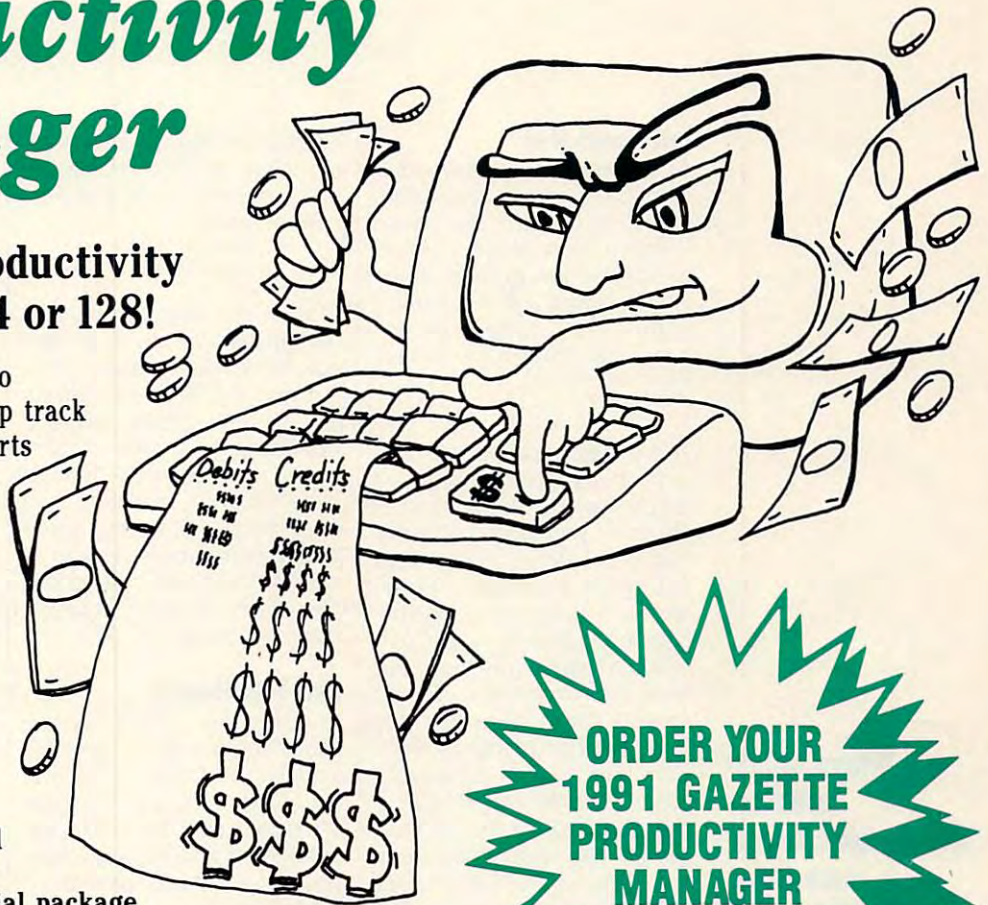
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Intelligent Use

As newcomers to the world of computers, our family is using our 64 as a game machine. Can you direct us toward information on how to begin making intelligent use of our computer? Also, where can we get public domain programs?

JANE TENBRINK
SHELBY, MI

That's a tall order for this column, but you might start by reading every back issue of Gazette you can get your hands on. We've always tried to provide a mixture of entertainment and productivity articles in Gazette to help Commodore users get the most from their machines. To get started, however, invest in the Big Three productivity software packages: a word processor, a spreadsheet, and a database program. These will let you write practically any type of document that you might use around the home or office, keep financial records, and manage other data, such as lists, club memberships, inventories, collections, or what have you.

A modem and terminal program are also good investments as they can enable you to contact other computers in your town or across the world. Electronic bulletin boards are great sources of public domain and shareware programs. You can also find PD software by looking through advertisements in the back of this magazine. There usually are a number of good sources listed. A user group is another excellent source. User group members will be glad to share their knowledge of computers with you and your family.

Transparency Labels

Can anyone tell me where to find some pin-fed label stock for photographic slides? I've

seen some programs for printing them, but I can't seem to find any here in the San Fernando Valley.

B. CHANDLER SHAW
GRANADA HILLS, CA

Check with any large office supply store in your area and ask for an Avery label, stock number 7207. These labels are 1½ x ¾ inches, pin fed, but designed to stick to cardboard rather than plastic slide mounts. You can call (800) 843-2347 for the name of the dealer nearest you or write to Avery-Dennison, 850 East Algonquin Road, Schaumburg, Illinois 60173.

Dial This Number

In "Beginner BASIC" (April 1991) you featured "Your 64 as a Digital Dialer." The article failed to include the tone information for a touch-tone telephone's * and # keys. Could you provide these, please?

RICHARD C. KIRK
NICEVILLE, FL

The telephone dialer program omitted the star () and pound (#) signs and the ability to insert a pause during the dialing process. To add these features to Larry Cotton's program, the author suggests the following changes.*

Add these lines:

```
25 DIMW(4,12)
291 IFD$(N)="P"THEN FOR-
DE=1TO1000:NEXT
292 IFD$(N)="*"THEN D$="10"
293 IFD$(N)="0"THEN D$="11"
294 IFD$(N)="#"THEN D$="12"
```

Change lines 150-180 to read as follows:

```
150 FORN=10TO12: W(1,N)=77:
W(2,N)=60: NEXT
160 FORN=1TO10STEP3:
W(3,N)=121: W(4,N)=77: NEXT
170 FORN=2TO11STEP3:
W(3,N)=156: W(4,N)=85: NEXT
180 FORN=3TO12STEP3:
W(3,N)=165: W(4,N)=94: NEXT
```

Delete line 190 in the original program listing.

To test the program, you'll need to increase the length of tones in line 240 and change the first test data item in line 390 to read as follows.

```
240 Z=150
390 DATA JIM, *0#-1P11
```

Be sure to use the capital P to insert a pause. To change pause length, adjust the length of the time-killing FOR-NEXT loop in line 291.

Gee, It's GEOS!

The August issue of COMPUTE arrived yesterday, and I just have to write and tell you how much I enjoyed the premiere of the long-awaited GEOS column by Steve Vander Ark. I hope that it will become a permanent feature in the Gazette section.

My cup runneth over! There was even a great GEOS type-in program for creating an animated mouse pointer. The talent and creativity of your program authors never cease to amaze me.

ROBERT NELLIST
BROCKPORT, NY

In our recent survey, many readers indicated that they wanted more GEOS information, articles, and programs. In an effort to fill this request, Gazette contacted Robert Nellist, who himself is no GEOS novice. (See his review of GEOS Font Editor.) Robert recommended Steve Vander Ark. For the past few months now, Steve's "GEOS" column has appeared in Gazette, and we think he's doing an outstanding job. If you have any GEOS-related questions or topics you'd like to see him cover, drop Steve a line in care of the magazine. You can also leave E-mail for him on QuantumLink, where his handle is SteveV14. □

Where to find labels for photographic slides, more about the Digital Dialer, and thanks from a GEOS user

MACHINE LANGUAGE

Jim Butterfield

FIXED POINT NUMBERS

We can often handle fractions without the complexity of floating point. Even BASIC sometimes has trouble with floating point. Try entering PRINT 8.13 and see what happens when you press Return.

Fixed point notation uses an assumed decimal point. A value of 12345 might be used to represent an amount of \$123.45; a value of 45678 might represent a distance of 45.678 meters or, if you like, 45678 millimeters. Thus, values that we think of as fractions can be held as integer values. This simplifies the arithmetic. Even nonmetric values can be stored this way: 876 ounces represents 54 pounds, 12 ounces (dividing by 16 is easy in binary).

Here's a simple program to keep a monetary value as binary cents. To keep the coding compact, we'll hold the value in two bytes, 16 bits. That limits us to a maximum amount of \$655.35; a practical program would use at least three bytes or more. (Three bytes would hold amounts up to \$167,772.15).

The program will start with three cents (binary 3) and double this value nine times. Each value will be printed on the screen; you'll see how the decimal point is inserted.

You may load and run the BASIC driver program given below. The full machine language code won't be shown; instead, I'll note highlights.

Our main program is at hex address 2000; it sets up the loop to print the ten values. The loop calls the subroutine at \$200B, which, in turn, calls the display value subroutine and then doubles the binary value at \$2100 and \$2101 with an ASL (Arithmetic Shift Left) and ROL (ROTate Left).

The display routine starts at \$2015. Its job is to convert the binary value into decimal so that it can be displayed. To do this, we use a clever procedure involving decimal mode. An area is set aside to hold the decimal value, originally 0. Bits are extracted from the binary number, one at a time. The decimal value is doubled by adding it to itself; the binary bit is added in automatically. When you've handled all the binary bits, the decimal area will contain the decimal value in BCD (Binary Coded Decimal). This coding is worth a look, if you haven't seen it before. Note that the binary number from \$2100/1 has been copied to \$2102/3.

```
0202C 0E 03 21 ASL $2103
;low byte
0202F 2E 02 21 ROL $2102
;high
```

The highest bit of the binary value will have been shifted into the Carry flag. If the Carry flag is set, the add that will take place soon will have an extra value of 1 added in.

```
02032 78 SEI
02033 F8 SED
02034 AD 06 21 LDA $2106
02037 6D 06 21 ADC $2106
0203A 8D 06 21 STA $2106
```

And it goes on, doubling the higher byte values at \$2105 and \$2104 by adding them to themselves. We'll skip those instructions and just note that we must clear decimal mode. We have locked out the interrupt because some early machines would get muddled on their keyboard scan if decimal mode were set.

```
0204F D8 CLD
02050 58 CLI
```

The above shift-binary, add-decimal is repeated 16 times, once for each bit of the bina-

ry number. Now we have the decimal digits, packed two to a byte; all we need to do is to print them, slipping in a decimal point at the right place. I've included zero suppression code; look for it.

Once you understand the principles involved, fixed point decimal seems natural. Use your monitor to snoop through all the code. Then you'll be ready to take on a similar job of your own.

This program will run on most any 8-bit Commodore computer. The code begins at hex address 2000—not the most convenient location, but it's an area of memory that's readily available on most Commodore machines.

```
100 DATA 162,0,32,11,32,232
110 DATA 224,10,208,248,96
120 DATA 32,21,32,14,1,33
130 DATA 46,0,33,96,173,0
140 DATA 33,141,2,33,173
150 DATA 1,33,141,3,33,160,0
160 DATA 140,4,33,140,5,33
170 DATA 140,6,33,14,3,33,46
180 DATA 2,33,120,248,173,6
190 DATA 33,109,6,33,141,6,33
200 DATA 173,5,33,109,5,33
210 DATA 141,5,33,173,4,33
220 DATA 109,4,33,141,4,33
230 DATA 216,88,200,192,16
240 DATA 208,214,169,48,141
250 DATA 2,33,173,4,33,32
260 DATA 123,32,173,5,33,32
270 DATA 123,32,169,46,141
280 DATA 2,33,32,210,255,173
290 DATA 6,33,32,123,32,169
300 DATA 13,32,210,255,96
310 DATA 72,74,74,74,74,32
320 DATA 136,32,104,32
330 DATA 136,32,96,41,15,9
340 DATA 48,205,2,33,240,5
350 DATA 206,2,33,16,2,169
360 DATA 32,32,210,255,96
400 FOR J=8192 TO 8347
410 READ X:T=T+X
420 POKE J,X
430 NEXT J
440 IF T<>12136 THEN STOP
500 REM Need to poke the
initial value of three cents
510 POKE 8448,0:POKE 8449,3
520 SYS 8192
```

Working with fixed point numbers is simple in machine language. All you need to know is where the decimal point should go.

Steve Vander Ark

GEOWRITING MADE EASY (ALMOST)

I'm a fan of *geoWrite*. The other day a guy I know called it *geoWrong* and proceeded to bombard me with a rather daunting list of evidence to back up his contention. I didn't listen; I figured that attack was caused by something disagreeable he ate for breakfast or the fact his wife had seen the bill he ran up last month on Q-Link. I think *geoWrite* is wonderful.

Oh, I know—you don't read this column just to hear me gush, but I have a real affection for proportional fonts and WYSIWYG (What You See Is What You Get). Since my first printer (a used Okimate 10) and my first *GEOS* package (1.3) arrived at pretty much the same time, *geoWrite* was really the first word processor I ever used. Now, I'm used to the program, and many of us like what we're used to.

To be fair, my friend's objections to *geoWrite* do have merit. It is a bit slow, and it's prone to dropping characters here and there if you really get cooking at the keyboard. When it redraws the screen—which is quite often—it's certain to miss a few keystrokes. In 40 columns, the side-to-side flipping as you cross the page can frustrate even a confirmed *geoNut* like me.

There are no global settings available, so if you decide to change fonts or margins on a multipage document, you're in for a rather monotonous process. You make the changes, watch the whole thing reformat itself, and then try to find the bits of text that slipped through at the page breaks with the old formatting. When that's finished, you're forced to print using *GEOS* fonts, wheth-

er or not they're appropriate for the document in question, or use the NLQ setting but forgo any style changes such as boldface or italic.

All this might convince you to try a more conventional program and avoid the hassles, but there are some big advantages to a word processor like *geoWrite*. For one thing, you can see what you're doing. The text appears on the screen in all the places and in all the styles that will print on your finished document. This makes formatting a breeze, and since you can preview your text onscreen, it saves a good deal of printer time and paper as well.

You really appreciate this if you ever need to create a page with some unusual spacing and formatting. With a conventional word processor you might spend the entire evening trying to get the right combination of cryptic codes in the right places to make the whole document look like you want. But with *geoWrite*, it happens right there on the monitor's screen as you type, indentations and all. You hardly need to print anything until you are certain that it's what you want and perfect.

The fonts you can use are another benefit of *geoWrite*. They range from businesslike to fun—and they're proportional, as well. As I mentioned in last month's column, you can even overcome the blocky curves and angles inherent to bitmapped fonts with the right printer driver.

Screen redraws will still make *geoWrite* stumble. You can overcome most drawbacks by using only one font for typing the entire document, adding special effects and other fonts only after the document's in shape and ready for the printer. The built-in font, BSW, works fine for this, but I like to use a 10- or

12-point font such as LeConte or University because it's easier to read on my screen. But keep to a smaller point size; the screen redraws only when it's filled with text, after all.

Side flipping can be eliminated by setting the margin to screen width for typing (about 5.2 inches) and then changing it back to full-page width for final printout. This is sometimes a trick in itself, as I mentioned above, but fortunately there's a program available called *Toolkit* which makes global commands a reality for *geoWrite* documents.

From the *Toolkit* menu screen you can set the margins for an entire *geoWrite* document as well as change the font and style of all the text at once. You have to create a text scrap containing the desired ruler settings and/or font. This can be a little tricky at first, but once you get that down, you'll find *Toolkit* to be invaluable and easy to use. If you need to combine several *geoWrite* files into one longer document, you can use *Combiner*, a utility which very neatly does just that.

There's even an answer to the NLQ problems. A desk accessory called *Text Print* will print out a *geoWrite* document using the built-in NLQ font of your printer with all the italic, underlining, and boldface you could want. A companion program, *Custom Print*, must be used to customize a copy of *Text Print* to your printer's specific control codes.

One other feature which *geoWrite* lacks is a word counter. With *geoSpell* you find out at the very end how many words you have, but there's no way to find that information without first going through the entire spelling-checker process. There are several utilities available to provide a word count with the click of the mouse. In the January 1988 issue of *COM-*

Even its fans find *geoWrite* tough to love, but here are ways to make it almost a pleasure to use.

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PUTE!'s Gazette, there was a type-in program called *Word Count* by Shawn Smith which will fit the bill. Back issues and disks are still available from COMPUTE Publications at the Greensboro, North Carolina, office.

Several writing analyzers are available as public domain or shareware. *Blue Pencil*, one of the fine utilities from Student Software, will keep track of the number of words you've used of different lengths, as well as how many words you average per paragraph or sentence. Another, called *Copy Editor*, even makes a judgment as to the difficulty (grade level) of your prose. This helps you tailor your writing to your audience. Look for these on Q-Link or BBS Post, (616) 531-1346.

All this aside, there is something delightful about just watching all those great GEOS fonts trip across the screen in *geoWrite*. Let's face it, I think most people will agree that fonts are

one of the best things about GEOS. It takes a graphics-based, WYSIWYG word processor like *geoWrite* to do them justice. In turn, they can make your routine word processing into full-fledged desktop publishing!

In the last column I mentioned several printer drivers which do a good job of smoothing out the jaggies that plague printouts of bitmapped images. Susan Lamb, a graphic artist whose efforts with GEOS will be featured in next month's column, put me onto a great driver for those of you have 24-pin printers and, like me, are disappointed in the haphazard way GEOS supports them. It's called *EPSON24pin90dpi*. It's available on QuantumLink and on BBS Post. It creates a somewhat shortened printout in *geoPublish*, but the quality is astonishing. If you have an Epson-compatible 24-pin printer, this file is a must! □

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D'IVERSIONS

Fred D'Ignazio

LIVE, REALITY TELEVISION

I woke up this morning, wandered into the kitchen, and found a poppyseed muffin. After I had popped the muffin into the microwave, I clicked on the tea kettle and switched on the TV. Suddenly I was watching three astronauts floating live around the Atlantis space shuttle, going 20,000 miles per hour in zero gravity, hundreds of miles above the surface of the earth.

One male astronaut was stripped to the waist and wired up like a cardiac patient. He was reading a book and taking swigs of salt water from a plastic bottle. Another man floated around sideways, in shorts and white socks, eating a tortilla. And the third, a tired-looking female, was operating the shuttle's on-board camcorder that was taking these live TV pictures. The female astronaut was only inches in front of the camcorder lens. I felt as if she and her shuttle companions were with me in my kitchen. It seemed almost rude not to offer her a bite of my poppyseed muffin.

Welcome to live, reality TV!

More than 15 million Americans have camcorders, and more than 70 million have VCRs. TV cameras, VCRs, and TV screens showing electronic live and prerecorded images are everywhere: in department stores, in boutiques, inside bank teller machines, and hanging from tree branches on our state and federal roads and highways.

In Michigan, where I live, we motorists have become more cautious in recent weeks about our driving. That is because the state police have installed strings of video robocops in trees and bushes along several of the state's highways. Each high-tech ro-

bot policeman is composed of a video camera, computer, radio, and radar. When a speeding motorist zooms by, the hidden robot cameraman snaps a picture of the motorist's license plate, records the motorist's speed, and transmits the information to a central computer that mails the motorist a speeding ticket along with a snapshot that shows him whizzing by.

Several states are considering installing similar video-monitoring systems in people's homes to keep track of alcohol consumption by motorists who have been convicted of driving while intoxicated. The system is used during the period the person is on parole for his conviction. It is overseen by a central computer in a local police station.

The computer calls the person at random intervals via the local telephone system. The person walks up to the alcohol sensor and breathes into it, while the computer monitors the person's movements on a video camera. The computer instantly analyzes the person's movements and his or her breath. If alcohol is detected in the person's breath or his movements are especially erratic, the computer places a call to a police officer who races to the person's home and puts the offender under arrest.

Have you watched TV news lately? Have you noticed that the shots are filled with drama, real-life grit, glory, and gore? But they're also a tad jiggly, fuzzy, and abrupt, as if shot by a news cameraman who's got the heebie-jeebies.

The video footage you are watching has been shot by amateurs, like you and me. It's now an in thing even for network news programs and CNN to show amateur video on the air, especially if it captures a sensational news story as it's happening.

So you can forget videotaping birthday parties, family vacations, and holidays. Home movies are out; video news is in. Now you can become a combination sleuth, CIA agent, and high-tech snoop, all by keeping your eyes open and carrying your trusty video camera at your side. And you can make money, too.

Thousands of your friends and neighbors are doing likewise, and when they get video footage that seems hot, they bypass the local law enforcement officials and send it right to their local TV stations or even to New York, Washington, or Atlanta, to get it on national TV. Police watch TV more carefully these days. They know they might learn about a crime for the first time by seeing it on TV.

We are entering a video goldfish bowl. Camcorders are shrinking, getting more powerful zoom lenses, and dropping in price. Soon they'll be as ubiquitous as the Kodak Brownie or Instamatic. People will carry them wherever they go, aiming them at everything and everyone.

Life will be a video arena with everyone grabbing video slices of everyone else's life, in the hope that they can sell them for a few dollars to the evening news or programs patterned after the phenomenally successful "America's Funniest Home Videos."

You'd better watch out. The next time you slip down the porch stairs in front of your home or yell at your kids or drive above the speed limit, someone might capture that act on videotape and send you a ticket. Or maybe you'll see yourself on the evening news or a national comedy show. Your misfortunes could gladden the hearts of millions of viewers. It may feel like video martyrdom to you, but it's just live, reality TV! □

**Smile,
America! Home
movies are
out; video news
is in.**

BEGINNER BASIC

Larry Cotton

MY FAVORITE BASIC KEYWORD

I don't ordinarily go around unabashedly touting a particular BASIC keyword, but RND is one I get excited about.

RND creates unpredictable havoc out of order—that's why I like it! Let's see if you can share some of my enthusiasm for this very useful function.

RND creates a virtually random number for use in games, music, graphics, and so forth. However, to generate the first random number, the function depends on a nonrandom seed, or starting number, that is automatically loaded into certain memory registers when the 64 is turned on.

To make the seed as random as possible, use the computer's internal clock (TI) as the argument and convert it to a negative value. The argument is a number inside the parentheses following RND. The best way to see RND in action is by example.

```
10 X=RND(-TI)
20 FORT=1T05:PRINTRND(1):
NEXT
```

After you run it, you should see five nonrepeating numbers between 0 and 1. Any positive number can be substituted for the 1, with similar results. Now enter and run this:

```
10 X=RND(-TI)
20 FORT=1T05:PRINT2*RND
(1):NEXT
```

You will now see five numbers between 0 and 2. We can truncate these numbers by adding the INT function.

```
10 X=RND(-TI)
20 FORT=1T05:PRINTINT(2*
RND(1)):NEXT
```

Be sure to use two opening and two closing parentheses.

How about random choices of two things, such as Yes and No for a Ouija board? Here's a way to do just that, using BASIC's ON and GOTO.

```
10 X=RND(-TI)
20 X=INT(2*RND(1))
30 ONX+1GOTO100,110
100 PRINT"YES":END
110 PRINT"NO":END
```

Run this program a few times and observe the results. Recall that ON and GOTO can control the flow of a BASIC program, so if X=0, then X+1=1, and control goes to line 100. If X=1, then X+1=2, and control jumps to line 110. To add a third alternative:

```
10 X=RND(-TI)
20 X=INT(3*RND(1))
30 ONX+1GOTO100,110,120
100 PRINT"YES":END
110 PRINT"NO":END
120 PRINT"MAYBE":END
```

To increase the range, change 3 to another number.

Again, using ON and GOTO, you can create a higher percentage of a particular response, thereby tilting the odds one way or another.

```
10 X=RND(-TI)
20 PRINTCHR$(147):POKE214,
10:PRINT
30 X=INT(5*RND(1))+1
40 ONXGOTO50,50,50,60,60
50 PRINT"ODD":GOTO70
60 PRINT"EVEN"
70 GETA$:IFA$=""THEN70
80 GOTO20
```

Run this program; then touch any key to run it again. In line 30 we add 1 to the randomly generated number to yield numbers from 1 to 5, inclusive. If X is 1, 2, or 3, then line 50 will be the target GOTO line. If X is 4 or 5, line 60 will be chosen. The computer will seem randomly to choose between odd and even yet will pick, on aver-

age, three odds for every two evens. Shades of Las Vegas!

Speaking of Las Vegas, here's a short program to simulate rolling one die:

```
10 X=RND(-TI)
20 PRINTCHR$(147)
30 X=INT(6*RND(1))+1
40 PRINTX
50 GETA$:IFA$=""THEN50
60 GOTO30
```

A random number from 1 to 6 will be generated. Press any key to see another, or hold a key down to see a string of rolls. Now, what else can be done with this function?

RND can also produce interesting, if not beautiful, music. Enter this short program:

```
10 X=RND(-TI)
20 FORT=54272T054295:
POKET,0:NEXT
30 POKE54296,15
40 POKE54278,255
50 POKE54276,33
60 FORT=1T0500:NEXT
70 POKE54273,INT(100*RND
(1))+10
80 FORT=1T0100:NEXT
90 GOTO70
```

Line 20 clears the sound chip, line 30 turns up the volume, and line 40 sets sustain and release to maximum (attack and decay default to 0). Line 50 turns on the sawtooth waveform, and line 60 creates a short pause.

Line 70 pokes a random frequency from 10 through 100 into voice 1's main frequency register. Line 80 allows the selected tone to sound a moment; then line 90 returns control to line 70, which generates another (probably different) random frequency and pokes it to the frequency register again. Press the Run/Stop key to halt the program.

Now experiment. Change lines 60 and 70 so that tone lengths and pitches, respectively, are also random. □

RND seemingly sets the precise world of computing awry, creating unpredictable havoc out of order.

PROGRAMMER'S PAGE

Randy Thompson

HOW OLD ROMS THWART FLOODS

An empty screen is all I saw when I first ran *Flood*, the game with the surprisingly short listing located at the end of this page. After 20 seconds of blank blue, however, I decided something was wrong with this submission.

Trusting that author Geza Lucz of La Jolla, California, wouldn't send me a game with no visible graphics, I hit Run/Stop and typed LIST to diagnose the problem. It turns out the problem was simple, and one I've dealt with before.

You see, I have a very old 64. I bought this machine back when a blank bright blue computer-generated screen seemed impressive. Anyway, if you own one of these elderly computers, then you know that the ROMs housed within it handle screen color memory differently from 128s and late model 64s.

By default, color memory on an old 64 is set to the text's background color instead of its foreground color. This means that if you poke a character into screen memory, it won't appear unless you also poke a nonbackground color into the corresponding color memory location. So all the characters that *Flood* was laboriously poking across my screen might as well have been spaces, since they adopted the same color as the rest of the screen.

The most obvious solution to this problem is to add a POKE to color memory for every POKE to screen memory. This would slow down the game, however. A better solution is to do as the new 64 ROMs do—preset all of color memory to the foreground color so that any POKE to screen memory produces visible re-

sults. This can be achieved with the loop FOR I=55296 TO 56295: POKE I, color: NEXT strategically placed at the beginning of the program.

But there's an even easier way—one that takes advantage of the way old 64s fill screen memory with the current background color whenever the screen is cleared. Take a look at this.

POKE 53281,14:PRINT CHR\$(147):POKE 53281,6

The first POKE sets the screen's background color to the color that we want our game's characters to appear in. Next, the PRINT CHR\$(147) clears the screen, forcing the computer to fill color memory with the current background color (which, unbeknownst to the computer, is actually our desired foreground color). Finally, the last POKE sets the screen's background color back to normal. Now a POKE to screen memory results in a visible character, no matter how young or how old your 64. You can see this code added to line 100 of the *Flood* program described below.

With the game graphics working, I found *Flood* to be quite entertaining. It's also a good example of what you can do with standard Commodore characters and direct access to screen memory.

The object of the game is to contain a spreading body of water (represented by a growing group of asterisks) by building flood walls. Your score is determined by how quickly and effectively you accomplish this task.

Your onscreen persona appears as a square checkerboard that moves about the screen via the cursor keys. To build a flood wall where you stand, hit Return. Be careful that you don't wall yourself in,

since nothing—not even your stylish square body—can scale the sturdy walls. So have fun and good luck.

As flood waters threaten to engulf you, this short program for the 64 is your only hope for survival.

Send your programming tips and tricks 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 use. □

RAMDRIVE 64

By Hong Pham

How would you like to have another disk drive that lets you access programs and files almost instantly? That's what you get with *Ramdrive 64*.

This program adds a virtual RAM drive to your 64. With information stored in memory, it doesn't have to access a mechanical disk drive. Programs load and save extremely fast. A 70-block program can load in less than four seconds.

What's more, *Ramdrive* does not use any BASIC memory. Instead, it uses the RAM under BASIC and Kernal ROM (\$A000-\$BFFF and \$D000-\$FFFF) to store files. That's about 80 blocks: 77 blocks to store data and 3 for the block availability map and directory.

Getting Started

Ramdrive is written entirely in machine language. To enter the program, use *MLX*, our machine language entry program. When *MLX* prompts you, respond with the following values.

Starting address: 7D00

Ending address: 86CF

When you have finished typing in *Ramdrive*, be sure to save it to a work disk under the name RAMDRIVE.OBJ because *Relocator*, a companion program mentioned below, searches for that name. To use *Ramdrive*, load it with LOAD "RAMDRIVE.OBJ",8,1 and then type SYS 32000, or whatever address you may have relocated it to.

Different Device

Ramdrive acts like any other storage device, such as a 1541 disk drive. That means you can load and save to it as if you were using an external disk drive. Like any device, *Ramdrive* has its own device number. The default device number is 7.

To save to the RAM drive, use the standard SAVE command. For example, SAVE "filename",7 with *filename* being the name of your file. A maximum of 77 blocks or a total of 30 files can be saved to the RAM drive. To load from the RAM drive, use LOAD "filename",7. Wildcard scans are allowed in a load operation. An asterisk (*) will

either load the first file on the directory or the first file with the matching character pattern preceding the asterisk. A question mark (?) can be used to replace an unknown character. Remember that information saved to a RAM drive is not permanent. It's lost once the computer is turned off. So be sure to save any alterations you may have made and want to keep to a disk before you turn off your computer.

RAM Drive Commands

Any device without a good BASIC interface would be clumsy and awkward to use. *Ramdrive 64* adds eight new BASIC commands to make accessing data and programs easier.

BLOAD "filename", device number, starting address

Load a binary file from a device and put it at a specified location in memory. Unlike the standard LOAD command, BLOAD does not corrupt BASIC pointers and reruns any BASIC program already in memory.

BSAVE "filename", device number, starting address, ending address

Save a binary file to a device from a specified memory location.

RDIR

Display the RAM drive directory with RDIR. Unlike in the disk directory display, the file length and the free RAM space are displayed in bytes. LOAD "\$",7 has the same effect as RDIR.

ERASE "filename"

Use this command to erase a file from the RAM drive. As with the LOAD command, wildcard scans are allowed in ERASE. To erase all the files in the directory, use ERASE "*".

DEVICE 0-255

Change the RAM drive device number with this command. Any number between 0 and 255 can be used, but the default RAM drive device number is 7. If you forget what number you assign to the device, enter DEVICE without an

argument, and *Ramdrive* will display the current RAM drive device number.

INIT

This command will initialize the RAM drive. Unlike ERASE "*", INIT clears everything: both the block availability map and the directory. On activation, *Ramdrive* initializes itself. If you accidentally disable the program and don't want to initialize the RAM drive itself, use SYS 32003 or SYS whatever address you choose, and add 3 to it.

VALIDATE

Validate the RAM drive. Although *Ramdrive* validates after every unsuccessful SAVE, use VALIDATE to fix the directory if you have problems.

DISABLE

Use this command to disable *Ramdrive*. SYS 65418 normally restores vectors, but it will not disable *Ramdrive*, nor will Run/Stop-Restore because the load and save vectors are fixed whenever a BASIC command is used. The previous load, save, and BASIC system vectors are restored when *Ramdrive* is disabled.

Although these next two features were originally debugging tools, I thought them too good to leave out. To warm reset the system, hit the space bar and Restore key simultaneously. The Run/Stop key is disabled. To reset the system to the power-up state, press the Back Arrow and Restore keys simultaneously. This routine is a handy debugging tool if you don't have a reset switch and your computer is too corrupt to warm start.

Relocate

Because there is no definite safe memory location in the 64, a conflict for the same memory could result between *Ramdrive* and another program. Where *Ramdrive* is situated, it is safe from programs such as *Metabasic*, *Bassem*, and *Micromon*, but lengthy BASIC programs or strings could overwrite *Ramdrive*.

Relocator solves this potential problem by relocating *Ramdrive* to another location anywhere in memory. Once

PROGRAMS

again, enter this program with *MLX* with the following prompts and be sure to save a copy.

Starting address: 0801
Ending address: 0FB8

Relocator loads and runs like a BASIC program. Once the file has been loaded, type *RUN*. When *Relocator* prompts for the new starting address for *Ramdrive*, enter the address in hexadecimal. If you don't have a good scientific calculator handy to convert decimal to hexadecimal, the following program may help.

```
PE 10 H$ = "0123456789ABCDEF": B = 16:
  B1 = 2↑B
FP 20 INPUT "ENTER DECIMAL VALUE";N: IF
  ABS(N)>B1-1 THEN 20
PP 30 N$ = "": IFN<0 THEN N = B1+N
FF 40 FOR I = 1 TO B/4:T = N-(INT(N/16)*16):
  N$ = MID$(H$,T+1,1)+N$:N = N/16
CG 50 NEXT: PRINTN$
```

After *Relocator* relocates *Ramdrive*, insert a work disk to save the relocated version of *Ramdrive*. If the save is successful, you may exit to BASIC or relocate another copy of *Ramdrive*. Be sure to remember your new starting address and to add 3 to it when you want to run it.

RAMDRIVE 64

```
7D00:20 F5 81 20 AE 84 20 FF 62
7D08:84 A9 81 A2 7D 8D FA FF 22
7D10:8E FB FF 20 44 E5 20 6B B8
7D18:84 A2 08 20 62 84 A9 A6 20
7D20:A0 85 20 1E AB A9 BF A0 D6
7D28:85 20 1E AB A2 06 20 62 3C
7D30:84 4C 34 85 48 8A 48 98 F4
7D38:48 AD 01 DC C9 EF F0 09 A9
7D40:C9 FD F0 1D 20 ED F6 D0 07
7D48:15 20 12 85 20 81 FF 20 97
7D50:8A FF 20 F3 84 20 84 FF 81
7D58:EA EA EA 02 A0 4C 9F 72
7D60:7D A2 FF 7C 9A D8 E8 8A DE
7D68:95 02 E8 D0 FB 20 A3 FD 7E
7D70:A2 00 A0 A0 20 8C FD 20 2A
7D78:15 FD 20 5B FF 58 6C 00 71
7D80:A0 48 8E 95 7D 20 EF 81 D6
7D88:78 A9 99 A2 7D 8D 5F 7D E5
7D90:8E 60 7D 68 A2 FF 4C 34 03
7D98:7D 20 12 85 20 E4 81 68 F4
7DA0:A8 68 AA 68 40 20 73 00 4F
7DA8:20 D4 E1 A6 2D A4 2E A9 91
7DB0:2B 20 D8 FF B0 03 4C 3B C9
7DB8:7E 08 48 AD 46 85 C5 BA 67
7DC0:F0 05 68 28 4C F9 E0 68 79
7DC8:28 6C 00 03 A5 7A A6 7B 03
7DD0:8D 62 85 8E 63 85 A9 00 49
```

```
7DD8:8D 61 85 20 F3 84 A9 64 0F
7DE0:A2 85 85 29 86 2A 20 73 62
7DE8:00 C9 94 F0 B8 20 1D 85 FD
7DF0:A0 00 B1 29 F0 29 20 73 E4
7DF8:00 D1 29 D0 03 C8 D0 F2 6A
7E00:20 1D 85 EE 61 85 EE 61 54
7E08:85 AD 61 85 C9 12 B0 25 D4
7E10:A0 00 20 97 82 B1 29 D0 D8
7E18:F9 20 97 82 4C ED 7D 20 6A
7E20:73 00 AE 61 85 BD 94 85 94
7E28:8D 33 7E E8 BD 94 85 8D EF
7E30:34 7E 4C FF FF 20 1D 85 B0
7E38:4C 3D 7E C6 7A 4C FF FF EB
7E40:20 57 E2 20 BD FF 20 F1 A1
7E48:B7 A9 0F A0 00 20 BA FF 6D
7E50:20 28 85 84 C3 85 C4 A9 C7
7E58:00 20 A2 F4 08 A5 BA CD 1B
7E60:46 85 F0 04 28 4C 3B 7E A7
7E68:28 B0 02 90 CE 6C 00 03 1A
7E70:20 57 E2 20 BD FF AE 46 43
7E78:85 20 F1 B7 A9 0F A0 08 CC
7E80:20 BA FF 20 28 85 84 C1 60
7E88:85 C2 20 28 85 84 AE 85 A0
7E90:AF 20 EA F5 4C 5C 7E 20 1B
7E98:10 83 4C 3B 7E 20 F5 81 9D
7EA0:A9 66 A0 86 20 1E AB 4C A5
7EA8:3B 7E 20 57 E2 86 22 84 56
7EB0:23 A8 D0 05 A2 08 6C 00 E1
7EB8:03 98 A6 22 A4 23 20 BD 04
7EC0:FF AD 46 85 85 BA 20 BA 5C
7EC8:FF 20 70 84 4C 3B 7E 20 90
7ED0:E4 81 20 D2 82 20 EF 81 C7
7ED8:4C 3B 7E 20 79 00 F0 0A 54
7EE0:C9 3A F0 06 20 F4 B7 8E A2
7EE8:46 85 20 31 85 4C 3B 7E D3
7EF0:A9 47 A2 FE 8D 18 03 8E 3A
7EF8:19 03 AD 7A 7F AE 7B 7F CD
7F00:8D 30 03 8E 31 03 AD 48 54
7F08:80 AE 49 80 8D 32 03 8E ED
7F10:33 03 AD 3E 7E AE 3F 7E AE
7F18:8D 08 03 8E 09 03 AD 46 1F
7F20:7F AE 47 7F 8D 00 03 8E 6C
7F28:01 03 A9 7E A0 86 20 1E 03
7F30:AB 4C 3B 7E 38 0E 41 F0 20
7F38:0F E0 42 F0 11 E0 43 F0 D1
7F40:13 E0 44 F0 15 4C FF FF 72
7F48:A9 93 A0 86 B0 10 A9 9F 36
7F50:A0 86 B0 0A A9 AE A0 86 C7
7F58:B0 04 A9 BC A0 86 48 20 81
7F60:6B 84 A9 3F 20 D2 FF 68 14
7F68:20 1E AB 4C 65 A4 85 93 95
7F70:A5 BA CD 46 85 F0 05 A5 AE
7F78:93 4C FF FF A5 93 D0 F7 69
7F80:20 AF F5 A5 B7 10 04 38 D2
7F88:A2 08 60 A0 00 B1 BB C9 F8
7F90:24 00 09 20 D2 F5 20 6B 13
7F98:84 4C 10 83 20 E4 81 20 DE
7FA0:3B 82 20 EF 81 90 03 A2 D7
7FA8:04 60 20 D2 F5 20 E4 81 6E
7FB0:20 3B 82 8D C7 82 A9 00 53
7FB8:85 90 8D C6 82 AA 20 C5 81
7FC0:82 8D F0 7F E8 A8 D0 07 0D
7FC8:20 C5 82 8D 05 80 E8 A5 14
7FD0:B9 F0 11 20 C5 82 8D 47 A7
7FD8:85 E8 20 C5 82 98 AE 47 50
7FE0:85 4C E8 7F A6 C3 A4 C4 1D
7FE8:86 29 84 2A A2 03 A8 A9 C4
7FF0:FF D0 1F E8 8E C6 82 AA D5
7FF8:EE 05 80 20 C5 82 91 2A 47
8000:2E 97 82 E8 0E FF 90 F3 F1
```

```
8008:20 EF 81 18 98 A6 29 A4 1D
8010:2A 60 8D 21 80 20 C5 82 94
8018:91 29 20 97 82 E8 D0 F5 F8
8020:A9 FF 8D C7 82 8E C6 82 82
8028:20 C5 82 F0 06 8D 21 80 33
8030:E8 D0 E2 E8 20 C5 82 8D 6F
8038:05 80 EE 05 80 E8 D0 BB 0F
8040:A5 BA CD 46 85 F0 03 4C 23
8048:FF FF 20 8F F6 A5 B7 D0 D4
8050:04 38 A2 08 60 20 E4 81 05
8058:20 3B 82 B0 05 A2 41 4C 15
8060:A5 82 20 C9 82 A0 11 A2 D0
8068:00 B1 27 F0 0F 30 0D 20 3D
8070:80 82 E8 E0 1E D0 F2 A2 3A
8078:42 4C A5 82 A0 00 B1 BB AE
8080:C9 2A F0 08 C9 A0 F0 04 46
8088:C9 3F D0 05 A2 44 4C A5 0D
8090:82 91 27 C8 C4 B7 90 E6 B5
8098:A9 A0 C0 10 B0 05 91 27 93
80A0:C8 D0 F7 20 8C 82 90 03 CD
80A8:4C A3 82 48 A9 01 9D 50 6A
80B0:FD 68 8D 60 85 A0 10 91 E2
80B8:27 C8 A9 80 91 27 A5 AE DF
80C0:E5 C1 8D 5E 85 A0 12 91 21
80C8:27 A5 AF E5 82 8D 5F 85 AB
80D0:A0 13 91 27 AD 60 85 85 0B
80D8:2A A0 00 84 29 AD 5F 85 A3
80E0:D0 3F AD 5E 85 C9 FC B0 B3
80E8:38 A9 00 91 29 20 97 82 05
80F0:AD 5E 85 91 29 20 97 82 A5
80F8:A5 C1 91 29 20 97 82 A5 0C
8100:C2 91 29 20 97 82 AE 5E 72
8108:85 E8 B1 C1 91 29 C8 CA E7
8110:D0 F8 A0 11 A9 01 91 27 7A
8118:18 20 EF 81 A6 AE A4 AF 2E
8120:60 A5 C1 A6 C2 8D B4 82 97
8128:8E B5 82 20 8C 82 90 03 C4
8130:4C A3 82 A0 00 91 29 20 55
8138:97 82 A5 C1 91 29 20 97 81
8140:82 A5 C2 91 29 20 97 82 DA
8148:20 B3 82 91 29 C8 C0 FD 9D
8150:D0 F6 20 B7 82 20 8C 82 29
8158:85 2A A0 00 84 29 A9 01 D9
8160:9D 50 FD 38 AD 5E 85 E9 65
8168:FD 8D 5E 85 AD 5F 85 E9 D1
8170:F0 8D 5F 85 AD 5F 85 D0 E1
8178:2F AD 5E 85 C9 FE B0 28 76
8180:A9 00 91 29 20 97 82 AE 30
8188:5E 85 E8 E8 8A 91 29 20 D4
8190:97 82 EE 5E 85 A2 00 20 9A
8198:B3 82 91 29 C8 CC 5E 85 96
81A0:D0 F5 20 B7 82 4C 12 81 F3
81A8:20 8C 82 90 03 4C A3 82 4B
81B0:91 29 20 97 82 20 B3 82 C2
81B8:91 29 C8 C0 FF D0 F6 20 45
81C0:B7 82 20 8C 82 85 2A A0 2C
81C8:00 84 29 A9 01 9D 50 FD C9
81D0:38 AD 5E 85 E9 FF 8D 5E 48
81D8:85 AD 5F 85 E9 00 8D 5F 18
81E0:85 4C 74 81 78 A5 01 8D 4A
81E8:F0 81 A9 F4 85 01 60 A9 E3
81F0:37 85 01 58 60 A2 00 8A AE
81F8:9D A0 FD 9D 00 FE 9D F2 B6
8200:FE E8 D0 F4 A2 00 8A 9D EF
8208:50 FD E8 E0 4F D0 F8 60 EF
8210:C9 A0 90 18 C9 C0 B0 06 6E
8218:38 E9 A0 AA 18 60 C9 D0 19
8220:90 0A C9 FD B0 06 38 E9 01
8228:B0 4C 1B 82 38 60 18 E0 78
8230:20 B0 04 8A 69 A0 60 8A B3
```


8238:69 AF 60 20 C9 82 A2 00 89
8240:A0 00 B1 BB C9 2A F0 24 84
8248:C9 3F F0 04 D1 27 D0 0F 3C
8250:C8 C4 B7 90 ED C0 10 F0 6E
8258:13 B1 27 C9 A0 F0 0D E8 A0
8260:E0 1F F0 06 20 80 82 4C 70
8268:40 82 38 60 A0 11 B1 27 0F
8270:F0 ED 30 EB 18 88 B1 27 9B
8278:48 A0 12 B1 27 A8 68 60 34
8280:18 A5 27 69 14 85 27 90 0C
8288:02 E6 28 CA A2 4C BD 50 65
8290:FD F0 0B C6 A0 F8 38 E6 9A
8298:29 D0 02 E6 2A 60 20 2E 56
82A0:82 18 60 A2 43 8E 48 85 8D
82A8:20 D2 82 AE 48 85 38 20 96
82B0:EF 81 60 B9 FF FF 60 18 8E
82B8:98 6D B4 82 8D B4 82 90 F8
82C0:03 EE B5 82 60 BD FF FF DB
82C8:60 A9 A0 A2 FD 85 27 86 81
82D0:28 60 20 C9 82 20 04 82 C1
82D8:A2 00 8E 47 85 A0 11 B1 F7
82E0:27 F0 22 30 20 88 B1 27 AA
82E8:8D FC 82 48 A9 00 8D FB 2D
82F0:82 68 20 10 82 A9 01 9D B0
82F8:50 FD AD FF FF 8D FC 82 0E
8300:F0 03 4C F2 82 EE 47 85 DC
8308:AD 47 85 C9 1E D0 CE 60 37
8310:20 6B 84 A2 03 20 62 84 9E
8318:A9 04 A0 86 20 1E AB 20 62
8320:6B 84 A9 12 20 D2 FF A2 43
8328:04 20 62 84 A9 43 A0 86 EF
8330:20 1E AB A2 09 20 62 84 80
8338:A9 4C A0 86 20 1E AB A2 17
8340:04 20 62 84 20 6B 84 20 BD
8348:E4 81 20 C9 82 A9 00 8D 0B
8350:48 85 8D 61 85 A0 00 B1 05
8358:27 99 49 85 C8 C0 14 D0 1D
8360:F6 A0 11 B9 49 85 F0 35 40
8368:30 33 20 EF 81 EE 61 85 67
8370:A2 00 BD 49 85 20 D2 FF 67
8378:E8 E0 10 D0 F5 A9 20 20 F1
8380:D2 FF AD 5B 85 AE 5C 85 81
8388:20 FA 83 A9 1C A0 86 20 F9
8390:1E AB 20 6B 84 20 E1 FF B4
8398:F0 13 20 E4 81 20 80 82 3F
83A0:EE 48 85 AD 48 85 C9 1E C6
83A8:F0 03 4C 55 83 20 EF 81 C5
83B0:20 6B 84 A9 20 20 D2 FF F4
83B8:AE 61 85 A9 00 20 CD BD 94
83C0:A9 2B A0 86 20 1E AB 20 D4
83C8:E4 81 A9 00 8D 61 85 A2 77
83D0:4C BD 50 FD D0 03 EE 61 29
83D8:85 CA 10 F5 20 EF 81 A9 24
83E0:20 20 D2 FF AD 61 85 A2 FA
83E8:00 20 CD BD A9 1C A0 86 13
83F0:20 1E AB A9 23 A0 86 4C 94
83F8:1E AB 8D 57 85 8E 58 85 BD
8400:A9 00 8D 59 85 8D 5A 85 C1
8408:8D 5B 85 8D 5C 85 A2 0F 85
8410:0E 57 85 2E 58 85 78 F8 4C
8418:AD 59 85 6D 59 85 8D 59 2B
8420:85 AD 5A 85 6D 5A 85 8D 68
8428:5A 85 AD 5B 85 6D 5B 85 49
8430:8D 5B 85 8D 58 CA 10 D8 FB
8438:A2 02 BD 59 85 48 4A 8C
8440:4A 4A 20 4F 84 68 29 0F 21
8448:20 4F 84 CA 10 EC 60 CD 35
8450:5C 85 D0 04 A9 20 D0 07 B9
8458:09 30 A0 FF 8C 5C 85 4C 33
8460:D2 FF A9 20 20 D2 FF CA 21

8468:D0 FA 60 A9 0D 4C D2 FF 7E
8470:20 E4 81 A9 00 8D 47 85 D7
8478:8D 48 85 20 3B 82 B0 09 5B
8480:A0 11 A9 00 91 27 EE 48 A2
8488:85 20 80 82 EE 47 85 AD E1
8490:47 85 C9 1E D0 E5 20 D2 EA
8498:82 20 EF 81 20 6B 84 A9 62
84A0:00 AE 48 85 20 CD BD A9 14
84A8:51 A0 86 4C 1E AB AD 30 43
84B0:03 AE 31 03 8D 7A 7F 8E 21
84B8:7B 7F AD 32 03 AE 33 03 74
84C0:8D 48 80 8E 49 80 AD 08 4B
84C8:03 AE 09 03 8D 3E 7E 8E 41
84D0:3F 7E AD 00 03 AE 01 03 A6
84D8:8D 46 7F 8E 47 7F 60 A9 B5
84E0:CC A2 7D 8D 08 03 8E 09 F3
84E8:03 A9 34 A2 7F 8D 00 03 C3
84F0:8E 01 03 A9 34 A2 7D 8D 31
84F8:18 03 8E 19 03 A9 6E A2 70
8500:7F 8D 30 03 8E 31 03 A9 4D
8508:40 A2 80 8D 32 03 8E 33 B2
8510:03 60 A9 9F A2 7D 8D 5F 69
8518:7D 8E 60 7D 60 AD 62 85 6D
8520:85 7A AD 63 85 85 7B 60 12
8528:20 0E E2 20 8A AD 4C F7 C0
8530:B7 20 6B 84 A9 E9 A0 85 90
8538:20 1E AB A9 00 AE 46 85 B7
8540:20 CD BD 4C 6B 84 07 00 C6
8548:00 00 00 00 00 00 00 00 53
8550:00 00 00 00 00 00 00 00 5B
8558:00 00 00 00 00 00 00 00 63
8560:00 00 00 00 42 93 00 42 0E
8568:94 00 52 44 49 52 00 52 32
8570:D6 00 49 4E 49 54 00 45 D5
8578:52 41 53 45 00 C5 49 44 A9
8580:41 54 45 00 44 49 53 41 19
8588:42 4C 45 00 44 45 56 49 9D
8590:43 45 00 00 40 7E 70 E9
8598:97 7E 97 7E 9D 7E AA 7E A4
85A0:CF 7E F0 7E DB 7E 43 36 CE
85A8:34 20 52 41 4D 2D 44 52 2E
85B0:49 56 45 20 49 4E 53 54 1F
85B8:41 4C 4C 45 44 0D 00 0D B8
85C0:20 20 43 4F 50 59 52 49 17
85C8:47 48 54 20 31 39 39 31 28
85D0:20 50 48 41 4D 20 2F 56 C4
85E0:39 31 30 37 31 32 0D 0D C7
85E8:00 52 41 4D 44 52 49 56 D9
85F0:45 20 44 45 56 49 43 45 27
85F8:20 4E 55 4D 42 45 52 20 13
8600:49 53 20 00 43 36 34 20 06
8608:52 41 4D 44 52 49 56 45 26
8610:20 44 49 52 45 43 54 4F BB
8618:52 59 0D 00 20 42 59 54 57
8620:45 53 00 20 46 52 45 45 F1
8628:2E 0D 00 20 46 49 4C 45 C6
8630:28 53 29 20 49 4E 20 44 55
8638:49 52 45 43 54 4F 52 59 39
8640:2E 0D 00 46 49 4C 45 4E 60
8648:41 4D 45 00 53 49 5A 45 AB
8650:00 20 46 49 4C 45 53 28 09
8658:53 29 20 53 43 52 41 54 CC
8660:43 48 45 44 2E 00 0D 52 EB
8668:41 4D 44 52 49 56 45 20 65
8670:49 4E 49 54 49 41 4C 49 55
8678:5A 45 44 2E 0D 00 0D 52 44
8680:41 4D 44 52 49 56 45 20 7D
8688:44 49 53 41 42 4C 45 44 9A
8690:2E 0D 00 46 49 4C 45 20 82

8698:45 58 49 53 54 53 00 44 F0
86A0:49 52 45 43 54 4F 52 59 A1
86A8:20 46 55 4C 4C 00 52 41 0F
86B0:4D 44 52 49 56 45 20 46 A2
86B8:55 4C 4C 00 49 4C 4C 45 66
86C0:47 41 4C 20 46 49 4C 45 82
86C8:4E 41 4D 45 00 00 00 00 4B

RELOCATOR

0801:0E 08 C7 07 9E 20 28 32 7B
0809:30 36 34 29 00 00 00 78 50
0811:A2 FF 9A 20 A3 FD 20 15 32
0819:FD 20 5B FF 58 A9 05 20 2F
0821:D2 FF A9 93 20 D2 FF A9 FE
0829:00 20 90 FF A9 06 8D 20 F3
0831:D0 8D 21 D0 A2 02 A0 0A A6
0839:18 20 F0 FF A9 0F 8D 86 A6
0841:02 A9 AF 20 0D 0D A2 8A 21
0849:A0 0E 20 20 0D 20 15 0D 53
0851:A9 0B 8D 86 02 A9 B7 20 59
0859:0D 0D 18 A0 02 A2 06 20 07
0861:F0 FF A2 A4 A0 0E 20 20 26
0869:0D 18 A0 00 A2 09 20 F0 84
0871:FF AD 69 0E F0 03 4C DF 07
0879:08 A2 C9 A0 0E 20 20 0D B7
0881:A0 04 A2 0A 18 20 F0 FF FA
0889:A2 F3 A0 0E 20 20 0D 20 98
0891:34 0D 20 34 0D 20 E4 FF F8
0899:F0 FB A2 13 A0 0F 20 20 48
08A1:0D A9 05 A6 BA A0 FF 20 26
08A9:BA FF A9 10 A2 6A A0 0E 5B
08B1:20 BD FF A9 00 20 D5 FF 08
08B9:20 B7 FF 29 0F F0 1F A2 77
08C1:21 A0 0F 20 20 0D A2 39 22
08C9:A0 0F 20 20 0D 20 E4 FF A6
08D1:C9 59 F0 07 C9 4E D0 F5 CA
08D9:6C FC FF 4C 10 08 A9 01 19
08E1:8D 69 0E A2 4A A0 0F 20 12
08E9:20 0D A9 00 8D A2 0D 85 19
08F1:CC A9 01 8D 86 02 20 E4 2D
08F9:FF F0 FB C9 0D F0 21 C9 9A
0901:14 F0 0D A2 0F DD 7A 0E 18
0909:F0 20 CA 10 F8 4C F7 08 E6
0911:AD A2 0D F0 E1 A9 14 20 51
0919:D2 FF CE A2 0D 4C F7 08 2A
0921:AD A2 0D C9 04 90 CF 4C 3F
0929:4C 09 AE A2 0D 9D A3 0D D6
0931:20 D2 FF EE A2 0D AD A2 3E
0939:0D C9 04 D0 B9 20 E4 FF E9
0941:C9 14 F0 CC C9 0D F0 D8 65
0949:4C 3E 09 A9 01 85 CC A9 2E
0951:20 20 D2 FF AE A3 0D AC A0
0959:A4 0D 20 39 0D 8D 99 0D 77
0961:AE A5 0D AC A6 0D 20 39 83
0969:0D 8D 98 0D 20 34 0D A2 D7
0971:61 A0 0F 20 20 0D 20 97 4D
0979:0A A2 71 A0 0F 20 20 0D B7
0981:A9 00 85 CC 8D A2 0D 20 17
0989:E4 FF C9 0D F0 26 C9 14 DF
0991:F0 2A C9 20 90 F1 C9 80 42
0999:B0 03 4C A2 09 C9 A0 90 B9
09A1:E6 AE A2 0D E0 10 F0 DF 01
09A9:20 D2 FF 9D A3 0F EE A2 34
09B1:0D 4C 88 09 AD A2 0D F0 02
09B9:CE 4C D2 09 AE A2 0D F0 3C
09C1:C6 A9 14 20 D2 FF A9 00 10
09C9:9D A3 0F CE A2 0D 4C 88 CC

PROGRAMS

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09D1:09 A9 01 85 CC A9 20 20 B8
09D9:D2 FF 20 34 0D A2 85 A0 3B
09E1:0F 20 20 0D AE A2 0D A0 13
09E9:00 B9 9F 0F 9D A3 0F EE D7
09F1:A2 0D E8 C8 C0 04 D0 F1 EB
09F9:18 AD 9A 0D 6D 9E 0D 8D 35
0A01:A9 0D AD 9B 0D 6D 9F 0D 07
0A09:8D AA 0D AD 9E 0D AE 9F 31
0A11:0D 85 FD 86 FE AD A2 0D 36
0A19:A2 A3 A0 0F 20 BD FF A9 0E
0A21:05 A6 BA A0 05 20 BA FF E0
0A29:20 C0 FF 20 B7 FF 29 0F 9E
0A31:F0 03 4C 6C 0D A2 05 20 EB
0A39:C9 FF AD 98 0D 20 D2 FF FF
0A41:AD 99 0D 20 D2 FF A0 00 0E
0A49:B1 FD 20 D2 FF 20 B7 FF D6
0A51:29 0F F0 03 4C 6C 0D E6 21
0A59:FD D0 02 E6 FE 38 AD A9 2D
0A61:0D E5 FD 8D A8 0D AD AA 8D
0A69:0D E5 FE 0D A8 0D B0 D8 E1
0A71:A9 05 20 C3 FF 20 CC FF F5
0A79:20 34 0D 20 34 0D A2 91 FA
0A81:A0 0F 20 20 0D 20 E4 FF 62
0A89:C9 59 D0 03 4C 10 08 C9 9F
0A91:4E D0 F2 6C FC FF 20 8E DC
0A99:0C AD 9E 0D AE 9F 0D 8D 5F
0AA1:BC 0A 8E BD 0A AD 96 0D 85
0AA9:AE 97 0D 8D B9 0A 8E BA 43
0AB1:0A A2 00 AC 9B 0D C8 BD 9E
0AB9:FF FF 9D FE FF E8 D0 F7 AE
0AC1:EE BA 0A EE BD 0A 88 D0 24
0AC9:EE 20 03 0A 20 08 0C 4C FD
0AD1:2C 0C 18 AD 96 0D 6D 9C 3D
0AD9:0D 8D A0 0D AD 97 0D 6D 10
0AE1:9D 0D 8D A1 0D AE 01 40 39
0AE9:A0 00 A2 00 B1 FD 0D 36 1A
0AF1:0E F0 2B E8 E0 30 D0 F6 9D
0AF9:A2 00 DD F3 0D F0 10 E8 8F
0B01:E0 4F D0 F6 91 FB 20 50 F1
0B09:0C 20 64 0C 4C E9 0A 91 2A
0B11:FB 20 50 0C B1 FD 91 FB 9C
0B19:20 50 0C 4C 0A B9 91 FB 35
0B21:20 50 0C B1 FD 8D A2 0D 70
0B29:20 56 0C B1 FD 8D A3 0D FB
0B31:20 56 0C 38 AD A0 0D ED E9
0B39:A2 0D 8D A4 0D AD A1 0D 4F
0B41:ED A3 0D 0D A4 0D 90 50 74
0B49:38 AD 96 0D ED A2 0D 8D 2C
0B51:A4 0D AD 97 0D ED A3 0D A0
0B59:0D A4 0D 0B 3B 38 AD A2 84
0B61:0D ED 96 0D 8D A4 0D AD E3
0B69:A3 0D ED 97 0D 8D A5 0D C2
0B71:18 AD 98 0D 6D A4 0D 8D 88
0B79:A6 0D AD 99 0D 6D A5 0D EB
0B81:8D A7 0D A0 0D AD A6 0D 05
0B89:91 FB 20 5D 0C AD A7 0D B4
0B91:91 FB 20 5D 0C 4C 0A 0B F9
0B99:A0 00 AD A2 0D 91 FB 20 A6
0BA1:5D 0C AD A3 0D 91 FB 20 20
0BA9:5D 0C 4C 0A 0B A0 00 B1 28
0BB1:FD 8D A2 0D C8 B1 FD 8D E5
0BB9:A4 0D C8 B1 FD 8D A3 0D 14
0BC1:C8 B1 FD 8D A5 0D 38 AD C0
0BC9:A4 0D ED 96 0D 8D A4 0D 91
0BD1:AD A5 0D ED 97 0D 8D A5 5A
0BD9:0D 18 AD A4 0D 6D 98 0D D8
0BE1:8D A4 0D AD A5 0D 6D 99 3A
0BE9:0D 8D A5 0D A0 00 AD A2 72
0BF1:0D 91 FB C8 AD A4 0D 91 AA
0BF9:FB C8 AD A3 0D 91 FB C8 9F

```

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0C01:AD A5 0D 91 FB C8 60 20 F7
0C09:8E 0C A9 34 8D AC 0D AE CB
0C11:AC 0D BD AC 0D A8 BD AB 77
0C19:0D 20 A3 0C 20 AE 0B CE 95
0C21:AC 0D CE AC 0D AE AC 0D 01
0C29:D0 E5 60 20 8E 0C A9 12 3B
0C31:8D AC 0D AE AC 0D BD E0 BD
0C39:0D A8 BD DF 0D 20 A3 0C F3
0C41:20 CC 0C CE AC 0D CE AC EE
0C49:0D AE AC 0D D0 E5 60 20 F8
0C51:56 0C 4C 5D 0C E6 FD D0 BF
0C59:02 E6 FE 60 E6 FB D0 02 DC
0C61:E6 FC 60 38 A5 FB ED 9E 53
0C69:0D 8D A2 0D A5 FC ED 9F 2D
0C71:0D 8D A3 0D 38 AD A2 0D 83
0C79:ED 9A 0D 8D A4 0D AD A3 02
0C81:0D ED 9B 0D 0D A4 0D B0 A5
0C89:01 60 68 68 60 AD 96 0D C1
0C91:AE 97 0D 85 FD 86 FE AD 96
0C99:9E 0D AE 9F 0D 85 FB 86 11
0CA1:FC 60 8D A2 0D 8C A3 0D 1B
0CA9:18 AD 9E 0D 6D A2 0D 85 73
0CB1:FB AD 9F 0D 6D A3 0D 85 91
0CB9:FC 18 AD 96 0D 6D A2 0D E5
0CC1:85 FD AD 97 0D 6D A3 0D BD
0CC9:85 FE 60 A0 00 B1 FD 8D CA
0CD1:A4 0D C8 B1 FD 8D A5 0D 32
0CD9:38 AD A4 0D ED 96 0D 8D 50
0CE1:A6 0D AD A5 0D ED 97 0D FC
0CE9:8D A7 0D 18 AD A6 0D 6D 65
0CF1:98 0D 8D A6 0D AD A7 0D 31
0CF9:6D 99 0D 8D A7 0D A0 00 5C
0D01:AD A6 0D 91 FB C8 AD A7 5C
0D09:0D 91 FB 60 A2 14 20 D2 0C
0D11:FF CA D0 FA 38 20 F0 FF CB
0D19:28 A0 0A 18 4C F0 FF 8E 47
0D21:29 0D 8C 2A 0D A2 00 BD F7
0D29:FF FF F0 6E 20 D2 FF E8 F6
0D31:D0 F5 60 A9 0D 4C D2 FF 17
0D39:8E A9 0D 8C AA 0D A0 00 3A
0D41:AD A9 0D D9 7A 0E F0 03 CC
0D49:C8 D0 F8 98 0A 0A 0A 3B
0D51:8D A8 0D A2 0D AD AA 0D 41
0D59:DD 7A 0E F0 03 E8 D0 F8 28
0D61:8A 0D A8 0D 8D A8 0D AD C0
0D69:A8 0D 60 A9 05 20 C3 FF F1
0D71:20 CC FF 20 34 0D A2 21 0D
0D79:A0 0F 20 20 0D A2 39 A0 B3
0D81:0F 20 20 0D 20 E4 FF C9 5E
0D89:59 F0 07 C9 4E D0 F5 4C F7
0D91:10 08 4C F9 09 00 7D 00 22
0D99:40 CD 09 A8 08 00 40 00 B3
0DA1:00 00 00 00 00 00 00 00 BB
0DA9:00 00 00 00 00 09 00 00 48
0DB1:25 00 89 00 DE 00 A0 01 C8
0DB9:2A 02 48 02 4E 02 54 02 B7
0DC1:5A 02 18 06 2C 06 38 06 DC
0DC9:8B 06 C0 06 EC 06 F3 06 11
0DD1:A7 07 DF 07 E9 07 F3 07 48
0DD9:FD 07 07 08 12 08 34 08 37
0DE1:94 08 96 08 98 08 9A 08 BD
0DE9:9C 08 9E 08 A0 08 A2 08 1B
0DF1:A4 08 A9 A2 A0 A5 B5 A1 68
0DF9:B1 A4 B4 A6 B6 B0 F0 90 02
0E01:C9 C5 D5 C1 D1 D0 A6 B6 20
0E09:85 95 81 91 84 94 86 96 B0
0E11:C6 D6 E6 F6 C0 C4 CE E0 26
0E19:E4 EC E9 E5 F5 E1 F1 69 03
0E21:65 75 61 71 30 10 29 25 C9
0E29:35 21 31 09 05 15 01 11 6E

```

```

0E31:49 45 55 41 51 AD BD B9 78
0E39:AC BC 20 CD DD D9 AE BE 2E
0E41:4C 6C 8D 9D 99 8C 8E CE 15
0E49:DE EE FE CC EC ED FD F9 52
0E51:6D 7D 79 2D 3D 39 0D 1D 8B
0E59:19 4D 5D 59 2C 2E 3E 6E 9B
0E61:7E 4E 5E 0E 1E A9 A2 A0 7A
0E69:00 52 41 4D 44 52 49 56 6B
0E71:45 2E 4F 42 4A 2A 20 20 25
0E79:20 30 31 32 33 34 35 36 06
0E81:37 38 39 41 42 43 44 45 6F
0E89:46 8E 08 12 98 20 52 41 B9
0E91:4D 44 52 49 56 45 20 52 9E
0E99:45 4C 4F 43 41 54 4F 52 D5
0EA1:20 92 00 9A 43 4F 50 59 6D
0EA9:52 49 47 48 54 20 31 39 6D
0EB1:39 31 20 43 4F 4D 50 55 94
0EB9:54 45 20 50 55 42 4C 49 EF
0EC1:43 41 54 49 4F 4E 53 00 49
0EC9:05 49 4E 53 45 52 54 20 F5
0ED1:57 4F 52 4B 20 44 49 53 64
0ED9:4B 20 43 4F 4E 54 41 49 90
0EE1:4E 49 4E 47 20 52 41 4D CF
0EE9:44 52 49 56 45 2E 4F 42 0F
0EF1:4A 00 54 48 45 4E 20 50 36
0EF9:52 45 53 53 20 41 20 4B C1
0F01:45 59 20 54 4F 20 43 4F 32
0F09:4E 54 49 4E 55 45 2E 2E BB
0F11:2E 00 9F 4C 4F 41 44 49 50
0F19:4E 47 2E 2E 2E 2E 0D 00 1D
0F21:0D 9E 2D 2D 2D 2D 20 44 88
0F29:49 53 4B 20 45 52 52 4F 93
0F31:52 20 2D 2D 2D 2D 00 00 31
0F39:54 52 59 20 41 47 41 49 36
0F41:4E 20 28 59 2F 4E 29 3F 6D
0F49:00 0D 9A 52 45 4C 4F 43 60
0F51:41 54 45 20 41 44 44 52 C5
0F59:45 53 53 20 3A 20 24 00 F5
0F61:9F 52 45 4C 4F 43 41 54 AF
0F69:49 4E 47 2E 2E 2E 0D 00 CF
0F71:0D 9A 53 41 56 45 20 46 89
0F79:49 4C 45 20 4E 41 4D 45 51
0F81:3A 20 05 00 9F 53 41 56 88
0F89:49 4E 47 2E 2E 2E 00 32
0F91:41 4E 4F 54 48 45 52 20 2F
0F99:28 59 2F 4E 29 00 2C 50 DE
0FA1:2C 57 00 00 00 00 00 00 AB
0FA9:00 00 00 00 00 00 00 00 C7
0FB1:00 00 00 00 00 00 00 00 CF

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1-3-5-7

By Randy Thompson
Can computers learn? It's a thought-provoking question. In a sense, you teach your computer something every time you type in a new program, but is that really learning?

With these questions in mind, I set out to write a program that not only teaches the computer a new trick (to play a game) but also improves its perform-

ance by letting it learn from its mistakes. This program plays a simple game that I call 1-3-5-7 because of the way the game's 16 pieces are arranged—in four rows with one piece in the first row, three pieces in the second row, five pieces in the third row, and seven pieces in the fourth row. The more games of 1-3-5-7 you play against the computer, the better the computer gets at winning.

Getting Started

The program is written entirely in BASIC. Type it in using *The Automatic Proofreader*; see "Typing Aids" elsewhere in this section. When you've finished typing, be sure to save a copy of the program before running it.

When you play for the first time, your computer is a terrible opponent. It knows nothing about what is a good or bad move; it simply strives to make legal moves. At the end of each game, however, the computer reviews the moves both you and it made and attempts to learn from the loser's mistakes and the winner's good strategy. After a number of games, the computer's talent at remembering past events makes it a formidable adversary.

How to Play

The game is easy to learn. Players take turns removing pieces from the board. Remove as many as you like as long as those pieces are taken from one row only. You may remove pieces from any row, and you must take at least one piece. The player who removes the last piece loses the game.

When you run 1-3-5-7, the computer asks you if you want to load any previous game experience. This is a file that you can create after playing a few games and then exiting 1-3-5-7.

The game operates from a menu containing six options: Human Moves First, Computer Moves First, Human vs. Human, Computer vs. Computer, Auto-Learn Mode, and Quit.

In the first two options, you play against the computer. If you have not loaded a knowledge file, the computer selects legal moves totally at random (it doesn't know any better). Against a reasonably aware opponent, the computer nearly always loses. It *can* win, but it rarely does.

Beating the computer is not the

idea, however. It's your job to improve the computer's game through example. The computer considers any move that you make during a winning game to be a good one. Conversely, all moves made by the losing player are seen as bad moves. If you play a game perfectly, only to make a foolish move at the end, the computer will remember all your moves as being undesirable, and your teaching task will become much more difficult. If you wish to bring your computer up to speed as soon as possible, you must show no mercy and always play your best.

To make a move, you first select a row by pressing the A, B, C, or D key (the rows are labeled this way on the screen). Next, select the number of pieces you want to remove using the computer's number keys. When you've made your selections, press Return to accept the move; press any other key to start over and reenter your move. When the game is over, the computer announces the winner and returns you to the game's main menu.

Other Options

Option 3, Human vs. Human, allows you to play against another carbon-based opponent, such as your best friend. The computer still observes the game while you play this mode, so its expertise improves even though it's not an active participant.

Computer vs. Computer pits the computer against itself. It's a good option to choose when you want to check for weak spots in your computer's game strategy. By watching the computer play, you might learn a few tricks yourself. In Auto-Learn mode, the computer and a spurious opponent named Mr. Random take turns going first and continue playing until they are told to stop. To halt Auto-Learn mode, press the Back Arrow key. This is an excellent mode to select when you want to start building an experience file. Keep in mind that, while Mr. Random is a tireless player, he is hardly a good role model for your computer. Therefore, even after several hours of competition with Mr. Random, your computer will still need some careful tutoring to become a really good player.

When you select the Quit option, the computer asks you if you want to save

the current game experience to disk. If you answer Yes, you are asked to enter a filename. By using distinct filenames, you can create different experience files for various levels of play.

How It Works

The program keeps track of the current board position in the string variable BD\$. Each time a player moves, BD\$ is updated. The board position is stored as four characters. The first character reflects the number of pieces in row A, the second character reflects the number of pieces in row B, and so on. Thus, the initial board position is represented as 1357. If you removed three pieces from row B as your first move, 1057 would be the resulting board position. The four board positions 1000, 0100, 0010, and 0001 signify the end of the game.

In order for the computer to learn from a game, it must keep track of the game's moves. Each move is stored in the string array GM\$(). The first move of the game is stored in GM\$(1), the second move in GM\$(2), and so on. The current move number is kept in the variable MV, so the current move is referenced with the statement GM\$(MV).

The game's moves are stored in a seven-character format. The first four characters represent the board position in exactly the same way board positions are represented by BD\$. The fifth character is always a space. The sixth character represents the row, and the seventh and last character specifies the number of pieces removed from that row. If you remove four pieces from row C as the first move in the game, for example, the string 1357 C4 would be loaded into GM\$(MV).

How It Learns

This program learns from experience: Good behavior (winning) is rewarded, and bad behavior (losing) is punished. In order for the program to remember what is good and bad behavior, I had to supply the program with a memory or brain. The brain of 1-3-5-7 is the string array WM\$(). Winning moves are moved into the array, while losing moves are shoved out. At the start of the program, this array is empty.

Think of each array element in WM\$() as a brain cell, where one

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brain cell stores the possible winning moves for one particular board position. Accessing a brain cell is relatively easy. For example, the winning moves (or at least what the computer thinks are winning moves) for board position 1345 are stored in WM\$(1345). So, at any time during the game, WM\$(VAL(BD\$)) returns the winning moves (if any) for the current board position. (Note of interest: With 383 possible board positions and 1357 brain cells, only about 3 percent of the program's brain cells are actually ever used. Remind you of anyone?)

Winning moves are stored in WM\$() in the same format as game moves are stored in the last two characters of the GM\$() array. Several moves may be stored in one WM\$() brain cell. For example, the board position indicated by WM\$(1536) may contain C3B1A1C1B2 as its winning moves. This example offers the five moves C3, B1, A1, C1, and B2. It's possible that there will be just one winning move (or none) stored for any one board position.

Brain cells organize moves in order of preference; superior moves appear ahead of inferior moves. Using the previous example, we see that the 1-3-5-7 program prefers the move C3 over B1, B1 over A1, and so on. Hoping to make the best move possible, this program always uses the first move found in a brain cell.

After each game, 1-3-5-7 updates its brain cells in response to the outcome. Each move made by the winning player is placed into the brain cell corresponding to the board position in which the move was made. Consider the case when the player removes one piece from row A in the following board position:

- A) I
- B) III
- C) III
- D) IIIII

The string A1 is placed into WM\$(1230). If WM\$(1230) already contains the move A1, then the A1 is bumped up by one move in the list. If the move A1 is already the first move in the list, no change is made. If A1 is not already in the list, then A1 is placed as the first move in the list.

Each move made by the losing player is demoted in the brain cell corresponding to the board position in which the move was made. For example, let's say that the losing player removes two pieces from row C in the following board position:

- A) I
- B) III
- C) III
- D) IIIII

The string C2 is moved to the right or removed from WM\$(1335). If WM\$(1335) contains the move C2, then the move is bumped down a notch. If C2 is the last move in the list, it is removed from the list. If C2 is not in the list, no change is made.

Through this positive and negative reinforcement, the computer modifies its playing style, improves its performance, and—in its own cybernetic way—learns. Try to be a good teacher.

1-3-5-7

```

AS 0 CLR
CS 50 REM COPYRIGHT 1991 - COMPUTE PUBLICATIONS INTL LTD - ALL RIGHTS RESERVED
JP 100 GOSUB1750:GOSUB1210
KA 110 GOSUB1530:GOSUB300
RP 120 PRINT PL$(OP,PL);;"S MOVE":PRINT
EJ 130 ON (OP*2)+PL GOSUB420,590,590,420,420,420,590,590,590,690
HJ 140 GM$(MV)=BD$+" "+CHR$(R+64)+CHR$(N+48)
SR 150 MV=MV+1:PL=ABS(PL-3)
CD 160 GOSUB860:GOSUB300
BK 170 IF EG=0 THEN120
JF 180 NM=MV-1
GG 190 REM
EJ 200 REM ANNOUNCE WINNER
DG 210 REM
BA 220 PRINT "AND THE WINNER IS..."
RE 230 PRINT:PRINT PL$(OP,ABS(PL-3))
SD 240 GOSUB940
PG 250 GET K$:IF OP=4 AND K$<>"<" THEN110
PP 260 OP=0
EQ 270 PRINT "{9 DOWN}
{6 SPACES}= PRESS RETURN TO CONTINUE ="
AF 280 GET K$:IF K$<>CHR$(13){SPACE}THEN280
BD 290 GOTO110
JP 300 REM

```

```

HG 310 REM DISPLAY BOARD
AR 320 REM
FD 330 PRINT CHR$(147)
PF 340 PRINT:PRINT
CQ 350 FOR I=1 TO 4
AM 360 N=VAL(MID$(BD$,I,1))
AM 370 PRINT CHR$(I+64);" " ";LEFT$("-----",N)
RA 380 PRINT
PX 390 NEXT I
MA 400 PRINT
EX 410 RETURN
QD 420 REM
XR 430 REM GET HUMAN'S MOVE
EF 440 REM
DM 450 PRINT "ROW: ";
FG 460 GET K$:IF K$<"A" OR K$>"D" THEN460
AG 470 R=ASC(K$)-64
HR 480 X=VAL(MID$(BD$,R,1))
MM 490 IF VAL(BD$)=INT(10↑(4-R)*X) THEN X=X-1
SP 500 IF X=0 THEN460
MB 510 PRINT K$:R=ASC(K$)-64
PR 520 PRINT "NUMBER TO REMOVE: ";
KE 530 GET K$:IF K$<"1" OR K$>CHR$(X+48) THEN530
CQ 540 PRINT K$:N=VAL(K$)
MQ 550 PRINT "{8 DOWN}
{7 SPACES}= PRESS RETURN TO ACCEPT ="
HK 560 GET K$:IF K$="" THEN560
SC 570 IF K$<>CHR$(13) THEN GOSUB300:PRINT PL$(OP,PL);;"S MOVE":PRINT:GOTO420
QP 580 RETURN
DX 590 REM
JM 600 REM GET COMPUTER'S MOVE
SX 610 REM
XJ 620 BD=VAL(BD$):MV$=WM$(BD)
SX 630 IF MV$="" THEN690
JB 640 R=ASC(MID$(MV$,1,1))-64:N=VAL(MID$(MV$,2,1))
EG 650 PRINT "ROW: ";CHR$(64+R)
HB 660 PRINT "NUMBER TO REMOVE: ";N
KS 670 IF OP<>4 THEN FOR I=1 TO 1000:NEXT I
JA 680 RETURN
BF 690 REM
DP 700 REM GET RANDOM MOVE
GF 710 REM
GB 720 A$=""
EE 730 FOR I=1 TO 4
XF 740 R$=MID$(BD$,I,1)
JD 750 IF R$<>"0" THEN A$=A$+CHR$(I+48)
RG 760 NEXT I
QE 770 IF LEN(A$)=1 THEN R=VAL(A$):GOTO790
CP 780 R=VAL(MID$(A$,INT(RND(1)*LEN(A$))+1,1))
JB 790 X=VAL(MID$(BD$,R,1))
BJ 800 IF VAL(BD$)=INT(10↑(4-R)*X) THEN X=X-1
GS 810 N=INT(RND(1)*X)+1

```

```

SK 820 PRINT "ROW:";CHR$(64+R)
SH 830 PRINT "NUMBER TO REMOVE
      :";N
QK 840 IF OP<>4 THEN FOR I=1 TO
      O 1000:NEXT I
SM 850 RETURN
HX 860 REM
SK 870 REM EXECUTE MOVE AND CHECK
      FOR WIN
SB 880 REM
GE 890 CN=VAL(MID$(BD$,R,1))
CJ 900 CN=CN-N
RJ 910 BD$=MID$(BD$,1,R-1)+CHR$
      (CN+48)+MID$(BD$,R+1,4)
HS 920 IF BD$="1000" OR BD$="0
      100" OR BD$="0010" OR BD$="
      0001" THEN EG=1
MB 930 RETURN
FE 940 REM
FQ 950 REM LEARN FROM GAME
RG 960 REM
FC 970 REM{4 SPACES}REWARD WIN
      NING MOVES
DB 980 MV=MV-1:IF MV=0 THEN RETURN
CK 990 BD=VAL(LEFT$(GM$(MV),4))
EH 1000 MV$=RIGHT$(GM$(MV),2)
SC 1010 F=0:A$=WM$(BD):IF A$="
      " THEN A$=MV$:GOTO1080
GK 1020 FOR I=1 TO LEN(A$) STEP
      2
PA 1030 IF MID$(A$,I,2)=MV$ THEN
      EN F=I
MM 1040 NEXT I
XK 1050 IF F=0 THEN A$=MV$+A$:
      GOTO1080
PF 1060 IF F=1 THEN1080
DC 1070 A$=LEFT$(A$,F-3)+MV$+M
      ID$(A$,F-2,2)+MID$(A$,F+2)
GR 1080 WM$(BD)=A$
EG 1090 REM{4 SPACES}PUNISH LOS
      ING MOVES
GD 1100 MV=MV-1:IF MV=0 THEN RETURN
FR 1110 BD=VAL(LEFT$(GM$(MV),4))
EX 1120 MV$=RIGHT$(GM$(MV),2)
JK 1130 F=0:A$=WM$(BD):IF A$="
      " THEN970
HB 1140 FOR I=1 TO LEN(A$) STEP
      2
PJ 1150 IF MID$(A$,I,2)=MV$ THEN
      EN F=I
PC 1160 NEXT I
AC 1170 IF F=0 THEN970
XD 1180 IF F+1=LEN(A$) THEN WM$
      (BD)=LEFT$(WM$(BD),F-1):
      GOTO970
FQ 1190 WM$(BD)=LEFT$(A$,F-1)+
      MID$(A$,F+2,2)+MV$+MID$
      (A$,F+4)
KR 1200 GOTO970
SX 1210 REM
AR 1220 REM LOAD EXPERIENCE
DA 1230 REM
KQ 1240 PRINT CHR$(147)
KD 1250 PRINT "LOAD PREVIOUS GAME
      EXPERIENCE? ";
EX 1260 GET K$:IF K$<>"Y" AND
      {SPACE}K$<>"N" THEN1260
PD 1270 IF K$="N" THEN PRINT "
      NO":FOR I=1 TO 500:NEXT
      I:GOTO1350
DJ 1280 PRINT "YES":PRINT:INPUT
      T "FILENAME";A$:IF A$="
      " THEN1350
DA 1290 OPEN 15,8,15
AG 1300 OPEN 1,8,2,A$+".AI,S,R
      "
DH 1310 INPUT#15,E,E$
MD 1320 IF E THENPRINT"* ";E$;
      " *":FOR I=1TO2500:NEXT
      I:CLOSE1:CLOSE15:GOTO
      1210
MP 1330 INPUT#1,BD:INPUT#1,MV$:
      WM$(BD)=MV$:IF ST=0 THEN
      HEN1330
HG 1340 CLOSE 1:CLOSE 15
DE 1350 RETURN
AK 1360 REM
KD 1370 REM SAVE EXPERIENCE
MP 1380 REM
FM 1390 PRINT CHR$(147)
MD 1400 PRINT "SAVE GAME EXPER
      IENCE? ";
DR 1410 GET K$:IF K$<>"Y" AND
      {SPACE}K$<>"N" THEN1410
KA 1420 IF K$="N" THEN PRINT "
      NO":GOTO1520
XC 1430 PRINT "YES":PRINT:INPUT
      T "FILENAME";A$:IF A$="
      " THEN1520
ME 1440 OPEN 15,8,15,"S0:"+A$+
      ".AI"
FA 1450 OPEN 1,8,2,A$+".AI,S,W
      "
QR 1460 INPUT#15,E,E$
BJ 1470 IF E THENPRINT"* ";E$;
      " *":FOR I=1TO2500:NEXT
      I:CLOSE1:CLOSE15:GOTO
      1360
SK 1480 FOR I=1 TO 1357
RB 1490 IF WM$(I)<>" " THEN PRI
      NT#1,I:PRINT#1,WM$(I)
GK 1500 NEXT I
MQ 1510 CLOSE 1:CLOSE 15
SS 1520 RETURN
QE 1530 REM
BC 1540 REM PREPARE FOR NEW GAME
GF 1550 REM
BF 1560 BD$="1357"
AJ 1570 FOR I=1 TO NM:GM$(I)="
      ":NEXT I
KS 1580 MV=1
EG 1590 EG=0
PS 1600 IF OP=4 THEN WF=ABS(WF
      -3):PL=WF:GOTO1740
PQ 1610 PL=1
XR 1620 WF=1
XP 1630 PRINT CHR$(147);"{WHT}
      {7 SPACES}1-3-5-7
      {6 SPACES}"
DF 1640 PRINT
JS 1650 PRINT:PRINT "
      {2 SPACES}1) HUMAN MOVES
      FIRST"
SH 1660 PRINT:PRINT "
      {2 SPACES}2) COMPUTER
      {SPACE}MOVES FIRST"
BC 1670 PRINT:PRINT "
      {2 SPACES}3) HUMAN VS
      {SPACE}HUMAN"
AA 1680 PRINT:PRINT "
      {2 SPACES}4) COMPUTER
      {SPACE}VS COMPUTER"
CF 1690 PRINT:PRINT "
      {2 SPACES}5) AUTO-LEARN
      MODE"
KA 1700 PRINT:PRINT "
      {2 SPACES}6) QUIT"
EX 1710 GET K$:IF K$<"1" OR K$
      >"6" THEN1710
QG 1720 IF K$="6" THEN GOSUB13
      60:PRINT:PRINT "THANKS
      FOR PLAYING":END
GS 1730 OP=VAL(K$)-1
HX 1740 RETURN
KC 1750 REM
DJ 1760 REM INITIALIZE PROGRAM
XE 1770 REM
FP 1780 X=RND(-TI)
JG 1790 DIM WM$(1357)
PH 1800 DIM GM$(15)
GG 1810 DIM PL$(4,2)
JD 1820 RESTORE
HA 1830 FOR OP=0 TO 4:FOR PL=1
      TO 2:READ PL$(OP,PL):
      NEXT PL:NEXT OP
AF 1840 RETURN
QG 1850 DATA THE HUMAN,THE COM
      PUTER
GH 1860 DATA THE COMPUTER,THE
      {SPACE}HUMAN
HQ 1870 DATA HUMAN1,HUMAN2
RR 1880 DATA COMPUTER1,COMPU
      TER2
HC 1890 DATA THE COMPUTER,MR.
      {SPACE}RANDOM

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Randy Thompson is the editor of Gazette's "Programmer's Page." He lives in Eugene, Oregon. □

SPORT CARD COLLECTOR

By Kevin Scott Davis
 Sport card collecting is a fun and profitable hobby enjoyed by millions of Americans. One of the least enjoyable parts of card collecting, however, is cataloging that collection. The usual method is to keep the inventory and prices on paper, but that can be a headache. The problem comes when it is time to make

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changes. It can be a messy and time-consuming task.

Sport Card Collector was designed to eliminate these problems. It becomes much easier to alter card inventory and prices when the 64 lends a hand. *Collector* also can evaluate the value of your collection based on the prices you enter, and it can print out an orderly inventory. The program tracks card names, the number of cards and their condition, and price.

Getting Started

Sport Card Collector is written entirely in BASIC. To type it in, use *The Automatic Proofreader*; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program when you've finished typing.

Options

When you run the program, you are presented with the main menu. Option 1 on the menu allows you to load a new data file. If the memory is not empty, you will be prompted to erase it. You'll be asked for the set year and name (see option 3 for more details), and then the program will load. A counter will show you how many records (number of cards) exist in the set and which record is being read. (If you enter a filename that does not exist, you'll have to reload the program.)

Option 2 is Edit File. You'll first be asked if you want to start a new file. Again, you won't be able to do this if a file is still in memory. If your answer is Yes, you'll be asked how many records exist in the set. The counter will indicate the numbers as the file is created.

The next option is to edit entire file or prices only. The Entire File option is used to edit all seven fields of the record: Card Name, Number of Cards in Mint Condition, Number in Near Mint, Number in Excellent/Good, Number in Fair/Poor, Low Price, and High Price.

If you have not differentiated the conditions of your cards, enter the total number in the Mint field and ignore the others (a 0 is automatically registered). You must use Entire File when entering data on a new file or changing the number of cards. If you're merely making changes, it's not necessary to reenter all the previously entered data.

When you enter the card number to

edit, you'll be shown the existing data in that record. Hitting Return at any prompt will keep the data currently shown. In the Prices Only mode, you only edit the low and high prices in each record. This is much faster than editing the entire file. In either edit mode, enter a 0 at the Card to Edit prompt to return to the main menu.

Option 3 allows you to save your file. It will ask for the set year and name. The year can be any length, but usually two digits will suffice. The set name is limited to five characters. A total of seven characters is enough to identify a file, though. My 1990-91 Sky Box file, for example, is called 91SKYBX. (For a convenience to disk subscribers, this 45-block file has been included on this month's *Gazette Disk*.) If the program senses a file with the same name on the disk drive, the older one will be scratched. As the file is saved, the counter shows you the record being saved at any moment.

Option 4 prints out the file in memory. You'll be asked for a data line to be printed at the bottom of the printout. This is ideal for identifying the set year/name, date of prices, and so on. If there's no file in memory, the option will not work from the main menu.

When you're ready to print, you'll be offered two choices of printouts. One is for separate card conditions, which prints different columns for mint, near mint, and so on. The second adds the four card fields and prints the total number of cards. Make sure the printer is on and set to device 4 before hitting Return after entering your choice. The printer can print approximately 65 records per page. At the end of the listing, the set value will be calculated and printed, as explained in option 5.

Option 5 evaluates the set's worth. This calculation will depend on the values you've entered for each card. This program was designed around the standards of the *Beckett* card magazines, the industry benchmark. Of course, you can use any price values you care to assign as long as they include high and low values.

Just as with the *Beckett* prices, the figure given by this option is merely a guide to your collection's value. You may not be able to sell your set for these prices. This option works by tak-

ing the number of cards you have in each category, multiplying the number to obtain a high value and low value, and then multiplying by percentage allowances for card conditions.

The allowances are 100 percent of price for mint cards, 75 percent for near mint, 60 percent for excellent/good, and 10 percent for fair/poor. While these are not exactly *Beckett* standards, incorporating all eight card conditions would take too much memory to be efficient. There is also too much overlap in the percentages in the eight fields to be included. If you use different percentages for card grading (such as the higher percentages for older cards), change the values in lines 2000 and 2020. While the values are being calculated, a counter shows you the progress of the program. The prices are shown; then press any key to return to the program's menu.

Option 6 allows you to view the records of the file in memory. You'll be asked for the card number to view. You'll be shown the seven fields of the record for which you prompt. You can then request another record or enter 0 to return to the menu.

Option 7 erases any data in memory. You will be asked to confirm this option. Once the data is erased, there is no way to retrieve it, so be careful!

64 and 128 Modes

Sport Card Collector will run in both the 64 and the native 128 modes. In the 128 mode, you have access to the keypad. As 80 percent of all data entry is entered by number, I find the keypad makes data entry easier and faster.

The main advantage of the 128 is its larger memory. It can handle approximately 1800 cards. I would not recommend more than 750 cards per file in 64 mode. (I break up the few sets with more than 750 cards into two files, such as 89TOPP1 and 89TOPP2). *Collector* may occasionally appear to lock up with the counter stuck on card number 1. Be patient, though; in less than ten seconds the program will continue.

I use this program to hold my own basketball card records. The longest task when using this program is entering the data for the first time. Then be prepared to spend several hours at the computer the first time you edit a file.

Of course, you can save an incomplete file to disk and then reload it later and finish the job of entering data.

Once a file is set up, changing prices from month to month is quick and easy. Each month *Beckett* prints its list of prices with up and down arrows to indicate changes from the previous month. Once you have the hang of it, an entire file can be updated quickly.

Older sets are not as volatile; therefore, they may not need their value updated every month. Just as with collecting itself, you can get as much out of this program as you are willing to put into it. I've found it easy to carry my inventory printout to card stores and sport card conventions. My friends and other collectors find the printout easy to read, and it shows them which cards have duplicates that I might be willing to put up for trade.

SPORT CARD COLLECTOR

```

AS 0 CLR
KP 5 REM COPYRIGHT 1991 - COMP
    UTE PUBLICATIONS INTL LTD
    - ALL RIGHTS RESERVED
CC 10 YL=0
KG 20 POKE 53280,0:POKE53281,0
AQ 30 PRINT (CHR$(147))
JE 40 PRINT "{3 DOWN}
    {10 SPACES}{8}UDDDDDDDD
    DDDDDDDDDDI"
KM 50 PRINT "{10 SPACES}{8}G
    {5 SPACES}{RVS} {P}
    {OFF} {RVS}{V}{P}{C}
    {OFF} {RVS}{V}{P}{C}
    {OFF} {8}{3 SPACES}H"
RC 60 PRINT "{10 SPACES}G
    {5 SPACES}{RVS} {OFF}
    {2 O} {RVS} {OFF}
    {3 SPACES}{RVS} {OFF}
    {6 SPACES}H"
AE 70 PRINT "{10 SPACES}G
    {5 SPACES}{I}{P}{RVS}
    {OFF} {RVS}{F}{Y}{D}
    {OFF} {RVS}{F}{Y}{D}
    {OFF}{4 SPACES}H"
SA 80 PRINT "{10 SPACES}GEEEEEE
    EEEEEEEEEEEH"
DH 90 PRINT "{10 SPACES}GSPORT
    {SPACE}CARD COLLECTORH"
QS 100 PRINT "{10 SPACES}{Q}DDD
    DDDDDDDDDDDDDDD{W}"
CX 110 PRINT "{10 SPACES}G{RVS}
    [1] LOAD FILE{7 SPACES}
    {OFF}H"
BS 120 PRINT "{10 SPACES}G{RVS}
    [2] EDIT FILE{7 SPACES}
    {OFF}H"
KX 130 PRINT "{10 SPACES}G{RVS}
    [3] SAVE FILE{7 SPACES}

```

```

{OFF}H"
BA 140 PRINT "{10 SPACES}G{RVS}
    [4] PRINT FILE
    {6 SPACES}{OFF}H"
KC 150 PRINT "{10 SPACES}G{RVS}
    [5] EVAL. SET PRICE
    {OFF}H"
HD 160 PRINT "{10 SPACES}G{RVS}
    [6] VIEW FILE{7 SPACES}
    {OFF}H"
DF 170 PRINT "{10 SPACES}G{RVS}
    [7] ERASE MEMORY
    {4 SPACES}{OFF}H"
JB 180 PRINT "{10 SPACES}JFFFFFF
    FFFFFFFF"
BF 190 IF F$="" THEN XW$="**NO
    NE**"
SK 200 PRINT "{9 SPACES}FILE IN
    MEMORY: "XW$
MB 210 PRINT:PRINT "{13 SPACES}
    CHOOSE: [1 TO 7]"
HK 220 GET X$:IF X$="" THEN 22
    0
BK 230 X=VAL(X$):IF X<1 OR X>7
    THEN 20
SX 240 ON X GOTO 250,560,1120,
    1380,1880,2200,2150
QD 250 REM LOAD FILE
MG 260 PRINT "{CLR}{15 SPACES}L
    OAD FILE":PRINT
DF 270 PRINT"ENTER SET YEAR
    {WHT}"
HD 280 POKE19,65:INPUT SY$:PRI
    NT:PRINT"{8}ENTER SET N
    AME [MAX 5 CHARS.]{WHT}
    "
HC 290 POKE19,65:INPUT SN$
QC 300 IF XW$<>"**NONE**" THEN
    PRINT:PRINT"{8}MUST ER
    ASE MEMORY FIRST!"
KE 310 IF XW$<>"**NONE**" THEN
    PRINT"PRESS ANY KEY TO
    GO TO MAIN MENU"
AE 320 IF XW$<>"**NONE**" THEN
    GET HY$
HB 330 IF XW$<>"**NONE**" AND
    {SPACE}HY$="" THEN 320
DE 340 IF XW$<>"**NONE**" THEN
    20
QX 350 PRINT:PRINT:PRINT"{8}IN
    SERT DISK AND PRESS A K
    EY/'N' ABORTS"
AM 360 GET K$:IF K$="" THEN 36
    0
MK 370 IF K$="N" THEN 20
CC 380 F$=SY$+SN$:OPEN8,8,8,F$
    +",S,R"
MR 390 INPUT#8,YT:INPUT#8,GC
GB 400 GOSUB 2360
SA 410 PRINT "{CLR}":PRINT"{8}T
    OTAL RECORDS IN THE SET
    : "YT
HF 420 RN=1
AF 430 PRINT"ON RECORD NUMBER:
    {WHT} 1"
DJ 440 FOR TM=1 TO YT
RS 450 INPUT#8,CM$(TM):INPUT#8
    ,MT$(TM):INPUT#8,NM$(TM)

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```

):INPUT#8,GD$(TM)
DP 460 INPUT#8,FP$(TM):INPUT#8
    ,LO$(TM):INPUT#8,HI$(TM)
)
CH 470 PRINT"{WHT}{HOME}
    {2 DOWN}{17 RIGHT}"TM
KF 480 NEXT TM
MS 490 CLOSE8
SB 500 OPEN15,8,15:INPUT#15,EN
    ,EM$,ET,ES
FS 510 PRINT:PRINT:PRINT:PRINT
    "{8}DRIVE STATUS:":PRIN
    TEN;EM$;ET;ES
MC 520 CLOSE15:PRINT:PRINT"PRE
    SS ANY KEY TO CONTINUE"
KG 530 GET W0$:IF W0$="" THEN
    {SPACE}530
XF 540 XW$=F$
AF 550 GOTO 20
DM 560 REM EDIT FILE
AD 570 PRINT "{CLR}"
SH 580 PRINT"{8}START BRAND NE
    W FILE?? [Y/N]"
CH 590 GET YN$:IF YN$="" THEN
    {SPACE}590
FK 600 IF YN$="Y" AND XW$<>"**
    NONE**" THEN PRINT"ERAS
    E MEMORY FIRST! [HIT AN
    Y KEY]"
RP 610 IF YN$="Y" AND XW$<>"**
    NONE**" THEN GOTO 2570
KS 620 IF YN$="Y" THEN INPUT"
    {8}HOW MANY CARDS?{WHT}
    ";YT:F$="WORK":XW$="WOR
    K":GOSUB2360
XM 630 IF YN$="Y" THEN GOSUB 2
    490
FP 640 PRINT"{8}EDIT [1] ENTIR
    E FILE{2 SPACES}[2] PRI
    CES ONLY{WHT}{2 SPACES}
    "
JB 650 POKE19,65:INPUT TE$:TE=
    VAL(TE$):IF TE=2 THEN 9
    70
MK 660 PRINT:PRINT"{8}CARD NUM
    BER TO EDIT [0 TO EXIT]
    "
EH 670 PRINT"THESE ARE"YT"CARD
    S IN THE SET.{WHT}"
DB 680 POKE19,65:INPUT CE$:CE=
    VAL(CE$)
HP 690 IF CE=0 THEN 20
EB 700 IF CE>YT OR CE<0 THEN 6
    60
SA 710 PRINT "{CLR}{8}CARD NUMB
    ER: "CE:PRINT CM$(CE):P
    RINT"# IN MINT:
    {6 SPACES}MT$(CE)
XF 720 PRINT"# IN NRMT:
    {6 SPACES}NM$(CE)
FD 730 PRINT"# IN GOOD:
    {6 SPACES}GD$(CE):PRIN
    T"# IN FAIR/POOR: "FP$(
    CE)
EP 740 PRINT"LOW PRICE:
    {6 SPACES}"LO$(CE):PRIN
    T"HIGH PRICE:{5 SPACES}
    "HI$(CE)

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QX 750 PRINT:PRINT"CARD NUMBER
";CE
GE 760 PRINT"NAME [LESS THAN 2
0 CHARACTERS]{WHT}":POK
E19,65
AQ 770 INPUT CM$(CE):IF LEN(CM
$(CE))>20 THEN 760
RH 780 PRINT:PRINT"{8}NUMBER O
F CARDS IN MINT{WHT}"
KS 790 INPUT MT$(CE)
SJ 800 IF MT$(CE)="" THEN MT$(
CE)=""
ME 810 PRINT:PRINT"{8}NUMBER O
F CARDS IN NEARMINT
{WHT}"
RP 820 INPUT NM$(CE)
JA 830 IF NM$(CE)="" THEN NM$(
CE)=""
CF 840 PRINT:PRINT"{8}NUMBER O
F CARDS IN EXC./GD.
{WHT}"
JA 850 INPUT GD$(CE)
EP 860 IF GD$(CE)="" THEN GD$(
CE)=""
PP 870 PRINT:PRINT"{8}NUMBER O
F CARDS IN FAIR/PR.
{WHT}"
PK 880 INPUT FP$(CE)
EE 890 IF FP$(CE)="" THEN FP$(
CE)=""
DE 900 PRINT:PRINT"{8}LOW VALU
E{WHT}"
JR 910 INPUT LO$(CE)
FR 920 IF LO$(CE)="" THEN LO$(
CE)=""
SP 930 PRINT:PRINT"{8}HIGH VAL
UE{WHT}"
QK 940 INPUT HI$(CE)
GP 950 IF HI$(CE)="" THEN HI$(
CE)=""
CC 960 GOTO 660
DQ 970 REM EDIT PRICES ONLY
DR 980 PRINT"{CLR}"
PB 990 PRINT"{8}CARD NUMBER TO
EDIT [0 TO EXIT]"
PX 1000 PRINT"THERE ARE"YT"CAR
DS IN THE SET.{WHT}":P
OKE19,65:INPUT CE
RP 1010 IF CE=0 THEN 20
SD 1020 PRINT"{8}CURRENT: "
GP 1030 PRINT"PLAYER NAME: "CM
$(CE)
XH 1040 PRINT"LOW PRICE:
{3 SPACES}"LO$(CE)
FJ 1050 PRINT"HIGH PRICE:
{2 SPACES}"HI$(CE)
HR 1060 PRINT:PRINT"INPUT NEW
{SPACE}PRICES":PRINT
QR 1070 PRINT"LOW VALUE{WHT}"
JF 1080 POKE19,65:INPUT LO$(CE
)
HP 1090 PRINT"{8}HIGH VALUE
{WHT}"
KA 1100 INPUT HI$(CE)
BS 1110 PRINT:GOTO 990
GC 1120 REM SAVE FILE
AR 1130 IF XW$="**NONE**"THEN
{SPACE}PRINT"NO FILE E
XISTS! [HIT ANY KEY]"
FX 1140 IF XW$="**NONE**" THEN
GOTO 2570
JR 1150 PRINT"{CLR}{15 SPACES}
SAVE FILE":PRINT
MX 1160 PRINT"{8}ENTER SET YEA
R{WHT}"
FQ 1170 POKE19,65:INPUT SY$:PR
INT:PRINT"{8}ENTER SET
NAME [MAX 5 CHARS.]
{WHT}"
ME 1180 INPUT SN$:IF LEN(SN$)>
5 THEN 1180
FA 1190 PRINT:PRINT:PRINT"{8}I
NSERT DISK AND PRESS A
KEY/'N' ABORTS"
KK 1200 GET K$:IF K$="" THEN 1
200
BD 1210 IF K$="N" THEN 20
GC 1220 GOSUB 2350
HX 1230 F$=SY$+SN$:XW$=F$:OPEN
8,8,8,F$+" ,S,W"
RK 1240 PRINT#8,YT:PRINT#8,GC
KC 1250 PRINT"{CLR}":PRINT"TOT
AL RECORDS IN THE SET:
"YT
GH 1260 PRINT"ON RECORD NUMBER
:{WHT} 1"
PQ 1270 FOR TL=1 TO YT
BC 1280 PRINT#8,CM$(TL):PRINT#
8,MT$(TL):PRINT#8,NM$(
TL):PRINT#8,GD$(TL)
QK 1290 PRINT#8,FP$(TL):PRINT#
8,LO$(TL):PRINT#8,HI$(
TL)
JC 1300 PRINT"{HOME}{2 DOWN}
{17 RIGHT}"TL
FD 1310 NEXT TL
KK 1320 CLOSE8
SH 1330 OPEN15,8,15:INPUT#15,E
N,EM$,ET,ES
XE 1340 PRINT:PRINT:PRINT:PRIN
T"{8}DRIVE STATUS:":PR
INTEN;EM$;ET;ES
JF 1350 CLOSE15:PRINT:PRINT"PR
ESS ANY KEY TO CONTINU
E"
KE 1360 GET WO$:IF WO$="" THEN
1360
PS 1370 GOTO 20
JX 1380 REM PRINTOUT
QX 1390 IF XW$="**NONE**" OR F
$="**NONE**" THEN 20
GG 1400 PRINT"{CLR}"
QB 1410 PRINT"{13 SPACES}HARD
{SPACE}COPY"
FH 1420 PRINT"{2 SPACES}THIS W
ILL PRINT THE FILE IN
{SPACE}MEMORY"
AD 1430 PRINT"{2 SPACES}MAKE S
URE YOUR PRINTER IS ON
DEV 4"
ER 1440 PRINT:PRINT"ENTER YOUR
DATA LINE [UNDER 40 C
HARS.]{WHT}"
HE 1450 POKE19,65:INPUT DL$:IF
LEN(DL$)>40 THEN 1440
HC 1460 PRINT:PRINT:PRINT:PRIN
T"{8}CHOOSE [1] SEP. C
ARD COND. [2] STANDARD
{WHT}"
FA 1470 POKE19,65:INPUT VR:IF
{SPACE}VR=2 THEN 1720
FJ 1480 PRINT:PRINT"{9 SPACES}
THEN PRESS ANY KEY"
FE 1490 GET WE$:IF WE$="" THEN
1490
JF 1500 OPEN4,4
QF 1510 GH$=CHR$(14)
GK 1520 PRINT#4,"":PRINT#4,"":
PRINT#4,CHR$(14) "
{10 SPACES}SPORT CARD
{SPACE}COLLECTOR"
KE 1530 PRINT#4,CHR$(14) "
{39 T}"CHR$(15)
DC 1540 PRINT#4,GH$"C# CARD-NA
ME #MT #NM #EG #FP LO
{3 SPACES}HI{2 SPACES}
"CHR$(15)
BA 1550 FOR TP=1 TO YT
DR 1560 PRINT#4,CHR$(16)"01"+S
TR$(TP);
CC 1570 PRINT#4,CHR$(16)"08"+C
M$(TP);
GR 1580 PRINT#4,CHR$(16)"28"+M
T$(TP);
KC 1590 PRINT#4,CHR$(16)"36"+N
M$(TP);
HM 1600 PRINT#4,CHR$(16)"44"+G
D$(TP);
HJ 1610 PRINT#4,CHR$(16)"52"+F
P$(TP);
BK 1620 PRINT#4,CHR$(16)"58"+L
O$(TP);
GX 1630 PRINT#4,CHR$(16)"68"+H
I$(TP)
HP 1640 NEXT TP
JQ 1650 PRINT#4,CHR$(14) "
{39 T}"CHR$(15)
MJ 1660 PQ=1:GOTO 1920
FJ 1670 PRINT#4,"":PRINT#4,""
HK 1680 OO=LEN(DL$):SS=40-OO:S
D=.5*SS
QJ 1690 PRINT#4,CHR$(14)""SPC(
SD)""DL$
EX 1700 CLOSE 4
HF 1710 GOTO 20
FC 1720 OPEN4,4
HE 1730 GH$=CHR$(14)
JH 1740 PRINT#4,"":PRINT#4,"":
PRINT#4,CHR$(14) "
{10 SPACES}SPORT CARD
{SPACE}COLLECTOR"
SG 1750 PRINT#4,CHR$(14) "
{39 T}"CHR$(15)
XX 1760 PRINT#4,CHR$(14)"C# CA
RD-NAME{2 SPACES}#/CAR
DS{2 SPACES}LO
{2 SPACES}HI{2 SPACES}
"CHR$(15)
EC 1770 FOR TP=1TOYT
CP 1780 PRINT#4,CHR$(16)"01"+S
TR$(TP);
DQ 1790 PRINT#4,CHR$(16)"08"+C
M$(TP);
CH 1800 M=VAL(MT$(TP)):N=VAL(N

```



```

M$(TP):E=VAL(GD$(TP))
:F=VAL(FP$(TP))
ED 1810 TH=M+N+E+F
HJ 1820 PRINT#4,CHR$(16)"36"+S
TR$(TH);
EC 1830 PRINT#4,CHR$(16)"46"+L
O$(TP);
RJ 1840 PRINT#4,CHR$(16)"54"+H
I$(TP)
RG 1850 NEXT TP
AK 1860 PRINT#4,CHR$(14)"
{39 T}"CHR$(15)
CM 1870 PS=2:GOTO 1920
JC 1880 REM EVAL SET WORTH
PF 1890 IF XW$="**NONE**"THEN
{SPACE}PRINT"NO FILE!
{SPACE}[HIT ANY KEY]"
MR 1900 IF XW$="**NONE**"GOTO
{SPACE}2570
QA 1910 PS=1:PQ=0
FA 1920 IF GC=1 THEN 2140
FP 1930 PRINT"{CLR}{8}EVALUATI
NG SET WORTH:"YT" ITEM
S."
DK 1940 PRINT"SCANNING RECORD
{SPACE}NUMBER:{WHT} 1"
MB 1950 HS=0:LS=0
KB 1960 FOR T=1 TO YT
JK 1970 PRINT"{HOME}{DOWN}
{23 RIGHT}"T
GC 1980 M=VAL(MT$(T)):N=VAL(NM
$(T)):E=VAL(GD$(T)):P=
VAL(FP$(T)):LP=VAL(LO$(
T))
SK 1990 HP=VAL(HI$(T))
XA 2000 IF PS<>2 THEN LV=((M+(
.75*N)+(1.60*E)+(1.10*G)
)*LP)
SK 2010 IF PS=2 THEN LV=((M+N+
E+P)*LP)
FR 2020 IF PS<>2 THEN HV=((M+(
.75*N)+(1.60*E)+(1.10*P)
)*HP)
ED 2030 IF PS=2 THEN HV=((M+N+
E+P)*HP)
PX 2040 HS=HS+HV:LS=LS+LV
GA 2050 NEXT T
KA 2060 PRINT"{5}LOW SET VALUE
"LS
XR 2070 IF PQ=1 OR PS=2 THEN P
RINT#4,"SET - LOW VALU
E"LS
AD 2080 PRINT"HIGH SET VALUE"HS
SS 2090 IF PQ=1 OR PS=2 THEN P
RINT#4,"SET - HIGH VAL
UE"HS
MH 2100 IF PS=2 OR PQ=1 GOTO 1
670
CS 2110 PRINT"PRESS ANY KEY"
ER 2120 GET HH$:IF HH$=""THEN
{SPACE}2120
HX 2130 GOTO 20
PM 2140 GOTO 1930
SS 2150 REM CLEAR DATA
FD 2160 PRINT"{RVS}ARE YOU POS
ITIVE [Y/N]{OFF}"
SB 2170 GET QW$:IF QW$="" THEN

```

```

2170
GF 2180 IF QW$="N" THEN 20
HF 2190 RUN
FP 2200 REM VIEW CARDS
KP 2210 PRINT"{CLR}"
CC 2220 PRINT:PRINT"{8}SET:"F
$:PRINT"CARD NUMBER? [
0 TO EXIT]"
QS 2230 PRINT"THERE ARE"YT"CAR
DS IN THE SET.{WHT}"
MD 2240 POKE19,65:INPUT CD$:CD
=VAL(CD$)
DF 2250 IF CD=0 THEN 20
EP 2260 IF CD>YT THEN 2220
XH 2270 PRINT"{CLR}":PRINT"{8}
PLAYER'S NAME:"CM$(CD
)
RG 2280 PRINT"CARDS IN MT:
{2 SPACES}"MT$(CD)
HF 2290 PRINT"CARDS IN NM:
{2 SPACES}"NM$(CD)
AK 2300 PRINT"CARDS IN EG:
{2 SPACES}"GD$(CD)
MJ 2310 PRINT"CARDS IN FP:
{2 SPACES}"FP$(CD)
MR 2320 PRINT"LOW PRICE:
{4 SPACES}"LO$(CD)
RX 2330 PRINT"HIGH PRICE:
{3 SPACES}"HI$(CD)
GG 2340 PRINT:GOTO 2220
RC 2350 F$=SY$+SN$:OPEN 15,8,1
5:PRINT#15,"S0:"F$+"
,S":CLOSE15:RETURN
HD 2360 REM DIM SUBROUTINE
PF 2370 IF YT<=0 THEN PRINT"
{8}ERROR! PRESS ANY KE
Y"
EP 2380 IF YT<=0 THEN GET XH$
SH 2390 IF YT<=0 AND XH$="" TH
EN 2380
JA 2400 IF YT<=0 THEN 20
ED 2410 DIM CM$(YT)
AK 2420 DIM MT$(YT)
MM 2430 DIM NM$(YT)
SC 2440 DIM GD$(YT)
RF 2450 DIM FP$(YT)
BK 2460 DIM LO$(YT)
ME 2470 DIM HI$(YT)
FR 2480 RETURN
CG 2490 PRINT"{CLR}{8}SETTING
{SPACE}UP FILE -"YT"RE
CORDS"
QP 2500 PRINT"ON RECORD NUMBER
:{WHT}1"
MQ 2510 FOR TQ=1 TO YT
AK 2520 CM$(TQ)="0":MT$(TQ)="0
":NM$(TQ)="0":GD$(TQ)="
0"
CH 2530 FP$(TQ)="0":LO$(TQ)="0
":HI$(TQ)="0"
HD 2540 PRINT"{HOME}{DOWN}
{17 RIGHT}"TQ
BC 2550 NEXT TQ
CA 2560 RETURN
SG 2570 GET XL$:IF XL$="" THEN
2570
QM 2580 GOTO 20

```

Kevin Scott Davis is an honor student in high school and has a card collection of more than 2000 basketball players. He lives in Winter Park, Florida. □

FILE COPIER

By Daniel Lightner

Use this disk utility program to copy single files or groups of files and to perform other functions as well. *File Copier* loads the disk directory into memory and lets you freely thumb through its contents, tagging as many files as you like.

For example, you can copy these tagged files to another disk, scratch them, or rename them. *File Copier* performs other operations as well, such as formatting or validating a disk.

File Copier is written entirely in machine language. To type it in, use *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When prompted for starting and ending addresses, respond with the following values.

Starting address: 0801

Ending address: 1458

Be sure to save a copy of *File Copier* before you exit *MLX*.

Getting Started

File Copier loads and runs like a BASIC program. After *File Copier* has been started, it deletes 684 bytes, about three disk blocks, from the end of itself. This is where *File Copier* starts loading the files you select.

File Copier can load up to 48,722 bytes or 191 disk blocks at a time. When this memory is filled, the program will instruct you to place the target disk (the disk you want these files copied to) in drive 8 for saving.

When it has finished saving this first block of memory and you have selected more files, *File Copier* will instruct you to put the source disk back in the drive to continue the copying process.

First Things First

When you first run *File Copier*, it attempts to load the directory of any disk in drive 8. If you wish to format a disk, do not place it in the drive until af-

PROGRAMS

ter *File Copier* has read a disk directory, perhaps the one that you loaded *File Copier* from. After it has read the directory, if you wish to format a disk, then place the unformatted disk in the drive and choose the format option.

Menu Selections

When *File Copier* runs, all of its functions are listed on the screen, as shown below. Make selections by pressing the appropriate function key.

- f1—VALIDATE DISK
- f2—SCRATCH
- f3—RENAME
- f4—FORMAT
- f5—DIRECTORY
- f6—QUIT
- f7—COPY
- f8—ABORT

You will see the greater-than sign (>) on the lower left portion of the screen. This pointer is where all information will be displayed during operation.

To select files after *File Copier* has loaded the directory, use the Crsr Up/Down keys to scroll up and down the directory listing. When you see a file you wish to select, press the Return key. Notice that the filename is now followed by an arrow. This arrow is to indicate that this file has been selected. If you change your mind about your selection, you may press the Return key again to toggle the selection off again.

After you have made your selections, choose the desired function key. If you find that you have made the wrong choice, use the f8 key to abort that selection. Abort the selection only when *File Copier* is showing the option name and the Press Key prompt. If you press any other key, the program will activate the indicated function. So be careful; you could accidentally delete files that you intended to copy. If you only want to copy files, it is best to put a write-protect tab on your source disk.

When you choose the Format option, *File Copier* asks you to provide a name for the disk you are formatting; then it asks for an ID. This is a two-step process, so do not provide the ID when you enter a disk name.

To rename selected files, just follow the onscreen prompts. *File Copier* first shows you the current selection and

prompts for a keypress. It then asks for the desired new name. Enter the new name and press Return.

If you select the Scratch option, *File Copier* will delete all marked files unless you decide to abort the process at the Press Key prompt. So be sure that the files you have picked are ones that you really don't need.

The remaining functions are self-explanatory. *File Copier* keeps you informed with various onscreen messages while all selected functions are being carried out.

FILE COPIER

```

0801:1E 08 0A 00 9E 32 30 38 B9
0809:38 20 3A 20 46 49 4C 45 BB
0811:20 43 4F 50 49 45 52 20 15
0819:27 39 31 27 00 00 00 00 A3
0821:00 00 00 00 00 00 00 20 51
0829:CC FF D8 A9 00 8D 21 D0 9E
0831:A9 05 8D 20 D0 AD 0E DC 41
0839:29 FE 8D 0E DC A5 01 29 D8
0841:FE 85 01 AD 0E DC 09 01 24
0849:8D 0E DC A9 C1 8D 18 03 51
0851:A9 34 8D 14 03 20 B7 11 4F
0859:20 94 0D 20 B9 0D 20 87 0C
0861:10 20 FE 09 20 46 0A 20 40
0869:31 0B A9 00 8D A5 03 8D A0
0871:A8 02 8D C3 02 A9 01 8D 8A
0879:A2 03 20 07 0A 20 6F 09 C8
0881:20 E4 FF C9 11 F0 27 C9 DB
0889:91 F0 29 C9 0D F0 68 C9 27
0891:89 F0 27 C9 87 F0 2C C9 46
0899:8A F0 2B C9 85 F0 2D C9 41
08A1:8B F0 38 C9 86 F0 2B C9 6F
08A9:88 F0 43 4C 81 08 20 21 F4
08B1:0A 4C 7B 08 20 34 0A 4C FB
08B9:7B 08 20 12 09 20 7C 0B 7B
08C1:4C 59 08 4C 62 08 20 E8 70
08C9:0B 4C 59 08 20 64 0C 4C 15
08D1:59 08 20 12 09 20 AA 0C DF
08D9:4C 59 08 20 07 0A 20 E6 F0
08E1:0D 20 B9 0D 20 87 10 C9 91
08E9:8C F0 E4 4C E2 FC 20 12 3B
08F1:09 20 9D 0E 4C 59 08 AC A7
08F9:A2 03 B9 01 70 C9 00 F0 FE
0901:08 A9 00 99 01 70 4C 7B F8
0909:08 A9 01 99 01 70 4C 7B 21
0911:08 20 FE 09 A0 00 8C FF BD
0919:02 A9 01 8D A8 02 EE 00 BA
0921:70 B9 01 70 C9 01 F0 0C 41
0929:C8 CC 00 70 D0 F3 A9 00 83
0931:8D A8 02 60 8C FA 03 8C 5D
0939:A2 03 20 07 0A 20 6F 09 8A
0941:20 4A 09 AC FA 03 4C 29 87
0949:09 A0 00 A2 00 BD 35 03 96
0951:91 FD E8 20 EC 0A EC 34 68
0959:03 D0 F2 A9 00 91 FD 20 7C
0961:EC 0A 91 FD 20 EC 0A EE 36
0969:FF 02 60 4C 74 0B AD A0 98
0971:03 C9 00 F0 F6 A9 01 8D 74
0979:A5 03 20 BD 0A A0 00 AD 7F
0981:A5 03 CD A2 03 F0 1E B1 D4
0989:FB C9 2C F0 06 20 DE 0A 19

```

```

0991:4C 88 09 20 DE 0A 20 DE 4D
0999:0A 18 AD A5 03 69 01 8D 14
09A1:A5 03 4C 80 09 A9 00 8D 55
09A9:34 03 A2 00 B1 FB C9 2C 28
09B1:F0 10 20 F0 09 9D 35 03 7F
09B9:E8 EE 34 03 20 DE 0A 4C 8F
09C1:AD 09 9D 35 03 EE 34 03 33
09C9:20 F0 09 E8 20 DE 0A B1 1A
09D1:FB 9D 35 03 EE 34 03 20 8E
09D9:F0 09 AC A2 03 B9 01 70 D7
09E1:C9 01 F0 01 60 A9 20 20 51
09E9:F0 09 A9 5F 4C F0 09 48 62
09F1:AD A8 02 C9 01 F0 04 68 1E
09F9:4C D2 FF 68 60 A9 B7 85 0C
0A01:FD A9 11 85 FE 60 20 16 C8
0A09:0A A2 00 A9 20 20 D2 FF 8C
0A11:E8 E0 26 D0 F6 A9 13 85 AD
0A19:D6 A9 02 85 D3 4C 6C E5 2A
0A21:AD A2 03 CD A0 03 90 01 25
0A29:60 18 AD A2 03 69 01 8D A0
0A31:A2 03 60 AD A2 03 C9 02 F4
0A39:B0 01 60 38 AD A2 03 E9 5D
0A41:01 8D A2 03 60 A0 00 A9 EC
0A49:00 A9 01 A2 B6 A0 11 20 8C
0A51:BD FF A9 02 A2 08 A0 00 10
0A59:20 BA FF 20 C0 FF 20 97 0C
0A61:0D C0 0E B0 3C A2 02 20 89
0A69:C6 FF A9 9A 20 D2 FF A0 AC
0A71:00 8C B1 02 20 BD 0A A9 B4
0A79:01 8D B3 02 20 E4 FF 20 BC
0A81:E4 FF 20 E4 FF 8D B0 02 F3
0A89:20 E4 FF 0D B0 02 F0 1C 43
0A91:20 E4 FF 20 E4 FF 20 E4 3D
0A99:FF F0 E7 20 C6 0A 4C 97 77
0AA1:0A 20 B9 0D A2 00 20 C6 E6
0AA9:FF 20 87 10 A9 00 A0 00 46
0AB1:91 FB A2 00 20 C6 FF A9 A7
0AB9:02 4C C3 FF A9 00 85 FB AE
0AC1:A9 C0 85 FC 60 C9 22 F0 BA
0AC9:30 AA AD B3 02 C9 01 F0 BB
0AD1:19 AD B1 02 C9 01 D0 12 3A
0AD9:8A A0 00 91 FB 18 A5 FB FB
0AE1:69 01 85 FB A5 FC 69 00 4F
0AE9:85 FC 60 18 A5 FD 69 01 86
0AF1:85 FD A5 FE 69 00 85 FE 42
0AF9:60 AD B1 02 C9 01 F0 06 3A
0B01:A9 01 8D B1 02 60 A9 00 DD
0B09:8D B1 02 AD B3 02 C9 01 A7
0B11:F0 18 A9 2C A0 00 91 FB C1
0B19:20 DE 0A 20 E4 FF C9 20 15
0B21:F0 F9 A0 00 91 FB 4C DE 36
0B29:0A 60 A9 00 8D B3 02 60 31
0B31:20 BD 0A A0 00 A9 00 8D 46
0B39:A0 03 B1 FB C9 00 F0 1C A2
0B41:C9 2C F0 06 20 DE 0A 4C A2
0B49:3B 0B 20 DE 0A 18 AD A0 5E
0B51:03 69 01 8D A0 03 20 DE 6C
0B59:0A 4C 3B 0B AD A0 03 8D 23
0B61:00 70 A0 00 A9 00 99 01 29
0B69:70 CC A0 03 F0 04 C8 4C A4
0B71:65 0B 60 20 07 0A A2 08 B8
0B79:4C 06 0E 20 07 0A 20 BE 5A
0B81:0D 20 B9 0D 20 87 10 C9 37
0B89:8C F0 59 AD FF 02 C9 00 C3
0B91:F0 52 A9 01 8D BD 02 20 81
0B99:FE 09 20 2B F0 20 07 0A 39
0BA1:20 BE 0D 20 F0 20 64 7B
0BA9:0D A0 00 B9 F0 10 99 48 4D
0BB1:03 C8 C0 03 D0 F5 CE 34 F3
0BB9:03 CE 34 03 A0 00 B9 35 69

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0BC1:03 99 4B 03 C8 CC 34 03 3E 0DF1:0E 4C 06 0E A2 0C 4C 06 AB 1021:A9 01 8D FC 03 20 61 10 43
0BC9:D0 F4 18 AD 34 03 69 03 E6 0DF9:0E A2 10 4C 06 0E A2 0D 45 1029:20 97 0D C0 0E B0 BC 20 B9
0BD1:8D 34 03 20 76 0D AD BD 1F 0E01:4C 06 0E A2 0F A9 F4 85 3F 1031:07 0A 20 FF 0D 20 64 0D 1A
0BD9:02 CD FF 02 F0 06 EE BD BF 0E09:30 A9 10 85 31 A0 00 18 26 1039:A2 02 20 C9 FF A0 00 B1 FF
0BE1:02 4C 98 0B 4C 94 0D 20 BE 0E11:A5 30 7D A5 11 85 30 A5 BA 1041:FB 20 D2 FF 20 DE 0A 20 72
0BE9:07 0A 20 D2 0D 20 B9 0D A0 0E19:31 69 00 85 31 E0 00 F0 7E 1049:04 10 AD BA 02 CD BE 02 97
0BF1:20 87 10 C9 8C F0 6B 20 B7 0E21:04 CA 4C 10 0E B1 30 C9 DD 1051:F0 03 4C 40 10 AD BB 02 E8
0BF9:07 0A 20 C8 0D 20 34 0E 06 0E29:2A F0 07 20 D2 FF C8 4C ED 1059:CD BF 02 D0 E2 4C D5 0F A0
0C01:A0 00 B9 E4 10 99 48 03 69 0E31:26 0E 60 A0 00 A9 00 8D 2E 1061:20 CC FF AD 34 03 A2 35 C7
0C09:C8 C0 03 D0 F5 A0 00 B9 0F 0E39:34 03 20 E4 FF C9 00 F0 9A 1069:A0 03 20 BD FF A9 02 A2 C7
0C11:35 03 99 4B 03 C8 CC 34 75 0E41:F9 C9 14 F0 3E C9 7B B0 1F 1071:08 AC FC 03 20 BA FF 20 9C
0C19:03 D0 F4 AD 34 03 85 FB 15 0E49:F1 C9 11 F0 ED C9 13 F0 AF 1079:C0 FF A9 00 8D BA 02 8D 18
0C21:20 07 0A 20 CD 0D 20 34 65 0E51:E9 C9 1D F0 E5 C9 22 F0 13 1081:BB 02 8D C3 02 60 20 E4 A4
0C29:0E A6 FB A9 2C 9D 4B 03 7D 0E59:E1 C9 2C F0 DD C9 0D F0 8E 1089:FF C9 00 F0 F9 60 20 07 C3
0C31:E8 A0 00 B9 35 03 9D 4B BD 0E61:10 AC 34 03 C0 10 F0 D2 62 1091:0A 20 04 0E 20 B9 0D 20 42
0C39:03 E8 C8 C0 03 D0 F4 18 8F 0E69:20 D2 FF 20 7A 0E 4C 3B 2C 1099:87 10 C9 8C F0 39 AD E0 2C
0C41:8A 69 03 8D 34 03 20 07 27 0E71:0E AC 34 03 C0 00 F0 C2 21 10A1:02 8D BD 02 AD C9 02 85 1C
0C49:0A 20 04 0E 20 B9 0D 20 F1 0E79:60 AC 34 03 99 35 03 EE 3E 10A9:FB AD CA 02 85 FC 20 FE 0C
0C51:87 10 C9 8C F0 0C 20 07 32 0E81:34 03 60 AC 34 03 C0 01 7F 10B1:09 20 2B 0F AE 34 03 A9 AA
0C59:0A 20 D2 0D 20 F0 0D 4C D4 0E89:B0 03 4C 3B 0E 20 D2 FF 92 10B9:2C 9D 35 03 E8 A9 57 9D 68
0C61:76 0D 60 20 07 0A 20 D7 7E 0E91:38 AD 34 03 E9 01 8D 34 8E 10C1:35 03 E8 8E 34 03 20 21 52
0C69:0D 20 B9 0D 20 87 10 C9 21 0E99:03 4C 3B 0E 20 07 0A 20 E3 10C9:10 AD BD 02 CD D1 02 F0 DF
0C71:8C F0 35 A0 00 B9 E8 10 85 0EA1:E1 0D 20 B9 0D 20 87 10 99 10D1:07 EE BD 02 4C AF 10 60 AA
0C79:99 48 03 C8 C0 03 D0 F5 07 0EA9:C9 8C F0 49 A9 00 8D C3 AC 10D9:AD C1 02 85 FB AD C2 02 F7
0C81:A0 00 A9 03 8D 34 03 20 B2 0EB1:02 20 EC 0A A5 FD 85 FB 41 10E1:85 FC 60 4E 30 3A 2A 56 0A
0C89:07 0A 20 04 0E 20 B9 0D 5D 0EB9:8D C9 02 A5 FE 85 FC 8D 3F 10E9:30 3A 2A 52 30 3A 2A 53 2D
0C91:20 87 10 C9 8C F0 11 20 A4 0EC1:CA 02 A9 01 8D E0 02 8D 8A 10F1:30 3A 2A 4E 45 57 20 4E F8
0C99:07 0A 20 D7 0D A9 14 20 90 0EC9:D1 02 AD FF 02 C9 00 F0 2D 10F9:41 4D 45 20 3E 2A 44 49 25
0CA1:D2 FF 20 F0 0D 4C 76 0D C9 0ED1:24 AD D1 02 8D BD 02 20 4D 1101:53 4B 20 4E 41 4D 45 20 72
0CA9:60 20 07 0A 20 DC 0D 20 2A 0ED9:FE 09 20 2B 0F 20 72 0F 5B 1109:3E 2A 55 4E 49 51 55 45 E3
0CB1:B9 0D 20 87 10 C9 8C F0 18 0EE1:AD C3 02 C9 01 F0 15 AD 46 1111:20 49 44 20 3E 2A 46 4F 9E
0CB9:A9 20 FE 09 A0 00 A2 00 69 0EE9:BD 02 CD FF 02 F0 07 EE EF 1119:52 4D 41 54 2A 56 41 4C 96
0CC1:AD FF 02 C9 00 F0 9B B1 3A 0EF1:D1 02 4C D2 0E 60 20 8F EF 1121:49 44 41 54 45 2A 52 45 23
0CC9:FD C9 2C F0 0A 9D 35 03 1C 0EF9:10 4C 0B 0F A9 00 8D C3 AF 1129:4E 41 4D 45 2A 43 4F 50 0E
0CD1:E8 20 EC 0A 4C C8 0C 8E D0 0F01:02 20 8F 10 20 0B 0F 4C B2 1131:59 2A 51 55 49 44 2A 4E 48
0CD9:34 03 20 58 0D A0 00 B9 FA 0F09:F0 0E 20 07 0A 20 0F FA 0D 6B 1139:4F 20 46 49 4C 45 53 2A B0
0CE1:EC 10 99 48 03 C8 C0 03 EB 0F11:20 B9 0D AD D1 02 8D E0 BC 1141:20 3A 50 52 45 53 53 20 6F
0CE9:D0 F5 20 07 0A 20 EB 0D 12 0F19:02 EE 0E 02 20 87 10 AD 1D 1149:4B 45 59 2A 53 43 52 41 BD
0CF1:A0 00 B9 35 03 99 70 03 47 0F21:C9 02 85 FB AD CA 02 85 37 1151:54 43 48 2A 53 48 41 4E 26
0CF9:20 D2 FF C8 CC 34 03 D0 71 0F29:FC 60 A0 00 A2 01 EC BD A2 1159:47 45 20 2A 4C 4F 41 44 7D
0D01:F1 8C 6F 03 20 B9 0D 20 77 0F31:02 F0 13 B1 FD C9 2C F0 6A 1161:49 4E 47 20 2A 53 41 56 1E
0D09:87 10 C9 8C F0 48 20 07 DC 0F39:06 20 EC 0A 4C 34 0F E8 DA 1169:49 4E 47 20 2A 49 4E 47 09
0D11:0A 20 C3 D0 20 34 0E A0 10 0F41:20 58 0D 4C 2F 0F A0 00 E2 1171:20 2A 50 55 54 20 54 41 9A
0D19:00 B9 35 03 99 4B 03 C8 41 0F49:B1 FD C9 2C F0 07 99 35 C7 1179:52 47 45 54 20 44 49 53 7C
0D21:CC 34 03 D0 F4 A9 3D 99 7E 0F51:03 C8 4C 49 0F 99 35 03 8D 1181:46 20 49 4E 20 44 52 49 5F
0D29:4B 03 C8 18 AD 34 03 69 F1 0F59:C8 B1 FD 99 35 03 C8 8C 75 1189:56 45 2A 50 55 54 20 53 02
0D31:04 8D 34 03 A2 00 BD 70 68 0F61:C0 02 8C 34 03 B1 FD 8D 9D 1191:4F 55 52 43 45 20 44 49 AB
0D39:03 99 4B 03 C8 E8 EC 6F 08 0F69:BE 02 C8 B1 FD 8D BF 02 43 1199:53 4B 20 49 4E 20 44 52 9E
0D41:03 D0 F3 18 AD 34 03 6D C2 0F71:60 A9 02 8D FC 03 20 61 D8 11A1:49 56 45 2A 00 0B 0C 0C 99
0D49:6F 03 8D 34 03 20 76 0D 63 0F79:10 20 97 0D C0 0E B0 69 74 11A9:07 09 07 05 05 09 0C 08 2F
0D51:CE FF 02 4C BD 0C 60 20 D6 0F81:20 07 0A 20 F5 0D 20 64 3D 11B1:08 09 08 05 19 24 A0 00 06
0D59:EC 0A 20 EC 0A 20 EC 0A F3 0F89:0D A2 02 20 C6 FF A5 FB 96 11B9:A9 D5 85 FB A9 11 85 FC 30
0D61:4C EC 0A A0 00 B9 35 03 7C 0F91:8D C1 02 A5 FC 8D C2 02 27 11C1:B1 FB C9 00 F0 09 20 D2 B3
0D69:99 70 03 20 D2 FF C8 CC C3 0F99:A9 00 8D BA 02 8D BB 02 A9 11C9:FF 20 DE 0A 4C C1 11 A9 A5
0D71:34 03 D0 F1 60 A9 0F A2 0A 0FA1:A0 00 20 CF 1F 91 FB 20 6F 11D1:13 4C D2 FF 93 11 1D 1C 22
0D79:08 A0 0F 20 BA FF AD 34 09 0FA9:DE 0A 20 04 10 A5 FB C9 D6 11D9:12 D5 C0 C0 C0 C0 C0 C0 E9
0D81:03 A2 48 A0 03 20 BD FF EC 0FB1:FF F0 0A 20 B7 FF C9 40 E0 11E1:C0 C0 C0 C0 C0 C0 C0 04
0D89:20 C0 FF A9 0F 20 C3 FF FE 0FB9:F0 0C 4C A3 0F A5 FC C9 E9 11E9:C0 C0 C0 C0 C0 C0 C0 1C
0D91:4C CC FF 20 CC FF 20 07 B4 0FC1:CF 0C 52 4C B4 0F AC C0 0F 11F1:C0 C0 C0 C0 C0 C0 C0 0C
0D99:0A A5 BA 20 B4 FF A9 6F E3 0FC9:02 AD BA 02 91 FD C8 AD 8F 11F9:C0 C0 C0 C0 C0 C0 C9 0D 7A
0DA1:85 B9 20 96 FF A0 00 20 FC 0FD1:BB 02 91 FD A2 00 20 C6 7C 1201:1D 1C 12 DD 20 20 20 20 2C
0DA9:A5 FF C9 0D F0 07 20 D2 57 0FD9:FF A2 00 20 C9 FF 20 07 38 1209:20 20 20 20 20 20 20 20 2D
0DB1:FF C8 4C 08 0D 4C AB FF 03 0FEL:0A 20 94 0D A9 02 4C C3 22 1211:20 20 20 20 20 20 20 20 35
0DB9:A2 09 4C 06 0E A2 0A 4C AC 0FE9:FF 68 68 18 AD BE 02 65 82 1219:20 20 20 20 20 20 20 20 3D
0DC1:06 0E A2 00 4C 06 0E A2 EF 0FF1:FB 85 FB AD BF 02 65 FC 97 1221:20 20 20 20 20 20 20 20 45
0DC9:01 4C 06 0E A2 02 4C 06 D4 0FF9:85 FC 20 B9 0D 20 87 10 C1 1229:DD 0D 1D 1C 12 DD 20 9E CB
0DD1:0E A2 03 4C 06 0E A2 04 72 1001:4C D5 0F 18 AD BA 02 69 E5 1231:D5 C0 C9 20 D5 C0 C9 20 11
0DD9:4C 06 0E A2 05 4C 06 0E FA 1009:01 8D BA 02 AD BB 02 69 4E 1239:B2 C9 D5 B2 20 B2 C0 C9 26
0DE1:A2 06 4C 06 0E A2 07 4C 0E 1011:00 8D BB 02 60 A9 01 8D 65 1241:20 AE 20 B0 20 B0 B2 AE 08
0DE9:06 0E A2 0B 4C 06 0E A2 C8 1019:C3 02 CE D1 02 4C C7 0F 72 1249:20 B2 C0 AE 20 CE D5 C0 D5

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1251:C9 20 1C 20 DD 0D 1D 1C 61
1259:12 DD 20 9E DD 20 20 20 BB
1261:DD 20 DD 20 DD CA CB DD C9
1269:20 AB C0 CB 20 DD 20 DD F3
1271:20 20 DD 20 20 AB C0 20 BC
1279:20 20 CA C0 C9 20 1C 20 42
1281:DD 0D 1D 1C 12 DD 20 9E 24
1289:CA C0 CB 20 CA C0 CB 20 CF
1291:BD 20 20 AD 20 B1 20 20 A3
1299:20 CA C0 CB 20 20 B1 20 5A
12A1:20 B1 C0 BD 20 20 CA C0 0E
12A9:CB 20 1C 20 DD 0D 1D 1C BA
12B1:12 DD 20 20 20 20 20 20 3E
12B9:20 20 20 20 20 20 20 DD
12C1:20 20 20 20 20 20 20 E5
12C9:20 20 20 20 20 20 20 ED
12D1:20 20 20 20 20 20 DD 5E
12D9:1D 1C 12 CA C0 C0 C0 CD
12E1:C0 C0 C0 C0 C0 C0 C0 06
12E9:C0 C0 C0 C0 C0 C0 C0 0E
12F1:C0 C0 C0 C0 C0 C0 C0 16
12F9:C0 C0 C0 C0 C0 C0 C0 1E
1301:CB 0D 11 9A 1D 1D 1D 1D D0
1309:20 B2 AE 20 B2 20 20 B2 CC
1311:20 20 B2 AE 20 20 20 B2 05
1319:AE 20 B0 AE 20 B2 AE 20 E8
1321:B2 20 B2 AE 20 B2 AE 0D 20
1329:1D 1D 1D 1D 20 AB 20 AA
1331:DD A0 20 DD 20 20 AB 20 49
1339:20 20 DD 20 20 DD DD 74
1341:20 AB BD 20 DD 20 AB 20 03
1349:20 AB B3 0D 1D 1D 1D 1D 66
1351:20 B1 20 20 B1 20 20 B1 F9
1359:BD 20 B1 BD 20 20 B1 EB
1361:BD 20 AD BD 20 B1 20 20 28
1369:B1 20 B1 BD 20 B1 AD 0D B2
1371:11 96 1D 1D 1D 1D 1D 1D EF
1379:1D 1D 1D 1D 1D 1D 1D 43 C5
1381:4F 50 59 52 49 47 48 54 FF
1389:20 31 39 39 31 0D 11 96 3D
1391:1D 1D 1D 1D 1D 1D 43 4F 36
1399:4D 50 55 54 45 20 50 55 0B
13A1:42 4C 49 43 41 54 49 4F 96
13A9:4E 53 20 49 4E 54 4C 20 E0
13B1:4C 54 44 11 0D 1D 1D 1D E0
13B9:1D 1D 1D 1D 1D 1D 41 04
13C1:4C 4C 20 52 49 47 48 54 96
13C9:53 20 52 45 53 45 52 56 EA
13D1:45 44 11 0D 1C 3E 11 1F B9
13D9:0D 1D 1C 46 31 2D 1F 20 52
13E1:56 41 4C 49 44 41 54 45 B6
13E9:20 20 1C 46 32 2D 20 1F B5
13F1:53 43 52 41 54 43 48 20 51
13F9:20 1C 46 33 2D 20 1F 52 AD
1401:45 4E 41 4D 45 0D 1D 1D 12
1409:1D 1D 1C 46 34 2D 20 1F A4
1411:46 4F 52 4D 41 54 20 20 0B
1419:20 1C 46 35 2D 20 1F 4C E8
1421:4F 41 44 20 44 49 52 45 FC
1429:43 54 4F 52 59 0D 1D 1D 6D
1431:1D 1D 1C 46 36 2D 20 1A
1439:1F 51 55 49 54 20 2D 1C 04
1441:46 37 2D 20 1F 43 4F 50 F6
1449:59 20 20 1C 46 38 2D 20 79
1451:1F 41 42 4F 52 54 0D 00 94

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PUZZLE MANIA

By Maurice Yanney

As different pieces fall from the sky in *Puzzle Mania*, it's your job to see that they land on identically shaped pieces on rows at the bottom of the screen. You control the position of the lower shapes, but lining them up with the falling pieces can be tricky.

Completing a puzzle and continuing to the next level require matching all the pieces on each of the three rows at the bottom of the puzzle. *Puzzle Mania* is a one-player game which requires fast reactions and quick thinking.

Getting Started

Although *Puzzle Mania* is written in machine language, it loads and runs like a BASIC program. To type it in, use *MLX*, our machine language entry program. When *MLX* prompts you, respond with the values given below.

Starting address: 0801

Ending address: 12E0

Be sure to save a copy of the program before exiting *MLX*. Movement is controlled by using a joystick (in either port) or the keyboard.

Playing the Game

As pieces fall, you try to see to it that they land on matching pieces before time expires. Complete one level, and then proceed to the next. Each level contains a more difficult puzzle.

The first level consists of the falling pieces and three bottom rows. An additional row is added on subsequent levels. Each row consists of five shapes to be matched. When a piece is matched by a falling piece, it disappears from the row. When all the pieces have been matched, you move to the next level.

You position the shapes on the bottom rows with a joystick (in either port) or by using the I, J, K, and M keys to move up, left, right, and down, respectively. When you move up, the top row of the puzzle becomes the bottom row, and all the other rows move up one row. Moving down does the opposite; the bottom row becomes the top row, and all the other rows move down one row. Moving left and right affects only

the top row by moving the shapes left or right. If you move a shape off one side of the screen, it will wrap to the other side. Moving 39 positions to the left is the same as moving one position to the right, except that it takes longer.

Pieces fall three at a time, and there are eight different pieces in all. Each piece has a unique match. If a falling piece is not met by its match, then a different shape takes its place. If the falling piece matches, that piece disappears, and you receive 100 points. Then a new piece starts to fall.

The time given to complete the first level is 500 ticks. An onscreen clock shows ticks remaining. An additional 100 ticks are given to complete subsequent levels until level 6, and then no additional time is awarded. When all the pieces are matched and a level is completed, bonus points are awarded based on the amount of time remaining. Ten bonus points are given for each remaining tick.

To pause the game, hold down the Shift key (or press the Shift Lock key). When the Shift key (or Shift Lock key) is released, the game continues.

Tips on Playing

The puzzle pieces fall slowly in the first few levels, so utilize this time to your advantage. Instead of just lining up one piece and waiting for it to fall into place, plan a move or two ahead. One way of doing this is to line up the second falling piece with its match on the second or third bottom row. Once the first piece is matched, move up or down until the row with the prealigned piece is on top. You can then get pieces that are going to reach the top row at nearly the same time. On higher levels you'll need to do this often.

Another tip useful on higher levels involves putting a priority on which piece you're trying to match. There are eight different pieces. Although the pieces fall in a somewhat random order, all eight pieces will fall before a new sequence starts. If one piece appears many times on the puzzle board and another only a few times, you should try to match the ones appearing more frequently. You may have only a couple of pieces remaining, don't waste time waiting for the the same one or two pieces to reappear.

PUZZLE MANIA

```

0801:0B 0B 0A 00 9E 20 32 30 A4
0809:36 32 00 00 00 A9 0C 8D 0D
0811:20 D0 A9 0F 8D 21 D0 20 3E
0819:95 10 20 D9 11 20 CB 08 42
0821:20 A9 12 20 03 0D 20 D9 56
0829:11 20 8B 12 20 72 0F AD F2
0831:8D 02 C9 01 F0 F9 20 F7 79
0839:0C AD E6 12 18 69 01 8D AE
0841:E6 12 F0 0B C9 FA F0 12 46
0849:C9 FD F0 0E 4C 30 08 20 10
0851:16 10 20 EA 0B A9 F7 8D 9F
0859:E6 12 A5 C5 C9 25 F0 35 6C
0861:C9 22 F0 37 C9 21 F0 39 5E
0869:C9 24 F0 3B AD 00 DC C9 2A
0871:77 F0 22 C9 7B F0 24 C9 0C
0879:7E F0 26 C9 7D F0 28 AD 14
0881:01 DC C9 F7 F0 0F C9 FB 55
0889:F0 11 C9 FE F0 13 C9 FD E4
0891:F0 15 4C AE 08 20 B4 0D 0B
0899:4C AE 08 20 CA 0D 4C AE 50
08A1:08 20 63 D0 4C AE 08 20 48
08A9:F7 0D 4C AE 08 20 CB 0A CF
08B1:AD F5 12 D0 03 20 3A 0C 7E
08B9:AD DB 12 C9 FF F0 08 A9 F3
08C1:01 20 2F 0B 4C 30 08 4C 70
08C9:AB 09 20 22 12 A0 00 A9 D4
08D1:FF 99 D0 06 C8 C0 C8 D0 6E
08D9:F8 A2 13 A0 02 18 20 0A 36
08E1:E5 A9 51 A0 09 20 1E AB 34
08E9:A2 15 20 7D 12 A9 01 8D 33
08F1:DF 12 A2 00 AD DF 12 38 14
08F9:E9 01 C9 FF D0 02 A9 0C 66
0901:8D DF 12 A8 B9 9E 09 9D 96
0909:00 04 9D B4 04 9D 68 05 87
0911:9D 1C 06 AD DF 12 29 07 35
0919:0A 9D 0D 18 9D B4 D8 9D 34
0921:68 D9 9D 0C DA C8 C0 0D DB
0929:D0 02 A0 00 E8 E0 B4 F0 5D
0931:03 4C 05 09 A2 00 AD 00 79
0939:DC C9 7F D0 12 AD 01 DC 4F
0941:C9 FF D0 0B 20 F7 0C E8 E4
0949:E0 03 D0 EA 4C F3 08 60 F7
0951:96 54 4F 20 4D 4F 56 45 49
0959:3A 20 20 4A 4F 59 53 54 14
0961:49 43 4B 20 4F 52 20 49 A1
0969:2C 4A 2C 4B 20 26 20 4D 85
0971:20 4B 45 59 53 00 96 4D B9
0979:4F 56 45 20 4A 4F 59 53 09
0981:54 49 43 4B 20 4F 52 20 30
0989:50 52 45 53 53 20 53 00 48
0991:41 43 45 20 54 4F 20 53 33
0999:54 41 52 54 00 10 15 1A 3A
09A1:1A 0C 05 20 0D 01 0E 09 F7
09A9:01 20 20 2F 0B A2 01 A0 C0
09B1:0F 18 20 0A E5 A9 F6 A0 5A
09B9:09 20 1E AB A2 C8 20 F7 47
09C1:0C E8 D0 FA A2 03 20 7D BC
09C9:12 A2 05 A0 0F 18 20 0A 5B
09D1:E5 A9 01 A0 0A 20 1E AB 24
09D9:AD 00 DC C9 7F F0 03 4C 0D
09E1:21 08 AD 01 DC C9 FF F0 4B
09E9:03 4C 21 08 A5 C5 C9 27 34
09F1:D0 E6 20 E2 FC 96 47 41 6A
09F9:4D 45 20 4F 56 45 52 00 69
0A01:96 4E 20 54 4F 20 51 55 30
0A09:49 54 00 AC F7 12 B9 EC 0A
0A11:12 85 FB B9 ED 12 85 FC 6A
0A19:A0 00 B1 FB C9 20 F0 7D A1

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0A21:C9 FF F0 76 C9 EF B0 75 84
0A29:AC F6 12 B9 F2 12 18 69 A8
0A31:01 29 FE AA A0 00 B1 FB FE
0A39:A8 C0 EE D0 07 E0 FE D0 47
0A41:59 4C 8F 0A C0 ED D0 07 0E
0A49:E0 FC D0 4E 4C 8F 0A C0 81
0A51:EC D0 07 E0 FA D0 43 4C EC
0A59:8F 0A C0 EB D0 07 E0 F8 EB
0A61:D0 38 4C 8F 0A C0 EA D0 68
0A69:07 E0 F6 D0 2D 4C 8F 0A E8
0A71:C0 E9 D0 07 E0 F4 D0 22 89
0A79:4C 8F 0A C0 E8 D0 07 E0 5E
0A81:F2 D0 17 4C 8F 0A C0 E7 F8
0A89:D0 10 E0 F0 D0 C0 20 9F CB
0A91:0A AD F5 12 38 E9 01 8D EE
0A99:F5 12 20 6D 0B 60 A0 00 23
0AA1:A9 FF 91 FB 20 3B D0 A0 25
0AA9:02 A9 00 91 FB AD DF 12 AA
0AB1:85 FD AD E0 12 85 FE 88 F8
0AB9:88 B1 FD C8 C8 C8 91 FB 53
0AC1:C0 2A D0 F3 A9 0A 20 03 D2
0AC9:10 60 A9 00 8D F6 12 8D 2D
0AD1:F7 12 20 0C 0A A9 01 8D B1
0AD9:F6 12 A9 02 8D F7 12 20 D3
0AE1:0C 0A A9 02 8D F6 12 A9 E9
0AE9:04 8D F7 12 20 0C 0A 60 29
0AF1:AC F6 12 B9 F8 12 49 01 9B
0AF9:99 F8 12 D0 03 20 BE 0B 89
0B01:60 A9 C8 8D DA 12 A9 00 16
0B09:8D DB 12 AC E3 12 C0 07 D9
0B11:90 02 A0 07 AD DA 12 18 89
0B19:69 64 8D DA 12 AD DB 12 6D
0B21:69 00 8D DB 12 88 C0 FF 8F
0B29:D0 EA 20 4E 0F 60 8D E1 42
0B31:12 A2 00 A0 00 B9 E9 12 CF
0B39:D0 2A BD EC 12 85 FB E8 50
0B41:BD EC 12 85 FC 98 8D DF 51
0B49:12 AD E1 12 F0 0A B9 F2 47
0B51:12 38 F9 F8 12 4C 5B 0B D0
0B59:A9 20 A0 00 91 FB AC DF 16
0B61:12 4C 66 0B E8 E8 C8 C0 4E
0B69:03 D0 CA 60 20 97 E0 A5 5B
0B71:8F 29 0F 69 01 AC F6 12 CC
0B79:99 E9 12 20 CA 0E 0A 69 27
0B81:F0 AC F6 12 99 F2 12 20 18
0B89:97 E0 A5 8F AC F6 12 C0 77
0B91:00 F0 14 C0 01 F0 08 29 77
0B99:0F 18 69 18 4C AA 0B 29 38
0BA1:07 18 69 10 4C AA 0B 29 BB
0BA9:0E AC F7 12 99 EC 12 A9 E0
0BB1:04 99 ED 12 A9 01 AC F6 B0
0BB9:12 99 F8 12 60 AC F7 12 37
0BC1:B9 EC 12 85 FB B9 ED 12 3F
0BC9:85 FC 98 8D DF 12 A0 00 56
0BD1:A9 20 91 FB AC DF 12 B9 79
0BD9:EC 12 18 69 28 99 EC 12 18
0BE1:B9 ED 12 69 00 99 ED 12 7D
0BE9:60 AD E9 12 F0 09 38 E9 FF
0BF1:01 8D E9 12 4C 03 0C A9 7A
0BF9:00 8D F6 12 8D F7 12 20 04
0C01:F1 0A AD EA 12 F0 09 38 97
0C09:E9 01 8D EA 12 4C 1E 0C C0
0C11:A9 01 8D F6 12 A9 02 8D 28
0C19:F7 12 20 F1 0A AD EB 12 C5
0C21:F0 09 38 E9 01 8D EB 12 C1
0C29:4C 39 0C A9 02 8D F6 12 18
0C31:A9 04 8D F7 12 20 F1 0A 4F
0C39:60 A9 00 20 2F 0B 18 AD 71
0C41:E2 12 69 01 C9 0D D0 02 B2
0C49:A9 0C 8D E2 12 8D E3 12 B9

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0C51:A9 0F 8D F5 12 AE E2 12 36
0C59:AD F5 12 18 69 05 8D F5 F9
0C61:12 CA E0 02 D0 F2 A2 06 0F
0C69:A0 0D 18 20 0A E5 A9 E3 39
0C71:A0 0C 20 1E AB A2 06 A0 57
0C79:1A 18 20 0A E5 A9 00 AE CD
0C81:DC 12 20 CD BD A2 08 A0 96
0C89:0F 18 20 0A E5 A9 F0 A0 2C
0C91:0C 20 1E AB A9 00 8D E7 86
0C99:12 8D E8 12 18 AD E7 12 B5
0CA1:69 0A 8D E7 12 AD E8 12 4C
0CA9:69 00 8D E8 12 A2 08 A0 82
0CB1:16 18 20 0A E5 AD E8 12 49
0CB9:AE E7 12 20 CD BD A9 01 21
0CC1:20 03 10 AD DB 12 C9 FF 42
0CC9:F0 06 20 16 10 4C 9D 0C 3A
0CD1:20 38 12 A2 7D 20 F7 0C DC
0CD9:E8 D0 FA 20 8B 12 20 2B 0C
0CE1:10 60 45 4E 44 20 4F 46 2F
0CE9:20 4C 45 56 45 4C 00 42 80
0CF1:4F 4E 55 53 3A 00 A0 4B D3
0CF9:A9 DC 69 01 D0 FC C8 D0 38
0D01:F7 60 A2 00 A9 70 85 FD 9B
0D09:A9 07 85 FE A9 FB 85 FE 9E
0D11:A9 12 85 FC A0 00 A5 FD 53
0D19:91 FB C8 A5 FE 91 FB C8 6D
0D21:A9 02 91 FB 38 A5 FD E9 C0
0D29:28 85 FD A5 FE A9 00 85 F7
0D31:FE 20 9B 12 E8 E0 0D D0 1D
0D39:DB 60 20 48 0E A9 FB 85 76
0D41:FB A9 12 85 FC A0 00 38 01
0D49:B1 FB ED DF 12 8D E1 12 93
0D51:C8 B1 FB ED E0 12 0D E1 E5
0D59:12 F0 06 20 9B 12 4C 46 7F
0D61:0D 60 20 48 0E 20 E0 0D 62
0D69:A0 00 38 B1 FB ED DF 12 5F
0D71:8D E1 12 C8 B1 FB ED E0 D3
0D79:12 0D E1 12 D0 0E A0 00 3D
0D81:A9 70 91 FB C8 A9 07 91 0B
0D89:FB 4C 9D 0D A0 00 38 B1 60
0D91:FB E9 28 91 FB C8 B1 FB A4
0D99:E9 00 91 FB 38 AD E2 12 EA
0DA1:E9 01 8D E2 12 C9 FF D0 59
0DA9:BC AD E3 12 8D E2 12 20 67
0DB1:6F 0E 60 20 3B 0D A0 02 66
0DB9:38 B1 FB E9 01 C9 FF D0 7A
0DC1:02 A9 27 91 FB 20 91 E0 D6
0DC9:60 20 3B 0D A0 02 18 B1 43
0DD1:FB 69 01 C9 28 D0 02 A9 33
0DD9:00 91 FB 20 91 0E 60 AC 0C
0DE1:E2 12 A9 FB 85 FB A9 12 68
0DE9:85 FC C0 00 F0 07 88 20 F2
0DF1:9B 12 4C EB 0D 60 20 E0 B1
0DF9:0D A0 00 38 B1 FB E9 70 88
0E01:8D E1 12 C8 B1 FB E9 07 03
0E09:0D E1 12 D0 13 20 48 0E 2B
0E11:A0 00 AD DF 12 91 FB C8 C8
0E19:AD E0 12 91 FB 4C 31 0E 21
0E21:A0 00 18 B1 FB 69 28 91 13
0E29:FB C8 B1 FB 69 00 91 FB D5
0E31:38 AD E2 12 E9 01 8D E2 A3
0E39:12 C9 FF D0 B9 AD E3 12 3C
0E41:8D E2 12 20 6F 0E 60 AC 42
0E49:E3 12 A9 70 8D DF 12 A9 D1
0E51:07 8D E0 12 C0 0F 00 15 8E
0E59:88 38 AD DF 12 E9 28 8D 91
0E61:DF 12 AD E0 12 E9 00 8D 7B
0E69:E2 12 4C 55 0E 60 A2 00 90
0E71:A9 FB 85 FB A9 12 85 FC 6F
0E79:8A 8D DF 12 20 91 0E AD 6C

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PROGRAMS

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0E81:DF 12 AA EC E3 12 F0 07 86
0E89:20 9B 12 E8 4C 79 0E 60 32
0E91:A2 00 A0 00 B1 FB 85 FD 99
0E99:C8 B1 FB 85 FE C8 18 B1 5B
0EA1:FB 69 03 A8 A5 FE F0 20 2C
0EA9:B1 FB 8D E0 12 98 8D E1 4D
0EB1:12 8A A8 AD E0 12 91 FD D9
0EB9:AD E1 12 A8 C8 E8 C0 2B 88
0EC1:D0 02 A0 03 E0 28 D0 E0 35
0EC9:60 AD E4 12 C9 07 D0 0F 5A
0ED1:A9 00 8D E4 12 20 97 E0 E3
0ED9:A5 8F 29 07 8D E5 12 18 82
0EE1:AD E4 12 69 01 8D E4 12 01
0EE9:18 AD E5 12 69 01 29 07 04
0EF1:8D E5 12 60 20 E0 0D A0 D5
0EF9:03 A9 00 8D E1 12 A9 FF 85
0F01:91 FB C8 C0 2B D0 F9 A0 3D
0F09:03 C8 C8 C8 C8 C8 C8 44
0F11:98 8D DF 12 20 CA 0E 18 5C
0F19:69 E7 AC DF 12 91 FB AD F5
0F21:E1 12 18 69 01 8D E1 12 62
0F29:C9 05 D0 DD 20 97 E0 29 AF
0F31:07 A0 02 91 FB 60 20 F5 EB
0F39:0E 38 AD E2 12 E9 01 8D 18
0F41:E2 12 C9 FF 00 F0 AD E3 18
0F49:12 8D E2 12 60 A2 18 A0 AF
0F51:06 AD DA 12 8D DF 12 AD 18
0F59:DB 12 8D E0 12 20 BA 2F 2F
0F61:20 38 10 18 20 0A E5 AD C3
0F69:DB 12 AE DA 12 20 CD BD E7
0F71:60 A2 18 A0 21 AD DC 12 01
0F79:8D DF 12 A9 00 8D E0 12 3D
0F81:20 B2 0F 18 20 0A E5 A9 5E
0F89:00 AE DC 12 20 CD BD 60 24
0F91:A2 18 A0 14 AD DD 12 8D F2
0F99:DF 12 AD DE 12 8D E0 12 6A
0FA1:20 B2 0F 18 20 0A E5 AD 82
0FA9:DE 12 AE AD 12 20 CD BD D9
0FB1:60 38 A9 0F ED DF 12 8D D4
0FB9:E1 12 A9 27 ED E0 12 0D 19
0FC1:E1 12 90 3D C8 38 A9 E7 9D
0FC9:ED DF 12 8D E1 12 A9 03 9F
0FD1:ED E0 12 0D E1 12 90 29 D3
0FD9:C8 38 A9 63 ED DF 12 8D 76
0FE1:E1 12 A9 00 ED E0 12 0D CE
0FE9:E1 12 90 15 C8 38 A9 09 64
0FF1:ED DF 12 8D E1 12 A9 00 C4
0FF9:ED E0 12 0D E1 12 90 01 D3
1001:C8 60 18 6D DD 12 8D DD A7
1009:12 AD DE 12 69 00 8D DE DF
1011:12 20 91 0F 60 20 4E 0F 94
1019:38 AD DA 12 E9 01 8D DA 86
1021:12 AD DB 12 E9 00 8D DB 98
1029:12 60 18 AD DC 12 69 01 4B
1031:8D DC 12 20 72 0F 60 38 5C
1039:A9 E7 ED DA 12 8D E1 12 30
1041:A9 03 ED DB 12 0D E1 12 0D
1049:D0 05 A9 30 8D C7 07 38 1D
1051:A9 63 ED DA 12 8D E1 12 27
1059:A9 00 ED DB 12 0D E1 12 64
1061:D0 05 A9 30 8D C8 07 38 39
1069:A9 09 ED DA 12 8D E1 12 A8
1071:A9 00 ED DB 12 0D E1 12 7C
1079:D0 05 A9 30 8D C9 07 60 7D
1081:A0 00 A9 20 99 00 04 99 97
1089:00 05 99 00 06 99 08 06 EB
1091:C8 D0 F1 60 A9 30 85 34 DB
1099:85 38 AD 0E DC 29 FE 8D 38
10A1:0E DC A5 01 29 FB 85 01 0A
10A9:A9 00 A0 00 B9 00 D0 99 BB

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10B1:00 30 B9 00 D1 99 00 31 3B
10B9:00 00 D2 99 00 32 B9 00 E6
10C1:D3 99 00 33 B9 00 D4 99 76
10C9:00 34 B9 00 D5 99 00 35 78
10D1:B9 00 D6 99 00 36 B9 00 8F
10D9:D7 99 00 37 C8 D0 CD A5 8A
10E1:01 09 04 85 01 AD 0E DC 55
10E9:09 01 8D 0E DC 18 AD 18 1C
10F1:D0 29 F0 69 0C 8D 18 D0 11
10F9:A0 00 B9 71 11 99 80 31 D9
1101:C8 C0 50 D0 F5 A0 00 A2 A3
1109:00 A9 00 20 55 11 20 5E 25
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1119:00 20 55 11 C0 80 D0 E9 92
1121:A0 00 A2 00 A9 00 99 38 A0
1129:37 C8 20 71 12 20 71 12 3A
1131:20 71 12 A9 FF 99 38 37 AA
1139:C8 99 38 37 C8 99 38 37 F4
1141:C8 99 38 37 C8 C0 40 D0 43
1149:DB A0 F7 A9 FF 99 01 37 BA
1151:C8 D0 FA 60 99 78 37 C8 57
1159:99 78 37 C8 99 78 37 C8 BF
1161:99 78 37 C8 60 20 68 12 48
1169:20 68 12 20 68 12 CA 60 7B
1171:00 7F 7F 63 63 63 7F 7F C0
1179:00 1C 3C 6C 0C 0C 7F 7F FF
1181:00 7F 7F 03 7F 60 7F 7F 9F
1189:00 7F 7F 03 1F 03 7F 7F 2F
1191:00 66 66 66 7F 7F 06 66 8C
1199:00 7F 7F 60 7F 03 7F 7F 18
11A1:00 7F 7F 60 7F 63 7F 7F A1
11A9:00 7F 7F 03 03 03 03 03 F8
11B1:00 7F 7F 63 7F 63 7F 7F E1
11B9:00 7F 7F 63 7F 03 03 03 F2
11C1:FF FF FF AA AA AA 99 99 5B
11C9:99 66 66 66 E7 C3 81 7E 55
11D1:3C 18 E7 E7 E7 18 18 18 7B
11D9:A0 00 A9 FF 99 98 07 A9 68
11E1:0A 99 98 DB C8 C0 50 D0 FA
11E9:F1 A2 18 A0 01 18 20 0A 6D
11F1:E5 A9 FA A0 11 20 1E AB CB
11F9:60 96 20 54 49 4D 45 3A 7F
1201:30 30 30 30 20 1D 20 53 5B
1209:43 4F 52 45 3A 30 30 30 64
1211:30 30 30 20 1D 20 4C 45 A8
1219:56 45 4C 3A 30 30 30 20 A9
1221:00 A9 04 A0 00 99 00 D8 79
1229:99 00 D9 99 00 DA 99 98 26
1231:DA C8 C0 00 D0 EF 60 A9 BD
1239:00 8D F6 12 8D F7 12 20 51
1241:6D 0B A9 01 8D F6 12 A9 3A
1249:02 8D F7 12 20 6D 0B A9 68
1251:02 8D F6 12 A9 04 8D F7 4A
1259:12 20 6D 0B 60 A9 FF 99 30
1261:78 37 C8 20 66 11 60 BD A0
1269:C1 11 99 78 37 E8 C8 60 BC
1271:38 A9 FF FD C1 11 E8 99 B9
1279:38 37 C8 60 A0 01 18 20 FF
1281:0A E5 A9 77 A0 09 20 1E 58
1289:AB 60 20 81 10 20 22 12 0F
1291:20 37 0F 20 6F 0E 20 02 6D
1299:0B 60 18 A5 FB 69 2B 85 1A
12A1:FB A5 FC 69 00 85 FC 60 D3
12A9:A9 00 8D DD 12 8D DE 12 C8
12B1:A9 0F 8D F5 12 A9 02 8D 48
12B9:E2 12 8D E3 12 A9 F7 8D 78
12C1:E6 12 A9 01 8D DC 12 8D B4
12C9:F8 12 8D F9 12 8D FA 12 0F
12D1:A9 00 8D E4 12 20 38 12 60
12D9:60 00 00 00 00 00 00 2E

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ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, *Gazette Disk* offers bonus programs and original 64 and 128 artwork. Here are this month's bonuses.

Connect the Letters
Richard J. Sands
Atlanta, GA

This version of a popular paper-and-pencil game is played on a grid of five rows by five columns with 25 letters. The object is to draw horizontal and vertical lines that connect the letters. You and the computer take turns drawing one line at a time. You win a square when you draw the line that completes it. The player with the most squares wins.

Sport Card Collector
Kevin Scott Davis
Winter Park, FL

To help you use *Sport Card Collector*, we have included a partial listing of the author's basketball card collection.

You may order this disk (\$9.95 plus \$2.00 shipping and handling) from *Gazette Disk*, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in *Gazette* programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each *Gazette Disk* and are printed in all issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write to us, and we'll send you free copies of both of these handy programs. We'll also include instructions on how to type in *Gazette* programs. Please enclose a self-addressed, stamped envelope.

Write to Typing Aids, COMPUTE's *Gazette*, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

REVIEWS

Get your *Police Quest III* briefing, take an advance look at the *Kidz Mouse*, and sample a cornucopia of reviews.

KIDZ MOUSE

Anyone who has introduced a preschooler to the world of computing soon discovers several rules. First, little kids don't need an introduction to computers. Their agile minds immediately grasp cause and effect, and they are soon encamped permanently in front of the PC, happily tapping keys while watching letters appear on the screen. The second thing a computer-using parent learns is to forbid drinks and snacks in the home office. Third, you soon realize that using a mouse with a PC isn't imprinted from birth; it's a skill that requires practice, coordination, and a complex appreciation for manipulating images.

Using a mouse also requires the right kind of tool. Logitech delivers it in the form of the *Kidz Mouse*, a pint-size device shaped much more like its namesake than the bars of soap we grownups insist on calling mice. The *Kidz Mouse* is smaller than the standard-issue device, allowing small hands to better hold and control the pointer. The physical design of the mouse calls for a raised back and a pointed front (thus the mouse shape) with the tail (cord) issuing from the back and clipped to run alongside the mouse and then out toward the front (nose).

My four-year-old, who learned his mousing on a Microsoft model and then switched gamely to a three-button MouseMan, adapted quickly to the new device. I did notice that the shape of the mouse—its high back is reminiscent of the shape of a real mouse—encouraged him to use his thumb to click the left mouse button. Somewhat older children, with



The unimposing *Kidz Mouse* cuts the distance between your kids and the PC.



Your wife Marie, is the latest victim in a series of brutal murders—can you bring her attacker to justice?

hands just a bit bigger, will probably be able to use the correct fingering.

The mouse driver deserves special mention because here, too, Logitech has made special efforts to make the *Kidz Mouse* easy to install and use. The installation procedure puts the mouse driver in a directory called KIDZ (or you can select your own name—just don't put it in the same directory as your present mouse). An option called Kids Support turns the two-button *Kidz Mouse* into a one-button mouse. Not only does

this eliminate unnecessary complexity, but it makes the mouse equally effective for right- and left-handed kids. Interestingly, I found that the *Kidz Mouse* worked fine using my standard Logitech MouseMan driver.

Only a single caveat is worth mentioning here, and that is that you need two free serial ports if you plan to activate the *Kidz Mouse* and a regular mouse simultaneously. The driver software will support dual mice, but you'll only be able to use a single button on either mouse when they operate together.

My solution is to connect the *Kidz Mouse* before I head off to work in the morning and then reconnect my MouseMan when I sit down for work late at night. If you're not comfortable with letting your kids have access to the back of your PC, Logitech offers a serial cord extension.

As an added bonus, the *Kidz Mouse* comes bundled with *The Dinosaur Discovery* kit from First Byte software. This excellent program guarantees that your kids won't be able to keep their hands off the *Kidz Mouse*.

PETER SCISCO

Scheduled Release: October 1991
IBM PC and compatibles—\$79
Five-foot serial extension cord—\$10

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Fremont, CA 94555
(800) 231-7717

Circle Reader Service Number 324

POLICE QUEST III: THE KINDRED

Police Quest players of old, you're in for a real surprise. Gone are the days of a pixel-faced bobby scouring the streets of small-town Lytton for tattoo-bearing drug kingpins. Nothing is simple and everything is complicated about your surrogate life as the new Sonny Bonds, dashing young homicide detective turned sergeant.

Now a full-blown metropolis, Lytton offers the rewards and woes of any big-time city, a new ethnically mixed police department, and a hodgepodge of weirdos, traffic violators, and other major and minor offenders.

In the opening sequence, you meet the program's creator, retired California Highway Patrol officer Jim Walls, who charges you to look at



The greatest hero for the Hyborean Age was a fierce barbarian born of the harsh northlands,

CONAN THE CIMMERIAN

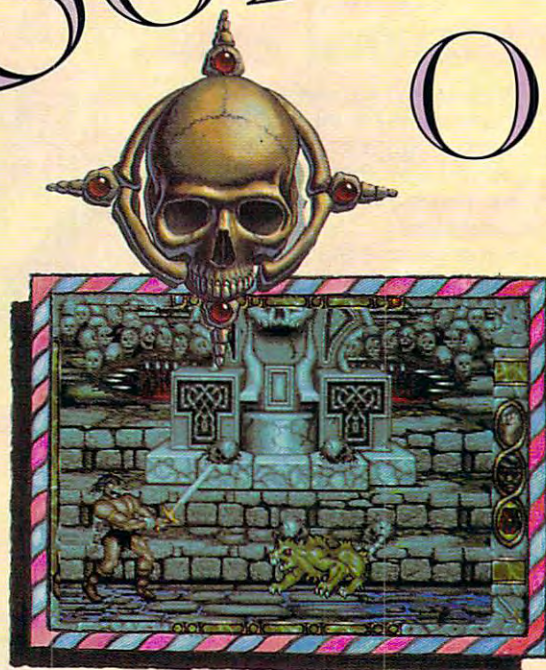
You have heard the tales of Conan's adventures. Only now will you have the opportunity to live the life of this fierce barbarian from the land of Hyborea.

Our odyssey begins with murder most foul. When Conan's village is massacred by the ravaging hordes of Thoth Amon, high priest of the vile cult of Set, Conan vows to avenge the death of his family and friends.

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

Only with luck, courage and constant struggle will Conan have the chance to force a reckoning with the powerful Thoth Amon.

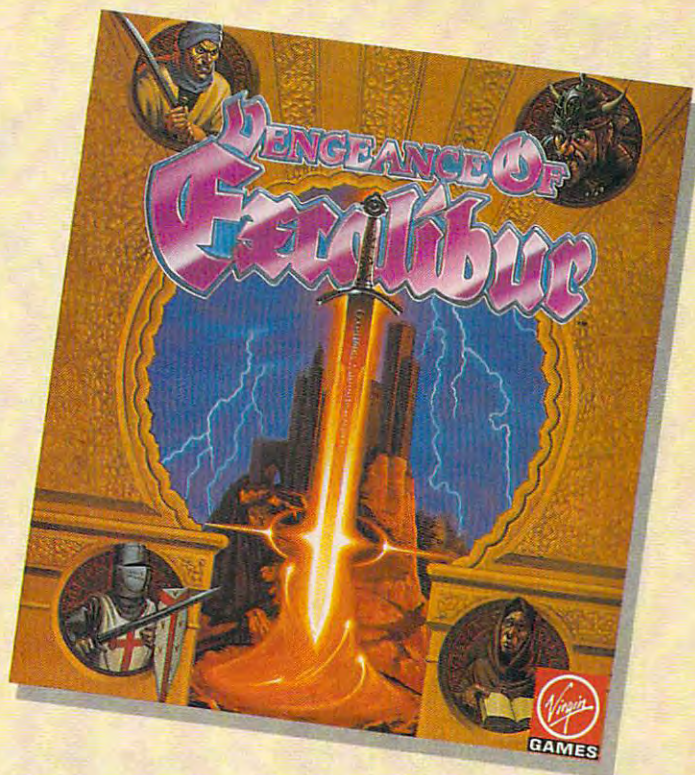
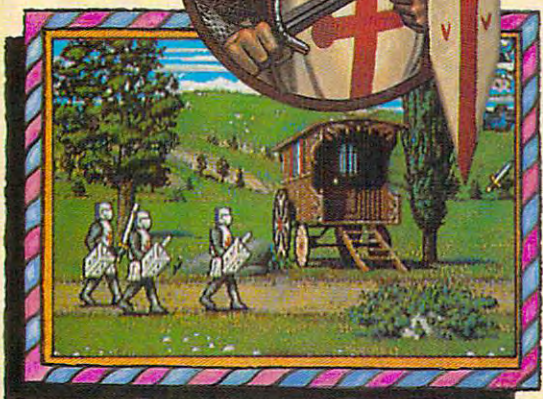
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THING D



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

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

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

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

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SOME NE

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SEGA
GENESIS
NEAR YOU
THIS FALL

ARE YOU TOUGH ENOUGH TO TAKE ON THE 21st CENTURY AND SAVE MANKIND FROM HIS UNTIMELY DESTRUCTION BY A GENETICALLY ENGINEERED WAR MACHINE?!

Talk about your work-related stress! As a ZODIAC special agent, your job is to crack the complex security systems of the Universal Cybernetics Corporation and track down the mutant robot they have designed as the ultimate killing machine.

You'll arm yourself with a whole arsenal of weapons - everything from hologram projectors to special vision enhancement visors to thermal infra-red image intensifiers. If all else fails - you'll have to rely on your own psychic powers!

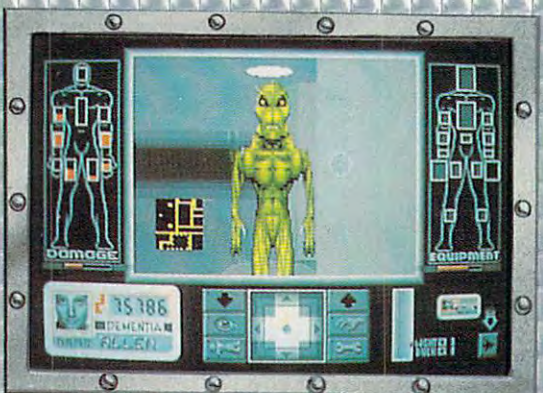
FEATURES INCLUDE:

- 16-level 3-dimensional environment complete with fast, smooth scrolling
- Realistic action control of six characters: 2 male, 2 female and 2 droid
- 360 degree vision
- Environmental sound effects

"Tension and unease, with danger lurking around every corner.... This Number One European Hit will keep you on your toes and coming back for more."

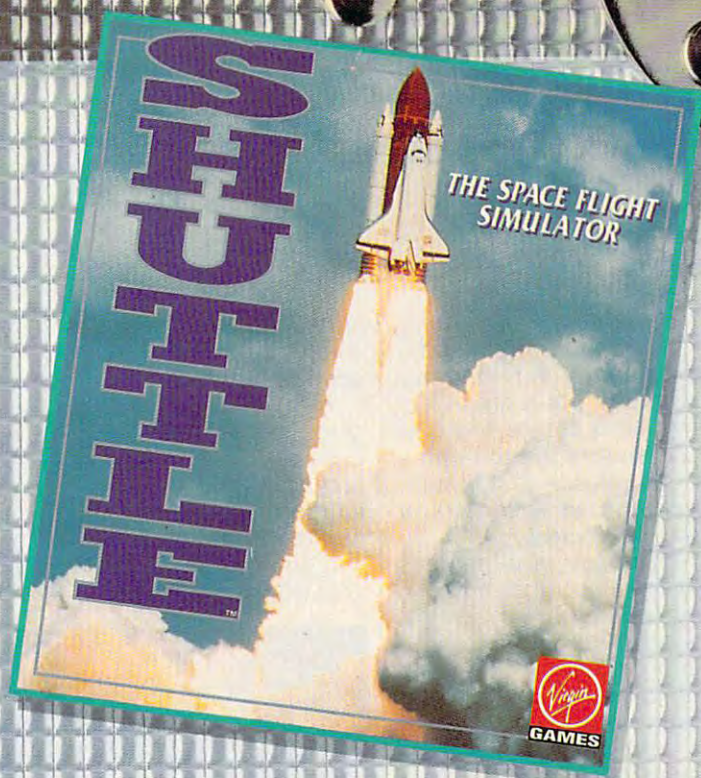
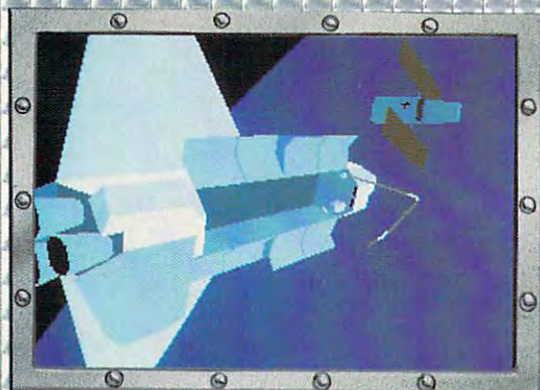
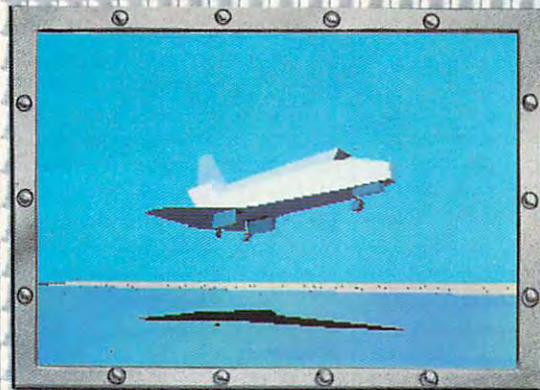
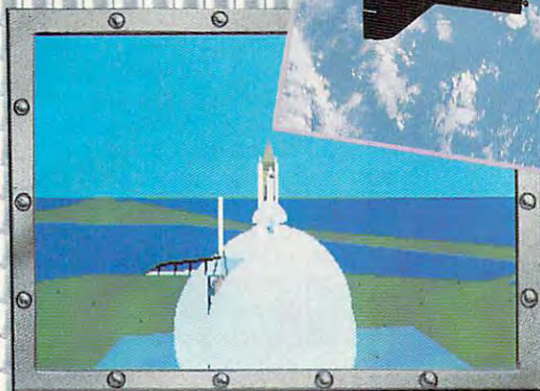


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SHUTTLE

W



The space flight simulator to end all simulators, SHUTTLE is the most accurate and comprehensive simulation of NASA's Space Shuttle ever produced for the home computer.

With the aid of Mission Control, you will master such challenges as deploying and repairing satellites, launching spy satellites, maneuvering your craft in zero gravity, attaining the correct re-entry trajectory, and pulling off complicated landings.

Advanced polygon and elliptical graphics, along with actual land and star maps were used to create the breathtaking 3D panoramas of the Orbiter and its environment, which can be viewed from any angle at any time.

Other features include:

- Authentic control panel display
- Detailed comprehensive training and reference manual
- Numerous training, scientific and "Star Wars" (SDI) Missions
- Multiple help levels from "novice" to "veteran"
- Various launch and landing sites
- Orchestral quality music
- Fold-out Shuttle flight deck poster

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this not as fun and games but as a learning experience, to see and live what a real cop's life is like. "Sonny's life is simple," he tells us, "but it's a good one—worth defending." That statement lays the groundwork for what's to come.

You begin what appears to be a routine day, having agreed to help out in traffic, which, Walls tells us tongue in cheek, always seems to be understaffed. You begin your average cop's day with a disciplinary complaint against Officer Pat Morales—Hispanic, female, and carrying a chip on her shoulder the size of Mount Rushmore.

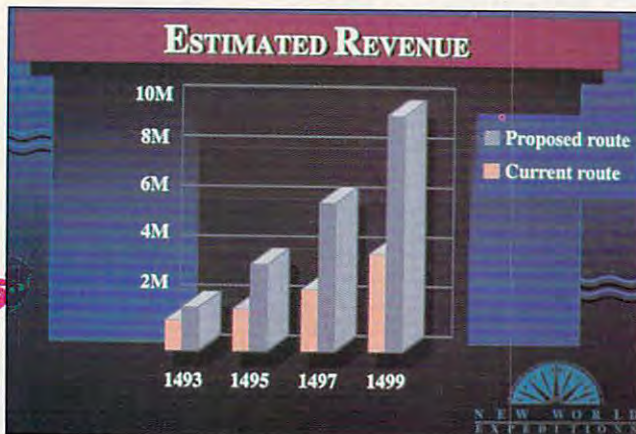
Eventually comes patrol duty, bringing with it the usual number of metropolitan complaints, including a maniac taking off his clothes in the park. The nut ends up attacking you at one point, and if you aren't swift, Sonny bites the dust then and there.

Responding to an attempted murder while out on patrol, you discover a stabbing victim who turns out to be your beloved wife, Marie. Lying motionless and dead, she still grasps the gold chain she grabbed from her attacker's neck. Later you find a military bronze star at the crime scene, directly beneath your wife's car. Therein lies the mystery, and at that point, you're assigned homicide detective duty on your wife's case.

A series of fatal stabbings, rife with satanic undertones, linger unsolved in the city, and now with your wife as the latest victim, it's up to you to conduct a thorough investigation into the crimes. Homicide is run by Captain Tate, a Philip Michael Thomas look-alike minus the Italian designer duds, and your partner turns out to be none other than the hot-tempered

Pat Morales, who promises she's "not so bad" once you get to know her.

The real challenge of this game is to use logic and insight to rule your actions. You have to use your best judgment (as a real cop would), follow procedure, and know when to call on your team members.



PowerPoint for Windows incorporates graphic design in your presentations.

Amidst the darkness and apprehension, *The Kindred* isn't without humor—try walking into the women's locker room, and you'll get socked in the eye by a female cop—but mercifully minus the silly banter and comic relief of *Police Quests* past.

Also missing are type-in commands. Sierra's parserless interface allows you to move through a room quickly. Placing the hand icon on a doorknob walks the character to the door and opens the door. You're left to think about which course of action to take rather than ask a dozen questions. A look around with the eye icon explains everything you see, and "talking" with characters helps you gather pertinent information and clues you in on whether you're behaving correctly or wasting your time.

From the time the credits

roll to the cliff-hanger end, *The Kindred* delivers role-playing adventure you can feel. The characters and settings are as true to life as I've seen. It's obvious to me how carefully planned and well orchestrated the whole scenario is. Most notable in a long list of pluses here, Jan Hammer of "Miami Vice" fame

MICROSOFT POWERPOINT FOR WINDOWS

If you make repeated or important presentations such as speeches, seminars, or sales pitches, a presentation graphics package can prove indispensable. *Windows 3.0* users who need such a package should consider *Microsoft PowerPoint for Windows*.

PowerPoint enables you to quickly and easily create dramatic, coordinated presentations. While the basic unit of a presentation remains the slide, "slides" include actual 35mm photographic slides (produced from your file by a service bureau), full-color or black-and-white overhead transparencies, color or standard printed pages, or a computer-screen slide show.

PowerPoint also creates speaker's notes with reduced-size copies of your slides at the top of each page and printed slides (one, two, or six to a page) to leave with your audience. Your slides, notes, and handouts reside in a single file, coordinated so that any changes you make are reflected in all parts of your presentation.

As your presentation takes shape, you view your slides on a simulated on-screen light table. You can change the order of the presentation by moving slides around with your mouse, making *PowerPoint* not just a presentation creator, but a presentation manager as well.

For the not really artistic (like me), *PowerPoint's* extensive built-in help can solve many graphics predicaments. Have you ever agonized over a color scheme? *PowerPoint* has over 5000

sets a moody tone with a riveting musical score that enralls and captivates and is, in a word, electrifying. It will make you tingle from head to toe. Indeed, you'll feel as though you're actually in *Police Quest III*, and that's the whole point, isn't it? Perhaps for those of us who would walk a desktop beat every day if we could, Sierra On-Line could continue the entertaining *Sonny Bonds* police mystery series.

JILL CHAMPION

Scheduled Release: September 1991
IBM PC and compatibles with 286 or better processor, 640K RAM, MCGA or VGA; supports mouse or joystick, supports Ad Lib, Game Blaster, PS/1, Roland, and Sound Blaster—\$59.95

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"World War III Eliminated The Weak... Now The Real Fight Begins."

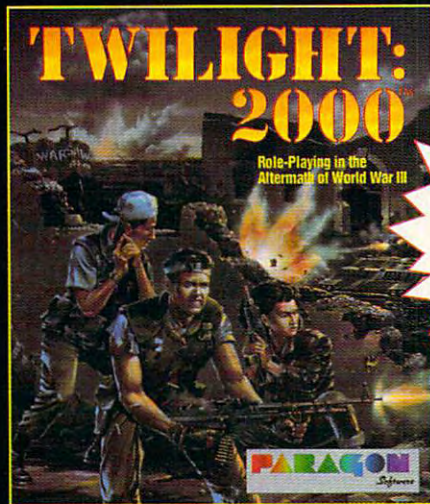


Actual screen shown.

In the wake of nuclear holocaust not even the strong are guaranteed survival. Staying alive requires resourcefulness as well as might.

You lead a squadron of 20 highly-trained soldiers who discover World War III isn't over. An insane genius named Baron Czarny has built an army from the dispossessed and armed it with abandoned high-tech weaponry. Now, you must pit your group's diverse skills, and your leadership abilities, against an onslaught of marauders and military madmen determined to win a war the world lost.

Twilight: 2000 is state-of-the-art, futuristic role-playing: Extensive character generation • Over 2MB of stunning bit-mapped graphics • Movement in military vehicles is shown in detailed 3-D; actions outside vehicles are presented in scaled 2-D 3/4 views • Digitized sound effects and a mood-setting soundtrack • 9 unique vehicle types ranging from an American-made HUM-VEE to a Soviet-made T-72 tank • Scenario design by GDW founder Marc Miller!



Based on the world's most popular war role-playing system!



Actual screens may vary.

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For IBM-PC/Tandy compatibles. For the latest information on release dates and availabilities, call Paragon Customer Service at 412-838-1173, 9 am to 5 pm EST, weekdays. © 1991 Paragon Software and Game Designers Workshop. Twilight: 2000 is produced under license from Game Designers Workshop.

Circle Reference Service Number 115

www.commodore.ca

carefully crafted color schemes built in—your color choices need never clash.

Templates for many kinds of slides offer you proven choices of fonts, underlines, graphic frames and boxes, drop shadows, and so forth. Beautiful in their unity, the template sets coordinate well; four-item basic bullet charts carry on the visual theme of your title screen, your paragraph slides, and your three-column tables, for example. The templates range in mood from lighthearted to stuffed-shirt boardroom. *PowerPoint* even separates sets of templates into 35mm slides, overheads, and PC screens, each optimized for the different aspect ratios of these media.

All presentation files include a slide master, on which you put items that appear on all slides. Borders, corporate logos, and other theme graphics go here.

Stunning slide presentations no longer require the attention of professional artists or graphics designers—bad news for the company graphics department. This power has its price, however. *PowerPoint* demands a PC outfitted for *Windows 3.0*. Depending on how many features you install, *PowerPoint* takes upwards of 8.5 megabytes of hard disk space, and learning to use the program takes some time.

Produced in cooperation with Geniographics, *PowerPoint* certainly packs serious design muscle. The Geniographics artists prepared the color schemes and provided the 400 full-color, resizable clip art images that come with the product. They provide overnight 35mm and color overhead transparency production services. You can take your file on disk to one of their

offices (in many major cities) or send it by modem to the nearest office. You get five slides free as an introduction to the service; after that they run \$10 to \$20 per first slide of each image, depending on how quickly you want them. *PowerPoint* has a built-in modem communications program to call Geniographics—it even knows all the phone numbers.

Creating your presentation requires some tools. The limited word processing function seems perfectly adequate to create whatever you may need for slides. If you know *Word for Windows*, you'll find this smaller look-alike familiar. It even has its own spelling checker to keep you from projecting misspelled words in glorious color for all the world to see.

Drawing functions, too, have specific limitations. Don't expect to do any free-hand drawing here; you choose from simple lines, rectangles, circles, and ellipses. Anything more complex requires creation in another paint program. *PowerPoint* imports PIC, GCM, TIFF, EPS, HPGL, WMF, and PCX file formats directly.

Always an important part of a business presentation, graphs take shape in a separate module, a near clone of the *Excel* graph module. You start with a separate data sheet (a small spreadsheet) that you see on-screen along with its graph. Basic graph types, including area, pie, bar, line, column, and scattered data points (including high-low-close) get support. Many competitive presentation packages offer greater flexibility and diversity of graphs; *PowerPoint* gives you a workmanlike set of normal graphs along with tools to customize them only a lit-

tle. You can import graphs created in other *Windows* packages such as *Wingz* or *3-D Charts for Windows* as images; you can import the data sheet from most spreadsheet programs.

Other packages outshine *PowerPoint* in screen-show features. *PowerPoint* displays the slides in order on a full screen waiting either for a timed advance or a click or keystroke. Slide shows run only from a full-scale copy of *PowerPoint*. Other packages provide a series of special effects such as fades, zooms, and wipes to add interest to the process of changing slide images. Some provide runtime capabilities, meaning that they create a self-executing slide show that does not require the parent program to run on other computers.

Strong in coordinating presentations through master slides, color schemes, and templates that tie everything together, *PowerPoint* certainly doesn't lack fine features. Its flexibility in working with other *Windows* applications further enhances its value. With this amazing tool, nonartists can create truly professional-looking presentations. A little well-deserved self-confidence about the quality of the visuals in a presentation can make the difference between success and failure for the whole event. Before you go before the board with slide carousel in hand, sample *PowerPoint* to make your points unforgettable.

RICHARD O. MANN

IBM 286 or 386 and compatibles, *Windows 3.0*—\$495

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DOS BATCH FILE POWER WITH THE JAMSA BATCH UTILITIES

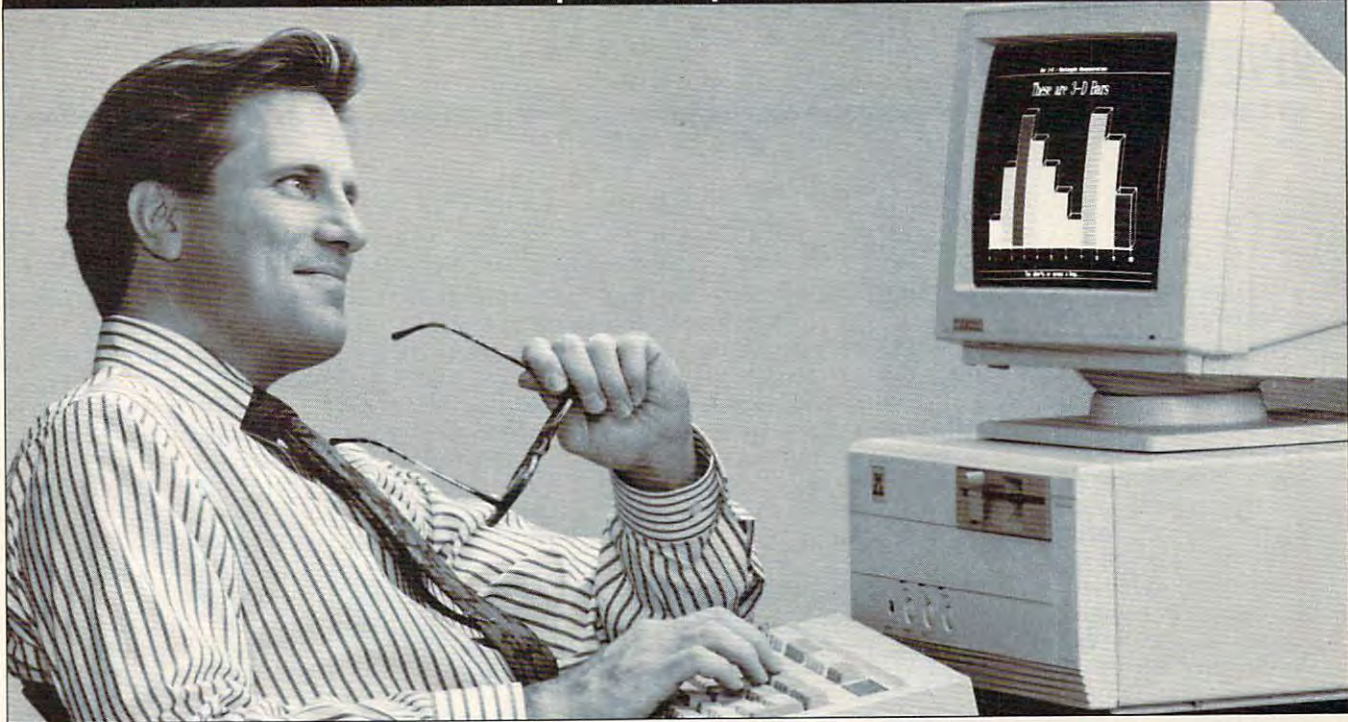
Programmer Kris Jamsa packs everything you could want to know about DOS batch file programming into this hefty edition. Jamsa clearly explains the ins and outs of all the batch file commands and their myriad switches and options. Beginners can build from this solid foundation, and more advanced programmers can benefit from the tricks and tips displayed in the book's plentiful program examples.

Going well beyond the basics, Jamsa includes dozens of programming examples and more than 100 batch language extenders on the three disks included with the book. With this set of utilities, batch files become extraordinarily sophisticated.

These programs, called *Jamsa Batch Utilities*, permit batch files to process input and to format output; to work with system information such as dates, filenames, and available hardware; to accept mouse input; and to compare and manipulate strings. These programs will permit you to use batch programs to automate activities in even the most complex of computer environments.

Jamsa has structured this book like a textbook, building from the very basic to the complex. The chapters are short and focused. Thanks to repetition, less advanced programmers can study the information from a number of angles, and each chapter includes a set of review questions and answers designed to make certain you understand the material that's been presented.

Includes AT-compatible computer and Borland C++



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REVIEWS

While jammed with valuable information, this book unfortunately seems to talk down to all but the most elementary of users, and the amateurish illustrations that introduce each chapter help engender this feeling. Despite this shortcoming in form, I recommend *DOS Batch File Power* for its content. It includes nearly all the information batch file programmers could need, and the value of *Jamsa Batch Utilities* to programmers is indisputable.

TONY ROBERTS

Author: Kris Jamsa
604 pages and three disks—\$39.95

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Circle Reader Service Number 327

BIG BUSINESS

What would you do if you were the chief financial officer of a large company? Would you manufacture cigarettes or microchips? Would you pump money into marketing or product development? How much would you sell your product for? All of these issues and more are considered in the humorous—but accurate—simulation of the business world seen in *Big Business*.

Big Business comes on eight 5¼-inch 360K disks for a total of almost 3MB of code. The game's size is partly a result of the extensive graphics and sound support and partly owing to the multitudinous factors in the running of a large business.

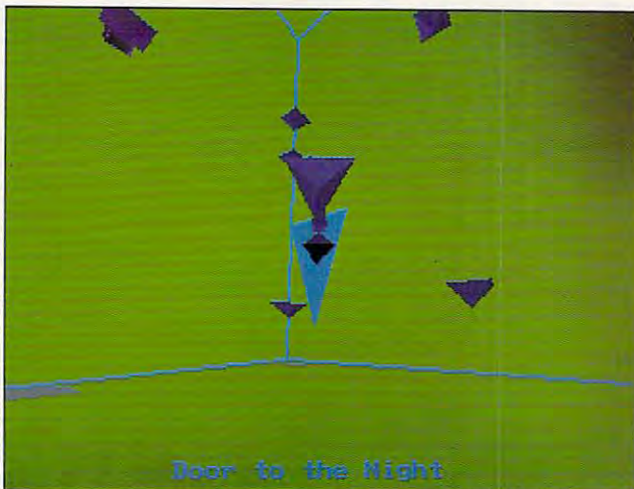
Although *Big Business* is targeted at players over 16, it nevertheless captivated my children, aged 9 to 13. The business concepts of marketing, production, and pricing are well illustrated by the simulation and might be well received in an academ-

ic setting. The game is based upon a complex algorithm that mediates the interplay of the factors that must be balanced to produce success in a manufacturing business. You control the actions of five caricatured corporate officers in finance, purchasing, production, product de-

velopment, and marketing. The game uses 256-color VGA mode with 50 colors and realtime animation that is compatible with all major color adapters and IBM-compatible machines. All major sound boards are supported, but if all you have is an internal speaker, *Big Business* offers digitized sound.



You'll learn the ropes fast in the corporate free-for-all of *Big Business*, or your company flounders.



Lose yourself in *Continuum* either to soothe your frazzled nerves or to score points.

ic setting, and marketing. If you complete the game with a higher net worth than your opponents, you win.

The interface supports mouse, keyboard, and joystick. Though the mouse is by far the easiest to use, the keyboard runs a close sec-

Also packaged with *Big Business* is *Wall Street*, a realistic simulation of the stock market. This share-trading game allows you to trade a portfolio of stocks from a modest holding up to a large investment—or go broke, depending on how well you an-

alyze the market trends. *Wall Street* also contains a stock market trivia quiz game as a bonus.

If you fancy yourself a junior executive, see how you rate in *Big Business*. Don't expect the keys to the corporate washroom to come easy, but do expect a lot of fun playing chief executive.

ALFRED GIOVETTI

IBM PC and compatibles, 512K RAM, CGA, EGA, VGA, or Tandy 16-color; hard disk recommended, supports Ad Lib, Sound Blaster, and Covox Speech Thing—\$49.95

Also available for Amiga—\$49.95, Atari ST—\$39.95, and Macintosh—\$49.95

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CONTINUUM

Given the power of today's personal computers, you'd think it would be easy to come up with an original game concept. Unfortunately, 99 out of 100 games are variations on old themes. However, it is with great delight that this computerist reports stumbling upon a game so captivating and fresh that nothing short of a nuclear attack will stop me from playing it. Load *Continuum*, and you'll see.

Pilot your "mobile" through a 256-room maze, searching for 16 cubes and 15 crystals. Mobiles can turn right or left and can accelerate forward. To become airborne, however, they must bounce on one of many colored platforms scattered throughout each room. Moving from one platform to the next means bouncing to the appropriate height and applying enough thrust to reach your target. Too much or too

Les Manley in:
Lost in L.A.

"SHE STOOD NAKED,

HER WET BODY BATHED IN BEVERLY

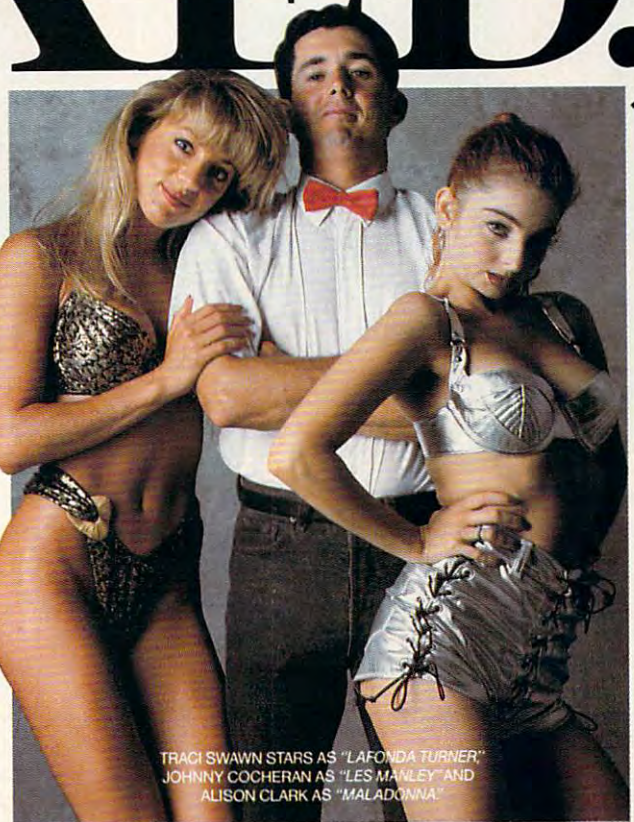
HILLS MOONLIGHT. THE STRANGER CREEPT
OUT FROM THE SHADOWS TOWARDS THE POOL. LIKE

THE STARLETS WHO HAD VANISHED BEFORE HER, SHE WAS
OBLIVIOUS TO HIS MENACING

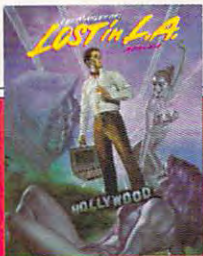
PRESENCE. HER
SCREAM WAS NOT
HEARD! THE HIPPEST
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ARE BEING KIDNAPPED.
AND ONLY ONE MANLEY
CAN SOLVE THE CRIME
OF THE CENTURY. *LES
MANLEY IN LOST IN L.A.*
PLUNGES THE HERO OF
SEARCH FOR THE KING
INTO A MEGA-MYSTERY
THAT SPANS ALL OF LA
LA LAND. MEET GOR-
GEOUS BABES, BODY
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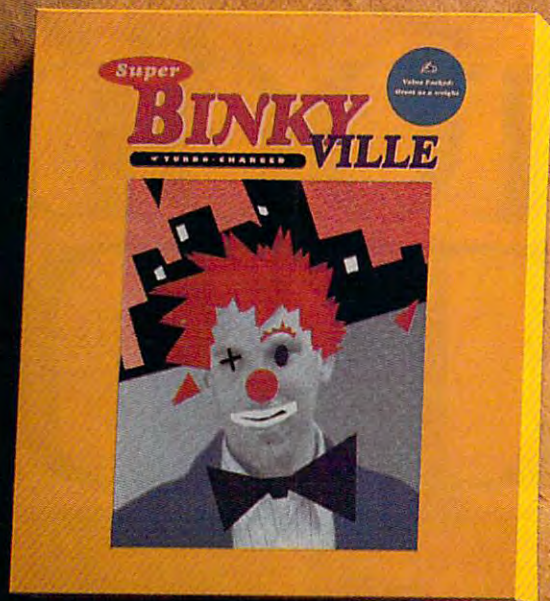


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Circle Reader Service Number 201

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Which Would You Rather Have? A Game That Challenges You For A Few Weeks.

little thrust, and you miss the platform and fall back to the floor, where you restart your laborious climb.

To exit a room, you must reach any of several windows high on the room's walls. Each window leads to a different room in the maze. Reaching a window is as difficult as getting a date with Michelle Pfeiffer. As if bouncing from platform to platform isn't challenging enough, some rooms contain obstacles—force fields, energy drains, and enemy mobiles—which block exits, knock you from platforms, or bounce you out of control. In addition, platforms are often arranged in puzzling patterns. Some platforms even move, gliding back and forth through a room, placing high demands on your mobile-control skills.

The game, which is played from first-person perspective, features 3-D graphics and animation so well implemented that if you're prone to motion sickness,

you may want to keep a box of Dramamine next to your computer. To make the environment even more realistic, the room can be viewed from any angle by adjusting the camera. The camera, too, is well implemented—changing the viewing angle feels as natural as raising and lowering your head. You won't experience the lose-your-place disorientation common to so many shifting-viewpoint games.

Continuum can be played in two modes, action or emotion. In action mode, you start the maze with three minutes on the clock. Entering a room adds one minute, whereas capturing crystals and cubes may add substantially more time. Your score is based on flight time and the number of objects you captured.

Of course, scoring isn't everything. *Continuum's* designers give you the opportunity to merely explore. In emotion mode, you navigate specially designed mazes

without worrying about score or time. The mazes are, according to the manual, "scientifically proven" to evoke certain emotions. Each region of the maze is tagged with an appropriate name, including *Dream*, *Relax*, *Motivation*, and *Meditate*, among others. While I can't attest to the game's ability to affect your psyche, I can say that the Ad Lib-compatible music is wonderfully melodious.

One in a hundred, *Continuum* will draw you into its world again and again. Keep this puppy locked up, and give the key to someone you trust. Otherwise, you'll get no work done.

CLAYTON WALNUM

IBM PC and compatibles, 512K RAM, CGA, EGA, VGA, Tandy 16-color, or Hercules; supports Ad Lib and Sound Blaster sound cards—\$49.95

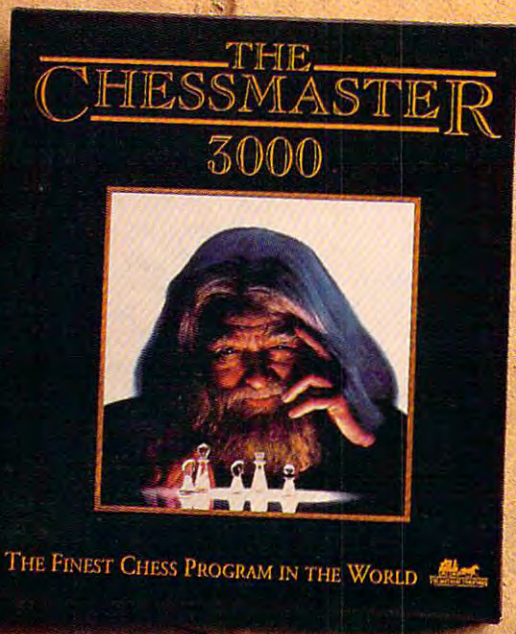
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THE NORTON UTILITIES 6.0

A longtime favorite of personal computer users, *The Norton Utilities* has earned public approval and even fame through its usefulness and reliability. Version 6.0 continues the tradition by adding many valuable features and expanding and improving on the capabilities of earlier versions. Now with categories of data recovery and disk repair, speed and performance enhancement, and security tools, the utilities will consume almost three megabytes of your hard disk space—a price warranted by the improvements.

The *Norton Disk Doctor* runs numerous tests on your hard disk to verify the integrity of the partition table, the boot record, the file allocation table, and the directory and file structure. Further, it checks the free space for lost chains and cross-linked files. *Norton Disk Doctor*



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calls any errors to your attention and gives you the opportunity to correct them.

Powerful and sophisticated, the *Disk Editor* tool offers far more than the name implies. Use it to work on files or directories, the partition table, the file allocation table, and the boot record. You can even rescue sectors from a bad cluster.

Perhaps you forgot to use the system switch when you formatted a disk, but you'd like to make it bootable. Invoke *Disk Tools*. One utility will insert the system files while preserving the data on the disk. Another utility lets you recover from the mess often created by the *DOS Recover* program. Another revives a defective floppy disk, reformatting without loss of data, while others provide a rescue feature for your hard disk by creating a floppy which contains the vital information for the hard disk.

Calibrate optimizes your hard disk interleave to maximize data transfer speed

and performs nondestructive low-level formatting of the disk. Pattern testing takes place at the level which you specify; it can be superficial or very deep. The prudent user will low-level format the disk about once every three months.

DOS has an unfortunate tendency to fragment files, splattering them over the disk with a consequent increase in read and write times. *Speed Disk* lets you optimize the use of disk space by collecting the fragmented files and consolidating the unused space on the disk. In version 6.0, this function requires significantly less time to perform than in earlier versions. Along with defragmentation, you might choose to reorder your directory structure and place often-used directories at the head of the search path.

If you have extended or expanded memory, the use of a disk cache can provide remarkable improvement in performance. If you're not al-

ready using another cache program like *Windows' Smartdrive*, for instance, you could find the *Norton Cache* quite helpful. On an 80286 or 80386 machine, the cache will perform both read and write operations, make guesses at what file you will call next, and, with the help of a memory manager, occupy less than a kilobyte of DOS RAM. *Norton Cache* works with *Windows 3.0*.

Speaking of *Windows*, *Norton Utilities 6.0* works efficiently from the *Windows Program Manager*. Complete with icons, the utilities make keeping up with files a matter of pointing and clicking, though some modules, like *Speed Disk*, won't perform in a multitasking environment.

Want protection of your files not only from unauthorized persons but also from viruses, programming errors, and yourself? *Disk Monitor* allows you to prevent any write operations to specified files from taking place without your permission. You

may specify just the system files, system and all executable files, or even the entire disk. When a write operation is attempted to a protected file, a message appears on the screen, and you must accept or deny the operation.

When prevented from writing to a system or executable file, many forms of viruses fail in their corruption duties. Closer to home, most C programmers have lost control of a pointer at one time or another and created havoc in the system files. Even closer to home, since Delete is a write operation, *Disk Monitor* prevents inadvertent erasure of a vital file.

The security utility *Dis-kreet* protects your confidential files from snoopers by encrypting the files and requiring a password for access. Two encryption schemes come with *Dis-kreet*. The first, a proprietary encryptor, is sufficient protection from amateur data thieves. The other meets the secure Data Encryption Standard approved

by the U.S. Government.

The difference in time required for encryption and decryption is significant. You may encrypt individual files requiring individual passwords, or you may create an entity called an NDisk, which behaves like a hidden directory, requires password access, and contains encrypted files. A convenient feature closes this directory after a user-defined interval of no keyboard activity. In the simplest form of machine security, you can block the keyboard and blank the screen. Access then requires the entry of a password.

The tools category contains the utilities familiar to users of previous editions of the program, with a *System Information* utility greatly improved over the old *SI*. It now provides many screens of information about your computer, including one detailing the performance of your CPU and another concerning the performance of your hard disk. The performance indices have improved; rather than some mysterious number, you now see a bar chart which compares your computer with an XT, an AT, and a Compaq 386.

Does DOS still get you down, even after you've installed *Norton Utilities*? Try Norton's *NDOS*, a slick, intuitive DOS replacement. Improved commands include *Color* (sets foreground and background colors) and *CD* (climbs directory trees when you add multiple periods to this command). Entirely new commands such as *Describe* (attaches file descriptions up to 40 characters in length) and *List* (displays a file with the option to scroll forward and back) should draw applause from DOS users everywhere. If you've already moved up to DOS 5.0,

Norton Utilities will meet you there with support for DOS 5.0's *LOADHI* command and task-switching capabilities, among other things.

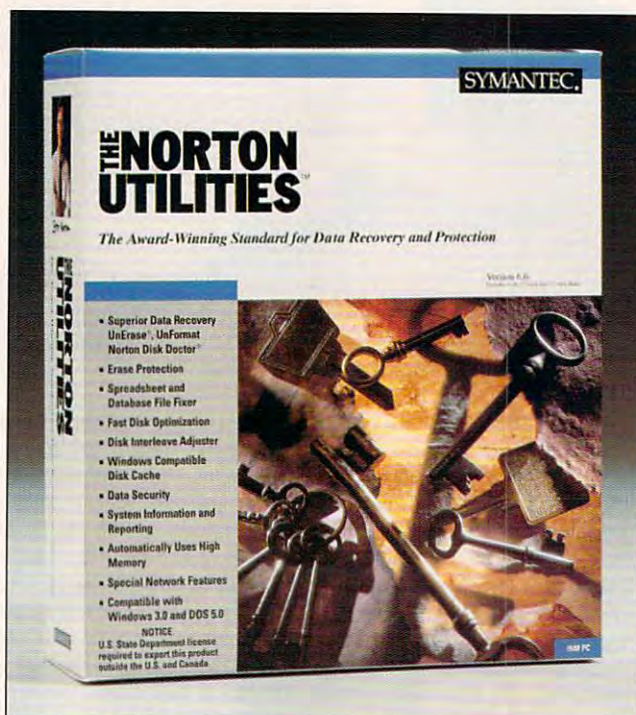
The utilities of *Norton Utilities* 6.0 run fast and without a snag; menus support mouse or keyboard input. *Disk Explorer*, a companion

BY DESIGN

Most *WordPerfect* users know that versions 5.0 and 5.1 have features for mixing text and state-of-the-art graphics to make professional-looking documents. Many people, however, find that these features are hard to

great on my system and contains many of the features that ought to but won't necessarily be included in *WordPerfect* version 6.0. For now, you can increase your productivity painlessly by installing *By Design*.

JOEY LATIMER



More of a magic act than a toolkit, The Norton Utilities can make PC problems disappear.

volume to the User's Guide, tells you more about your disks than you knew you wanted to know, but if you care about the maintenance and performance of your disks, *Norton Utilities* 6.0 belongs in your toolkit.

CHARLES IDOL

IBM PC and compatibles, 512K RAM; hard disk recommended, supports mouse—\$179

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XENOCIDE

Insectoids called Xenomorphs have invaded your solar system; you'll need to kill all of them, of course, and that constitutes *xenocide*—hence the name of this thriller. Guilty of genocide, cross-species genetic experimentation, biological warfare, and eating your peace envoys, the Xenomorphs deserve extinction. So blast away; you're one of the good guys.

You'll need to blow up the three Xenomorph-infested moons of your home planet, Argenia. Since the only interest that the Xenomorphs have in humans is "how they taste with catsup," there's no chance of an armistice. Fight your way across the surface of each moon, killing alien bugs, avoiding large rocks, collecting ammunition canisters, and looking for the docking station that allows you to proceed further into each moon. You'll unleash fireballs, missiles, and nuclear bombs while on the lunar surface, but to actually destroy the moon, you must collect bombs on level 1 and leave them on level 4, the biolab level, before hurriedly teleporting away to safety.

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The bugs splat most realistically on the windshield of your hovercraft. The programmers took great pains to make the squashed bugs highly detailed. Bug corpses litter your windshield and obscure your vision, and they can't be removed. Whatever happened to windshield washers?

A good shoot-'em-up with all the bells and whistles, *Xenocide* doesn't allow for saving games. You may forgive this deficiency when you watch the colorful graphics scroll effortlessly. This one's for arcade addicts of all sorts, but especially trigger-happy xenophobes.

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LEXI-CROSS

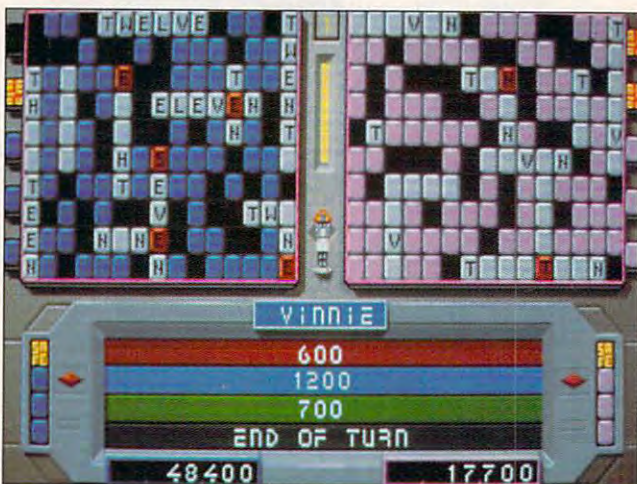
Get up off that couch, you couch potato! Throw away your remote control, and meet the interactive game show of the future.

In the twenty-first century *Lexi-Cross* has been the hottest holovision game show for years, loved by humans, aliens, and cyborgs alike. *Lexi-Cross* is a cross between Scrabble and the hit television game show "Wheel of Fortune" that replaces Vanna with Robanna the Robot and Pat Sajak with Cyborg Chip Ramsey.

At the start of the game, a beautiful cyborg backstage assistant named Pristine Mint helps you assemble your tel-



Xenocide's the only answer when the alien invaders want to make you the main course.



Wordplay's the name of the game in Interplay's addictive game show-style puzzler Lexi-Cross.

evision persona, allowing you to choose from eight sets of heads, torsos, and arms. When you're ready to go, *Lexi-Cross* can be played "on the air" or in practice mode in various combinations of robot, human, and modem play. The game itself consists of four rounds in which the points double, triple, and eventually multiply by 10,000 as the rounds increase.

You can select to reveal tiles from each player's 150-tile board, spin the wheel for a letter, choose a vowel (if you have a vowel token), or solve the puzzle. Robanna

turns tiles for you to reveal blank-letter, vowel, point, safety, lose-turn, lose-safety, and peek-and-poke tokens. When the wheel spins, you win (or lose) points by picking a letter for the blank-letter tokens, lose a turn, end your turn, reveal a column or a row, or go bankrupt.

As in "Wheel of Fortune," you solve the literal, common theme, and other puzzles from the scrambled or unscrambled words and partial phrases revealed on the board. There are only 600 puzzles in the current game, and you'll run through these

quickly if you get hooked on *Lexi-Cross*—and you most likely will. Luckily, Interplay plans to release specialty trivia upgrade disks in the areas of sports, cinema, music, literature, and history.

Robot opponents can be set at five levels of difficulty, though I found *robot intelligence* a bit of a misnomer; *cheating* seems more appropriate than *intelligence*. On the highest mode, the robots know too much about the game. Your best bet is to find a human opponent.

Both 3½- and 5¼-inch disks were enclosed in the box with a humorous manual that was nevertheless hard to decipher. A quick reference card to clarify the instructions would've been useful, but the 20,000-word *Webster's Pocket Dictionary* does assist players of *Lexi-Cross* to some extent. Besides, play a few rounds, and you'll find the function keys won't be a problem. Worry more about beating your computerized game show nemeses.

Quite addictive, *Lexi-Cross* delivers many hours of play. The colors and graphics are dazzling for a word-oriented game, and the sounds never become tiresome. The well-thought-out puzzles, though, soon become stale because of their limited number. Average players memorize the puzzles quickly, so the proposed puzzle disks are a must.

ALFRED GIOVETTI

IBM PC and compatibles; 512K RAM for CGA and EGA, 640K for MCGA and VGA; supports mouse and joystick, hard drive optional, supports Ad Lib, Roland, Innovation, Sound Blaster, and Tandy sound—\$39.95

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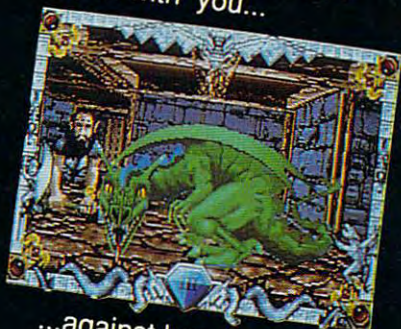
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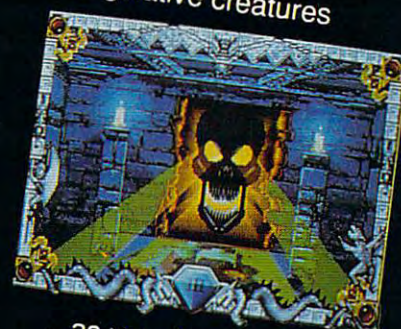
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Circle Reader Service Number 191

FINALSOFT EXECUTIVE

Hard to categorize, *FinalSoft Executive* operates under *Windows* as a groupware/hypertext/scheduling/E-mail application and, though designed mainly for group work, proves quite effective for personal use. *Executive* might be what you need to tie your office together.

Installation is well explained, with each of its dozen or so directories and its two environment variables detailed. Two configuration files, similar in format to WIN.INI, are not explained at all. This could pose a problem to a system administrator who found one of these files damaged.

The hypertext editor is less powerful than *Write*, the word processor bundled free with *Windows*; it doesn't even let you change fonts, but then it's not really meant to produce hardcopy. A simple but very useful hypertext

scheme lets you create links to PCX graphics files, other text files, and *Windows* or DOS programs. And there's more to the hypertext editor than meets the initial, skeptical eye. It supports the import and export of files in ASCII, *WordPerfect*, and Microsoft *Word for Windows* formats, and files can be any size. With this modest feature set anyone can create online documentation for anyone else on the network, with both text and images, without reinventing the wheel. Paperless manuals might actually become practical using *Executive*.

Though flat-file oriented and possessing a very limited report writer, the database manager does create *dBASE III* data files with all the trimmings: memo fields (free-form text of arbitrary length), index files, and forms. Each file may also include a single graphics field. That means, for example, that a real estate office could use scanned-in imag-

es of properties in PCX format, tie them directly into a database manager and scheduler, and allow all the realtors in the office to view them from their personal machines. And while *FinalSoft Executive* won't knock *Superbase* out of the *Windows* market, its graphic interface makes creation and maintenance of databases an order of magnitude easier than in the bad old DOS days.

FinalSoft Executive's personal scheduler, group scheduler, and to-do list make good use of the program's other modules and of *Windows* itself. For example, when you schedule a group meeting, you set priority levels for the people involved. If someone of only peripheral importance to the meeting has a conflicting appointment, the meeting will be scheduled without him or her. A graphic Find Best Time chart scans the participants' schedules and displays them all in bar charts, so that you can see who's

busy, who has a tentative appointment, and so forth—far simpler than trying to check with everyone and settle on a mutually agreeable time.

Is *FinalSoft Executive* for you? The answer is a qualified Yes; you must know exactly what you want from a program like this. Without a programming language, *FinalSoft Executive* may not let you work around its limits. Unlike, say, *dBASE* or *Lotus 1-2-3*, this program is less likely to offer a work-around if its built-in features don't do the trick. And while not one of its modules is a powerhouse, the integration is everything it should be. Just run it on a fast machine; a slow net server could render *FinalSoft Executive* useless.

TOM CAMPBELL

IBM PC and compatibles, hard drive. *Windows* 3.0—\$249

FINALSOFT
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Circle Reader Service Number 334



Web your way to Mary Jane's rescue in this comics-inspired action game.

THE AMAZING SPIDER-MAN

As a devotee of Marvel Comics not so very many years ago, I looked forward to this new game starring the Amazing Spider-Man, the most intriguing character in Marvel publisher Stan Lee's heroic pantheon. Lee's attempt to infuse Spider-Man with psychological and social realism set the series apart from many that had come before it. Peter Parker, alias Spider-Man, felt fears and doubts, had family obligations, and wasn't trusted by the police. He even married! This attention to realism made Spider-Man stories popular for many years. Unfortunately, not much of this quality made it into *The Amazing Spider-Man*.

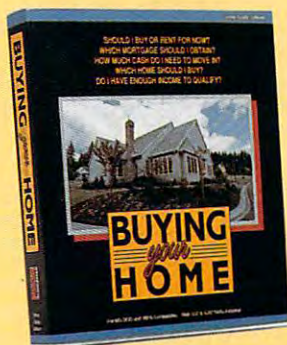
A standard arcade game with a tiny Spider-Man figure moving through essentially rectilinear mazes, *The Amazing Spider-Man* lacks any real depth. The scenario, too, seems familiar. Mysterio, a former stunt man and master of illusion, has kidnapped Spider-Man's wife (Mary Jane Parker) and hidden her in a Hollywood studio rigged with illusions, robots, and traps. (Just once, I'd like to see the girlfriend or wife rescue the superhero, but I guess that game programmers aren't any more willing to take risks than are comic-book writers.) Spidey must use his strength, agility, webs, and wits to deactivate each trap before confronting the sinister Mysterio.

It's not that this is a bad game—the graphics live up to industry standards, some of the puzzles challenge, and learning to play takes you little time. Nothing distinguishes this game from a dozen others though, except for the Spider-

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REVIEWS

Man name. Longtime fans of Spidey's exploits may indeed want *The Amazing Spider-Man* anyway, but players seeking a new gaming experience will have to look elsewhere. 'Nuff said.

STEVEN ANZOVIN

IBM PC and compatibles, 640K RAM, CGA, EGA, VGA, or Tandy 16-color; supports Ad Lib sound; joystick recommended—\$34.95

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The program consists of a dictionary; a gazetteer, covering a variety of geographical information; a biographies section with basic facts regarding historically significant individuals; an abbreviations list with common acronyms; and a secretarial handbook, which covers usage, punctuation, business correspondence, and forms of address.

Inductel—using one of the more comprehensive dictionaries available—has created a product that successfully replaces your hardbound dictionary with one that utilizes the computer. Since the program is hard disk-based, using its search functions is much quicker than looking up definitions by hand or using a CD-ROM-based product. You can search by word or by selecting from a list of onscreen wildcards using mouse or keyboard. You can edit existing definitions, create new ones, and (for the ambitious) create your own dictionary of specialized terms. The program also has print options for all online informa-



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How to create your own software without programming.

tion. The dictionary functions as a memory-resident utility enabling you to look up words from within a document with the touch of a key. I found the program to be user-friendly with a relatively short learning period. Well written and supplemented by helpful illustrations, the manual also serves as documentation for all of Inductel's add-on modules, which include technical terms for engineering, chemistry, physics, and other areas of specific interest. An online manual duplicates the printed one, less the illustrations. Installation is straightforward and should pose no problem for even novice users. One note regarding installation, though: There is a bug which requires the creation of the KAS subdirectory before running the installation. Inductel has a fix for this problem and will send a free update to all registered users upon request.

Despite its lack of bells and whistles, which are common to many of today's applications, Inductel's dictionary program effectively accomplishes the task for which it was designed. Students and professionals, such as writers, publishers, educators, and the like, will find *Funk & Wagnall's Standard Desk Dictionary* more than useful. If you can't afford the hardbound, multivolume *Oxford English Dictionary*, settle for a dramatic improvement in the speed of referencing definitions instead.

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DINOWARS

Dinosaurs have been extinct for over 65 million years, but you wouldn't know it from looking around classrooms, playrooms, and children's toy stores. Science projects, museum exhibits, and plastic toy replicas of all shapes and sizes pay homage to the prehistoric "terrible lizards." Even the computer industry offers an amazing collection of dino software. DigiTek's *DinoWars* capitaliz-

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Editing is a snap. Screens are seen exactly as the user will see them. Commands, such as Draw, Block and Color, are clear and instructive. If Help is needed, pressing F1 provides information on the command currently being used and also lets you browse other topics.

There's a powerful Screen Capture Utility. Graphics or character mode screens displayed by other software can be copied and then used in your program. The common .PCX file format is used for graphics.

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es on our insatiable quest for knowledge about these giant reptiles.

An electronic strategy game with a flair for the arcade, *DinoWars* pits eight famous dinosaurs—including the ever-popular tyrannosaurus, stegosaur, and brontosaur—against one another. Alternatively, dinosaurs may join forces and wage ferocious battles to retrieve a kidnapped dinosaur egg and ensure survival of their group.

Activities take place on an electronic game board measuring ten squares wide by nine squares deep. Five game board layouts—including river valley, volcanic terrain, lush jungle, and barren desert—harbor perilous environmental dangers.

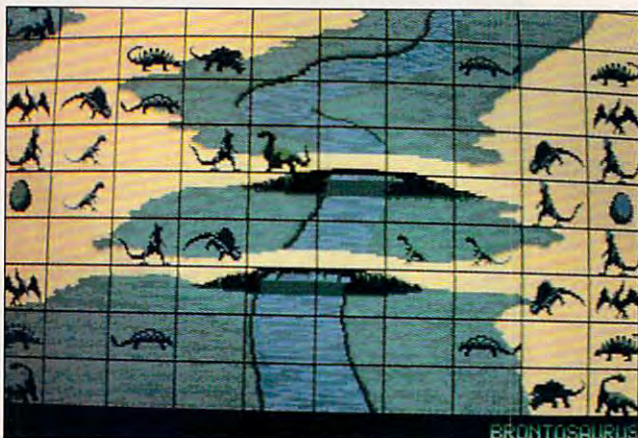
Play begins with competing dinosaur armies lined up in a chesslike arrangement along opposite sides of the board. Two human players (or one human player and the computer) take turns moving dinosaur pieces across the board in an effort to capture the enemy egg.

If two dinosaurs meet on the same board square, the screen changes to a closeup view of the animals, and the players manipulate their reptilian alter egos in a battle to the death. The winner remains on the board (usually in a weakened state), but ready to continue the fight for survival with the next prehistoric enemy.

To win the game, either obliterate your opponent's entire army or recapture the kidnapped egg and return it to the farthest edge of your side of the board. As straightforward as this sounds, *DinoWars* consists of more than a senseless contest of brute force. Like chess, it's a game of ploy and counter-ploy, strategy, and tactics.

Each dinosaur has its own personality, moving at a particular speed and with limited range (a designated number of x-axis and y-axis squares). Configured with a certain level of strength, agility, and armor, attributes that significantly affect a dino's ability to do well in bat-

featuring 15 categories of information about the dinosaurs' geologic time, extinction theories, and related topics. As much as it offers and as impressive as these educational aids are, however, it's a kids' game. While I quickly tired of the violence, my ten-year-old son really en-



DinoWars makes you commander in the clash of reptilian titans.

tle, some dinosaurs fare better against certain opponents. Players may choose to alter their dinosaurs' attributes and customize their dinosaur armies to contain only certain animals.

For example, my ten-year-old assistant decided that he wanted an army consisting predominantly of powerful tyrannosaurs. He configured each *T-rex* with maximum strength, agility, and armor, gave them all the ability to survive aquatic obstacles, and equipped them to move over maximum range. He then configured the computer's army with wimpy dimetrodons, set to move over a minimum range. To further guarantee the odds of winning, he elected to play at the Advanced level and set the computer at Novice. Of course, he won every battle.

DinoWars does have a high level of configurability, with an online encyclopedia

joyed being able to test new fighting strategies. Colorful graphics, animation, and realistic sounds, such as animal roars and gushing river waters increased the program's entertainment value. An Ad Lib sound card magnified the sound intensity. If you're looking for a game that will entertainingly teach your children something about dinosaurs, *DinoWars* could be the product for you.

CAROL HOLZBERG

IBM PC and compatibles, 512K RAM, CGA, EGA, MCGA, VGA, or Tandy 16-color; hard drive—installable; supports Ad Lib, Sound Blaster, and Covox Speech Thing; mouse or joystick optional—\$39.95

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LIGHTSPEED

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Lightspeed's action revolves around your Trailblazer-class scouting ship. No subcompact, this jewel sports a hull 3400 meters long and 2960 meters wide. You can even tailor its configuration to your needs, rearranging components to enhance your defenses, armament, or drive.

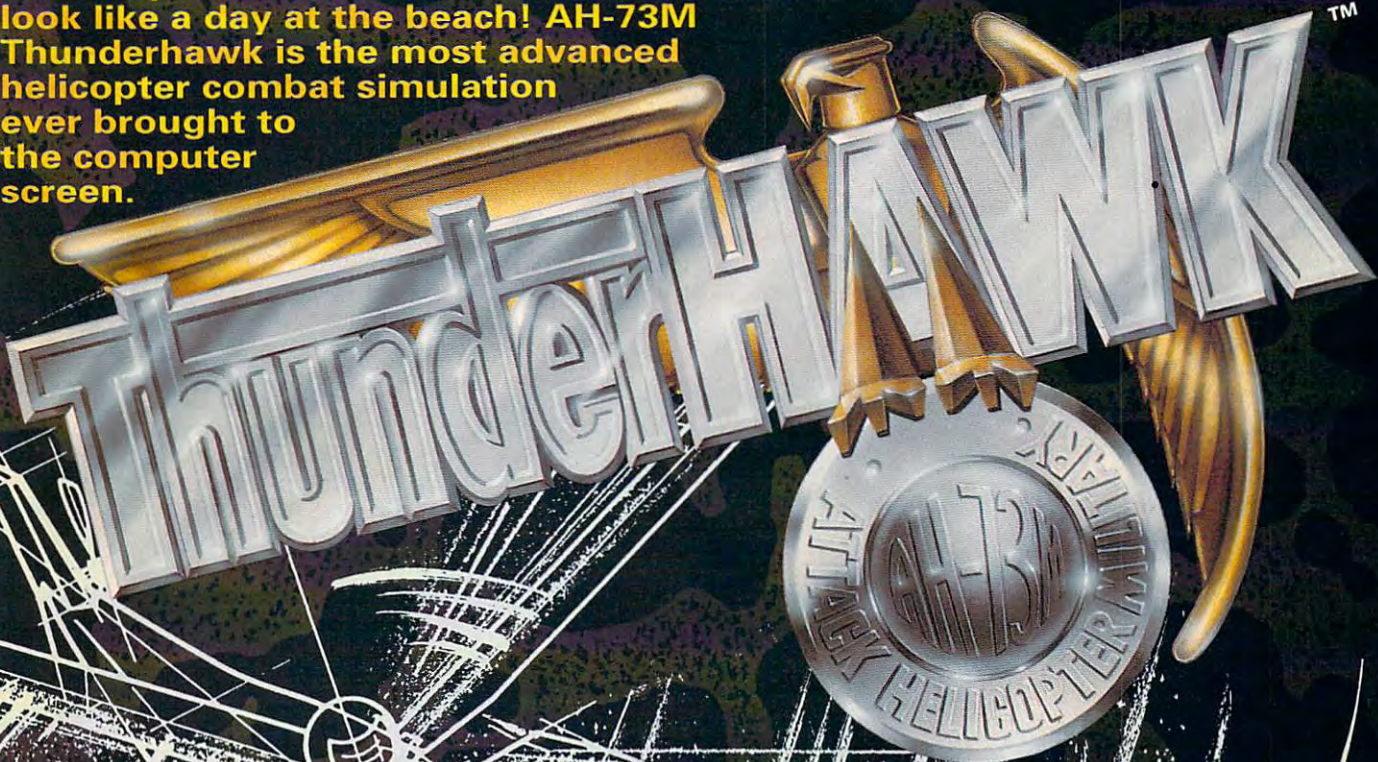
You control your Trailblazer from a comfortable and fully instrumented cockpit that boasts a three-dimensional radar view of surrounding space, plus holographic views of any alien ship you target. The main view screen dominates the cockpit view with its smoothly animated 3-D representation of space.

Besides humble you, the Trailblazer carries three automated mining systems and up to ten missile chassis for hauling remotely guided missiles, kamikazes, and fighters. It also sports a main gun and a steerable blaster turret. Why all the firepower? Well, humankind's not the only species with a claim on space. MicroProse has peopled its universe with beaucoup alien species. Some can be bartered with. Some will even sign peace treaties. All require your constant attention.

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veys ideas but also shows you the alien you're talking to. Sometimes you can pick up valuable information by watching for clues in facial expressions. There's even an automated trade balance system to help you strike deals. Still, remember that these creatures view you as the alien. You'll need all the political skill you can muster, but when negotiations go awry, you've got all those blasters.

Much to MicroProse's credit, *Lightspeed* entails more than simply blowing away aliens. Your trigger finger won't see you through every difficult situation; expect to use your brain quite a lot. You need treaties, new drive components, and resources. Sure, you can take them by force sometimes, but you may find it less painful to negotiate with the aliens instead of blasting them into cosmic dust.

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Yesterdayland provides the only entrance to the park and the monorail of fear, and it houses three coin/token machines: a Zoltan machine, a bagatelle machine, and a grabber full of marching soldiers. The bagatelle machine allows you to win tokens to use on the other machines. You capture a gremlin from the grabber. For tokens, Zoltan trades clues, tickets for the monorail, and extra lives.

Dragonland features you as a barbarian in loincloth. Enter bizarre Dreamland by finding the sleeping potion in Dragonland. Dreamland presents you with an overhead view of a chessboard inhabited by boxes, birdseed, keys, demons, eyeballs, snowmen, sand, piglets, putty, and so on. Reveal boxes by moving into the spaces with chess pieces. You open boxes with keys that you get from birds. You trade birdseed to the birds for keys, and the birdseed comes from gold insects. You get the idea—you'll do a lot of bartering on this level. After collecting the two gremlins, you move on.

You'll find the monorail ticket to Futureland in Dreamland. A pure and simple shoot-'em-up, Futureland has you engaging alien spaceships; spaceship debris may be used to restore your shields.

and a datebook that allows you to check appointments months in advance. You can also create specialized and password-protected *Reminders!* levels if more than one person uses your system.

Menu! and *Reminders!* provide clear manuals and copious help screens to prompt you through their functions. Both are solid, streamlined programs—and all that many people will ever really need.

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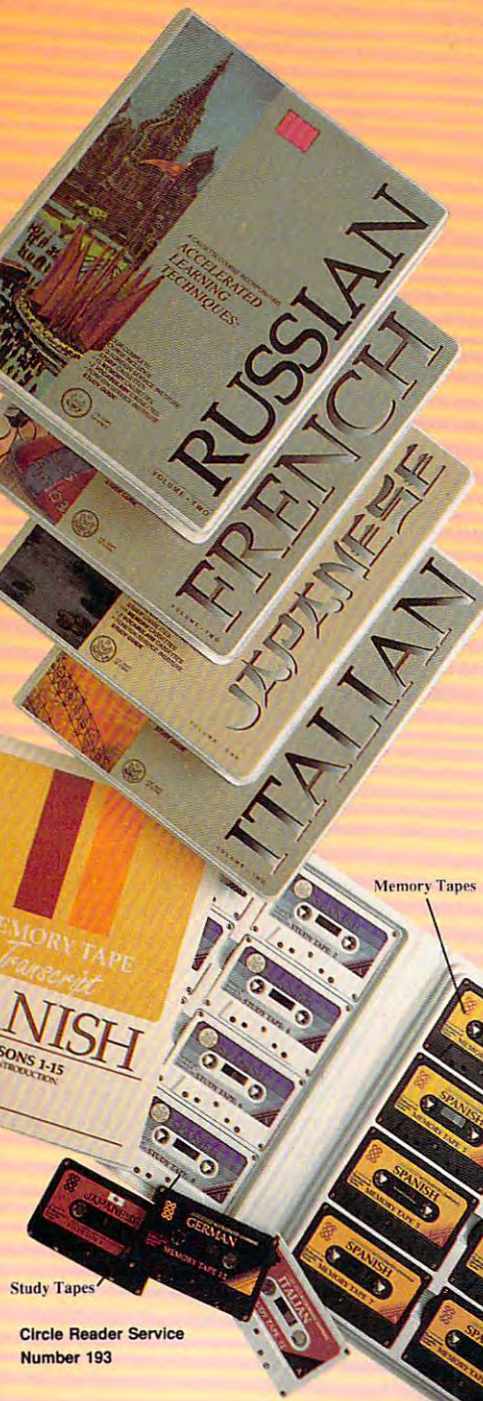
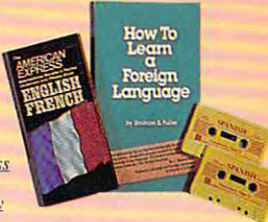
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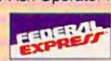
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In this world, the gremlins hide inside blue balls, which you'll also collect.

Plan carefully for the capture of the gremlins, or you won't complete the game. The way that all three arcade games and Yesterdayland interact creates a unique strategic situation; it's beatable but resistant to immediate solution. The hallmark of a successful adventure is its ability to entertain players as they work toward task completion, and *Theme Park Mystery* throws plenty of curiosities in your path to hold your interest throughout your travels. With first-rate animation and appropriate colors, the action should make arcade addicts take note. For those who love good puzzles, *Theme Park Mystery* offers more than enough weird ones. Fun, yes, and sometimes even a little creepy. The interface supports either the keyboard or a combination of joystick and mouse for game control. The combination joystick-and-mouse interface has one active while the other is inactive. In the beginning sequence the joystick is active and can be used for movement while the mouse is inactive. When you step in front of a coin-op machine, the machine screen replaces the Yesterdayland screen, the mouse becomes active, and the joystick becomes inactive. Obviously, the interface has tremendous potential to confuse.

Theme Park Mystery otherwise suffers only from having no save-game feature, requiring you to complete the game in one sitting. Replay of already completed sequences bores most gamers, but it shouldn't prevent you from playing. I wonder, though, why you shouldn't be able to save a position in Dreamland, for instance, and

avoid another harrowing trip through Dragonland.

Combining three complete arcade games into an arcade adventure, *Theme Park Mystery*'s a bit quirky, but delightful. And as further incentive to buy, each game comes with a color poster of Zoltan and a chance to win back the purchase price of *Theme Park Mystery*. If you can live without a save-game option and you like your action a bit on the sinister side with some puzzles thrown in, then *Theme Park Mystery*'s truly worth the price of admission.

ALFRED C. GIOVETTI

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NIGHTBREED

What horrible and demented imaginings inspire a software title like *Nightbreed*? For Ocean Software, the inspiration is fright master Clive Barker's movie *Nightbreed*. Described by Ocean Software as an "interactive movie," this game struggles to capture the movie's feel in a videogame. Unfortunately, adventure game fans will likely find this game a disappointment.

As Aaron Boone, a diagnosed schizophrenic and suspected serial killer, you certainly have your share of problems, enough to drive anyone crazy. While being held for observation in a mental asylum, you hear of a place called Midian, where men can escape civilization's in-

justices. You decide to find Midian and join its inhabitants, misshapen creatures of the night known as the Breed. However, during your search, you unwittingly lead the police to Midian and place the survival of the Breed in jeopardy. Now you must fight to save them. As in the movie, you first have to escape the Breed—who seem bent on your death—before you can help them.

Nightbreed goes astray by forcing you to follow the movie's plot too closely. Often an adventure game's appeal stems from investigating and exploring a fictional world—something you can't control when you watch a movie, and something you can't do in this game. Exploration frequently merits swift, unavoidable death. Besides being frustrating, these unjust exterminations negate the reason for the game's existence. If we wanted to see the movie's plot line repeated verbatim, we'd just rent the movie.

The lack of basic features such as mouse support and a save-game facility adds to the frustration. A mouse seems the natural choice of controls for this game, given all the pointing and clicking you must do, and I'm frankly amazed that the designers didn't include mouse support as at least an option. Considering how often you die in this game, every concession to players should've been made.

Redeemed only by its graphics, *Nightbreed* does incorporate some appealing artwork, capturing the ambience of horror movies. Unfortunately, my opinion of *Nightbreed* the videogame parallels my opinion of the movie; it could've been an order of magnitude better.

RICHARD RAPP

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UNDOCUMENTED DOS: A PROGRAMMER'S GUIDE TO RESERVED MS-DOS FUNCTIONS AND DATA STRUCTURES

An instant classic, *Undocumented DOS* explains DOS calls that Microsoft and IBM mark—infuriatingly—as "reserved" in their technical reference manuals. Well written by a team with impeccable credentials (including the original author of MS-DOS), this book/disk combination belongs on every serious programmer's shelf.

The book gives you everything you need to know to write TSRs, network code, alternate command processors, debuggers, and other high-performance software. The source code is largely in C, with dollops of assembly and *Turbo Pascal*. Luckily, *Undocumented DOS* explains using these calls.

Emphatically not a rehash of IBM or Microsoft technical documentation, *Undocumented DOS* also emphasizes complete programs, providing source code for utilities that not only teach but stand as useful programs on their own. Examples include a pro-

continued on page 154

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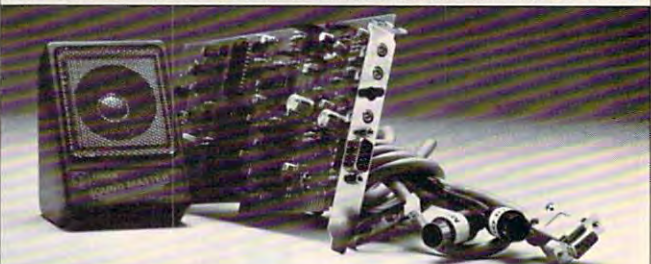
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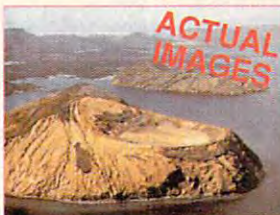
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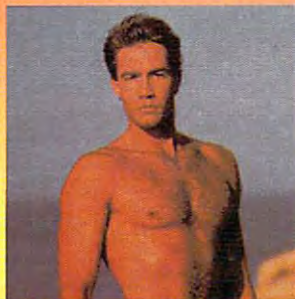


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REVIEWS

gram that lets you load and remove device drivers from the command line; a simple RAM disk, also loadable from the command line; a program that lets you hide disk volumes, making them invisible to DOS; and a utility that lets you rename files using wildcard specifications across directories (something that DOS won't let you do).

Learning anything well requires that you make connections between seemingly disparate ideas. *Undocumented DOS* is written by experts at such a Nirvana-like plane that they're able to make those connections for you. For example, the section on the network redirector, normally thought of as a way to create CD-ROM and network drivers, correctly points out that the network redirector can be used to graft any alien file system onto DOS, making it look like any other device. Another telling passage about version-specific DOS utilities remarks that "it is almost never necessary to patch DOS or the DOS utilities." Considering the huge number of DOS patches available on bulletin boards and in magazine articles, one might wonder if the authors haven't made a mistake. But sure enough, a program follows that lets you fool DOS into thinking it's a different version (without patching DOS).

The software, on two 1.2MB floppies, includes a hypertext reference guide, TSR template programs, and some great utility programs. One of them is an interrupt monitor program that has a full scripting language with replaceable parameters (like those in batch files) and access to the CPU registers. The hypertext guide (ironically, not a TSR) is itself worth the price of the book. Even though the guide itself takes up well over a megabyte of disk space, I'd like to see it with example code, even in fragmentary form, and as a swappable TSR. The insights that this code could provide would be well worth an extra disk to dedicated programmers.

While other books, including Microsoft's own *MS-DOS Encyclopedia*, have touched on a few of the issues covered by *Undocumented DOS*, none of them have even approached its scope. If you need to write code that *DOS Technical Reference* says you can't write, buy this book and code the impossible.

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EZCOSMOS 3.0

Go outside one cloudless night and tilt back your head. Unless you live deep in the country, you'll see only a smattering of the visible stars—city lights mask the rest. It's no wonder that we don't share the awe our ancestors held of the heavens. They imagined bears and warriors, bulls and crustaceans in the sky, and built legends, mythologies, even religions around what they saw. We look up and see nothing more than a few meaningless pinpricks of light.

You can rediscover the sweep of the Milky Way and the bright path of the planets with a good telescope and the time it takes you to drive out of the city. Or you can stay at home and turn your PC into a personal planetarium with *EZCosmos 3.0*, a fascinating and instructive astronomy program.

EZCosmos is delightfully simple to use. From a status screen, you select such things as your location, the date, and the time. Stepping through the set-up is quick; the program recognizes 1150 cities across the world and automatically takes the date and time from your PC's clock. If you want to get adventurous, you can view the skies from any place on the planet by setting the longitude and latitude, or even transport yourself back in time as far as 4000 B.C. or as far ahead as A.D. 10,000. That's especially useful for hunting down solar eclipses, past or future, since *EZCosmos* can animate the planets and show you an eclipse close up.

Your monitor turns into a stunning display once you leave the status screen and plot the sky. On an EGA- or VGA-equipped system, planets are color-coded, and stars appear in their true colors—Betelgeuse, a red giant, gleams red on the PC screen, for instance. As expected, CGA and Hercules modes are far less satisfactory. Constellation lines, the sun and moon, and New General Catalogue objects (nebulae, clusters of stars, and distant galaxies) complete the display.

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REVIEWS

With all this information on the screen, it's easy to go into stellar overload. *EZCosmos* conveniently solves the problem by letting you pare the display to the essentials—the stars. A small cursor box can be moved around the screen to identify stars and other galactic objects of interest. Mouse support—one of version 3.0's enhancements—makes it easy to move around the screen and choose objects for identification. Another way to get to where you want is with the program's fill-in-the-blank Find command, which lets you jump to stars you know by name. Although the program offers a menu list of commands at the press of a key, I'd like a system that doesn't require me to know the names of stars, one that would let me pop up all the stars whose names begin with S when I press that key, for example.

Once you've located an object, hit the Enter key, and an information box appears, filled with such things as its magnitude (brightness), azimuth (deviation from true north), and rising/setting times. The last is especially useful for planet watching. The moon appears when appropriate and shows its phases, as well. Though the stars don't move, you can animate the planets and watch them track across the sky. The outer planets seem to barely move from month to month, while the inner worlds fairly zip through the heavens. *EZCosmos* makes it easy to identify what planet is where, both onscreen and in the night sky.

Extras include 40 full-color graphics of planets, star clusters, galaxies, and nebulae; extensive online help; and a filter to display only the brighter stars. In all, you have access to more than 10,000 objects in the program's database—a good start towards a guide to the galaxy. But this program is more than a sky watcher's reference limited to your desktop. With version 3.0 of *EZCosmos*, you have the ability to generate a star map on your laser or dot-matrix printer. Maps can make your star gazing jaunts more productive.

EZCosmos brings a bit of astronomy into anyone's home. Its sights may be set too low for astronomers who have already memorized the skies, but for amateur enthusiasts, it's an enjoyable diversion and an educational voyage of

discovery. More than that, it gives you an excuse to get up from your computer and go outside, to see the real interstellar sights of the night.

GREGG KEIZER

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MACE FORMAT

Have you ever formatted the wrong disk? In your hurry to prepare a disk for an important task, you grab the wrong one, shove it in the drive slot, and issue the fateful command, `FORMAT A:`. After the format is complete, you remove it from the drive, only to discover that it was the only copy of your club's membership list or your checkbook files. I can tell you from experience: It's not a good feeling.

A small set of programs, *Mace Format* helps you recover from such unhappy lapses in concentration. It includes a special formatting program for floppy disks, an undelete program, and a hard disk recovery program.

If you install `Formatf`, the disk formatter, in place of DOS's deadlier `FORMAT` command, you increase your safety level in two ways. First, `Formatf` won't format a hard disk, so you can't accidentally format your hard drive. Second, the program performs its own special brand of nondestructive formatting. Instead of wiping out everything on the disk, `Formatf` copies the files from the disk into temporary storage, formats the disk, and then writes the files back on to the disk and deletes them. Deleting a file doesn't remove the data from the disk; it just marks the file in the File Allocation Table (FAT) as no longer worth saving. If subsequent disk activity doesn't write over the sectors containing the original file, the undelete program can recover the data by restoring its entry in the FAT.

`RxBak`, the hard disk recovery program, stores an image of the essential FAT and directory files in a safe area. If you accidentally format your hard disk, the `unformat` program can mirac-

ulously restore your lost data.

Undelete and hard disk recovery programs are fairly common these days (*PC Tools* has both). While not unique, *Mace Format's* special way of formatting floppy disks certainly makes this a valuable application, one you'll be glad you have the next time you grab the wrong disk.

RICHARD O. MANN

IBM PC and compatibles, 512K RAM; supports hard drive—\$69

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PROCOMM PLUS

A longtime favorite among the legions of the DOS-faithful, *ProComm Plus*, a dependable, multipurpose telecommu-

nications program, is back. And as the first major upgrade to Datastorm's premiere communications package in several years, *ProComm Plus 2.0* debuts as a winner, touting some significant, much-appreciated enhancements.

Full mouse compatibility and 132-column support have been added. (Switching from 80 to 132 columns and back presents no problem to *ProComm*.) If your system doesn't have EGA or VGA higher-resolution modes, *ProComm Plus* scrolls across the larger 132-column window.

Roughly doubled in size, the Aspect script language now necessitates a separate manual. The manual itself has been rewritten and includes a helpful tutorial. Several appendices provide useful information on common problems such as file transfer protocols and terminal emulation. Background communications are supported, but notably, expanded and extended memory use

isn't. However, the amount of memory required—300K for fully functional operations—is small enough to allow multitasking with ease. Intended primarily for DOS users, *ProComm Plus* nevertheless operates in the *Windows* multitasking environment. Just set it up as a DOS application and you can switch between telecommunicating and *Word for Windows*, for example. You're also saved the memory expense of accessing ZMODEM as an external protocol; *ProComm Plus* features it as part of the main executable file.

ProComm Plus remains, above all, easy to use. *ProComm Plus 2.0* is fully compatible with the older 1.1B release and both the installation process and the program are supplemented by generous online help, which now includes a topic index. If problems occur that require outside assistance, unlimited technical support is quickly available. You'll find Datastorm's technicians very

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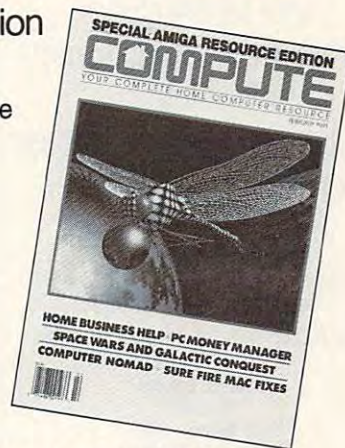
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REVIEWS

knowledgeable and courteous.

In short, *ProComm Plus* reestablishes its claim to a first-tier position among communications software. Combining breadth of features, low memory usage, and excellent documentation, *ProComm* leaves little to be desired. This is the DOS-based asynchronous telecommunications package to buy.

BARRY BRENESAL

IBM PC and compatibles, 210K of RAM (300K recommended)—\$119

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ALPHANOTE PERSONAL DATABASE

A cross between a notepad and a database could be just what you need if you find yourself duplicating information in several applications. Consider *AlphaNote*, a multifeatured, menu-driven personal note keeper, as a solution. *AlphaNote* stores information in freeform units called *notes*. Notes can be saved either as formatted text (for brief memos or to-do lists) or as unformatted text (for data tables, exported word processor documents, or program source code). The utility will even import and display binary data in hexadecimal notation (for COM or EXE program files or application data). Users must manually edit the system's AUTOEXEC.BAT file before *AlphaNote* will run.

Each *AlphaNote* note saves as two files, with TXT and DAT extensions. TXT files contain text data, while DAT files consist of descriptive keywords (tags) used to identify individual TXT files. Notes can be viewed, edited, printed, or protected to avoid accidental deletion. *AlphaNote* ships with an ASCII text file reader called *AlphaView File Browser*, a multifunction text editor called *MicroEMACS*, and a perpetual calendar. The disk includes two *AlphaNote* versions, one for 640K RAM systems and one for less robust 256K systems. A convenient utility, *AlphaNote* enables users to create and access a variety of personal notes and helpful reminders

with surprising ease.

CAROL HOLZBERG

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ADDRESS BOOK PLUS

More than just a computerized address book that stores your contacts, *Address Book Plus* sorts, indexes by user-assigned category, and neatly prints the results on enclosed pocket-size pages. This latest 3.0 release holds 1800 addresses per file and provides improved printer (especially laser) support.

Address Book Plus performs its main task very well, with excellent on-line help and written documentation—touches that would profit many major applications. Other features include unlimited date-stamped notes for each contact entry and the option to dial a displayed phone number using your computer modem. Alas, the usefulness of these business tools depends on running the program exclusively, and there just aren't enough other PIM-like add-ons (a calendar, task scheduler, and expense tracker, for instance) to keep your computer activities centered on *Address Book Plus*.

Furthermore, *Address Book Plus's* memory requirement of 512K RAM is rather steep when you consider its task limitations. Many PIMs load themselves as TSRs, pop up on demand, and leave behind a kernel of less than 20K. There aren't any PIMs, however, that currently print out address books to a variety of user specifications. The answer is an inexpensive, easily configurable utility; here *Address Book Plus* provides excellent service.

BARRY BRENESAL

IBM PC and compatibles, 512K RAM; supports hard drive—\$79.95

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